PRODUCTIVITY: IMPROVING CONDITIONS FOR GROWTH

KEY MESSAGES

- Productivity growth has been slowing in the developed economies. This is particularly problematic for Germany due to its ageing population.
- Education, research and innovation are required in order to achieve higher levels of productivity growth. It is important to strenghten the transformation of knowledge into economic success.
- Therefore, an environment that sets the right incentives for private investment is required. In turn, this will help to improve the German economy's ability to innovate.

SUMMARY

Productivity growth in many advanced economies has **slowed**. Germany is no exception here. Aggregate productivity in this country is actually stagnating at present. As hardly any further growth stimulus can be expected to come from labour input, the key question is how the Germany economy's growth potential can be raised through productivity growth.

Productivity is the **key factor driving material prosperity over the long term**. Productivity levels continue to vary significantly in some cases from one advanced economy to another. Although labour productivity within Europe has certainly converged to some extent, a few southern European countries have failed to keep up with the more productive economies. This process has been accompanied by a loss of price competitiveness that has only partially been regained.

Two key factors determining productivity growth are investment in physical capital and **technological progress**. Human capital and public institutions also play a crucial role. Investment and productivity are interrelated. Investment in the capital stock can raise productivity and, conversely, productivity improvements can lead to new investment. Other factors, such as the conditions available for funding investment, are also likely to be important. One of the government's main duties is to create a **supportive environment for businesses**. This includes a **functioning public infrastructure**.

Given the pervasiveness of technological innovation, the sluggish performance of productivity appears to be a paradox. One of the main reasons in Germany's case is likely to be **delays in adopting new technologies**. There has also been a **broad-based decline in the numbers of business start-ups**. This could be attributable to Germany's product and labour market regulation, which remains strict compared with other countries. It would make sense to **reduce barriers to market entry** – especially in services. A further explanation for the lower productivity growth is our aging society. Lifelong learning could help older workers **adapt** to new technologies and would boost innovation. Action should also be taken to address existing deficits of start-up finance, especially in the provision of private venture capital.

Economies of scale are important in many areas such as research and digital services. It therefore makes sense to **coordinate** these **at European level** in line with the subsidiarity principle. Existing **barriers to a completion of the common market in services** should be removed. The tightening of the EU Posting of Workers Directive goes in the wrong direction. The competitiveness of the European economy, not its protection, should be in the focus.

I. IDENTIFYING SOURCES OF GROWTH

132. Improvements in aggregate **productivity** are a **key factor** in the **growth** of an economy **and** the associated growth in material **prosperity** and individual scope for development. Productivity growth in many advanced economies has slowed compared with previous decades. ↘ ITEM 157 Before effective measures to increase productivity growth can be taken, it is necessary to identify the causes of this decline.

133. The Council of the European Union (EU) has recommended that the member states set up **national productivity boards** (Council of the European Union, 2016). These boards have been tasked with assessing and analysing productivity trends and competitiveness. The issues that they need to address include challenges in the respective member state as well as aspects of the European Economic and Monetary Union (EMU) and the EU. The German government has entrusted the **German Council of Economic Experts (GCEE)** with this task. In the past the GCEE has extensively examined productivity trends in Germany as part of its legal remit (most recently in GCEE Annual Report 2015 items 590 ff.). The GCEE also publishes detailed projections of the German economy's potential output in its annual reports. ↘ ITEMS 130 FF.

134. Growth in advanced economies results in particular from knowledge, knowledge sharing and diffusion. This includes knowledge that is directly accociated with people (human capital), specialisation in research fields and institutions such that knowledge can be shared with a growing number of people allowing an advantageous adaption, change and increase of economically applicable knowledge, or technologies that can be transferred between companies and economies (Giersch, 1981; Helmstädter, 2000, 2001). ↘ ITEM 199 The prosperity of an economy ultimately depends on the extent to which innovation enables new technologies to be created and productively employed. Wise economic policy therefore encourages institutions that generate and disseminate knowledge and, at the same time, creates the framework within which **innovation and entrepreneurship** can flourish. ↘ ITEMS 283 FF.

135. Investment in the productive capital stock plays a key role in determining levels of aggregate productivity over time. One of the government's main duties is to create the **right environment** for businesses. This includes a competitive tax system and the provision of a functioning public infrastructure funded by state **investment**. ↘ ITEM 215 Focusing on investment in physical capital alone, however, is not enough. Investment in human capital such as education and management skills also has a significant impact on productivity levels.

136. The productivity-related research conducted by the GCEE is intended to help understand the current trends and flag up economic policy measures that would enable the forces of growth to be strengthened over the long term. **Detailed analysis at the disaggregated level** can provide important clues as to the causes of the slowdown in productivity growth. Reallocation of production factors between sectors affects aggregate productivity if productivity varies from

one sector to another. ↘ ITEMS 185 FF. At the same time, analysis of productivity trends at the company level can provide information on potential factors and thus suggest possible ways of raising productivity. ↘ ITEMS 194 FF. And, last but not least, productivity is affected by demographic change and by changes in the composition of the labour force. ↘ ITEMS 200 FF.

137. Productivity is closely associated with an economy's competitiveness, which is partly determined by supply-side conditions. ↘ ITEMS 165 FF. The EU has recommended that the national productivity committees examine the issue of competitiveness (Council of the European Union, 2016). One key factor here is **non-price competitiveness** (GCEE Annual Report 2014 box 7). If firms manage to operate competitively in global markets by introducing innovative products, this puts the economy on a steeper growth trajectory. The economic policy debate should therefore focus on the productivity of private actors. Governments should provide a functioning infrastructure and, where necessary, implement structural reforms in areas such as taxation and regulation in order to unleash the forces of growth.

138. **Price competitiveness** also plays a crucial role in economic growth and long-term prosperity. If productivity growth fails to keep pace with pay rises, this can result in a loss of price competitiveness. Although price competitiveness is a key factor in short-term economic performance, sustainable growth cannot be ensured by internal or external devaluation. The economic policy options available are in any case limited by Germany's system of **free collective bargaining**. The government can only indirectly influence this process by, for example, implementing labour market policies. When conducting their analysis, the national productivity boards must take account of such national wage-setting practices operating in the respective member states (Council of the European Union, 2016).

139. **Discussions about Germany's current account surplus** must be separated from debates on productivity and competitiveness. The amount of an economy's current account balance depends on a large number of factors (GCEE Annual Report 2014 items 400 ff.). From an economic perspective it is questionable whether a target for the current account balance is desirable (GCEE Annual Report 2014 items 404 f.). Experience of crises in Latin America, Asia and, not least, the euro area has shown that excessive current account deficits can pose a risk of strong adjustment responses. This is not true of current account surpluses to the same extent. Viewed at the global level, crises in deficit countries can impact on surplus countries.

Although national fiscal policy can influence the current account balance, it **is not advisable for economic and fiscal policy** to set a specific **target** for this **balance**. Rather, stabilisation policies should aim to keep economic output at its potential level. In addition, structural economic policy conditions should be adjusted in such a way that they **strengthen growth potential** regardless of whether they influence the current account. This can help to reduce Germany's current account surplus.

II. PRODUCTIVITY GROWTH: DIAGNOSIS

140. Germany – in common with most advanced economies – is facing two major **challenges**. Ongoing demographic change and more modest productivity improvements are curbing the country's medium- and long-term growth potential. There are, however, differences between national economies. One of these relates to competitiveness. There was a significant divergence in the euro area during the 2000s, when many member states' price competitiveness deteriorated substantially compared with Germany's. Moreover, the economic recovery has ground to a halt in many places, and there remain significant variations in productivity both within Europe and between the advanced economies.

1. Demographics hampering growth prospects

141. The **volume of work** is likely to **contribute very little** to Germany's **growth potential over the medium term**. ↘ ITEM 130 The main reasons for this are the retirement of growing numbers of baby boomers as a result of demographic change, the lower levels of immigration compared with previous years, and an estimated **equilibrium rate of unemployment** (non-accelerating inflation rate of unemployment, or NAIRU) that is already at a historically low level. ↘ CHART 26 LEFT

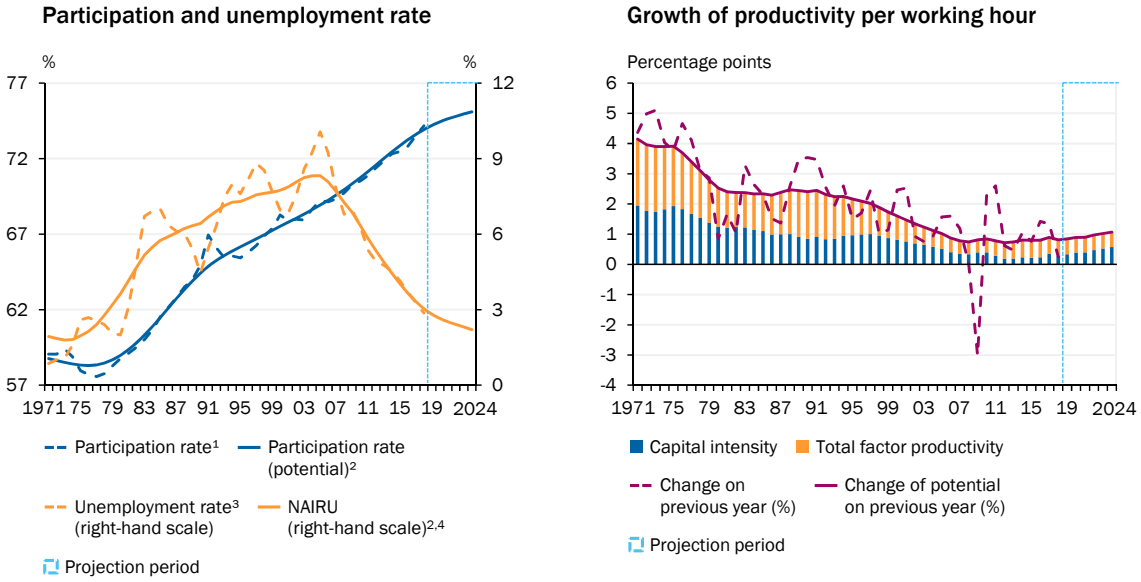
142. However, the **participation rate** is expected to rise slightly after already having increased by around 8 percentage points since the mid-1990s. Data from the Organisation for Economic Co-operation and Development (OECD) show that Germany has a high participation rate compared with other countries. Nonetheless, there are still gender-related differences. The participation rate for women remains roughly 10 percentage points lower than that for men. Over the coming years, the higher share of 55- to 70-year-olds is likely to slow the rise in the participation rate because these age cohorts have a relatively low participation rate (Breuer and Elstner, 2017).

The number of **hours worked per employee** is generating slightly negative growth stimulus at present, although this decrease is less pronounced than it was in the 1990s and 2000s. The main reason for this trend back then was the sharp rise in the proportion of part-time work (Breuer and Elstner, 2017). As no further significant growth stimulus is expected to come from the labour factor in the foreseeable future, **higher productivity growth is** therefore **needed** in order to raise the German economy's growth potential.

143. Measures of productivity relate **output** produced and the **inputs** used in the production process (GCEE Annual Report 2015 box 22). Productivity within a macroeconomic context can be expressed in terms of individual production factors – especially labour and capital. Measures of **labour productivity** by industrial sector use the ratio of price-adjusted gross value added to labour input, while productivity measures for the economy as a whole use the ratio of gross domestic product (GDP) to labour input. A distinction can also be made between

↘ CHART 26

Selected results of the GCEE's estimates of potential



1 – Labour force as a percentage of total working-age population. 2 – Estimate by the GCEE; excludes refugee migration since 2014. 3 – 100*(EWP-ET)/EWP. EWP: Labour force (national concept); ET: persons in employment (domestic concept). 4 – Unemployment rate given price stability (GCEE Annual Report 2017 box 5).

Sources: Federal Statistical Office, OECD, own calculations

productivity per hour and productivity per worker. The first of these ratios measures output divided by the number of hours worked, while the second measures output divided by the number of workers. A further single-factor measure of productivity is capital productivity, which is determined by the ratio of GDP to the capital stock.

144. Germany's current productivity performance is extremely weak. ↘ CHART 26 RIGHT Having grown by only 0.3 % in 2018, **hourly productivity** is **likely to stagnate this year**. This is partly attributable to the robust performance of the labour market, which has so far been only marginally affected by the economic slowdown, which means that the ratio of GDP to employment is declining. ↘ ITEM 94 However, productivity grew only modestly even during the previous economic upturn.

On the one hand, the **increase in employment** – such as the success in integrating immigrants into the labour market – has been an encouraging development and has helped to mitigate labour shortages in recent years (GCEE Annual Report 2018 items 285 ff.). On the other hand, the strong performance of the labour market has concealed the underlying **weakness of productivity**. Given that Germany's labour potential is set to decline, the weakness of productivity is likely to become more evident again in GDP growth rates. In its medium-term projection for the years 2018 to 2024 the GCEE estimates that potential output will grow at an average rate of 1.3 %. By the end of the projection period, however, no further growth stimulus is likely to come from the volume of work, with growth potential then falling to around 1.1 %. ↘ ITEM 130

The **GCEE's medium-term projection** adopts a production function approach (Breuer and Elstner, 2017). This involves decomposing potential economic output into capital and labour inputs as well as total factor productivity (TFP). Labour input is analysed in particular detail. A **cohort model** is used, for example, to take account of age- and gender-specific labour market participation rates. Analysis of the capital stock at the disaggregated level differentiates between various capital goods such as equipment and residential buildings. This takes account of differences in capital use. TFP constitutes the residual. In order to determine the potential, statistical filters are used to remove cyclical fluctuations from the time series determined in this way.

145. **Total factor productivity** (TFP) plays a key role in long-term growth potential. It is measured as the ratio of gross value added to the aggregate factors of production inputs. TFP growth is the **residual** after the measured changes in the individual factors of production – weighted with their output elasticities – have been deducted from the output growth calculated. The sustained growth achieved by the industrialised nations since the Industrial Revolution – especially the significant rise in gross domestic product per inhabitant – has mainly resulted from the increase in total factor productivity rather than from the growth in the physical capital stock.

146. The basic **Solow growth model** implies that the capital stock per effective unit of labour converges towards a constant level. Although it is possible for less advanced economies to achieve higher growth temporarily through capital accumulation, the diminishing marginal product of capital ensures that they eventually converge towards an equilibrium growth path. Here the growth in economic output per inhabitant equals the rate of technological progress.

Innovation is therefore **crucial** for sustained growth. Increases in TFP have a direct and indirect impact on productivity. Firstly, higher TFP enables existing factors of production to be used more productively. And, secondly, increases in TFP can ensure that the use of additional factors of production becomes more productive, thereby, for example, raising the profitability of investment. Recent growth theory attempts to explain technological progress in terms of a general increase in knowledge as a result of research and development as well as specific human capital. ↘ BOX 5

↘ BOX 5

Recent growth theory and determinants of long-run productivity growth

Growth theories are designed to explain economic growth and the reasons why economic performance varies from country to country. The **Solow-Swan model** devised by Solow (1956) and Swan (1956) laid the foundations for neoclassical growth theory (Acemoglu, 2009). Its starting point is an aggregate production function that represents the production side of an economy. The factors of production are capital (K) and labour (L) as well as **labour-saving technological progress** (A). The aggregate production (Y) follows the function

$$Y_t = F(K_t, A_t L_t).$$

If a Cobb-Douglas production function is used, the approximated per-capita growth, $\Delta \ln y_t$, can be attributed to two different sources,

$$\Delta lny_t = \alpha \Delta lnk_t + (1-\alpha)\Delta lnA_t\,,$$

i.e. to an increase in the per-capita capital stock, Δlnk_t, and to technological progress ΔlnA_t. The parameters α and 1-α denote the output elasticities of capital and labour. The Solow-Swan model shows how saving, population growth and technological progress determine economic growth. If labour efficiency improvements are disregarded, and given the diminishing marginal product of capital, then **sustained long-term** per-capita **growth** can only be achieved through technological progress. However, **technological progress** is **exogenously determined** in the Solow-Swan model, which means that the model can only describe growth but cannot explain its causes.

In order to **explain growth endogenously**, Romer (1986) defined the concept of capital more broadly to include human capital – i.e. knowledge – in particular. Unlike in the Solow-Swan model, capital in the **AK model** exhibits a **constant marginal product** rather than a declining one (Acemoglu, 2009). The AK model thus enables long-run growth to be represented endogenously. 'Knowledge production' is of great importance in understanding technological progress in this strand of research. **Education** as well as **research and development (R&D)** play a crucial role. But knowledge is not a purely public good here. Although the use of knowledge is non-rival, third parties can be prevented from using it for a certain period of time, for example through patents (Romer, 1994). This knowledge advantage can confer market power, for example when increasing returns to scale from technology are used (Romer, 1994). The resultant incentives for firms to invest in knowledge generation explain growth in terms of the model (**endogenous growth theory**). This strand of recent growth theory emphasises the **role of human capital**. Technological progress depends on this investment (Romer, 1986). It is what makes lasting technological progress possible (Lucas, 1988).

Acemoglu et al. (2005) highlight the **role of institutions**, drawing a distinction between economic and political institutions. Whereas the former define the economic framework, such as the protection of property rights, the latter determine the legal system in democracies or dictatorships. It is also important to take account of the political power of societal groups that do not belong to political institutions (Acemoglu and Robinson, 2012). 'Good' institutions that guarantee property rights and wide access to resources are, according to Acemoglu et al. (2005), causal in ensuring strong economic growth.

Institutions and the importance of human capital can be even more broadly defined. For example, the relationship between economic growth and **development of the financial system** is emphasised (King und Levine, 1993; Rajan und Zingales 1998; Levine, 2005). There is also a relationship between growth and the quality of **educational institutions** (Hanushek and Wößmann, 2010). And, last but not least, a differentiation with regards to the characteristics of political systems can be made, for example in terms of the productivity discrepancies between systems based on direct and representative democracy (Feld and Savioz, 1997; Blomberg et al., 2004) or in terms of the impact that federalism and decentralisation have on economic growth (Baskaran et al., 2016). Given the considerable importance of the **institutional framework** in general, economic policy plays a key role in long-run productivity growth.

Building on Schumpeter, moreover, a branch of research has developed which views **creative destruction** as a necessary process in achieving lasting, sustainable growth (Giersch, 1984; Grossman and Helpman, 1991; Aghion and Howitt, 1992). This theory focuses on firms that use new innovative products to replace old technologies, thereby achieving productivity gains. A crucial role is played here by competition policy, although the **relationship between competition and productivity growth** is non-linear (Aghion et al., 2014). Productivity growth initially rises as competition increases, especially as the entry of new firms to the market raises the pressure on established firms. Above a certain point, however, greater competition can result in lower productivity growth. Inadequate patent protection, for example, could lead to a situation whereby it is not worthwhile for firms to invest in research and development.

2. Structural decomposition of productivity growth

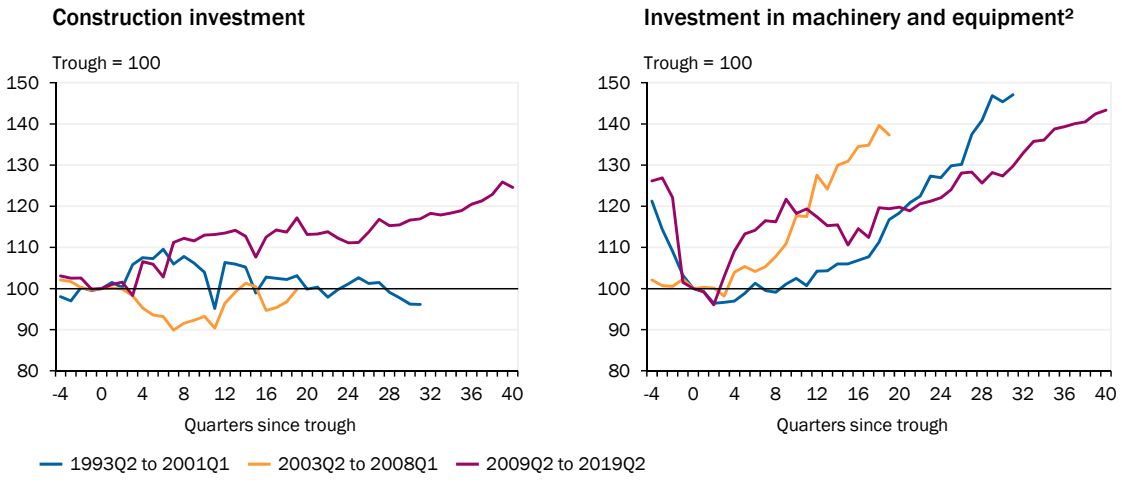
147. The productivity of individual inputs can be raised by the greater use of other factors of production or by technological progress. Measured labour productivity can increase if **investment** yields a larger or more productive capital stock that enables the same labour input to generate more output. A decomposition of productivity growth reveals that the modest rise in capital inputs has been largely responsible for the trend slowdown in productivity growth since the beginning of the 1990s. ↘ CHART 26 RIGHT

The problem of **weak investment** has therefore **repeatedly been diagnosed** for Germany in the past. Analysis of the various capital goods reveals that the poor performance of construction investment after Germany's reunification boom had subsided had a particularly adverse impact on capital intensity (GCEE Annual Report 2015 item 639; GCEE Annual Report 2016 items 279 ff.). By contrast, **construction investment** in recent years has been fairly strong. ↘ CHART 27 LEFT Private construction activity is likely to have been primarily driven by higher demand for accommodation and the continued low level of interest rates (GCEE Annual Report 2018 items 656 ff.). At the same time, prices in the construction sector are rising rapidly on the back of strong demand for buildings and the current capacity constraints. ↘ ITEM 83

148. Capital spending on construction constitutes the majority of **public-sector investment**, accounting for roughly 53 % of total government spending. However, the state accounts for only a little more than 12 % of total construction investment, which is very low compared with the private sector's share. Government spending as a proportion of GDP has recently increased slightly. Higher construction prices are likely to have played a role here. Further expansion of the

↘ CHART 27

Changes in investment levels during expansion periods[1]



1 – The chart shows changes in investment levels since the relevant trough of the economic cycle. The data include all private and government investment in construction, machinery and equipment and have been price adjusted as well as seasonally and calendar adjusted. 2 – Including military weapons systems.

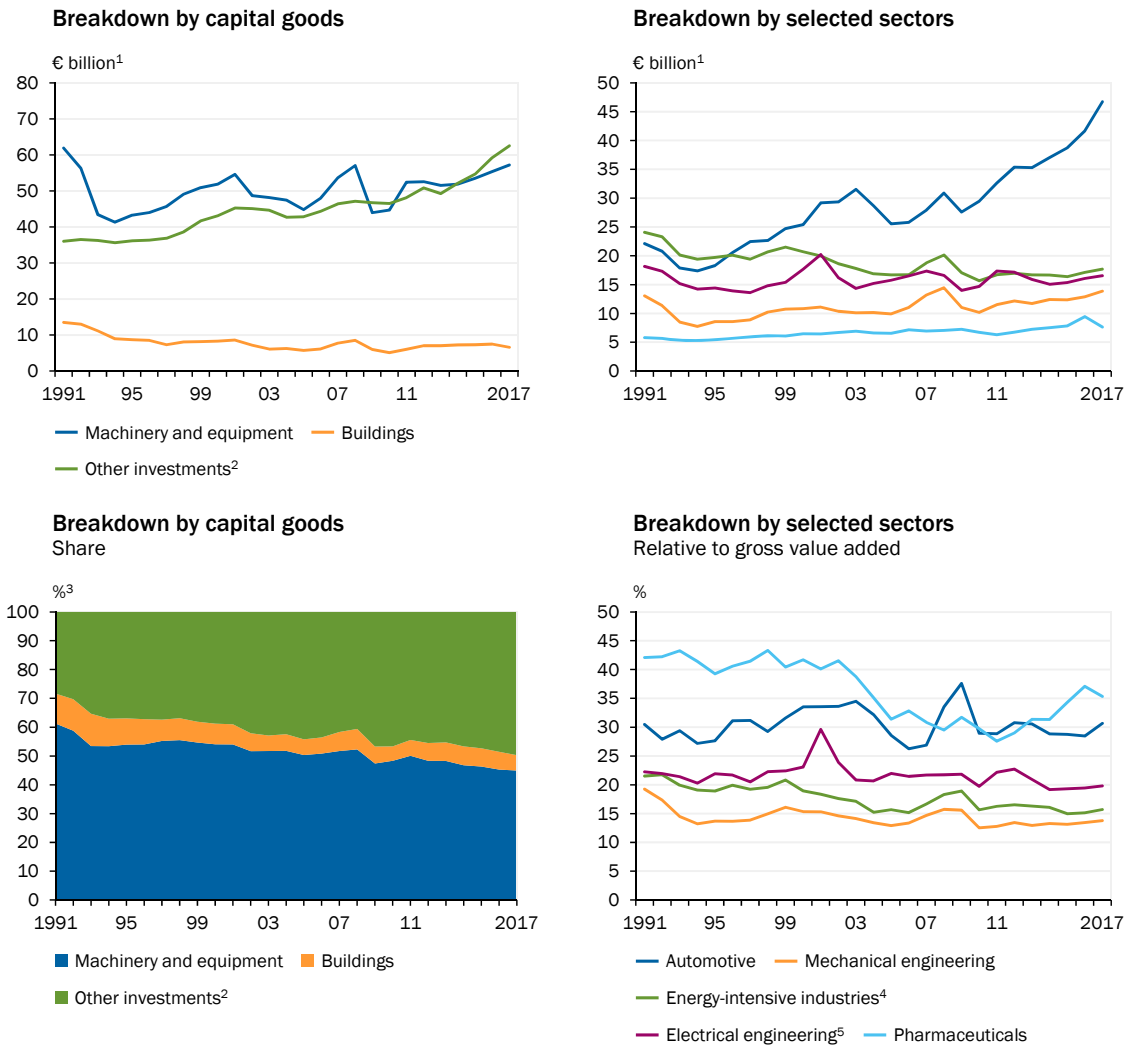
Sources: Federal Statistical Office, own calculations

volume of investment will probably be hampered by the capacity constraints in the construction sector. ↘ ITEM 548

149. A consolidation also took place over many years in Germany's corporate sector. Its investment ratio declined between the end of the 1990s and the beginning of the 2010s. Because firms were raising their equity ratios at the same time, this generated substantial funding surpluses in Germany's corporate sector (GCEE Annual Report 2014 items 421 ff.). In addition, **companies increased their foreign direct investment (FDI)**. Although this could be interpreted as evidence of Germany's lack of appeal as an investment location, Germany companies' FDI – for example in order to tap foreign markets – might complement their domestic investment activity. Changes to tax legislation also played a role (GCEE Annual Report 2015 item 768).

↘ CHART 28

Gross fixed capital formation in the manufacturing sector



1 – Price-adjusted. 2 – Investment in intellectual property (software and databases, research and development, copyrights, mineral exploration), livestock and crops. 3 – Percentage of total gross fixed capital formation. 4 – Production of paper, cardboard and goods made from them; coking and oil processing; manufacture of chemical products, manufacture of glass, glass goods, ceramics; processing of stones and earth; and metal production and metalworking. 5 – Manufacture of data-processing equipment, electronic and optical products, and manufacture of electrical equipment.

Sources: Federal Statistical Office, own calculations

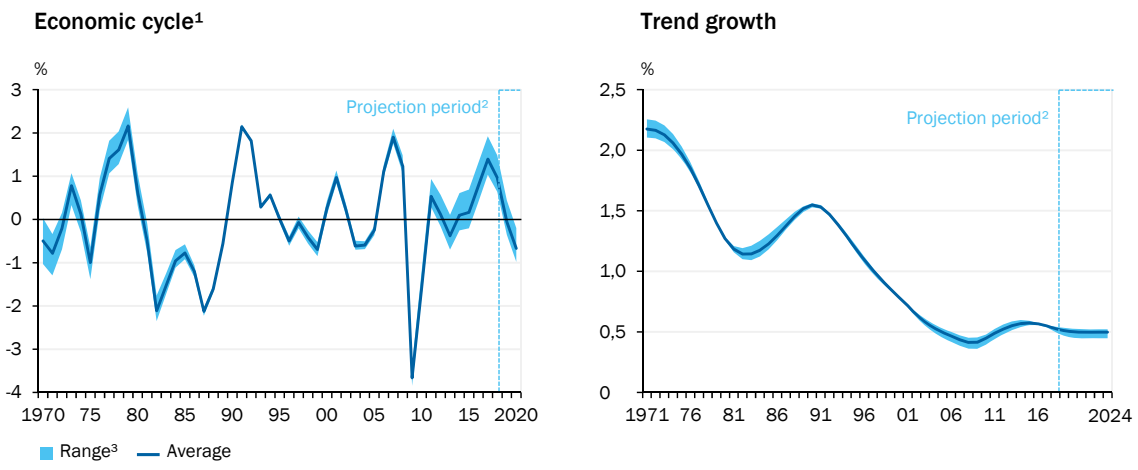
150. Within the various categories, **investment in intellectual property is becoming increasingly important**, whereas spending on machinery and equipment has grown more slowly in recent years. ↘ CHART 28 TOP LEFT ↘ ITEMS 293, 305 However, commercial construction investment accounts for only a small proportion of corporate capital spending. ↘ CHART 28 BOTTOM LEFT Industry has revealed **divergent trends**. The automotive industry in particular has significantly expanded its investment over the past two decades. ↘ CHART 28 TOP RIGHT This is mainly due to increased value added in the car industry. Investment in relation to value added has not changed much since the 1990s. ↘ CHART 28 BOTTOM RIGHT By contrast, fixed capital formation by energy-intensive industries has decreased over the same period.

151. The decline in the equipment-to-GDP ratio has been driven by price effects, especially the sharp fall in the prices of data processing equipment (GCEE Annual Report 2014 items 435 ff.). **Spending on machinery and equipment** has grown fairly slowly during the most recent upturn which, according to the GCEE's estimate, began in the second quarter of 2009 (GCEE Annual Report 2017 box 7). ↘ CHART 27 RIGHT One contributing factor was the euro crisis, which interrupted the strong upward trajectory of investment.

152. Investment and total factor productivity are subject to cyclical influences. When **analysing current productivity trends** it is therefore essential to separate the structural growth dynamic from cyclical fluctuations. Companies tend to invest more in new machinery and equipment during economic upturns so that they can increase their output even when capacities are fully utilised. Investment is therefore **highly pro-cyclical** (GCEE Annual Report 2017 item 266 and box 7). Because TFP also fluctuates sharply over the course of the economic cycle ↘ CHART 29 LEFT, the GCEE uses various time-series methods in its medium-term projection in order to smooth TFP, also including indicators such as capacity utilisation in the manufacturing sector.

↘ CHART 29

Economic cycle and trend growth in total factor productivity



1 – Difference between the total factor productivity (TFP), measured by the Solow residual, and estimated trend TFP. 2 – Forecast by the GCEE.
3 – Total of seven different model specifications (Breuer and Elstner, 2017).

Source: own calculations

153. Germany reveals a sharp decline in **total-factor productivity** growth over the long term. This largely reflects a **slowdown in technological progress**. TFP also captures factors such as the effects of reallocation between sectors, improvements in workers' skills levels, and the benefits of specialisation resulting from greater integration into supply chains (GCEE Annual Report 2016 item 280). The integration of low-skilled workers into the labour market, for example, is likely to have depressed measured TFP growth (GCEE Annual Report 2016 item 286). The trend growth rate has remained relatively constant at just over half a percent since the 2000s. ↘ CHART 29 RIGHT The GCEE expects to see trend growth rates of 0.5 % for TFP and 1.3 % for capital intensity over the period from 2018 to 2024.

154. Although **decomposing** economic output into its individual factors of production can provide clues as to the relevant growth factors, it cannot explain why, for example, investment does not rise more sharply. **Structural macroeconomic models** can offer deeper insights. Productivity growth can, for example, be attributed to supply-side and demand-side factors.

The real business-cycle theory states that technology shocks are the main determinant of fluctuations in economic output (Kydland and Prescott, 1982; Long and Plosser, 1983). More recent approaches in **New Keynesian theory** also take account of the fact that production capacities can be overutilised or underutilised in the short term if rigidities prevent nominal wages and prices from flexibly adjusting immediately (Galí, 1999). **Demand-side factors** such as monetary policy then **impact** – at least **in the short term** – on real economic output and, consequently, **on productivity**. Over the long term, however, technological progress and increases in the capital stock determine potential output.

Whereas most structural macroeconomic models regard the technology process as an exogenous shock, there has been a tendency for some time now to explain this factor within the relevant models (Comin and Gertler, 2006; Anzoategui et al., 2019). A key role is played here not only by technology shocks but also in particular by **investment in research and development**. Less favourable funding terms and conditions – for example as a result of financial crises – can prevent new technologies from being developed and adopted, thereby depressing long-run productivity. ↘ ITEM 209

155. Model-based analysis suggests that **technology shocks and investment shocks** are largely responsible for productivity trends in Germany. ↘ BOX 6 Besides technological changes technology shocks in the model may also capture labour hoarding during recession phases and non-modelled demand factors. Investment shocks include changes in funding terms and conditions for companies. Negative investment shocks played a key role at the beginning of the 2000s and during the euro crisis. Unlike GDP, labour productivity has recently grown only slightly. This is largely because technological progress has been below average.

156. Technology shocks are also important for growth in investment and wages. On the other hand, **wage mark-up shocks** – which reflect frictions in wage set-

ting – have **played a key role in Germany's strong employment growth**. These shocks capture changes in workers' negotiating power. Another key factor here is labour market reforms, such as those implemented as part of the Agenda 2010 policies in Germany. A negative wage mark-up shock means that wages rise by less than economic growth would appear to justify. The model used suggests that such negative wage mark-up shocks have been largely responsible for Germany's sustained employment growth since the mid-2000s. At the same time they have provided positive stimulus to investment and productivity.

↘ BOX 6

Productivity growth in Germany and the rest of the euro area

Whereas growth models seek to explain long-term trends and their determinants, ↘ ITEM 146 the New Keynesian approach to macroeconomics combines the long-run perspective with the medium- and short-term perspective in order to analyse growth trends in conjunction with economic cycles. This involves using **dynamic stochastic general equilibrium (DSGE) models**, which expand the neoclassical growth model to include price and wage rigidities, imperfect competition and additional assumptions from the field of behavioural economics. These models include technology shocks that cause fluctuations in total factor productivity.

In order to identify the factors determining Germany's economic performance compared with the rest of the euro area over the past two decades, Weiske (2019) estimates a **structural two-region model of the euro area**. To this end, Germany is compared with nine member states (Belgium, Finland, France, Greece, Italy, Netherlands, Austria, Portugal and Spain). These countries plus Germany account for almost 95 % of the euro area's total economic output. The model factors in wage and price rigidities, potential for variable capital use, investment adjustment costs, inflation and wage indexing, and consumption habits. A total of 14 macroeconomic time series are used to estimate the model.

A key factor affecting productivity over time is **technology shocks**, which explain roughly half of the volatility in GDP per worker. A further important factor affecting productivity levels is **investment shocks**. In conjunction with technology shocks they explain almost 75 % of changes in long-run productivity. Further **demand shocks**, such as preference shocks, are responsible – at least in the short term – for 15 % to 20 % of this volatility. This is caused by nominal rigidities that lead to a situation whereby output fluctuates around its normal capacity-utilisation level. Employment trends, on the other hand, are largely driven by **wage mark-up shocks**, which capture changes in workers' negotiating power.

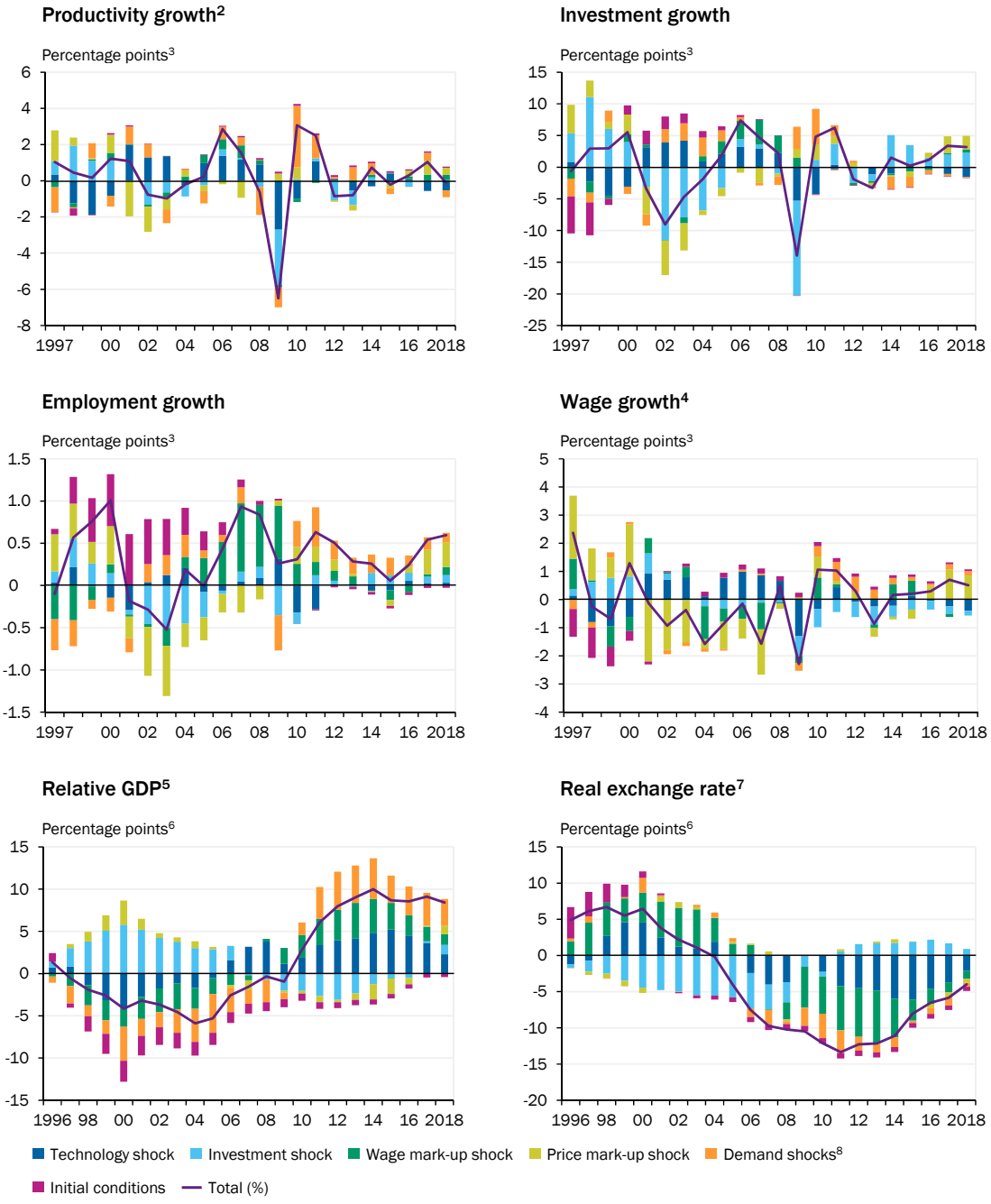
A historical shock decomposition reveals that demand-side factors play a short-term role in productivity growth, such as during the financial crisis. ↘ CHART 30 TOP LEFT The **disappointing performance of productivity in recent years**, however, **can largely be attributed to negative technology shocks**. The negative technology shocks captured in the model should not necessarily be seen as an actual retrograde technological step. Rather, they can represent changes in the use of factors of production – such as the hoarding of workers during a recession – or energy price shocks (Kim and Loungani, 1992; King and Rebelo, 1999). This **analysis covers the euro area only**. Consequently it cannot capture technological spillovers or shocks originating in the United States, for example.

The sharp economic downturn in Germany in 2008 and 2009 was probably largely attributable to a **decline in export demand**. This would then be interpreted in the model as a negative technology shock. The same applies to the **hoarding of workers** during the financial crisis. The model also analyses the trajectory of the balanced growth path. Provided that they are not too big, negative technology shocks can therefore emanate from positive but below-average technological progress. Other model-based estimates for the euro area also find that technology shocks play a key role in determin-

ing GDP levels over the short and long term (Smets and Wouters, 2003; Gadatsch et al., 2015; Kollmann et al., 2015).

↘ CHART 30

Decomposition of historical shocks[1]



1 – Based on an estimated New Keynesian two-region model of the euro area. Region 1: Germany. Region 2: Belgium, Finland, France, Greece, Italy, Netherlands, Austria, Portugal and Spain. Estimation period: second quarter of 1996 to first quarter of 2019. 2 – Per person employed. 3 – Year-on-year change; deviation from long-term growth rate. 4 – Per employee. 5 – Germany's GDP relative to the other euro area countries. 6 – Deviation from long-term level as at year-end in each case. 7 – Based on unit labour costs. 8 – Preference shock, external risk-premium shock, expenditure shock, monetary policy shock.

Sources: Weiske (2019), own calculations

Negative investment shocks curbed **investment growth** at the beginning of the 2000s and during the financial and euro crisis ↘ CHART 30 TOP RIGHT and therefore had an adverse impact on productivity growth. Negative investment shocks reflect, among other things, **frictions in the financial sector**. This mainly involves disruptions of financial intermediation, i.e. the process of transforming private savings into new productive capital (Carlstrom and Fuerst, 1997; Justiniano et al., 2011). An approxima-

tion for this is the credit spread between safe and risky bonds (Justiniano et al., 2011). Both the United States and Germany reveal negative correlations between credit spreads and investment shocks. For some years now investment shocks have been making a positive contribution in Germany. This is consistent with the continuously favourable funding terms and conditions available. ↘ ITEM 81

The sharp **upturn in employment since the mid-2000s can largely be attributed to wage mark-up shocks**. ↘ CHART 30 CENTRE These are the reason why employment in Germany was not affected much by the financial crisis. Gehrke et al. (2019) come to very similar conclusions. One notable aspect is the positive contribution that demand has made to employment since the end of the financial crisis. The explanations provided in the literature for the sharp rise in employment in Germany are its labour market reforms (Burda, 2016) and its institutional flexibility in setting wages (Dustmann et al., 2014). One side effect of this encouraging trend, however, is the sluggishness of productivity growth, which is likely to have been partly caused by the integration of low-skilled workers into the labour market (Elstner et al., 2018).

Technology shocks and wage mark-up shocks were largely responsible for the fact that the **performance of the German economy diverged from that in the rest of the euro area** before and after 2005. ↘ CHART 30 BOTTOM LEFT Demand shocks that impacted adversely on Germany also played a role in the 2000s in particular. Technology shocks, investment shocks and wage mark-up shocks largely explain the changes over time in terms of price competitiveness based on the relative levels of unit labour costs. ↘ CHART 30 BOTTOM RIGHT. The positive contribution made by these initial conditions could be an indication that the Deutsche Mark was possibly overvalued in the mid-1990s. Between 1990 and 1995 the German economy did indeed lose almost 13 % of its price competitiveness compared with the rest of the euro area.

3. Germany in an international comparison

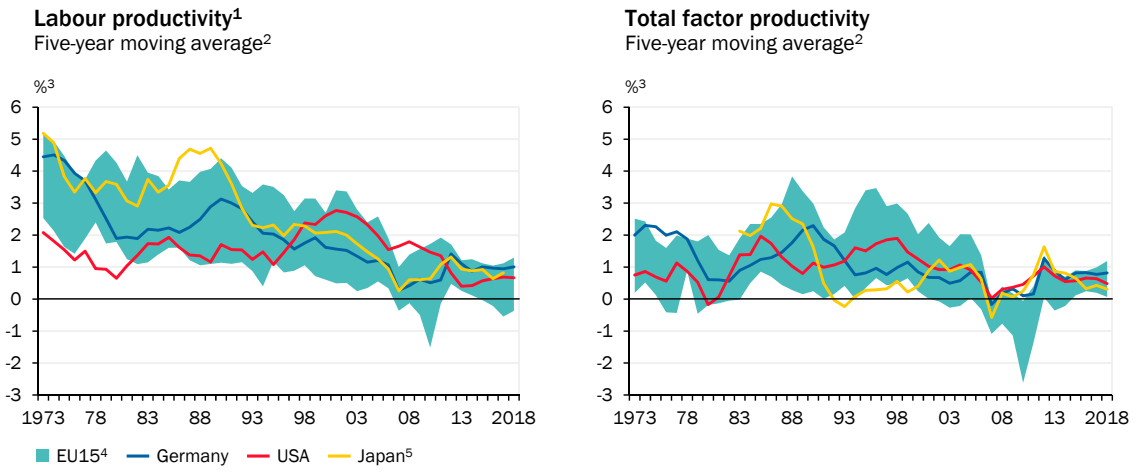
157. In recent decades the trend among the countries in the advanced economies has been that **productivity growth has slowed**. ↘ CHART 31 After this growth briefly accelerated in the United States during the 1990s, it has fallen back again here as well since the early 2000s. However, the slowdown in the growth of labour productivity per hour worked is more pronounced than it is for TFP. This is because the growth in capital intensity is also slowing. The trend in Germany is more or less the same as that in the other advanced economies. However, the demographic change will dampen economic growth relatively strongly in Germany.

158. Within the group of G7 countries there are in some cases substantial **differences in the levels of material prosperity**, measured in terms of GDP per inhabitant. ↘ CHART 32 TOP LEFT In particular, economic output per inhabitant in the other G7 member states is well below that in the United States. Although GDP per inhabitant rose in all countries during the period under review, no other G7 country was able to catch up with the US. Germany at least managed to narrow the gap.

159. Differences in GDP per inhabitant can be attributed either to differences in labour productivity or to differences in employment or in the average number of

↘ CHART 31

International comparison of productivity growth



1 – GDP per hour worked. 2 – For Germany calculations by the GCEE, otherwise calculations by the European Commission. 3 – Year-on-year change. 4 – Range excluding highest and lowest values. 5 – Data available for labour productivity up to 2017 and for total-factor productivity from 1980 onwards.

Sources: European Commission, Federal Statistical Office, own calculations

working hours per worker. A comparison of **GDP per worker** takes account of the differences in GDP that result from the fact that participation rates vary from one economy to another. ↘ CHART 32 TOP RIGHT In addition, **differences**, for example, **in the number of days of annual leave** mean that the **average number of hours worked** also varies from one economy to another and is higher in the United States than in the European economies (Bick et al., 2019).

160. There are a number of factors that impact on the labour inputs in an economy and, consequently, affect GDP per inhabitant. Employment can temporarily decrease as a result of the business cycle. The persistent differences observed, however, are likely to be caused by **structural factors**. These include differences in the taxation system and in tax rates. Coenen et al. (2008), for example, use a model analysis to demonstrate that cutting the euro area's tax rates to the level applicable in the United States would raise output and employment by more than 10 % each.

Alesina et al. (2006) rather emphasise how labour market regulation and the degree of trade union organisation are important for the number of hours worked. Bell and Freeman (2001) as well as Bowles and Park (2005) show a positive correlation between income inequality and the number of hours worked in an economy. Blanchard (2004) points to the importance of preferences in **deciding to work fewer hours**.

161. The figures published by the OECD show that Germany and France have more or less attained the United States' level of labour productivity (measured as **GDP per hour worked**). ↘ CHART 32 BOTTOM LEFT Given that France and Germany had still lagged some way behind in the 1970s, there had thus been some convergence here. Although Japan and the United Kingdom have also managed to narrow the gap, they remain at a lower level. Canada's relative hourly productivity compared with the United States has declined. Italy has been falling well behind

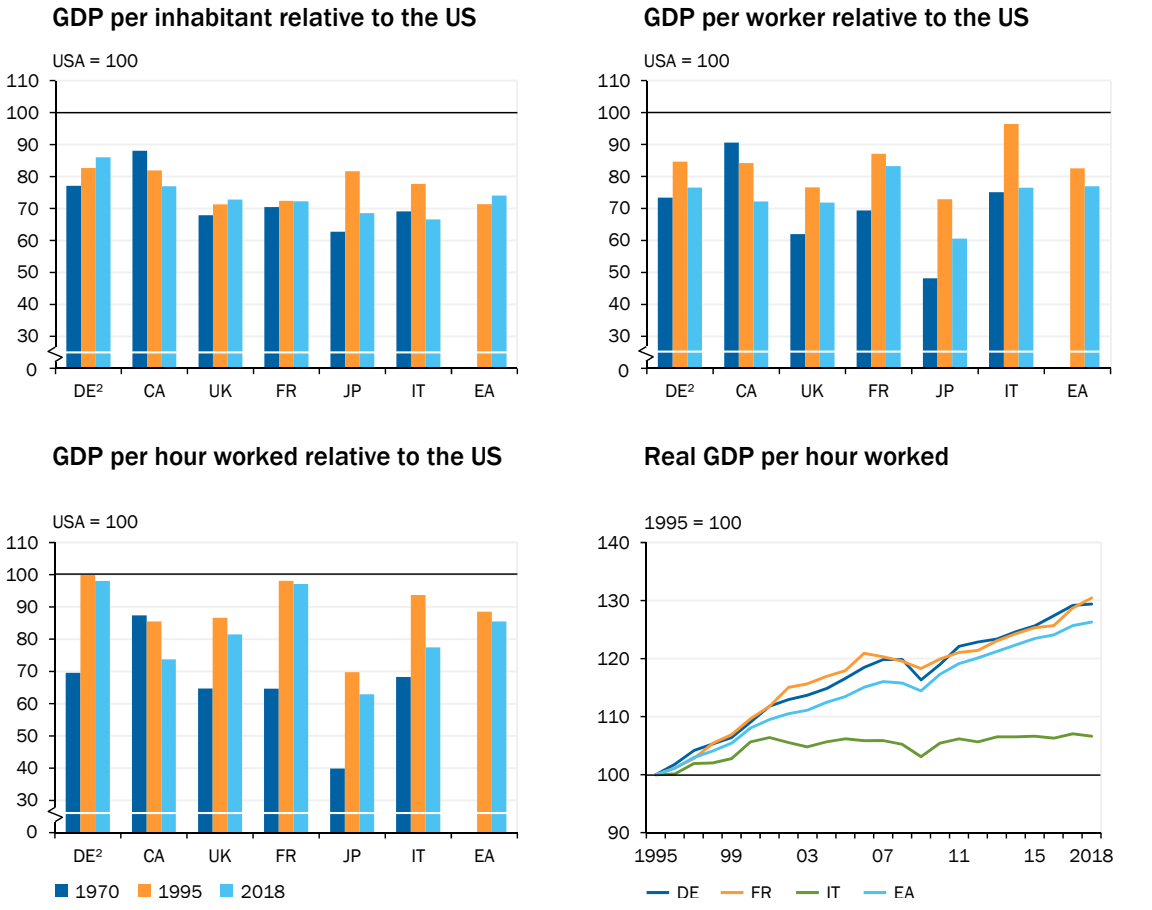
since the end of the 1990s. ↘ ITEM 194 Additionally, its level of labour productivity has been virtually stagnating since 2001. ↘ CHART 32 BOTTOM RIGHT

162. If potential issues with the comparability of figures owing to the difficulties involved in capturing them statistically are ignored, the key metrics reveal significant **differences between the G7 economies**. At the same time, they highlight the considerable impact that the labour market situation has on GDP per inhabitant. Relatively low labour productivity can, for example, be compensated for by greater labour input. Similarly, the institutional framework determining the population's **labour market participation rate** can affect measured labour productivity. This productivity is lower in economies in which relatively large numbers of workers with low productivity are employed than in economies in which less productive workers are not employed at all (GCEE Annual Report 2015 items 596 ff.).

163. In **Europe** there has been a certain amount of **convergence in labour productivity** since the year 2000. Economies that started from a lower base have tended to achieve higher productivity growth. ↘ CHART 33 LEFT There are, however, **clear differences between the groups of countries** (GCEE An-

↘ CHART 32

GDP in the G7 economies and in the euro area[1]

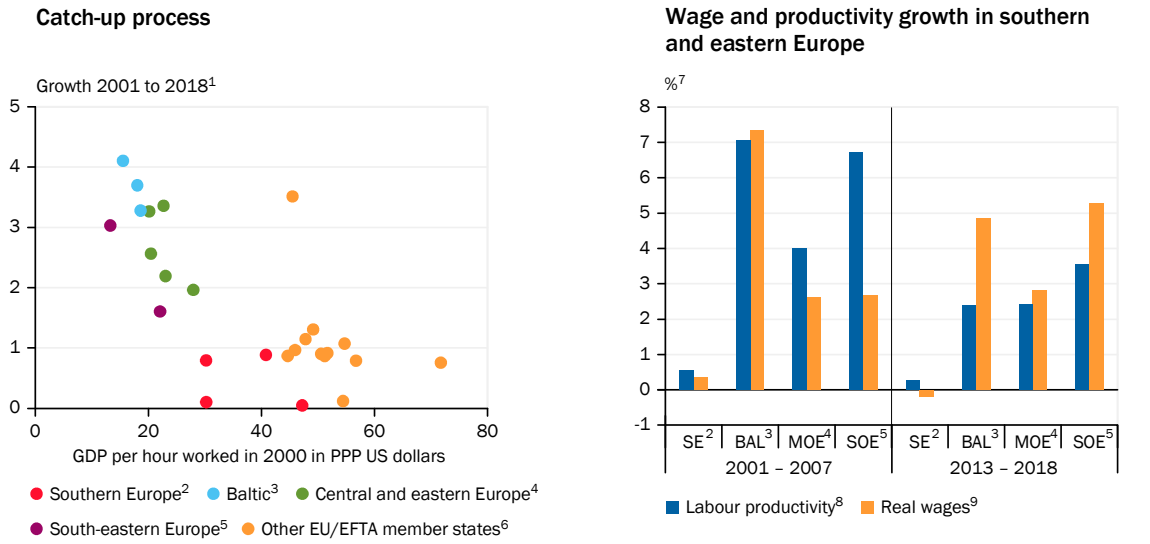


1 – DE-Germany, CA-Canada, UK-United Kingdom, FR-France, JP-Japan, IT-Italy, EA-Euro area 19 (data available from 1995 onwards).
2 – 1970 former West Germany.

Sources: Eurostat, OECD, own calculations

↘ CHART 33

Real convergence in Europe



1 – Average annual growth in GDP per total hours worked in PPP US dollars. Countries with fewer than one million inhabitants have not been included. 2 – Greece, Italy, Portugal, Spain. 3 – Estonia, Latvia, Lithuania. 4 – Czech Republic, Hungary, Poland, Romania, Slovakia, Slovenia. 5 – Bulgaria, Croatia (as not all values for 2018 are available for Croatia, numbers from 2017 were used for 2018), Romania. 6 – Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Netherlands, Norway, Sweden, Switzerland, United Kingdom. 8 – Average annual change. 9 – Real GDP per hour worked. Country groups weighted according to total hours worked. 10 – Compensation of employees deflated using the GDP deflator per hour worked (employees). Country groups weighted according to hours worked (employees).

Sources: Eurostat, OECD, own calculations

nual Report 2017 items 253 ff.). The observation does not apply, for example, to the southern European countries that were particularly hard hit by the euro sovereign debt crisis. These countries achieved only very low average productivity growth and thus failed to catch up with the more productive European economies.

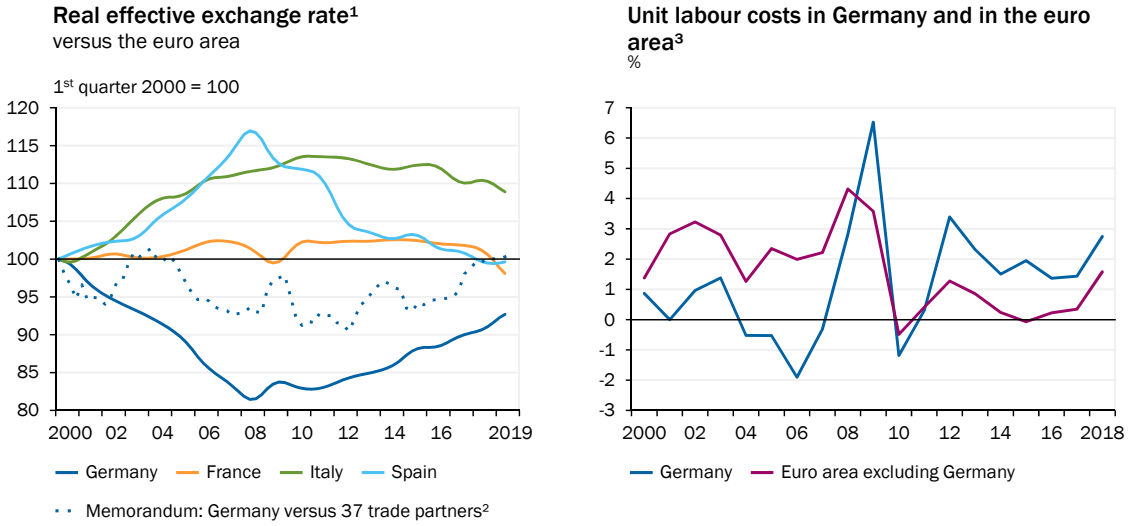
164. **In the eastern EU member states**, on the other hand, productivity has risen sharply. The **convergence progress** achieved in these countries can probably be attributed to factors such as their growing integration into the European single market, their improved infrastructure and the stable framework conditions associated with EU membership (Deutsche Bundesbank, 2019a). After productivity in this group of countries on average grew more than real wages did until 2007, wages have risen much more sharply since. ↘ CHART 33 RIGHT Whereas workers have therefore benefited more significantly from the productivity gains, some price competitiveness has been lost as a result.

4. Competitiveness and current account

165. Productivity growth is essential for increasing an economy's material prosperity over the long term. At the same time, productivity – in conjunction with wage levels – affects the **international competitiveness** of the products and services produced in the economy when they are sold in global markets. In a monetary union – in which adjustments through the exchange rate mechanism are excluded – divergent trends can therefore cause divergence in current account balances.

↘ CHART 34

Germany's price competitiveness



1 – Real effective exchange rates based on unit labour costs. 2 – Australia, Canada, European Union, Japan, Mexico, New Zealand, Norway, Switzerland, Turkey, United States. 3 – Change on previous year in nominal unit labour costs.

Sources: European Commission, Eurostat, own calculations

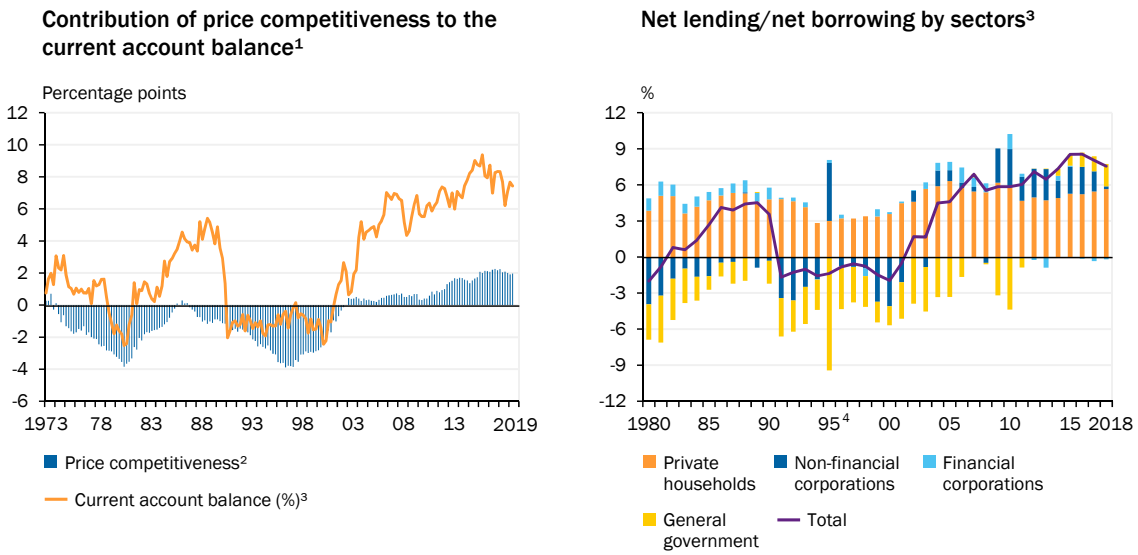
166. The development of Germany's price competitiveness relative to the other member states of the euro area in recent decades can be split into two distinct phases. From the beginning of the monetary union until the financial and economic crisis of 2008, Germany had devalued substantially relative to the rest of the euro area. Since then its real effective exchange rate has risen markedly again. ↘ CHART 34 LEFT Whereas labour productivity both per worker and per hour in Germany is now only about 10 % higher than it was at the start of the upturn in 2009 and has recently actually decreased slightly, wages have risen sharply. Taken together this means that **unit labour costs** are rising faster than during the years of wage restraint (GCEE Annual Report 2017 items 273 ff.). ↘ CHART 34 RIGHT At the same time, growth in unit labour costs in the other euro area member states has been lower than it was before the crisis and has been lower than in Germany. Germany's price competitiveness compared with the rest of the euro area has been declining for about the last ten years.

167. Time-series econometric methods provide information on the impact that price competitiveness has on changes in the current account balance over time (GCEE Annual Report 2014 items 460 ff.). Estimates obtained using a bivariate vector autoregression (VAR) model show that these trends in Germany over time fall into distinct phases. ↘ CHART 35 LEFT Since roughly 2002 – according to these estimates – **price competitiveness** has been making a **positive contribution to Germany's current account balance** vis-à-vis the rest of the world. More than two-thirds of the balance, however, is explained by other factors.

168. An economy's **current account balance** is **influenced by many factors**. On the one hand it can be analysed from the perspective of transactions in goods and services as part of the real economy (GCEE Annual Report 2014 items 445 ff.). This reveals that Germany in particular runs a permanent surplus in its

↘ CHART 35

Impact of price competitiveness on the current account balance and net lending/net borrowing



1 – Analysis using a vector autoregression model. The variables used are logarithmised price competitiveness and the current account balance as a percentage of GDP (Cholesky decomposition, 4 lags). Estimate period: 1. quarter 1972 to 2. quarter 2019. 2 – Indicator of price competitiveness based on the deflators of total sales. 3 – As a percentage of nominal GDP. Data prior to 1991 relate to former West Germany with unrevised results. 4 – One-off effect resulting from the fact that the Treuhandanstalt's debts and some of the legacy debts of the Eastern German housing sector were transferred to the public sector (for details see GCEE Annual Report 1995 item 19).

Sources: Federal Statistical Office, own calculations

trade in goods. On the other hand the current account balance can be viewed from the perspective of the financial accounts (GCEE Annual Report 2014 items 408 ff.). This reveals that positive net lending by households and, in particular, by non-financial corporations over the past 15 years has contributed to the high current account surpluses. ↘ CHART 35 RIGHT In addition, the German government has been running substantial budget surpluses for some years now.

169. A further explanation for the high level of surpluses is **demographic trends**. Aggregate household saving rises initially in a society that is ageing relatively rapidly. This is likely to have a noticeable effect on Germany's current account surplus at the moment (European Commission, 2019; IMF, 2019; GCEE Annual Report 2014 items 418 ff.). If this ageing trend continues, however, this effect will probably turn negative eventually.

170. Germany's consistently high current account surpluses since the 2000s have **repeatedly attracted international criticism** (GCEE Annual Report 2014 items 401 ff.; GCEE Economic Update 2017 box 2). Despite having decreased in recent years, the balance currently remains above the 6 % threshold set by the European Macroeconomic Imbalance Procedure. This monitoring mechanism complements the fiscal framework on the European level and tries to identify and then to address macroeconomic imbalances at an early stage (European Commission, 2016; GCEE Annual Report 2012 items 223 ff.). The scoreboard of indicators and the respective indicative thresholds forms the basis of the analysis. The decision, whether there is an (excessive) imbalance, however, does not follow mechanically from an indicator surpassing the threshold, but results from a comprehensive economic assessment of the individual economies.

171. The GCEE is of the view, however, that it should **not be a specific aim of economic policy** per se to stabilise the current account balance at a certain level. **Economic policy** should rather **focus on raising growth potential**, which ultimately determines the level of material prosperity in an economy over time. Politicians can assist in this process by creating the **right conditions** so that firms do business in Germany, invest more there and help to boost growth by introducing innovation and new technology. Up to now, the expected returns from investments in Germany are apparently too small from the perspective of a potential investor to direct the substantial German savings to domestic investments. If economic policy is successful in countering this impression by growth-friendly reforms, this should help to reduce the current account balance.

To what extent past German investment abroad has been a good deal is disputed (Deutsche Bundesbank, 2018; Fiedler et al., 2018; Hünnekes et al., 2019a; GCEE Annual Report 2014 items 475 ff.). In any case, foreign direct investments by German firms in the process of the **expansion of global value chains** have delivered an important contribution to the increase of productivity and economic growth in the past years. If a large share of the past investment had been invested in Germany instead of abroad, this investment probably would have had to go to projects with lower returns.

172. In addition, certain policy areas and measures affecting the current account do not lie within the government's remit. **Wage policy** in Germany, for example, **is the responsibility of the parties to the collective bargaining process** and is usually not directly decided by the government, which nevertheless has some influence, for example by statutatory extensions of collective bargaining agreements or as employer. As a member of Europe's currency union, moreover, Germany cannot pursue its own monetary policy. The monetary policy set by the European Central Bank (ECB) takes account of developments throughout the euro area. Given the euro's exchange rate, the highly expansionary stance adopted in recent years is likely to have helped to improve the German economy's price competitiveness.

173. By contrast, the **effects of fiscal policy measures** on the current account balance are usually reckoned to be fairly moderate (BMWi, 2017; Alloza et al., 2019; GCEE Annual Report 2014 items 466 ff.). Generally, such measures should not be aimed at reducing the current account balance. The common monetary policy pursued within a currency union can respond to only a limited extent to divergent trends in the member states. Fiscal policy therefore performs a special stabilising function at national level (GCEE Annual Report 2018 items 418 ff.). Any additional focus on the current account here could be counterproductive. In recent years the German economy has been characterised by excess capacity utilisation. ↘ ITEM 91 Any attempt to boost government demand in order to reduce Germany's current account surplus would have intensified this excess capacity utilisation and would have been counterproductive from an economic stabilisation perspective.

III. POSSIBLE CAUSES

174. In order to introduce appropriate economic policies to support aggregate productivity improvements, it is necessary to conduct a thorough **analysis of the causes** of the weak productivity growth observed in recent years. Against this backdrop and building on the analysis presented above, this section discusses various possible explanations.

1. Productivity paradox of digitalisation

175. The worldwide **decline in productivity growth** appears to **be inconsistent with** the hopes that have been placed in the productivity-enhancing effects of increasing computerisation and the development of new applications in **information and communication technologies (ICT)** such as cloud computing, machine learning and artificial intelligence. It is indeed the case that ICT-intensive industries were responsible for the temporary acceleration of productivity growth in the United States between 1995 and 2005 (Jorgenson and Stiroh, 2000). Given the further progress made in ICT in recent years, however, the current weakness of productivity growth appears to be a **paradox**. Four possible explanations for this paradox are discussed below.

176. First, there might be **delays in adaptation** (Brynjolfsson et al., 2018). Exploiting the potential offered by new information technologies requires things such as **complementary investment in human capital** and **adjustments to corporate organisational structures** (Bresnahan et al., 2002). Such adaptation delays have in the past also affected technologies that brought about fundamental changes in production structures and yielded considerable productivity gains (Comin and Hobijn, 2010). For example, it took more than 40 years from the invention of electric drives until 25 % of US factories' output was generated electrically and this translated into higher productivity gains (Atkeson and Kehoe, 2007). Consequently there might also be some delay before we see the productivity-enhancing effects of computerisation.

177. The second assessment, on the other hand, is much **more pessimistic**. The **productivity improvements** expected to come from new information technologies might be **much smaller** than those produced by previous general-purpose technologies. Many applications around Big Data might be primarily used to **acquire market share** rather than to create new products. Moreover, despite the advance of digitalisation it seems to be becoming increasingly **expensive and time-consuming to research new technologies**. For example, the speed at which there have been improvements in computing power or the yield of agricultural crops has remained virtually constant over the past 40 years despite a considerable increase in the research staff used (Bloom et al., 2017). This has given rise to the assessment that the technologies that are easy to research have already been researched (Cowen, 2011).

178. A third explanation for the fact that digital technologies are having little impact on measured productivity growth might be increasing **measurement problems**. The provision of free digital products and services, for example, could mean that although consumer benefit increases, the measured value added remains constant. The difference between GDP and aggregate welfare would then grow as a consequence (Brynjolfsson and McAfee, 2014). It is also possible that the rate at which new products and services are brought to market has risen. Given the problem of accurately capturing quality improvements and including them in inflation measurements, this could result in inflation rates being overestimated and **real GDP growth being underestimated** (Aghion et al., 2019).

However, various authors have cast **doubt** on these **arguments**. Aghion et al. (2019) show that the rate at which new products come to market or new markets are entered has not increased in the United States. Syverson (2017) questions the link between the measurement problem and ICT technologies and also **casts doubt** on the **quantitative relevance** of the measurement problem. On the one hand, he shows that the decline in productivity growth is no higher in countries with greater value added in ICT industries. On the other hand, even the most optimistic estimates of ICT's added benefits for consumers would explain no more than one-third of the decrease in productivity growth. At the same time, these optimistic estimates would implausibly require excessively strong productivity growth from the ICT industries themselves.

179. Elstner et al. (2018) suggest that improvements in ICT have had **two mutually offsetting effects** in Germany. On the one hand, labour productivity has risen for a given labour input. On the other hand, this generates additional demand for labour, which in turn reduces average labour productivity as a result of diminishing marginal returns. Past improvements in ICT have thus increased both GDP and labour inputs, which means that, on balance, there has been no significant productivity effect. These two effects have therefore **cancelled each other out**.

180. **Delays in adaptation** are also likely to be highly **relevant to Germany**. Compared with other advanced economies Germany is fairly average in terms of its use of digital technologies and the expansion of its digital infrastructure, which suggests that there are significant delays in its adaptation to such technology (OECD, 2019a). In addition, the proportion of ICT capital is much lower in Germany than it is in the United States, for example (Strauss and Samkharadze, 2011), which is why higher productivity in ICT would be expected to have a smaller positive impact on overall productivity. This also means that the estimation methodology used by Syverson (2017) for **Germany** would imply **far smaller measurement errors** than it would for the United States because the quantitative role of measurement problems grows as ICT-industries' share of value added increases.

The extent to which the hopes placed in ICT-driven productivity growth have been exaggerated has not yet been investigated in the case of Germany. It is equally unclear whether the greater complexity of research and development has **pushed up innovation costs** in Germany. Studies conducted for the OECD,

however, suggest that this could indeed be the case (Bloom et al., 2017). An adverse impact on Germany's productivity growth due to spillover effects would also be expected if the level of innovation in other advanced economies were to fall.

2. Low business dynamism

181. **Productivity levels vary** significantly between countries and **between firms within countries** (Hsieh and Klenow, 2009, 2014; Syverson, 2011; Restuccia and Rogerson, 2017). Some of the reasons for this are differences in management skills at companies and the gradual adoption of new technologies and production processes. The overall productivity of individual industries or of the national economy as a whole thus depends on the allocation of the factors of production, labour and capital, to the firms. An **efficient allocation of these factors** is characterised by the fact that it is not possible to increase the gross value added any further by reallocating the factors of production. **Deviations** from this efficient allocation are labelled as a **misallocation**, which results in **lower aggregate productivity**.

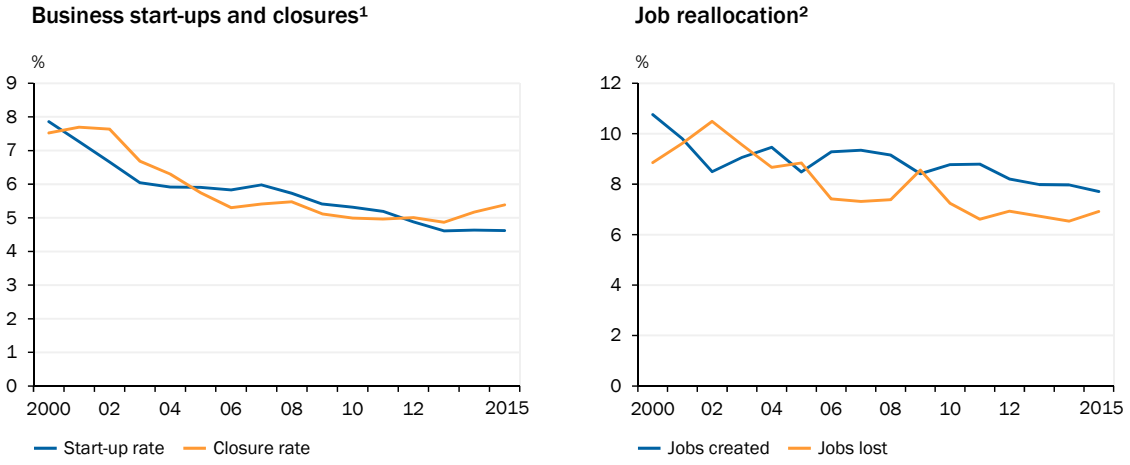
182. Differences in the **degree of misallocation** are a **major reason why productivity levels vary from country to country** (Hsieh and Klenow, 2009; Restuccia and Rogerson, 2017). In addition, reallocating factors of production to more productive firms can play a crucial role in **productivity growth** (Baily et al., 1992; Foster et al., 2008). And, vice versa, the falling levels of productivity growth in the United States since the 1980s could be partly explained by the declining reallocation rate over the same period (Decker et al., 2017).

183. Factors of production are reallocated between existing firms – for example as a result of the hiring and firing of workers – as well as to newly established businesses and away from closing ones. There is a strong correlation – both at regional level and in comparisons of different industries – between the reallocation rate and the **numbers of start-ups and closures** of firms and establishments (Foster et al., 2001, 2006, 2008). A major reason for the falling reallocation rate in the United States is believed to be the declining business start-up rate (Decker et al., 2014). New jobs created in Germany as a result of business start-ups and closures are responsible for roughly 20 to 25 % of job reallocation. Young businesses, set up less than five years ago, are especially dynamic as they exhibit higher closure rates and – provided they do not close – higher growth rates. They are responsible for roughly 30 to 35 % of job reallocation in Germany although they account for only around 12 % of jobs.

184. A broad-based **decline in business dynamism** has been observed in Germany since the start of this century. The Establishment History Panel of the Institute for Employment Research (IAB) (Schmucker et al., 2018) can be used to show that establishment entry and exit rates have fallen by more than one-third. ↘ CHART 36 LEFT Moreover, the amount of job creation and destruction has declined sharply. ↘ CHART 36 RIGHT These trends cannot be attributed to the fact that busi-

↘ CHART 36

Business dynamism in Germany



1 – New businesses set up between the years t-1 and t plus businesses closed between the years t-1 and t as a percentage of the average number of businesses active between the years t-1 and t. Businesses are recorded by the Establishment History Panel (BHP) as being active as soon as they have at least one employee. Business start-ups and closures have been adjusted to exclude ID changes and spin-off. 2 – New jobs created between the years t-1 and t plus jobs lost between the years t-1 and t.

Sources: Institute for Employment Research (IAB) Establishment History Panel (BHP) 7571 v1, own calculations

ness activity has shifted towards less dynamic sectors of the economy; they have been caused by the declining dynamism **across all sectors**. ↘ CHART 37 Rather, the structural shift from less dynamic manufacturing towards services has weakened the decline in business dynamism. Because this decline started well before 2003, it is probably not related to the reforms of the business start-up support provided by Germany's Federal Employment Agency (Bernhard and Grüttner, 2015).

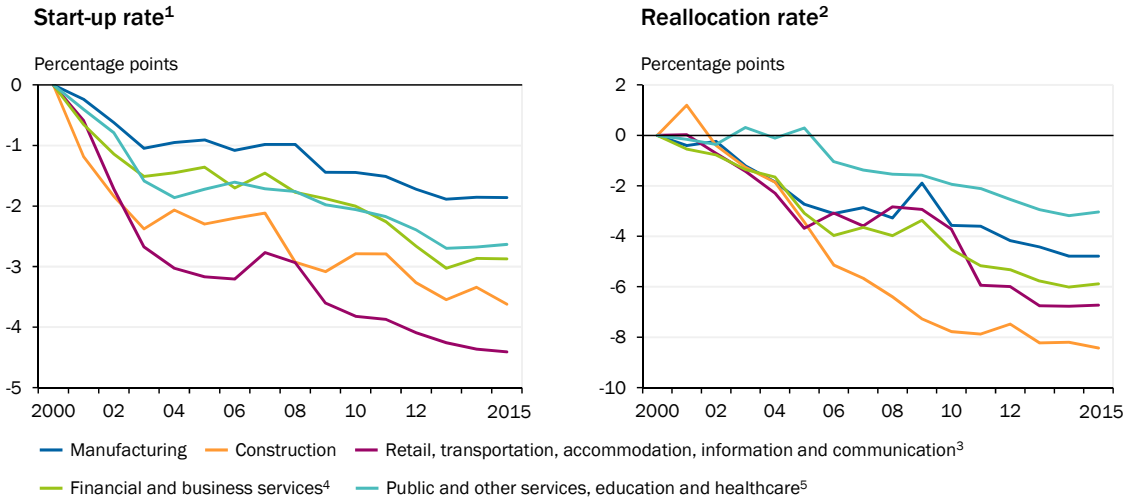
185. The reallocation of factors of production from exiting firms to business start-ups is crucial for productivity growth because start-ups are on average more productive than firms exiting the market. In addition, young businesses have higher productivity growth rates than older ones and make a significant contribution to creating new jobs (Haltiwanger et al., 2013). At a **regional level** in Germany there is a correlation between business dynamism and the labour productivity growth rate. ↘ TABLE 13

Panel analysis of productivity growth across all regions during the period from 2001 to 2015 reveals that **growth in labour productivity** is **high** in those years in which the **start-up rate** or the **reallocation rate is high**. The estimated coefficients of the entry, exit and reallocation rates are jointly statistically significantly different from zero in all models. In the short run the effects of the entry and exit rate on labour productivity growth are individually significantly positive when the estimation also controls for the reallocation rate. In this regression, an increase of the entry or exit rate by one percentage point is associated with an increase of labour productivity growth by 0.33 or 0.13 percentage points respectively. In the long run there is no significant individual effect of the regressors. ↘ TABLE 13

↘ CHART 37

Business dynamism in Germany by sector

Change compared to the year 2000



1 – New businesses set up between the years t-1 and t plus businesses closed between the years t-1 and t as a percentage of the average number of businesses active between the years t-1 and t. Businesses are recorded by the Establishment History Panel (BHP) as being active as soon as they have at least one employee. Business start-ups and closures have been adjusted to exclude ID changes and spin-off. 2 – Including maintenance and servicing of vehicles as well as storage. 3 – Including insurance services, real estate and housing, freelance, research and technical services as well as other commercial services. 4 – Public administration, defence, social security, education, healthcare, welfare, art, entertainment and recreation, other services, households with staff. 5 – Sum total of the new jobs created between the years t-1 and t plus the jobs lost over the same period as a percentage of the average number of jobs between the years t-1 and t.

Sources: Institute for Employment Research (IAB) Establishment History Panel (BHP) 7571 v1, own calculations

186. The **decline in the reallocation rate** and the decrease in productivity growth are **global phenomena** (Calvino et al., 2019). There is no consensus on the causes of this trend yet. It is also unclear to what extent the declining reallocation rate is responsible for the weaker productivity growth in recent years. Many attempts to explain this phenomenon see a link between the growing dominance of large corporations and the decline in business dynamism. The impact on productivity growth varies according to the explanation given.

187. In the United States in particular there has been an observable trend towards large corporations playing a more dominant role, which has resulted in **higher market concentration** (Autor et al., 2017). This could raise barriers to market entry for new businesses and reduce business dynamism. Concerns about adverse consequences for productivity growth would be justified especially if this trend were being caused by a **weakening of competition policy**. This is indicated by the **increasing mark-up** on the marginal cost of production in recent decades (De Loecker and Eeckhout, 2017). It should, however, be noted that growing market concentration at the national level does not necessarily mean less competition at the local level, which is the level primarily relevant to competition in services (Rossi-Hansberg et al., 2019).

Competition policies appear to work better in Germany and Europe than they do in the United States (Gutiérrez and Philippon, 2018). In addition, price mark-ups have risen less sharply (Weche and Wambach, 2018). Market concentration – calculated as the average of the Herfindahl-Hirschman-Indices across all sectors – has not risen significantly in Germany (Monopolies Commission, 2018).

Nonetheless, the total share of revenues generated by the largest companies in manufacturing and trade has grown since the mid-1990s. In the services sector, on the other hand, this proportion has decreased slightly (Monopolies Commission, 2018).

188. However, the growing market dominance of large corporations is not necessarily due to weaker competition controls and could simply be caused by **new technologies** which are yielding **higher returns to scale** (Autor et al., 2017). ↘ ITEMS 305 FF. For example, production processes based on **intangible factors of production**, which are playing an increasingly important role in the economy, are characterised by high fixed costs combined with low variable costs and, consequently, large economics of scale (Haskel and Westlake, 2017). In the past, in particular, **innovations in ICT** have often tended to primarily benefit larger companies, as suggested by significantly higher usage rates of Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) systems (OECD, 2019a). If the shift of economic activity towards larger companies and the decline in business dynamism can be attributed to new technologies, this would have much more positive implications for productivity growth than a weakening of competition controls would.

↘ TABLE 13

Growth in labour productivity and business dynamism[1]

Regressions at county level

Independent variable	Productivity growth[2]			Δ Productivity growth[3]		
Start-up rate[4]	0.290 ***		0.326 ***			
	(4.03)		(3.86)			
Exit rate[5]	0.094		0.128 **			
	(1.55)		(2.10)			
Reallocation rate[6]		0.064 ***	– 0.040			
		(2.94)	(–1.21)			
Δ Start-up rate[3,4]				0.078		0.051
				(0.41)		(0.27)
Δ Exit rate[3,5]				0.182		0.058
				(1.05)		(0.30)
Δ Reallocation rate[3,6]					0.108 ***	0.082
					(2.72)	(1.52)
Fixed effects (counties)	X	X	X			
R^2	0.043	0.037	0.044	0.014	0.018	0.020
F-statistic[7]	37.71 ***	8.64 ***	24.89 ***	2.79 *	7.42 ***	2.64 **
Observations	5,985	5,985	5,985	399	399	399

1 – Figures in brackets denote t-statistics. Level of significance: * p-value<0.1; ** p-value<0.05; *** p-value<0.01. 2 – Pooled dataset for the years 2001 to 2015. Standard errors clustered at county level. 3 – Difference between the average for the years 2001 to 2003 and the average for the years 2013 to 2015. 4 – New businesses set up between the years t-1 and t as a percentage of the average number of businesses active between the years t-1 and t. Businesses are recorded by the Establishment History Panel (BHP) as being active as soon as they have at least one employee. Business start-ups have been adjusted to exclude ID changes and spin-offs. 5 – Closed enterprises between years t-1 and t as a percentage of the average number of businesses active between the years t-1 and t. Businesses are recorded by the Establishment History Panel (BHP) as being active as soon as they have at least one employee. Closures have been adjusted to exclude ID changes and spin-offs. 6 – Sum total of the new jobs created between the years t-1 and t plus the jobs lost over the same period as a percentage of the average number of jobs between the years t-1 and t. 7 – Statistic of the F-test for joint significance of the regressors.

Sources: Institute for Employment Research (IAB) Establishment History Panel (BHP) 7517 v1, Regional Accounts, own calculations

189. Relative to smaller companies, large companies might also benefit from **the high fixed costs** of **product and labour market regulation**. Regulation directly leads to greater rigidities in factor markets, which restricts the reallocation rate (Hopenhayn and Rogerson, 1993). Moreover, it favours larger companies, which further reduces the start-up rate. In the United States there is currently a debate about the extent to which growing regulation is responsible for the decline in the reallocation rate (Davis and Haltiwanger, 2014; Gutiérrez and Philippon, 2018). On the one hand there is an observable trend that companies are reacting to demand shocks and productivity shocks much less than they did in the past (Decker et al., 2018). This indicates an increase in rigidities. At industry level, on the other hand, there is no discernible link between stronger product market regulation and any decline in business dynamism (Goldschlag and Tabarrok, 2018).

Although network industries have been deregulated in Germany since the end of the 1990s, regulatory requirements in the service sector are still relatively strict compared to other countries (Deutsche Bundesbank, 2019b). The **labour market** has tended to become more **deregulated** (during the 2000s, at least), and the OECD's product market regulation index as well as the German government's cost-of-bureaucracy index have been falling since the mid-2000s. However, the bureaucratic costs of starting a business (World Bank, 2019) as well as the individual employment protection still remain high (OECD, 2013).

Trends towards stricter regulation – such as the more stringent access restrictions on individual professions – should be resisted. The recent expansion of the so-called *Meisterzwang* (requirement for certain professions in Germany to hold a master craftsman's license) is counterproductive. Researchers in the United States have identified a correlation between occupational licensing and a decline in the reallocation rate (The White House, 2015; Johnson and Kleiner, 2017).

190. A further explanation is offered by the **crowding-out effect** of advancing **globalisation**. On the one hand, an increase in imports could strengthen competition in **product markets**. This would crowd existing firms out of the market and it would be less attractive to set up new businesses. On the other hand, an increase in exports could intensify competition in **factor markets** (especially the labour market). This makes it more attractive for potential entrepreneurs to remain in their respective jobs. This also raises the factor costs for new businesses. Colantone and Sleuwaegen (2010) show for eight EU member states that an increase in export intensity reduces business start-up activity, while an increase in import intensity causes more firms to exit the market without being replaced by new businesses. The significant rise in import and export intensities since the mid-1990s – especially between 2000 and 2008 – could therefore certainly be linked to the decline in start-up rates. It is questionable, however, to what extent this explains the sharp decrease in less trade-intensive sectors.

191. Liu et al. (2019) argue that the declines in reallocation rates and in productivity growth are linked to the decline in interest rates over recent decades. They show that, in a **low interest-rate environment,** a further fall in interest rates in-

creases the level of market concentration. Although low interest rates boost the investment incentives for both market leaders and less productive firms alike, the market leaders' investments increase more. Lower interest rates mean that the discounted value of firms' future earnings rises. Because the market leader's anticipated future earnings are higher, its investment incentives rise particularly sharply. This means that the productivity gap between the market leader and the less productive firms grows, which in turn reduces the less productive firms' investment incentives. In a **long-run equilibrium** this leads to higher **market concentration**, a falling reallocation rate and lower aggregate productivity growth.

192. The low level of interest rates could also lead to a situation where banks continue to lend to firms that are technically insolvent and merely use these loans to meet their outstanding liabilities. Banks are thus delaying writing off these loans. Such **zombie firms**, whose exit from the market is artificially delayed, tie up factors of production and thus prevent resources from being reallocated to more productive firms (GCEE Annual Report 2017 item 252). This mechanism might also be responsible for the growing **productivity divergence** between the leading firms at the upper limit of the productivity distribution ('**frontier firms**') and the struggling, unproductive firms at the lower limit of the distribution ('**laggard firms**'). Despite this categorisation, however, it should be noted that laggard firms in particular constitute a highly diverse group and that many young businesses are located at the lower limit of the distribution (Berlingeri et al., 2019). These firms presumably achieve lower revenue productivity, especially as a result of their lower prices. However, young businesses deliberately use this pricing strategy in order to win customers and establish themselves in the market (Foster et al., 2006).

193. A further potential explanation attributes the decline in business dynamism to **demographic factors**. Karahan et al. (2019) show that regions of the United States in which the **decline in population growth** is especially pronounced exhibit the sharpest decreases in start-up rates and reallocation rates. This can partly be explained by the fact that lower growth in the working population causes stronger competition for workers (Karahan et al., 2019). In addition, a decline in population growth leads to an **ageing population**, which has further adverse effects on start-up rates and reallocation rates (Engbom, 2019).

These **demographic trends** are **especially pronounced in Germany**. Population growth here fell by roughly one percentage point between the beginning of the 1990s and the end of the 2000s. Population growth in recent years has risen by around 0.5 percentage points and, owing to the migration of refugees in 2015 and 2016, and has even returned to the level it had reached at the beginning of the 1990s. At the same time, the average age of workers has risen by around four years over the past 20 years. Compared with other countries, especially the United States, Germany's lower population growth might at least partly explain its lower start-up rate.

3. Management and technology

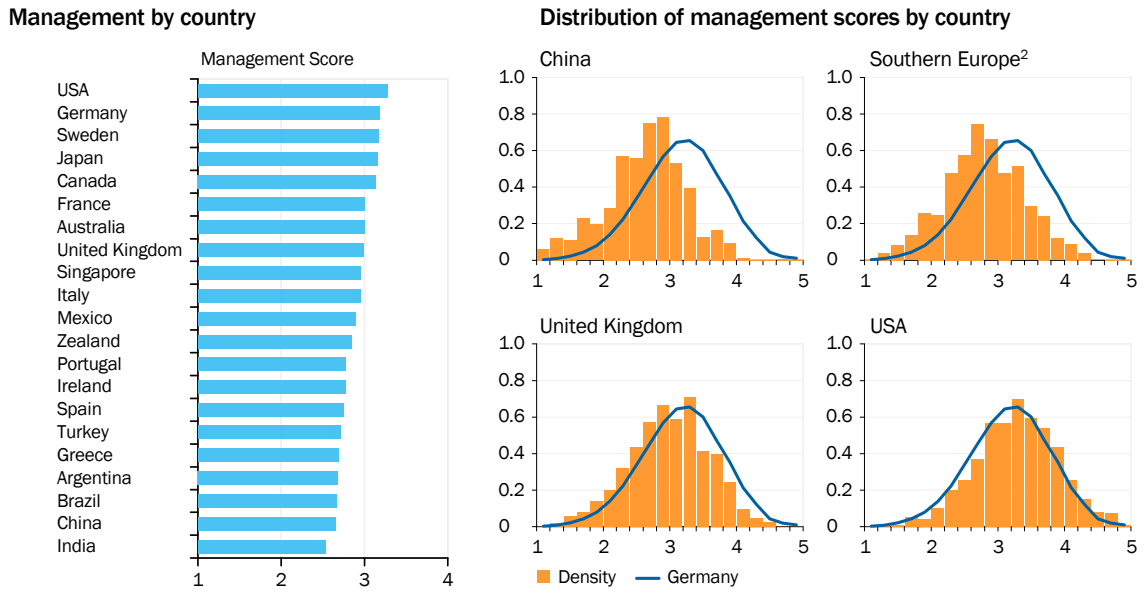
194. A further explanation for the varying productivity levels between countries and firms are **differences in management skills**. Compared with other countries Germany has a relatively large proportion of firms that achieve high 'management scores'. Based on the management skills metric developed by Bloom and Van Reenen (2007), **Germany is ranked second behind the United States**. ↘ CHART 38 LEFT Southern European countries, the United Kingdom and France have larger numbers of firms with very low management scores. ↘ CHART 38 RIGHT

One reason for the larger number of poorly managed firms in the United Kingdom and France is the traditional system of succession applied at family-run businesses. The share of German firms in which the family is the largest shareholder does not differ from the corresponding share in the United Kingdom and France. For traditional reasons, however, these two countries have a larger share of firms in which the family is the largest shareholder and, in addition, **the eldest son is running the business (primogeniture)**. Evidence shows that these firms **tend to possess poorer management skills**. This result is driven by a smaller talent pool, lower educational incentives for the future manager, and adverse incentive effects on employees, especially those in management positions (Bloom et al., 2011).

195. **Inefficient management** is also **a reason for low ICT adoption rates** at firm level. In order to exploit the full potential of ICT capital, firms need to make complementary adjustments to their organisational structures and corporate culture (Brynjolfsson and Hitt, 2000). The poorer management skills in south-

↘ CHART 38

International comparison of management skills[1]



1 – The data are based on manufacturing firms. Average management score based on 18 questions about monitoring, setting goals and offering incentives at firms. Waves for the years 2004, 2006, 2009 and 2014. 2 – Spain, Greece, Portugal, Italy.

Sources: World Management Survey, own calculations

ern European countries such as Italy, Spain and Portugal might explain the low levels of ICT investment. This means that potential productivity gains from new ICT applications cannot be sufficiently exploited. At the international level, the successful adoption of ICT also results in higher wages, which in turn attracts highly skilled individuals from abroad. Based on estimates by Schivardi and Schmitz (2018), roughly one-third of the productivity divergence between Germany and the aforementioned southern European countries can be explained by the interaction between low management skills and ICT adoption in the case of Italy and Spain, while two-thirds of the productivity divergence can be explained by this interaction in the case of Portugal.

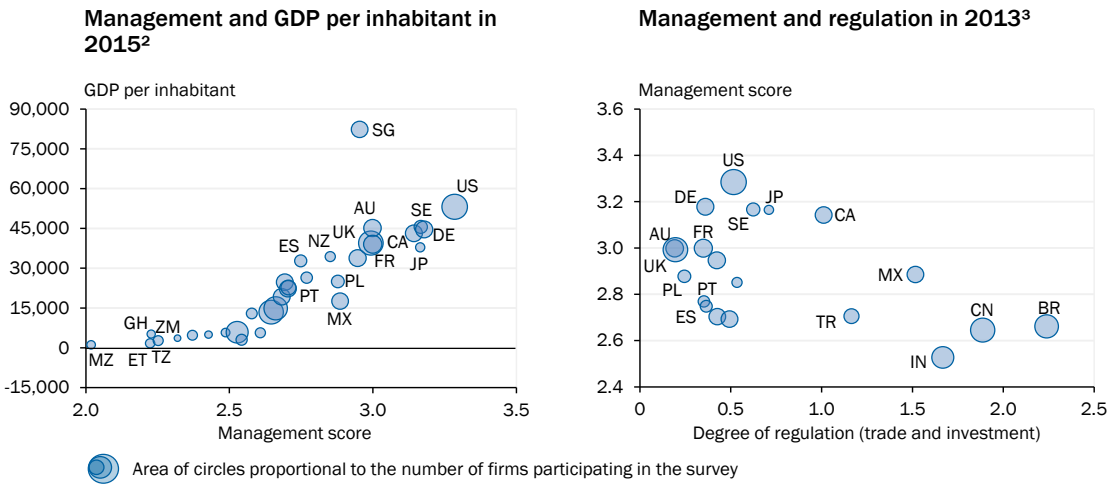
The **World Management Survey** (WMS) was developed by Bloom and Van Reenen (2007) as a tool for measuring management practices at manufacturing firms. Firms are interviewed and asked a total of 18 questions in three areas. Each of these areas comprise five categories on a scale of 1 (poor management) to 5 (best management). In the first area, the firm is asked about monitoring. Does the firm, for example, monitor its internal workflows and processes and, if so, does it use this information to improve its processes? In the second area the firm is asked to provide information about its goals and objectives. Does it set appropriate targets and compare these with the final result? Are adjustments made if the result does not meet the objectives? In the third area, the firm is asked about offering incentives. Does the firm encourage and reward personal achievement? To what extent does the firm recruit the best talent? The final management score is calculated as the average across all 18 questions. The survey interviews experienced managers who are familiar with their firm's day-to-day business. The managers are not told that they are being numerically scored. In addition, all questions are asked in an open format. Data are available for the years 2004, 2006, 2009 and 2014. The ORBIS company database is used to contact firms.

196. The importance of management quality and the associated innovation process can be seen, for example, in the case of Germany's **hidden champions**. Hidden champions are defined as small and medium-sized firms with high global market shares in their respective business area and with above-average growth rates over the past five years. Germany has a disproportionately large number of hidden champions compared with other countries (Simon, 2017). Rammer and Spielkamp (2015) show that these firms have higher productivity, larger profit margins and more highly-skilled workers than comparable firms. Although their level of spending on innovation is not different from that of their competitors, hidden champions are more successful product innovators. The authors argue that these firms' considerable management skills enable them to protect their product innovations more effectively by using patents and complex designs. This process is characterised by more efficient use of resources, greater personal responsibility for employees, and closer cooperation with external partners. This could have a positive impact on knowledge diffusion.

197. **Management skills** can be regarded **as a form of technology**. At international level, this technology reveals a positive correlation with real gross domestic product per inhabitant. ↘ CHART 39 LEFT Bruhn et al. (2018) show that even a one-year management training course has a significant impact on a firm's TFP.

↘ CHART 39

Management, GDP and degree of regulation[1]



1 – The data are based on manufacturing firms. Average management score based on 18 questions about monitoring, setting goals and offering incentives at firms. Waves for the years 2004, 2006, 2009 and 2014. AU-Australia, BR-Brazil, CA-Canada, CN-China, DE-Germany, ES-Spain, ET-Ethiopia, FR-France, GH-Ghana, IN-India, JP-Japan, MX-Mexico, MZ-Mozambique, NZ-New Zealand, PL-Poland, PT-Portugal, SE-Sweden, SG-Singapore, TR-Turkey, TZ-Tanzania, UK-United Kingdom, US-USA, ZM-Zambia. 2 – GDP per inhabitant in 2015 in US dollars, purchasing power parities for the year 2011. 3 – Degree of regulation in 2013.
Sources: IMF, OECD, World Management Survey, own calculations

These effects are long-term and persistent (Giorcelli, 2019). They, thus, affect total productivity and output (Bloom et al., 2019). Bender et al. (2018) show that 13 % of the variation in TFP between firms in Germany can be attributed to differences in management skills.

198. Suitable **market conditions** and a **functioning system of competition** will have a positive impact on the average management skills in the countries. There is a positive correlation between management quality and the number of competitors as well as import penetration at sectoral level (Bloom and Van Reenen, 2007). This correlation holds when using the OECD regulation indicator, which attempts to approximate barriers to trade and investment. ↘ CHART 39 RIGHT Findings for the entire OECD indicator, which also includes barriers in retail, transport, communications and business-related service, do not differ qualitatively.

199. Firms improve their management practices in response to more competition. Productive and efficiently managed firms also have positive **spillover effects** on neighbouring firms within the same sector (Bloom et al., 2019). The mechanism could be in worker and manager mobility. Knowledge often diffuses due to job changes within the labour market region (Serafinelli, 2019). **Knowledge diffusion** is a crucial part of business dynamism. The decreasing dissemination of knowledge between firms is considered an explanation for the decline in business dynamism (Akcigit and Ates, 2019). This demonstrates the high importance of job reallocation.

The reallocation rate in Germany has been steadily declining since the beginning of the 2000s. ↘ ITEMS 184 F.The reasons for this decline in the reallocation rate are not fully understood in the literature. There is, however, **the risk that productivity growth could continue to fall** and that heterogeneity between firms

increase. This could give rise to growing market power and rising inequality. Stronger support for regional clusters might be an appropriate way of increasing labour mobility and knowledge diffusion. ↘ ITEMS 345 FF.

4. Composition effects and globalisation

200. At the sectoral level, the growing importance of **services** has meant that the increase in the number of jobs in recent years has largely occurred in areas where labour productivity is relatively low (GCEE Annual Report 2015 items 599 f.). While the **reallocation of labour** from less productive to more productive sectors once had a clearly positive effect on productivity growth, particularly in the 1990s, the contribution of reallocation since the turn of the millennium has been close to zero or even negative. ↘ CHART 40 LEFT

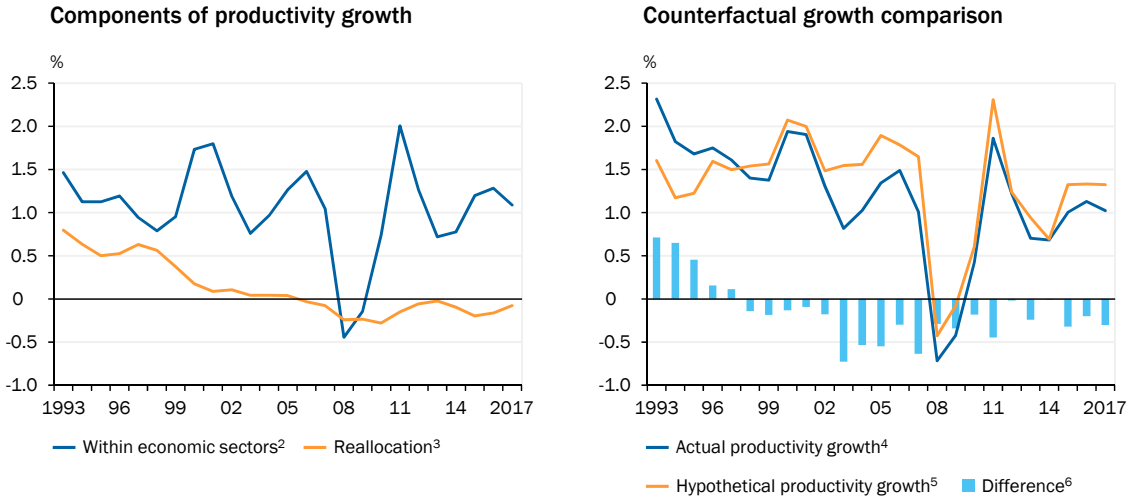
201. In addition, the shift towards **sectors with lower productivity growth** has led to a further slowing of productivity gains at the aggregate level. This can be seen by comparing actual productivity growth against a counterfactual scenario, which assumes that the economic structure has not changed since the early 1990s and the sector-specific productivity growth rates are the same as those actually observed. Since the end of the 1990s, actual labour productivity growth has been consistently below the hypothetical productivity growth that would have occurred if the economic structure had remained unchanged. ↘ CHART 40 RIGHT

202. In addition to the shifts in the economic structure, changes in the **composition of the labour force** may also play an important role for weaker productivity growth. The integration of **low-skilled workers** into the labour market may have dampened productivity growth within individual economic sectors (Elstner et al., 2018). At the regional level, however, there is no long-term correlation between a faster growing labour force and weaker productivity growth. ↘ CHART 41 LEFT One reason for this might be that although the increase in the labour force in the economy as a whole has primarily involved the integration of low-skilled workers, over the longer term there has also been a shift towards better qualified employees. Alternatively, workers may be attracted to regions with higher productivity growth. This could explain the positive correlation that was observed in spite of a possibly negative causal effect of additional workers on productivity growth.

203. In addition to changes in the qualification level, changes in the **demographic structure** towards an older workforce have been observed. This may slow down productivity growth (Engbom, 2019). Findings on the productivity of workers over the course of their life suggest that individual productivity rises up to the age of 50, after which it does not decline significantly (GCEE Expertise 2011 items 178 f.). However, companies with older workers seem less willing to embrace new technologies (Meyer, 2011). Moreover, businesses whose workforce is older than the average appear to have lower productivity (GCEE Expertise 2011 item 170). This could be because the human capital of older workers is not adapted to new technologies and it may be more difficult for these workers to

↘ CHART 40

Effect of economic structure on the growth of hourly productivity[1]



1 – Moving three-month average growth in hourly productivity. 2 – Growth of hourly productivity through increased productivity within economic sectors. 3 – Growth of hourly productivity through changes in the economic structure. 4 – Average hourly productivity growth of the economic sectors weighted by the hourly share of the economic sectors. 5 – Assuming a constant economic structure with the same proportion of total hours worked as the average in the period 1991 to 1995. 6 – Difference between actual growth in hourly productivity and hypothetical growth in hourly productivity.

Sources: Federal Statistical Office, own calculations

learn new working methods (Weinberg, 2004). At regional level, a sharper rise in the proportion of older workers in Germany between 2001 and 2016 coincided with a steeper decline in productivity growth. ↘ CHART 41 RIGHT

204. Another significant factor in productivity growth may be **outsourcing in the manufacturing sector** (GCEE Annual Report 2015 items 605 ff.). This now appears to have leveled off. Until the late 2000s, companies in Germany had increasingly concentrated on the final production of highly specialised products, with labour-intensive and less productive stages of the value chain being outsourced. This process of outsourcing has now slowed. Reasons include the effects of the financial crisis, companies having reached the limits of outsourcing in the production process, an increase in the cost of manufacturing abroad, and an increase in final production processes in countries abroad.

205. The **importance** of outsourcing **for productivity growth** at the company and the economic sector level is however **disputed**. Ademmer et al. (2017) show that at the sectoral level, the intensity of outsourcing has no effect on productivity. The intensity of outsourcing in more productive economic sectors is higher, but a change in intensity within an economic sector over time does not correlate with a change in productivity.

More recent studies at the company level show that – in accordance with the academic literature (Antràs et al., 2006; Grossman and Rossi-Hansberg, 2008) – a **higher degree of offshoring**, i.e. the procurement of intermediate goods or services from other countries, leads to an **increase in productivity** (Bandick, 2015). Using a larger, updated sample, Constantinescu et al. (2019) find that

↘ CHART 41

Demographics and productivity growth

1 – Change between the average productivity growth in the period 2014 to 2016 and that in the period 2001 to 2003 in percentage points. Unit of observation in each case is eight groups which were grouped in 2 %-percentile sections of the distribution of the variable on the Y-axis. 2 – Change in the average number of people in employment in the period 2014 to 2016 compared to the period 2001 to 2003 in %. 3 – Change between the average proportion of over-55 year old employees subject to social insurance contributions as a proportion of all employees subject to social insurance contributions in the period 2014 to 2016, and the average proportion in the period 2001 to 2003 in percentage points.

Sources: Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR), Regional Accounts, own calculations

closer integration of economic sectors in international value chains has a positive effect on productivity.

206. In addition to the classic channels of **specialisation** in sectors where an economy has a comparative advantage, and the procurement of intermediate goods and services produced at a lower cost, the more recent literature points to the importance of knowledge transfer through international **trade relations** (De Loecker, 2013; Sampson, 2015; Buera and Oberfield, 2016). Using the example of Slovenia, De Loecker (2013) shows that the companies' productivity increases significantly following their entry into export markets. The significant decline in the growth of German imports and exports since the end of the 2000s (Federal Statistical Office, 2017) could therefore partially account for the relatively weak growth in productivity.

207. At the global level, the weaker **growth in global trade** since 2009 could thus have contributed to the weaker productivity growth (GCEE Annual Report 2016 items 120 f.). At the same time, the current **trade disputes** and the protectionist tendencies witnessed in recent years are putting at risk the productivity and welfare gains achieved through international trade (GCEE Annual Report 2017 items 634 ff.). In Europe, **Brexit** poses an additional risk to internationally integrated value chains. Negative effects on productivity are a key reason for the anticipated drop in earnings resulting from the restrictions on trade relations due to the exit of the United Kingdom from the European Union (GCEE Annual Report 2016 items 306 ff.; GCEE Annual Report 2018 items 35 ff.).

5. The relationship between capital expenditure and productivity

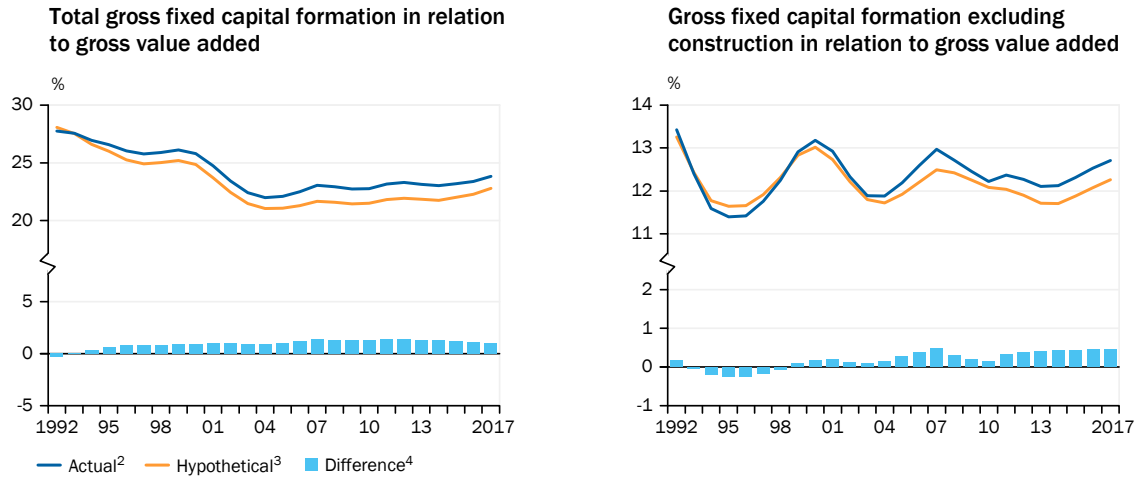
208. One possible explanation for the noticeable decline in productivity growth is the slowdown in the rate of capital intensity growth. ↘ ITEMS 147 FF. However, **capital goods** are **not a homogeneous group** and they differ in terms of their effect on increasing productivity and growth. So, for example, the macroeconomic **productivity gains** from **investment in housing**, which are the reason for the decline in investment intensity, ↘ CHART 42 **are likely to be fairly low** in comparison to capital expenditure on information and communications technologies or R&D (GCEE Annual Report 2015 item 636). As productivity growth in the construction sector is relatively weak (Corrado et al., 2007; GCEE Annual Report 2015 items 710 ff.), an increase in the importance of the construction sector could even have a negative impact on productivity growth, due to composition effects. Furthermore, an analysis of investment activity should not be restricted to the physical capital stock, as other factors such as human capital or intangible capital assets are equally important for productivity growth.

209. Greater investment in the physical capital stock could lead to an increase in productivity growth. The **technological advancement embodied in capital** plays a role here and is reflected, for example, in falling prices for capital assets (Greenwood et al., 1997). But this, in turn, requires innovation in the capital goods sector.

Other factors such as **lending conditions** are also important for private investing activities and thus for productivity growth. The restricted lending during the financial crisis and the crisis in the euro area probably depressed investment growth for years (ECB, 2016; Antoshin et al., 2017; Gilchrist and Mojon, 2018). Demand-side shocks that cause a contraction in **capital expenditure, partic-**

↘ CHART 42

Effect of economic structure on investment intensity[1]



1 – Moving three-year average. 2 – Average value weighted with the share of gross value added in the economic sector. 3 – Assuming a constant economic structure with the same proportion of gross value added as the weigted average during the period 1991 to 1995. 4 – Difference between actual and hypothetical investment intensity.

Sources: Federal Statistical Office, own calculations

ularly in information and communications technologies and R&D, can also act as a lasting brake on productivity growth (**hysteresis**). Studies for the USA show that companies cut their research activities as a result of the more restrictive lending during the financial crisis and that consequently the crisis had a lasting impact on productivity (de Ridder, 2017; Anzoategui et al., 2019).

210. Conversely, favourable lending conditions do not necessarily lead to higher productivity gains. Productivity had been almost stagnating in southern Europe even before the financial crisis, despite more favourable borrowing conditions. ↘ ITEM 163 The reason for this could have been a lack of complementary human capital or management capabilities. ↘ ITEM 195 Studies even suggest that the decline in interest rates that followed the introduction of the euro and the huge imports of capital may have led to a fall in productivity growth. Channels of impact include the **misallocation of capital** (Gopinath et al., 2017; GCEE Special Report 2015 items 328 ff.) and the **reduced incentives for economic reform** (Fernández-Villaverde et al., 2013; GCEE Annual Report 2015 items 328 ff.).

211. There are **interdependencies** between **capital expenditure and productivity** (GCEE Annual Report 2015 items 641 ff.). Capital expenditure affects more than just productivity growth. The **neutral technological progress** that occurs when productivity increases without any change in production factors such as labour and capital may also lead to an expansion of investment. Here, the direction of causality is from higher productivity to greater capital expenditure. Therefore, the trend towards slower investment growth in many advanced economies may be less the cause of lower productivity growth than the consequence of it.

212. The moderate **growth in capital expenditure** could also be **caused by demographic change**. If one accepts the complementarity of the production factors capital and labour, as posited for example by neoclassical growth theory, slower growth in the population would mean lower returns on capital, which in turn will act as a brake on investment activity. There may be a high degree of complementarity between capital and highly skilled workers (Krusell et al., 2000). Measures that increase human capital may therefore be capable of achieving higher capital expenditure. Like physical capital, accumulated knowledge frequently loses economic value over time as new technologies are introduced (Chari and Hopenhayn, 1991). An ageing population with a low stock of new human capital is therefore likely to inhibit investment in modern physical capital. ↘ ITEM 203 Lifelong learning could counteract this.

213. The **increasing importance** of the **service sector**, which tends to be **more labour-intensive**, may also affect the growth of spending on capital equipment (Strobel, 2015). However, in contrast to many other advanced economies, the size of the manufacturing industry as a proportion of gross value added in Germany has remained almost unchanged since the mid-1990s. There are **no negative composition effects between industry and services** for capital spending on plant and equipment overall or for investment in equipment. ↘ CHART 42

214. Surveys at company level suggest there are structural barriers to investment caused by **bureaucracy and regulation**, a **shortage of skilled workers** and a high **cost burden** (Bardt and Grömling, 2017). However, the surveys show that these barriers change over time. In 2014, around 45 % of companies cited demand-side problems caused by the weak economy in Europe as one of the important barriers to investment. In 2017, this figure was only just over 10 %. One important factor governing private investment activity may be the uncertainty concerning **economic and regulatory policy**. This applies with regard to the future of global free trade and to climate and energy policy. As some investment cycles are extremely long, long-term planning with regard to state regulation is likely to be crucial, particularly for energy-intensive industries (GCEE Special Report 2019 item 164).

215. **Functioning public infrastructure** is an **essential precondition** for private-sector **economic activity**. Public-sector investment is therefore significant for the growth of an economy's potential output (Expertise 2007 Box 4). Articles reviewing the empirical literature by Romp and de Haan (2007) and Bom and Ligthart (2013) find positive output elasticity of the public capital stock.

This observation alone does however not justify the demand for comprehensive state investment programmes in Germany or special legislation stipulating minimum volumes of state investment. ↘ ITEMS 531 FF. Not all government investment promotes growth, let alone productivity. At the same time, government's consumption expenditure, which includes spending on items such as maintenance, is also very important for the quality of public infrastructure. **Spending on public education**, not least to ensure the quality of teaching staff, also counts as consumption expenditure and is likely to contribute to the growth potential via the increase in human capital.

216. It is therefore necessary to **identify** and **prioritise spending that promotes growth** on a case-by-case basis. This includes creating a modern digital administration (GCEE Annual Report 2018 items 144 ff.), and raises the question of how far the state should be held accountable for the **provision of infrastructure** such as charging points for electric cars (GCEE Special Report 2019 item 252) or the expansion of the broadband network (GCEE Annual Report 2017 items 61 ff.). An alternative to the direct provision of infrastructure would be to set the economic conditions via regulatory measures so as to facilitate private-sector activity.

IV. CONCLUDING REMARKS

217. In Germany, as in other advanced economies, **productivity growth is persistently weak**. Demographic change will lead to a reduction of the number of people in the workforce and an increasing shortage of skilled workers that will have a significant detrimental impact on the growth prospects of the German

economy. The question, then, is how the trend growth rate can be boosted by a turnaround in productivity growth. ↘ ITEMS 141 FF.

218. The **weak productivity growth** in many developed economies appears to contradict the productivity increases anticipated through the revolution in information and communication technologies (ICT). Although potential measurement errors as a result of the increased use of ICT may be less relevant for Germany, adaptation delays may be an important explanatory factor. Germany is lagging behind in the use of ICT innovations, ↘ ITEM 180 even though the management capabilities required for their effective use are in fact likely to exist. ↘ ITEM 194

Investment in intangible production factors is weak, particularly in the service sector. Alongside ICT investment in software and databases, these include complementary spending on research and development. ↘ ITEM 305 Furthermore, Germany is lagging behind in terms of investment in complementary digital infrastructure (GCEE Annual Report 2018 items 144 ff.).

219. Productivity is also affected by demographic factors. Alongside composition effects relating to the qualification levels of the workforce ↘ ITEM 202, one of the most important of these factors is the **rate of new business start-ups**, which is still **falling** in Germany. ↘ ITEM 184 This is reflected in a reduced reallocation rate. Production factors are therefore not utilised efficiently from a macroeconomic perspective. This could be due to **regulation in the labour market** an in the **service sector** that is still elevated by international comparison. In the service sector, in particular, the further dismantling of market access barriers is required (GCEE Annual Report 2015 items 616 ff.). However, a number of measures have recently been introduced that prevent such removal of barriers, such as the tightening of the EU Posting of Workers Directive and the extension of the *Meisterzwang* (requirement in Germany for a master craftsman's qualification).

220. In an ageing society it is particularly important to strengthen entrepreneurial activity and to create the right conditions so that more potential entrepreneurs are willing to take the necessary risks. Demographic change may also inhibit capital expenditure. Businesses with a larger proportion of older workers invest less in innovative equipment. One reason may be that older workers have often built up **human capital** that is less complementary to new capital. ↘ ITEM 203 **Lifelong learning** can help older workers to adjust to new technologies and increase society's capacity to innovate (Expertise 2011 items 185 f.).

221. Education institutes also play an important role in **increasing equality of opportunities** across the generations. ↘ ITEM 705 Lack of educational mobility not only entrenches existing social structures, but may also be a barrier to growth. If, in contrast, society succeeds in getting more people qualified and into the job market, the build-up of human capital would increase the potential for growth. In Germany there is a strong correlation between children's education level and that of their parents (OECD, 2019b). It is therefore important to make further improvements, particularly in the **area of early years education**, (OECD, 2019b; GCEE Annual Report 2017 item 854). In addition, equality of

opportunity may be improved by making it easier for learners to move between different educational paths and by the introduction of a mandatory pre-school year (GCEE Annual Report 2016 item 63).

222. Another means of boosting productivity lies in increased investment activity. From an economic policy perspective, the primary objective is to create **a reliable business and regulatory environment for companies**. ↘ ITEM 224 An internationally **competitive tax system** is hugely important. International tax competition has been intensifying for a number of years (GCEE Annual Report 2018 items 589 ff.). In many countries, profit tax rates have been on a downward trajectory. The challenge for fiscal policy is therefore to create an attractive business and regulatory environment for private investment in Germany while at the same time providing a functioning public infrastructure.

223. Government infrastructure policy needs to **identify and prioritise growth-promoting spending**. This includes energy supply, digital infrastructure and the modernisation of the transport infrastructure as well as local public services. It is important to ensure that **existing infrastructure is maintained** and not to undermine the individual responsibility of private households and companies. This could play a role in respect of charging points for electric cars (GCEE Special Report 2019 item 252) or the expansion of the broadband network (GCEE Annual Report 2017 items 61 ff.). Then there are the many regulatory and bureaucratic obstacles, including the scepticism of the general population towards the expansion of public infrastructure. ↘ ITEM 556

224. Access to capital is an important requirement for corporate investment. ↘ ITEM 155 In particular, **deficits in the provision of private venture capital** for companies in the start-up and growth phase need to be overcome. ↘ ITEMS 284 FF. By international comparison **bank funding is particularly dominant in Germany** while capital market funding, most notably in the form of equity capital, is underdeveloped, particularly compared to the US. One reason may be the privileged tax treatment given to borrowed capital in Germany, as in most EU member states. The German Council of Economic Experts has therefore called many times for an allowance for corporate equity (GCEE Annual Report 2012 items 385 ff.; Annual Report 2015 items 714 ff.; Annual Report 2018 items 640 ff.) Given the structural change within the financial system, the challenge for the banking and financial supervisory authorities is likely to lie in regulating the **activities of new market players** appropriately while not stifling innovation. ↘ ITEMS 423 FF.

225. The long-term prosperity of an economy hinges on its **ability to innovate**. ↘ ITEM 146 This refers firstly to the creation of knowledge and technical innovation. Research and innovation policy is extremely important, primarily due to externalities. ↘ ITEMS 291 FF. As the **decline in productivity is an international phenomenon**, the need for a change in economic policy is not restricted to Germany. In all economies, national economic policy is required to take action, as it would not be advisable to accept slowing productivity growth just becasust this is taking place elsewhere, too. In addition, international solutions should be sought to increase productivity growth.

226. In many areas such as research and digital services, **economies of scale are significant**. **Coordination at the European level**, taking account of the principle of subsidiarity, is therefore desirable (GCEE Annual Report 2018 items 50 ff.). This could mean: (i) the creation of a digital single market, (ii) the reallocation of financial resources to fundamental research, (iii) alignment of climate policy and energy policy, in particular deeper integration of the electricity market, and (iv) the expansion of the European capital markets union. ↘ ITEMS 288, 298, 313

Strengthening European competition policy with a focus on standardised regulation and low barriers to entry could also boost the benefits of a single market with around 500 million consumers. However, there should not be any promotion or creation of national or European champions. ↘ ITEMS 313 FF.

227. Germany is a very open economy and is tightly integrated into the global economy, which has brought it considerable prosperity gains (GCEE Annual Report 2017 items 657 ff.). Since the financial crisis, however, the ongoing process of integrating the global economy has faltered. ↘ ITEM 207 The positive contribution to productivity growth brought about by this integration is likely to have reduced accordingly. The objective must therefore be to **strengthen the multilateral trading system** in order to further boost the productivity and prosperity gains achieved by the international division of labour (GCEE Annual Report 2018 items 8 ff.). ↘ ITEM 206

A protectionist trade and competition policy that might provoke other countries to introduce reciprocal measures should be avoided at all costs. ↘ ITEMS 318 FF. **Germany** should instead be made more **attractive as a place to do business**, not least **for foreign investors** (GCEE Annual Report 2018 item 18).

228. Alongside the efforts to increase productivity growth, there is a need to **leverage untapped labour market potential** and thereby increase the trend growth rate. That means getting more people into employment, particularly women and older people, reducing long-term unemployment (GCEE Annual Report 2018 items 89 ff.) and encouraging the immigration of skilled workers (GCEE Annual Report 2018 items 96 ff.). A **reform of the tax system** could provide greater incentives to those currently not in employment. ↘ ITEMs 648 ff. In view of the ageing population and the associated burden on social security systems, a **longer working life** may be unavoidable. One option would be to make the retirement age more flexible, particularly by linking it to future life expectancy (GCEE Annual Report 2018 items 108 f.).

A differing opinion

229. One member of the Council, Achim Truger, does not agree with the majority position of the GCEE on the subject of 'Productivity: improving the conditions for growth'. His **differing opinion** relates to the statements on **current account imbalances**, some of the **economic policy implications for productivity growth** and the approach of looking at productivity growth almost exclusively through the lens of increasing (potential) GDP growth.

230. The majority of Council members do not regard Germany's current account surplus as a major problem that needs to be addressed through economic policy, and consequently do not believe that a **specific value for the current account balance** is a useful target for economic and fiscal policy. They state that experience from recent crises, not least in the euro area, showed that excessive current account deficits could be accompanied by the **risk of sharp corrections**, but that this is not true to the same extent for current account surpluses. In addition, the current account balance is said to be dependent on a number of factors and is hard to influence through economic policy.

231. However, Hünnekes et al. (2019a, 2019b) argue that the **German proclivity for current account surpluses** is an **anomaly** when set in a long-term historical context. They point out that the high level of capital export that has been a virtually permanent feature of Germany's economy since 1950 has not been good for Germany. Firstly, the **returns on German foreign capital** are considerably **lower** than the returns achieved by other economies on their exported capital. Secondly, **returns generated abroad are lower than those in Germany**, so greater capital expenditure domestically would make more sense. Thirdly, the foreign investments do not provide **effective hedging against risk**. In their summary, they say: "[...It] is [...] not about questioning German industry's focus on exports or about curbing export volumes. It is about exploring new ways of investing the substantial German savings to produce higher private and social returns at home, instead of continually accepting substantial write-downs on foreign assets" (Hünnekes et al., 2019b).

232. But the German current account surpluses are not just a problem from an isolated national perspective. They also have a **major destabilising effect on the euro area** and the global economy. Current account surpluses and deficits need to be looked at symmetrically. As the French National Productivity Board argues, a combination of permanently relatively slow domestic economic growth and relatively low growth in unit labour costs creates **permanent pressure on partner countries**, particularly within the euro area where there is no longer an exchange rate mechanism that can be used to adjust real effective exchange rates. The resulting tendency towards substantial current account surpluses throughout the entire euro area will have two negative external effects on the member states: firstly, it will cause the euro to appreciate and create disinflationary pressure that is increasingly hard for the ECB to counter as interest rates approach or reach zero. Secondly, the current account surpluses in individual

member states within the eurozone could lead to trade policy conflicts – particularly during the administration of US president Donald Trump (Conseil National de Productivité, 2019, pages 109 ff.).

233. The IMF (2019) also concludes in its **external balance assessment**, which calculates internationally compatible current account balances in medium-term equilibrium, that in 2018, Germany had an equilibrium current account surplus of 2.5 % of GDP, while the actual surplus was 7.3 % of GDP. Accordingly, the real effective exchange rate was found to be undervalued by 13 %. The calculated equilibrium balance also includes a demographic component that the Council majority discusses as an explanatory factor for the high German surplus. However, according to the IMF, the demographic component only accounts for a surplus of less than 1 % of GDP. The majority of the Council themselves come to the conclusion that the real effective exchange rate can explain an additional two percentage points or so of the German economy's current account surplus.

234. Both the IMF and the French National Productivity Board draw the conclusion that an overly restrictive fiscal policy has contributed to the surpluses. Accordingly, a **more expansionary fiscal policy** in **countries that run a current account surplus** could play an important role in **countering current account imbalances**. According to the IMF (2019, pages 17 f.), within the euro area where accommodative monetary conditions remain necessary to support the return of area-wide inflation to its target, fiscal policy in key creditor economies (Germany and the Netherlands) could be used to boost potential growth through **infrastructure investments** and greater support for innovation. And in Germany, where the current account surplus is associated with rising top income inequality, further **tax relief for low-income households** could boost their disposable income and support domestic demand, while **property and inheritance tax reform** could help reduce excess saving and wealth concentration.

235. The Council majority is proposing some very specific measures to **increase productivity growth**. In some cases it is not clear how the above diagnosis and analysis has led the Council to propose these particular measures, and why and to what extent they would be capable of increasing productivity in Germany. As frequently mentioned in the text, the **productivity slowdown** is part of a **long-term global trend** affecting all developed economies. Moreover, the growth in labour productivity and total factor productivity (TFP) in **Germany** was **not particularly remarkable by international comparison**. Almost none of the rolling five-year averages are at the bottom end of the EU range; since the financial crisis (in the case of TFP) and since 2012 (labour productivity) they have even tended to be at the upper end. ↘ CHART 31

236. The causal analysis discusses a wide range of approaches, which is a very instructive exercise. However, because of the large number of views represented in the literature, including some fairly controversial ones, there is **no persuasive explanation** for the productivity paradox or the differences in the productivity growth of different economies. Such an uncertain basis is hardly appropriate for drawing **clear economic policy implications** for structural reforms in Ger-

many promising a perceptible productivity boost. If structural reforms could easily unleash productivity growth, then why does no developed economy appear to have succeeded in decoupling itself from the international downward trend in productivity growth with any of a wide variety of structural factors.

237. The majority view of the Council is that the slowdown in the rate of new business start-ups in Germany could be due to **product and labour market regulation**. Although this is decreasing, it is still said to be high by international comparison. The Council therefore believes a further reduction of market access barriers is called for, especially in the service sector. Aside from general doubts with regard to the assumed mechanisms by which this would work, many of the usual OECD indicators for **labour market regulation** (protection against dismissal, amount and duration of earnings replacement benefits, trade union density, collective pay bargaining coverage), place **Germany in the middle** of the **EU rankings**. The same applied in 2013 for the overall indicator for **product market regulation**, which shows a **low level of regulation** (GCEE Annual Report 2015 Chart 94). Only in the area of business services was the indicator significantly higher; here it was **at the top end of the middle of the table**. According to the OECD, the indicator for administrative hurdles to business start-ups is significantly below the OECD average.

238. The Council majority argues that deficits in the provision of private venture capital for companies in the start-up and growth phase need to be overcome. One reason for this relates to the privileged tax treatment of debt capital. The Council therefore repeats its call for its previously developed concept of **interest-rate-based tax exemption for share capital** in connection with corporation taxation. However, that would further promote the dualisation of income tax and would **violate** the **principle of horizontal equity**, i.e. equal tax treatment of all types of income, even more severely than the flat rate withholding tax.

239. **The interest-rate-based tax exemption for share capital** would reduce **government revenues** in the short term by between €2.8 and 5.6 billion and in the long term by between €3.5 and 7 billion, depending on the underlying imputed interest rate (GCEE Annual Report 2018 table 25). Ninety per cent of such tax relief on company profits would benefit the **top 10 % of taxpayers** (Bach and Buslei, 2017, table 3, 4). The redistribution of the tax burden from top to bottom, which has been going on since the start of the new millennium, if not before, ↘ ITEM 719 would thus continue. In the coalition agreement, the parties of government however agreed to **scrap flat-rate withholding tax on interest income** with the aim of creating taxation that is neutral in terms of investment decisions. If interest rates were to rise in future, this could lead to a slight rise in tax revenues. Around 60 % of the additional tax burden is likely to fall on the top 20 % of taxpayers, and would therefore be progressive (Bach and Buslei, 2017, table 3, 4).

240. The Council majority believes that an internationally competitive tax system is very important for private-sector investment activity. The **increase in international tax competition** and decreasing rates of tax on profit means that fiscal policymakers face the challenge of creating an attractive business and regula-

tory environment for private-sector investment in Germany while at the same time providing a functioning public infrastructure. The first thing to say here is that Germany does not have to simply accept international tax competition, as **Peter Bofinger** argued in his **differing opinion last year** on the fiscal policy position of the Council majority (GCEE Annual Report 2018 items 645 ff.): "Rather, Germany should do everything it can at European level to prevent **tax competition and its draining effect**."

241. When emphasising the importance of an internationally competitive tax system for private investment activity, however, it must be borne in mind that **high quality public infrastructure** is also a key factor for private-sector capital investment. **Cuts to corporate tax rates** on the scale under discussion are **fiscally expensive**: the Advisory Board to the Federal Ministry of Finance (2019) calculates that its proposal to reduce corporation tax from 15 % to 10 % would reduce tax revenues by just under €14 billion, before taking into account any adjustments in reaction to the cuts. Unquantifiable negative effects arising from tax relief for individuals trading as a company have to be added to this sum. The complete abolition of the solidarity surcharge and introduction of the interest-rate-based tax exemption proposed by the Council majority would cost €13 to €17 billion (GCEE Annual Report 2018 items 639 ff.). This type of structural burden on the government budget poses **major risks to public finances** in view of the debt brake and the reduced tax revenues expected as a result of cyclical effects combined with a procyclical economic correction. This would make it more difficult to fund a high quality infrastructure programme.

242. The Council majority opinion does not systematically pursue explanations that try to account for the growth of TFP in part via the **long-term effects of short-term shocks** (total factor productivity hysteresis). Ball (2014), for example, examines the long-term effect of the great recession in OECD countries. Adler et al. (2017) see expansionary macroeconomic policy, in particular in the form of **public infrastructure investment**, as a means of increasing productivity growth primarily in the European countries badly affected by the financial crisis.

243. Ultimately, the approach of the majority of Council members – which examines the increase in macroeconomic productivity almost exclusively through the lens of the rise in the trend growth rate – is by no means the only possible viewpoint. **Productivity growth** does not necessarily only have to be used to increase growth – it can also be used to **reduce working hours** and thus increase **intangible prosperity** in the form of more leisure time. This is why it is problematic to use the USA's very high per capita income as a benchmark for other economies and thus implicitly hold it up as a model. The high per capita income of the United States – particularly in comparison to Germany and France – is based not on being significantly better in terms of productivity per person hour, but first and foremost on longer working hours per worker.

244. Accordingly, the use of high productivity per person hour to enable shorter working hours for each worker in Germany can – as the Council majority also mentions – be regarded as an expression of a **greater preference for leisure ti-**

me (Blanchard, 2004). A greater **degree of labour market regulation and trade union organisation** is an important factor in this regard (Alesina et al., 2006). Furthermore, the lower income inequality in comparison to the US may mean that individuals are less exposed to social consumption norms that are associated with **inequality** (Bowles and Park, 2005; Oh et al., 2012). The conclusion that an ageing population makes a longer working life inevitable is therefore far from compelling.

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