

08 LABOUR MARKET: SECURING THE SUPPLY OF SKILLED WORKERS IN THE DIGITAL TRANSFORMATION

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This is a translated version of the original German-language chapter "Arbeitsmarkt: Fachkräftesicherung im digitalen Wandel", which is the sole authoritative text. Please cite the original German-language chapter if any reference is made to this text.

Summary

Germany's labour market is in great shape. Employment increased again strongly this year, and the number of unemployed is set to fall below 2.6 million for the first time since reunification. Furthermore, employees have experienced tangible increases in real wages over the last few years. In 2018, the volume of work is likely to exceed its previous record level set up in 1991. The **rapid increase in employment** in recent years has by no means been mainly due to a rise in atypical employment. On the contrary, the number of people in normal employment has risen especially strongly, so that atypical employment as a percentage of total employment actually declined slightly, despite the continued rise in part-time employment.

In the past few years, the labour market has thus successfully adjusted to the challenges posed by technological progress and the intensified international division of labour. The extent of this **structural change** is reflected, for example, in a high proportion (around 22%) of apprentices in vocational training occupations that did not even exist in their present form in 2000.

Digitisation involves an ever-deeper division of labour in the organisation of work processes, and changes in the skills required suggest a similarly intense structural transformation in the future. At the same time, the decline in the potential labour force – as the baby-boomers who were born in the 1960s enter retirement – will accelerate in the next decade. The rising number of job vacancies already indicates that it is becoming increasingly difficult for companies to find suitable employees. Although it may still be too early to speak of a comprehensive shortage of skilled workers, an increasing number of **bottlenecks** can already be observed in some industries and regions.

Despite the good situation on the labour market, it will be difficult to reduce the still-high number of long-term unemployed and to integrate the large number of recognised asylum seekers into the labour market. In order to counteract the impending bottleneck of skilled labour, it will be important to make better use of the existing labour potential, especially women and older people, to boost investment in education and further education, and to minimise the number of barriers standing in the way of rapid structural change in the labour market. In addition to training recognised asylum seekers to give them better qualifications, it would make sense to extend the **controlled immigration** of academics from non-EU states to include qualified skilled workers without academic qualifications.

In addition, **digitisation offers considerable opportunities** for countering impending bottlenecks in the labour supply. However, this requires a suitable regulatory framework on the labour market, for example the modernisation of the Working Hours Act. In addition, the digital infrastructure should be further enhanced and the labour force of the coming decades better prepared for the digital working world of tomorrow by providing corresponding opportunities in school education.

I. LABOUR MARKET IN VERY GOOD SHAPE

712. The labour market is currently rushing **from one employment record to the next**. There were 44.3 million people in gainful employment in August 2017, nearly 690,000 more than in the same month of the previous year. The number of people in employment in Germany rose by 4.3 million between 2005 and 2016. At the same time, this year unemployment will be at its lowest level since reunification with an average of fewer than 2.6 million people. There is still no end in sight to the upward trend in employment. In 2017, there is likely to be a further increase of 660,000 in the working population compared to the previous year, to be followed by over 500,000 in 2018. [↪ ITEMS 306 FF.](#)
713. Furthermore, **wages are rising much faster** than in the last decade. Since 2011, real wages have gone up by an average of 0.6 percentage points more per annum than productivity per hour worked. The increases in real wages over the last two years – 2.3 % and 2.7 % respectively – were the highest since 2009. [↪ ITEM 275](#)

Likewise, frequently expressed fears that the strong increase in employment was mainly due to the expansion of atypical employment have also proved to be unfounded. For example, it has been primarily the increase in the number of normal jobs that has contributed to the growth of employment in recent years. By contrast, the **importance of atypical employment has** recently **fallen** slightly. However, the still-high number of unemployed people illustrates that not everyone is benefiting from the good labour-market situation. There are also challenges as regards the integration of recognised asylum seekers into the labour market; this will require considerable staying power from all concerned.

714. Ongoing **digitisation will sustainably change the world of work**. A growing proportion of the activities currently carried out by humans will be automated. At the same time, new activities will emerge within existing occupations, and completely new employment possibilities will open up. It is not to be expected that the bulk of jobs will be permanently replaced by machines as long as people are sufficiently willing to acquire new skills and take on new activities. Furthermore, structural change must not be impeded by excessive interference from regulatory, industrial or regional policy.

1. Importance of atypical employment is declining

715. The positive situation on the labour market is reflected by a large number of people in employment and by the number of **hours worked**, which in 2018 is expected to exceed the previous 1991 record level of 60.3 billion hours. Since other forms of employment have gained in importance alongside normal employment relationships, the hours worked are spread over many more shoulders – with more than five million additional employees compared to 1991. The **dynamics of employment** over the last decades **differed considerably** between normal employment and atypical employment.



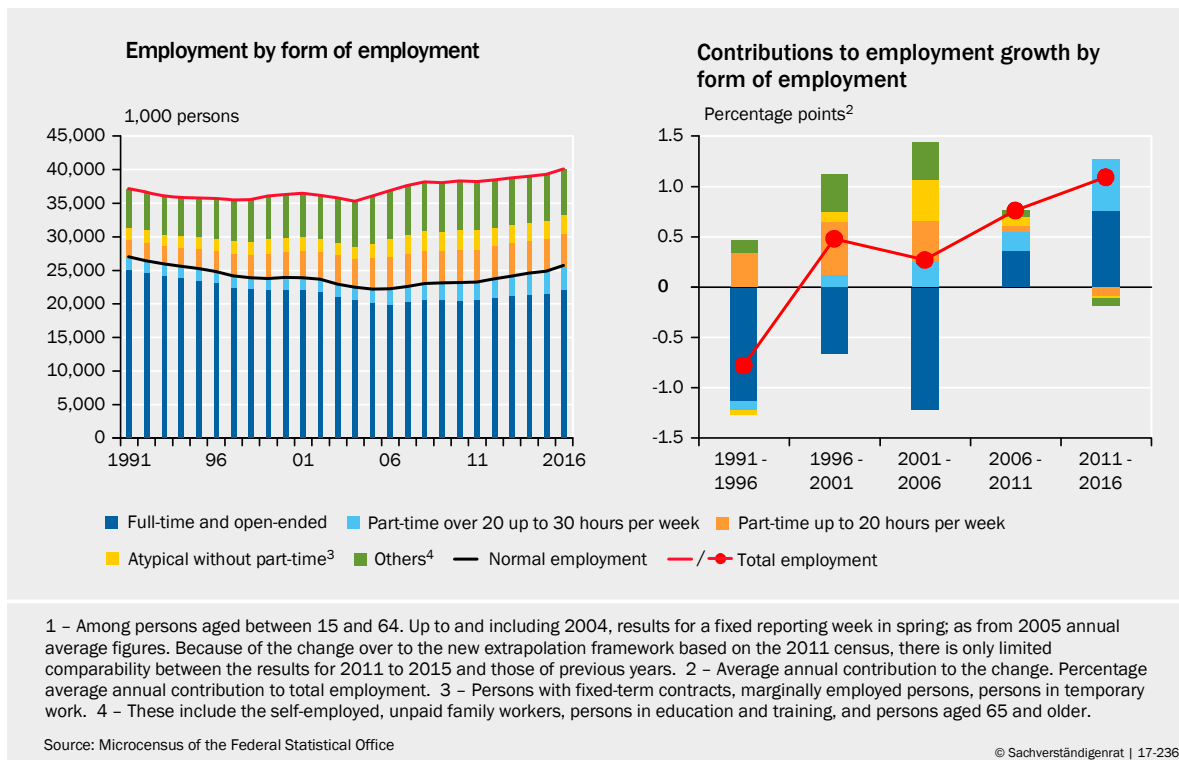
According to the Federal Statistical Office's definition, a **normal employment relationship** is a dependent employment relationship that applies to people between the ages of 15 and 64 who work permanently full-time or part-time for more than 21 hours per week and who work directly in a company. By contrast, **atypical employees** in the same age group include employees with fixed-term contracts, the marginally employed, temporary workers, and part-time employees working up to 20 hours per week. Self-employed persons do not have a dependent employment relationship and are therefore not taken into account in the division between normal and atypical employment. That this definition is not unequivocal is shown by two analyses of the risks of atypical employment that were compiled within the framework of the Federal Government's Fifth Report on Poverty and Wealth. Unlike the Federal Statistical Office's definition, both of these studies define a normal employment relationship as requiring at least 31 hours per week (RWI, 2015; Thomsen et al., 2015). Unless otherwise stated, the German Council of Economic Experts (GCEE) uses the Federal Statistical Office's definition.

Normal employment continues to grow vigorously

- 716.** Between 1991 and 2006, over five million normal employment relationships were replaced by different forms of atypical employment. [↘ CHART 89 LEFT](#) During this period, the number of open-ended full-time jobs fell by around 1 % per year. Subsequently, both atypical and normal employment rose slightly until 2011. Between 2011 and 2016, the number of atypical employees eventually fell slightly, while the **number of persons in normal employment rose considerably**. Additional open-ended full-time jobs made a particularly strong contribution (0.8 percentage points per annum) to employment growth during this period. [↘ CHART 89 RIGHT](#) On the assumption that the quality of a normal employment relationship is higher than that of an atypical job, the quality of all jobs has improved accordingly in recent years. However, many workers deliberately opt for atypical employment, so that this assessment is not always true.
- 717.** Atypical employment increased steadily from the mid-1990s, particularly as a result of increases in part-time employment and the number of marginally employed persons. In 1993, about 15 % of all employees were atypically employed, and by 2007 this figure had grown to 26 %. In the following years, the **importance of atypical employment decreased slightly**. It accounted for 23 % of all wage and salary earners in 2016. [↘ CHART 90 TOP LEFT](#) If employment relationships with over 20 and up to 30 working hours per week are also regarded as atypical, the proportion of atypical employment, at around 33 %, has been roughly constant since 2006 due to the recent dynamic development of part-time employment with over 20 hours per week.
- 718.** However, the percentage figure for atypical employment that is calculated on the basis of the microcensus – a representative survey of households covering 1 % of the total population – is likely to be **below the true figure**. For, according to a study that merges the information from this survey of households with administrative data from the Federal Employment Agency and public employers, only 77 % of all exclusively marginally employed persons categorise themselves as gainfully employed in the microcensus. Especially retired people and students

↘ CHART 89

Development of employment¹



who are marginally employed frequently regard themselves as non-employed (Cröbmann and Eisenmenger, 2016).

Using linked data from the National Educational Panel Study and administrative personal data from the Institute for Employment Research (IAB) for the period from 2007 to 2012, Thomsen et al. (2015) calculated an average **share of 35 %** (or 44 % including part-time employees working 21 to 30 hours per week). Although the lack of clarity in the microcensus influences the level of atypical employment, its development is not likely to be affected by it if the erroneous self-assessment in the case of marginal employment does not change over time.

Percentage of fixed-term and marginal employment is declining; temporary work is increasing

- 719. Contributory factors to the fall in atypical employment in the last few years have included the relative declines in part-time employment under 20 hours per week, in marginal employment, and in fixed-term employment. Between 2007 and 2016, the number of persons employed on a fixed-term basis 'against their will' who wished for an open-ended employment contract fell as a percentage of all fixed-term employees from over 50 % to 36 %. This figure was thus recently below the level observed at the turn of the millennium (Federal Statistical Office, 2017a).

Fixed-term employment relationships are common in public service, where about 60 % of the new employment contracts in the first 6 months of 2014 (outside the academic sphere) had fixed terms, compared to approximately 40 % in the private sector. Fixed-term employment was most pronounced in academia

at 87 % of new contracts (Hohendanner et al., 2016). While public employers, who are constrained by particularly strict rules on protection against dismissal, mention the need to have stand-ins and a lack of budgetary posts as the most important motives for fixed-term contracts, the main reason in the private sector is the desire to test the quality of new employees.

720. **Marginal employment** was liberalised under the Hartz II reform, which entered into force on 1 January 2003. It grew significantly by about a million people between 2003 and 2004, according to the Federal Employment Agency (BA). Since then, it has increased only among marginally employed people with a second job, who are under-represented in the microcensus. While their number has almost doubled since 2004 to approximately 2.7 million people, according to the Federal Employment Agency the number of exclusively marginally employed remained stable up to 2014 at around five million people. The **increase in second jobs** was probably mainly due to the good absorptive capacity of the labour market, the moderate wage development, the sharp increase in services and part-time working, and changes in legislation (Klinger and Weber, 2017).

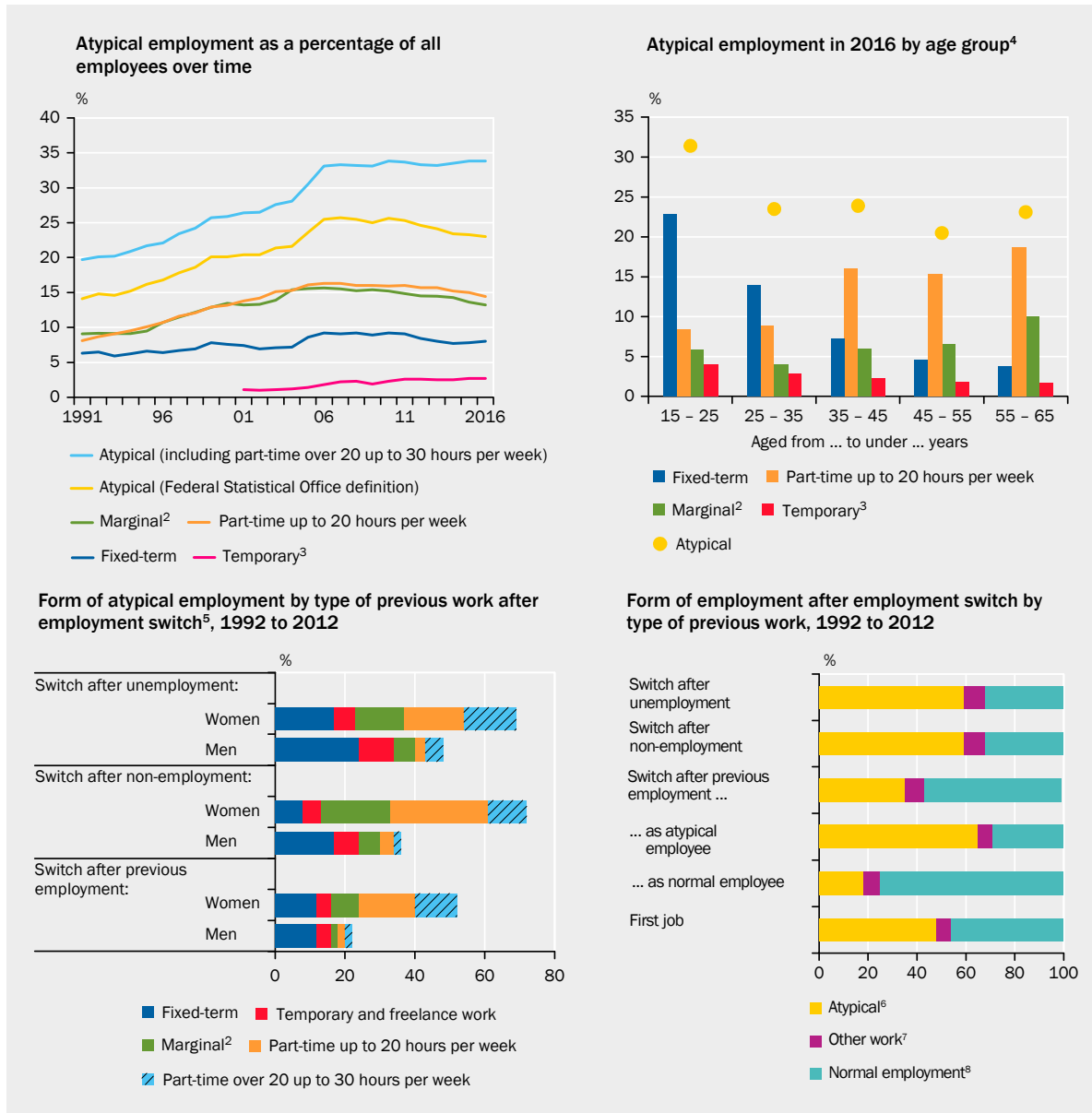
The introduction of the minimum wage led to a marked (seasonally adjusted) fall in marginal employment of 92,000 persons or 1.8 % between December 2014 and January 2015 (vom Berge et al., 2017). Up to now, **employment relationships** that were **converted** from marginal jobs to jobs subject to social security contributions when the minimum wage was introduced have **hitherto not been less stable** than such conversions were in the past (vom Berge and Weber, 2017).

721. Only the **percentage of temporary workers has continued to rise** in the last few years relative to total employment. According to the Federal Employment Agency, approximately one million people were in temporary work in 2016, nearly 300,000 more than in 2007. However, this group still only constitutes a small proportion of total employment with about 3 % of all employees.
722. Atypical employment is particularly common among women, persons without a recognised vocational training, and young people. In 2016, about 20 % of over-45-year-olds were atypically employed, while the figure for persons under the age of 25 was 31 %. The form of **atypical employment varies greatly with age**. Six times more under-25-year-olds are in fixed-term employment than people over the age of 55. [↘ CHART 90 TOP RIGHT](#) Furthermore, the proportion of employees in temporary work is more than twice as high among the under-25s than among the over-55s. On the other hand, the latter work part-time more than twice as frequently and are more frequently marginally employed than young workers under 25.
723. In 2016, **atypical employment** accounted for a **higher** proportion of total employment **in western Germany** (approx. 24 %) than in eastern Germany (18 %). Among other factors, this is because east German part-time employees tend more frequently than west Germans to work more than 20 hours per week, so that they are not included in the usual definition of atypical employment.

724. For people who do not have a job, **atypical employment often serves as a first step** into employment. This applies particularly to women. Between 1992 and 2012, more than half of women who switched from unemployment or economic inactivity to employment were first atypically employed. ↘ CHART 90 BOTTOM LEFT Especially if women were not gainfully employed previously, they tended to work primarily in marginal employment or part-time. Men who began an atypical form of employment in the same period mostly took on fixed-term employ-

↘ CHART 90

Atypical employment in Germany¹



1 – Persons aged between 15 and 64. Break in the time series in 2005 and 2011. Comparability of results with those of previous years is limited. 2 – Exclusively marginally paid employees as a percentage of all employed persons. Source: Deutsche Bundesbank. No data available before 2000. Figures before 2000 are chained back on the basis of the deviation between the percentages given for the marginally employed in the microcensus and in the administrative data of the Federal Employment Agency (FEA). 3 – In relation to all employed persons. Source: FEA. 4 – As a percentage of all employees. Multiple answers possible 5 – Normal employment or other work makes up the difference to 100%. When individual employment relationships can be attributed to several of the atypical forms of employment, the employment forms are allocated to one of the atypical forms of employment according to the following dominance rule: a) freelance work, b) minijob/marginal employment, c) temporary employment, d) part-time work, e) fixed-term employment. 6 - Including part-time employees working over 20 up to 30 hours per week. 7 – Self-employed persons and employees who cannot be exactly categorised due to a lack of detailed information in the data. 8 – Excluding part-time employees working over 20 up to 30 hours per week.

Sources: Federal Statistical Office, RWI (2015)

ment. Especially after a phase of unemployment, men are more likely to be atypically employed. This finding is consistent with the results of Rothe and Wälde (2017), according to which unemployed persons increasingly switched to atypical employment between 2005 and 2009.

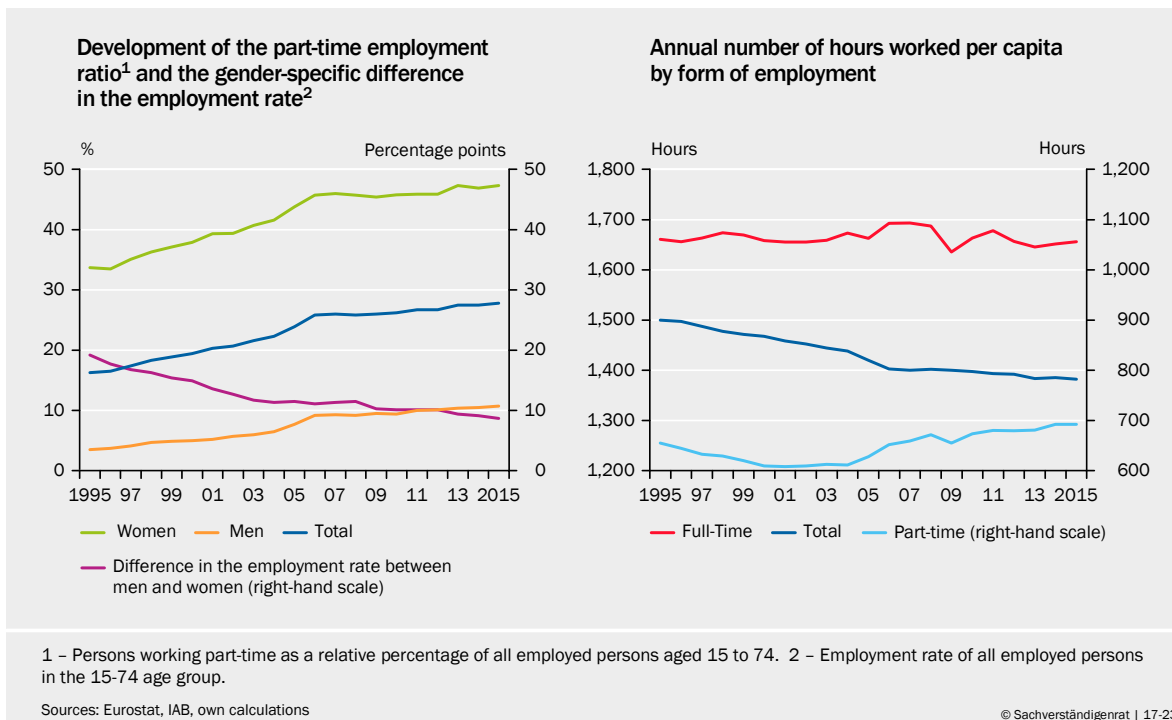
725. Changes in employment show a **high degree of persistence**. People who had an atypical job before the change of employment continue in atypical employment after the change much more frequently than those who were in normal employment before the change. [↘ CHART 90 BOTTOM RIGHT](#) However, the degree of persistence is not high enough to justify speaking of a fully segmented labour market (RWI, 2015). Around 30 % of the atypically employed worked in a normal employment relationship after the change of employment; just under 20 % of persons in normal employment who switched their workplace were subsequently atypically employed. There is little evidence to suggest that the disadvantages of atypical employment – e.g. as regards the amount of earned income – continue after a successful transition into normal employment. However, in the short and medium term atypical employees are initially more frequently economically inactive than normal employees (RWI, 2015).
726. The risk of becoming unemployed is significantly higher for employees in fixed-term employment and particularly in temporary work than for those in part-time or marginal employment. In the case of the first-named groups of people, this is reflected in a lower level of job satisfaction and in their standard of living (RWI, 2015; Thomsen et al., 2015). Yet even **pronounced lock-in effects** of part-time and marginal employment would not be a disadvantage in many cases, since people in such forms of employment are not usually looking for a full-time job. In particular, these forms of employment enable women to increase their labour-market participation.

Increasing labour-market participation by women continues

727. The increased participation by women in the labour market has led to a **convergence** between the **employment rates of men and women**. This ratio relates the number of employed persons aged 15 to 74 to the total population in this age group. In 1993, the ratio for men was still more than 20 percentage points higher than for women. This difference had been significantly reduced to around 9 percentage points by 2015. [↘ CHART 91 LEFT](#)
728. This development had a direct impact on the part-time employment ratio. Because of the increase in part-time employment and the simultaneous decline in normal employment, the part-time ratio rose markedly from approx. 15 % (32 % for women and 3 % for men) in 1993 to approx. 26 % (46 % for women and 9 % for men) in 2006. This development has slowed down in about the last ten years. [↘ CHART 91 LEFT](#) The continuing increase in part-time employment has since been almost offset by an increase in normal employment of comparable magnitude, which is why the **part-time ratio has no longer risen noticeably**.
729. One consequence of the higher part-time employment ratio was the **downward** trend in **average working hours** per employee (Burda and Seele, 2017).

▸ CHART 91

Part-time employment in Germany



▸ CHART 91 RIGHT In 1993, employees worked an average of over 1,500 hours; by 2015, that figure had fallen below 1,400 hours. This decrease is due solely to the increased importance of part-time work. While the number of hours worked by full-time employees remained approximately constant over the entire period at an average of around 1,660 hours per year, hours worked by part-time workers actually increased from 600 to 700 hours between 2004 and 2015. Because the part-time ratio has remained almost constant since 2006, the average number of working hours per employee has only fallen slightly since then.

730. Women and men often have **different reasons for taking up part-time employment**. Whereas men often work part-time because they cannot find a full-time job, or are doing an apprenticeship or studying, the main motive among women is the need to look after children or dependent adults (Wanger, 2015). In addition, a part-time job makes it easier for employees to reconcile private and occupational interests. In the long term, however, part-time employees are at a disadvantage compared to full-time workers. For example, with increasing work experience full-time employees receive higher wage rises in percentage terms than part-time employees (Boll, 2010). In addition, part-time workers make less use of continuing training opportunities (Wanger, 2015). Overall, part-time workers typically acquire lower personal pension entitlements.

731. The **part-time employment of women** in particular is **high** by international comparison. Only the Netherlands (77 %), Switzerland (61 %) and Austria (47 %) reported higher part-time ratios by women in 2015, according to Eurostat. At the same time, women in Germany have an above-average participation rate. According to the OECD, in 2016 only in Sweden and Iceland did more women between the ages of 15 and 64 participate in the labour market than in Germany (78 %).

732. At the same time, according to Eurostat the proportion of part-time workers who say they would like to work more hours is lower in Germany than in almost any other European country. For example, more than half of all part-time workers in Spain, Portugal and Greece express a **desire for more working hours**, compared to less than one in six in Germany. Furthermore, the percentage of people in Germany who stated they were working part-time involuntarily almost halved between 2007 and 2016, according to figures from the OECD, while this figure has risen in most European countries (OECD, 2017a).
733. However, **international comparisons** should be **interpreted with caution**. Especially when people are asked about how many working hours they would prefer to work, it must be taken into account that the answers can be greatly influenced by how the question is phrased (Rengers et al., 2017). Because questionnaires are country-specific, the resultant measurement errors are likely to be relevant. Yet country-specific institutional differences are probably more important. In Germany, for example, incentives for a second earner to work are reduced both by the income-tax splitting rule for spouses (Bick and Fuchs-Schündeln, 2017a, 2017b) and by premium-free insurance coverage for spouses in statutory health insurance (GCEE Annual Report 2013, items 628 ff.). The increased provision of childcare has enabled more employees to realise their wishes on working hours and has probably thus reduced the extent of involuntary part-time work.

This seems to be relevant for women especially, since their participation in the labour force and their preferences in working hours vary greatly depending on whether they share a household with a partner or with children. For men, by contrast, the **household constellation** is of little importance (Lietzmann and Wenzig, 2017).

734. Whereas capacity underutilisation has increased in most European countries, it roughly halved in Germany between the fourth quarter of 2005 and the fourth quarter of 2016 (ECB, 2017). However, **labour-force potential is not yet exhausted**, especially among women. On the one hand, the employment ratio of 15- to 74-year-old women in 2015, at 70 %, was still about nine percentage points below that of men. On the other hand, it is probably even more important to support people who are already gainfully employed and working part-time by improving framework conditions in such a way that they can work more hours. One example here is expanding all-day care for children throughout the country.

↘ ITEMS 775 FF.

2. Obstacles on the road to full employment

735. The **gratifying situation on the labour market** is due not only to the positive current economic development, but also to the wage restraint exercised between the mid-1990s and the mid-2000s, which markedly improved German competitiveness (Dustmann et al., 2014). Furthermore, the 'Agenda 2010' reforms helped to provide incentives to create new jobs and to significantly reduce

structural unemployment (Krause and Uhlig, 2012; Burda and Seele, 2017) – which is currently around the West German level of 1980. [↪ BOX 5](#)

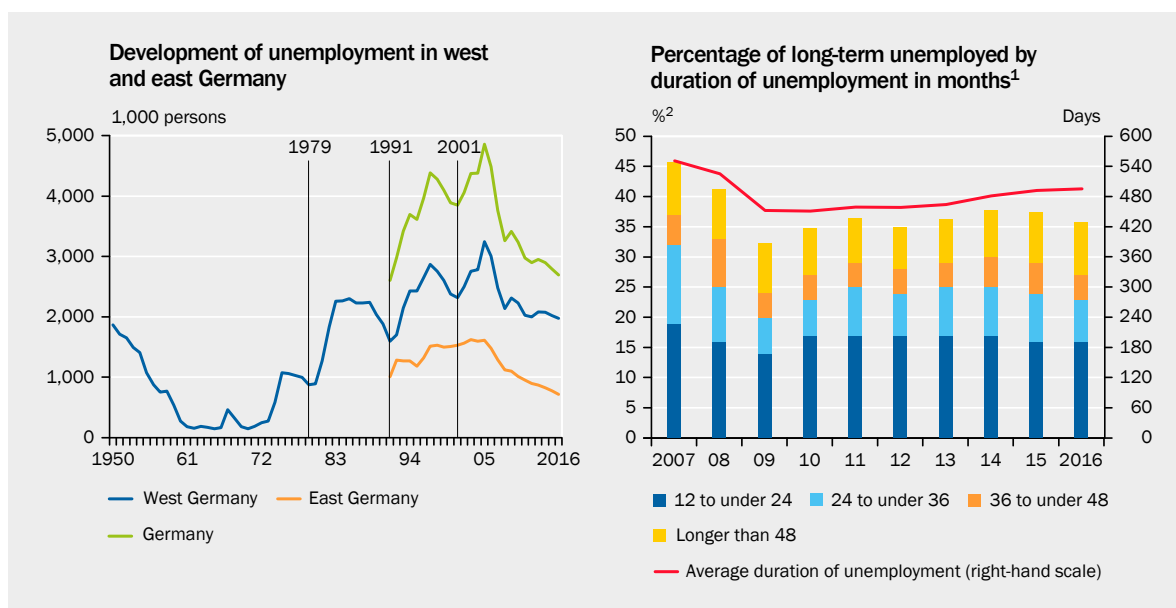
Entrenched unemployment remains a problem

736. This **broke a long-prevailing labour-market cycle** during which unemployment had not returned to the level prior to the previous low since the 1970s. The fall in unemployment between 2001 and 2016 was particularly marked in east Germany. 2001 marks the previous low in Germany as a whole. In the intervening periods between the two previous lows (1979 to 1991 and 1991 to 2001), by contrast, unemployment in west Germany had risen strongly, due not least to a demographically caused, comparatively large young labour force. [↪ CHART 92 LEFT](#)

Compared to 1970, however, when there was full employment in west Germany, **unemployment remains high**. Despite the favourable overall situation on the labour market, the positive economic development is not benefiting the whole labour force. Although long-term unemployment has been decreasing gradually for several years and fell below the million mark in 2016 for the first time this century, the number of people who have been unemployed for four years or more increased slightly compared to the previous year (Federal Employment Agency, 2017a).

737. Since 2011, furthermore, the average duration of unemployment has risen slightly. [↪ CHART 92 RIGHT](#) This is probably largely due to composition effects as an **entrenched core of unemployment** has increasingly developed in recent years. Many of the long-term unemployed have an unfavourable combination of the characteristics that are important for success on the labour market (GCEE An-

[↪ CHART 92](#)
Unemployment in Germany



1 – The short-term unemployed in the respective year who have been unemployed for less than twelve months make up the difference to 100 %. 2 – In relation to the total number of unemployed for the year in question.

Source: FEA

nual Report 2016, item 739). In their case, a return to the labour market is difficult to achieve using the existing instruments of labour-market policy.

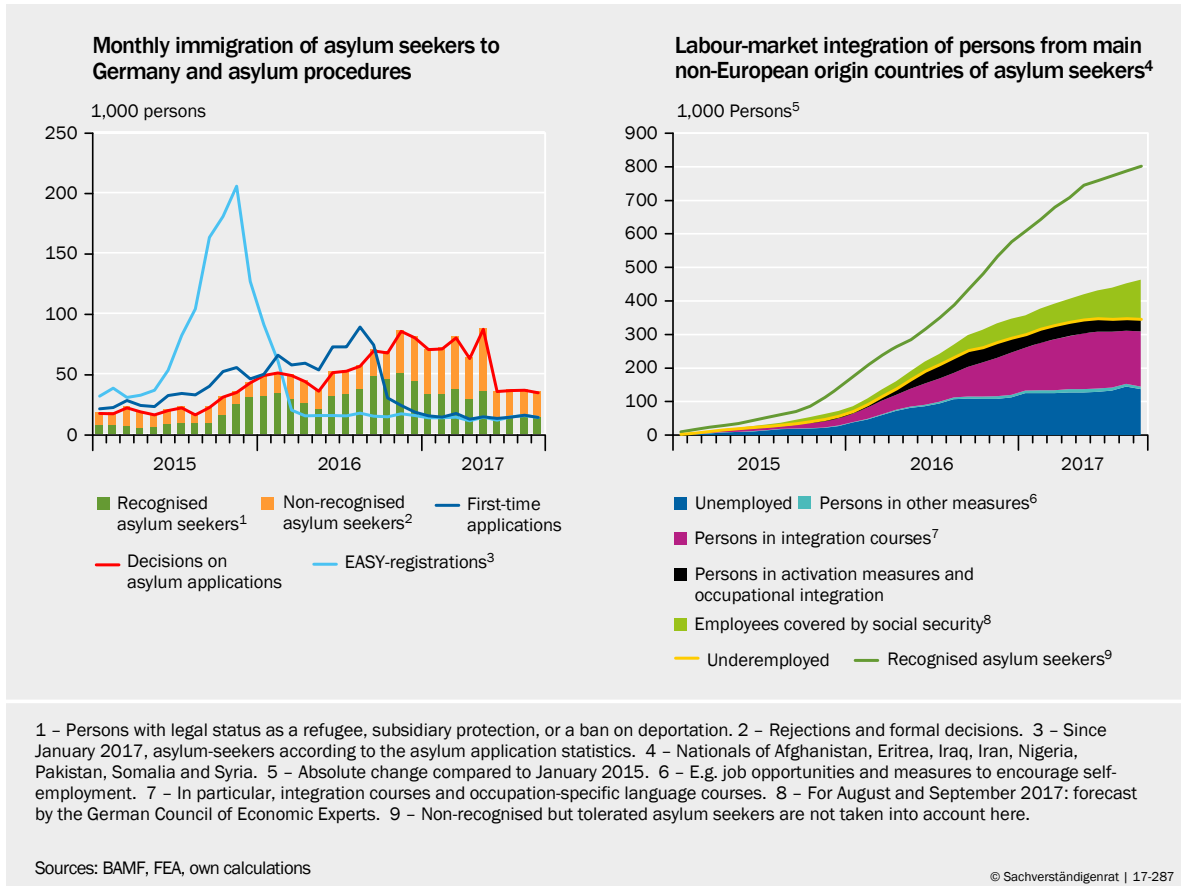
This also highlights the problems involved in making a clear definition of full employment. The definition of the GCEE from 1967 – that full employment is reached if the unemployment rate is no higher than 0.8 % – should no longer be up to date (GCEE Annual Report 1967, item 248). However, it may be difficult to lay down a meaningful, different maximum unemployment rate suitable for unequivocally identifying full employment.

Integration of recognised asylum seekers takes time

738. Labour-market policy faces another challenge in the coming years with the integration of recognised asylum-seekers. The **inflow of refugees slowed further** in 2017. Since March 2016, the number of asylum seekers has levelled off at under 20,000 people per month. [↘ CHART 93 LEFT](#) The amount of time between a refugee's arrival in Germany and their filing of an application for asylum shortened considerably in the course of 2016. Next to the decline in numbers, this is due the Federal Office for Migration and Refugees (BAMF) having increased its capacities. However, the average duration of asylum procedures up to an administrative decision lengthened again in the first quarter of 2017 compared to 2016 (Federal German Parliament, 2017). Among other things, this increase can be attributed to the fact that an increasing number of applications from previous periods were processed, which pushed up the average processing time.
739. Since June 2017, the decline in asylum applications has been reflected in a significantly lower monthly number of asylum decisions taken. [↘ CHART 93 LEFT](#) The overall protection rate up to September 2017 fell from 63 % to 44 % compared to the same period of the previous year (BAMF, 2017). **Subsidiary protection** was granted in almost **40 %** of positive asylum decisions until September 2017. Here, unlike for recognised asylum seekers under the Geneva Convention, the residence permit is initially limited to one year, and family reunification is not granted until further notice. This percentage had been as low as 1 % in 2015. The number of cases pending has declined significantly since its peak in September 2016 (with 580,000 cases) to below 100,000 cases in September 2017.
740. There is some uncertainty about how many of the 800,000 asylum seekers who have been recognised since 2015 are still in the country and how high the family reunification rate per recognised asylum seeker will turn out to be in the coming years. By the end of 2017, there are likely to be some 600,000 adult refugees with protection status living in Germany, including 400,000 people under the Geneva Convention and 200,000 persons with subsidiary protection. Since the majority of refugees' children and spouses are already in Germany, and many other refugees are single, the number of family members entitled to enter the country for **family reunification** is likely to be approximately **0.3 family members per recognised asylum seeker** (Brücker, 2017). This figure is significantly lower than the estimate made by the BAMF in the autumn of 2015, according to which there could be 0.9 to 1.2 family members for each recognised asylum seeker.

↘ CHART 93

Development of the inflow of refugees in Germany



By the end of 2017, between 100,000 to 120,000 spouses and under-age children living abroad are likely to be **entitled to family reunification**. Including the family members of refugees with subsidiary protection increases this number by between 50,000 and 60,000 (Brücker, 2017).

- 741. Responsibility for the refugee challenge is increasingly shifting from the BAMF to the BA and the judiciary system. Courts are under mounting pressure because many rejected asylum seekers are appealing against their deportation and thus delaying their departure. In 2016, **lawsuits were filed** against over half of the approximately 175,000 asylum rejections. In addition, at the end of February 2017 there were more than 50,000 pending lawsuits by recognised asylum seekers with subsidiary protection seeking legal status as refugees under the Geneva Convention. In 2016, the requested residence permits were granted in around three-quarters of these lawsuits (Federal German Parliament, 2017).
- 742. From the beginning of 2015 until September 2017 there was a **significant increase** (approx. 340,000 people) **in the number of underemployed persons** among asylum-seekers from eight non-European countries of origin, i.e. Afghanistan, Eritrea, Iran, Iraq, Nigeria, Pakistan, Somalia and Syria. ↘ CHART 93 RIGHT They include people registered as unemployed, as well as participants in training measures, activation measures and occupational integration. However, these figures have hardly increased in the past few months. More than half of the people are currently taking integration courses, e.g. language lessons. Many recognised asylum seekers have been able to avoid unemployment for the time be-

ing due to the widespread creation of integration measures, especially language courses, during 2016.

743. This explains why unemployment figures among recognised asylum seekers have risen only slightly since the summer of 2016. The expiry of the integration measures for many recognised asylum seekers as from autumn 2017 is likely to lead to a significant **increase in unemployment among recognised asylum seekers**, unless this is compensated by subsequent training programmes for recognised asylum seekers.
744. Employment subject to social insurance contributions within this group of people rose by nearly 100,000 between January 2015 and July 2017. [↘ CHART 93 RIGHT](#) **A more dynamic rise in employment is only expected in the next few years** (GCEE Annual Report 2015, item 530; Andritzky et al., 2016). The results of a representative survey among refugees show that 9 % of those who entered the country in 2015 stated that they were gainfully employed in the summer of 2016. The employment ratio at the same point in time was 22 %, i.e. more than twice as high, for people who already arrived in Germany in 2014, and 31 % for those who came in 2013 (Brücker et al., 2016). The IAB therefore continues to expect that, as with previous refugee cohorts, 50 % of refugees of working age will probably be gainfully employed within five years (Brücker et al., 2017).
745. This assessment is quite plausible. Former refugee cohorts probably found it easier to gain access to the labour market due to their greater cultural proximity and **higher level of education**. According to a survey conducted among refugees, a high proportion (37 %) had no school-leaving certificate or had only attended elementary school – or no school at all (Sirries and Vallizadeh, 2017). In addition, the influx of refugees is much larger than in the past. On the other hand, the situation on the labour market is much better now than it was during the mid-1990s, for example.

Furthermore, the **more active integration policy** practised today is likely to promote integration in the labour market. However, there is still a considerable need for improvement in many areas to ensure sustainably successful integration, for example in the quality assurance of language courses and the recognition of qualifications. [↘ ITEMS 795 FF.](#) A good integration policy is not limited to active measures, but should also ensure rapid and reliable asylum procedures, low barriers to integration before and after asylum procedures, and a well-functioning labour market in general (Bauer, 2015).

3. Structural change: a constant companion

746. The integration of recognised asylum seekers and the growing participation of women in the labour market are examples of how the **composition of the working population is constantly changing**. This also applies to its activities as can be illustrated by the **shifts of employment between the sectors of the economy**. For example, the importance of agriculture has decreased dramatically since the late 19th century (Federal Statistical Office, 2006). During

industrialisation, employment initially rose in industrial sectors; since the 1950s employment in the services sector has risen sharply. One **driving force** behind this is **technological progress**. In conjunction with the internationalisation of trade flows in recent decades, it has contributed to an enormous increase in prosperity in the developed economies. [↪ ITEM 631](#)

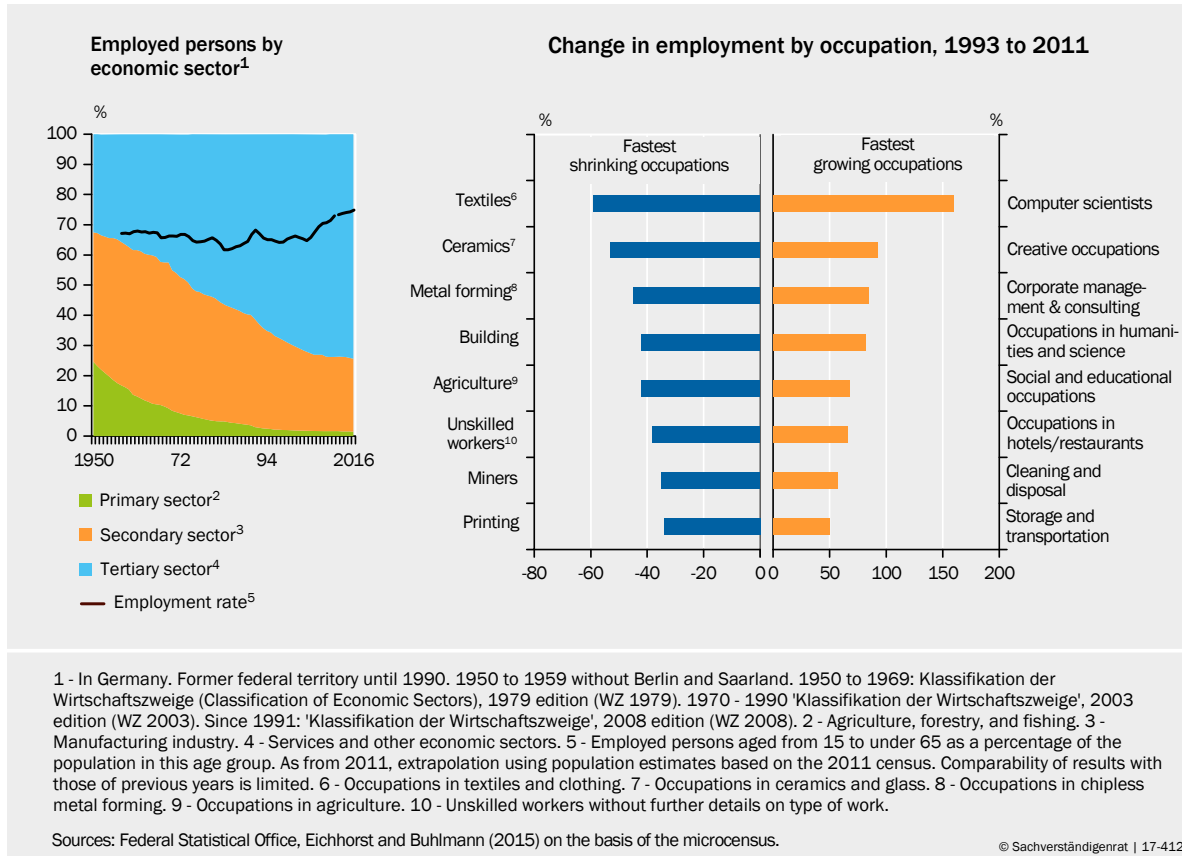
However, all these structural changes have **not led to a fall in the number of people employed**. On the contrary, the employment ratio has tended to rise in recent decades. [↪ CHART 94 LEFT](#) In future, technological progress is also likely to have a far greater impact on shifts in the employment shares of sectors and occupations than on the development of overall employment (Wolter et al., 2015; Vogler-Ludwig et al., 2016).

Impact of technological change on the labour market

747. Since the 1980s, skill-biased technological change has led to a relative increase in corporate demand for highly skilled labour. This is reflected in higher wage increases for highly qualified employees (Fitzenberger, 1999; Berman and Machin, 2000). In addition, the ubiquitous spread of computers since the 1990s has meant that more and more routine-based jobs have been replaced by machines. Since such jobs tend to be in professions with medium remuneration levels, this development has led to a certain degree of **polarisation on the labour market**. Employment in poorly paid and well paid occupations rose between 1993 and 2010 relative to employment in occupations with average remuneration (Goos et al., 2014; GCEE Annual Report 2015, item 548).
748. However, **polarisation trends in Germany** have been **less severe** than in other industrialised countries. This is probably not least because, in this country, people with a vocational training have a comparatively high level of technical qualifications, which enables them to carry out far more than routine tasks. In addition, de-industrialisation is less advanced in Germany than in other industrialised countries. The extent to which polarisation is influenced by trade-union coverage and labour-market regulations, e.g. protection against dismissal, is less clear. If these two factors are highly advanced, they can, on the one hand, curb growing polarisation more effectively. A counteracting effect is, however, that especially in this situation companies then have a bigger incentive to replace people by machines (OECD, 2017a).
749. Also encouraged by technological progress, employees with better qualifications have become more concentrated in more productive companies in recent years. This growing **segmentation into highly and less productive companies** has contributed to wages in the upper part of the distribution rising more strongly than in the lower part in the period from 1985 to 2009 in west Germany (Card et al., 2013). This illustrates the fact that technological change affects not only overall employment, but also the distribution of incomes and wages.
750. The changes on the labour market have been reflected in the **occupational profiles**. While some occupations have become less important, moved abroad, or completely disappeared over the last few decades, new ones are constantly be-

↘ CHART 94

Structural change of employment in Germany



ing created (Eichhorst and Buhlmann, 2015). The number of computer specialists in employment, for example, more than doubled between 1993 and 2011. By contrast, the number of people working in textiles and ceramics shrank by more than half in the same period. ↘ CHART 94 RIGHT

Many new and transformed vocational training occupations

751. A look at vocational training occupations provides further indications of ongoing adjustments in the labour market. **Approximately two-thirds of the 327 currently existing training regulations have been revised** since 2000, and 40 new vocational training occupations have emerged since then. The demand for occupations requiring vocational training has recently been declining, so that an isolated analysis of these occupations will only cover part of the occupational changes that have taken place in recent decades. The number of apprentices was around 1.6 million between 1991 and 2009, and has decreased significantly to 1.3 million since then. ↘ CHART 95 TOP LEFT The annual decline has been especially pronounced in craft industries with around 15,000 fewer apprentices per year since 2009.

On the other hand, young people have **increasingly opted for a course of academic study**. The number of students rose markedly between 2007 and 2015 by about 820,000, or 42 %. New tertiary students as a percentage of the population in the corresponding year of birth rose in this period from 37 % to 58 % (Federal Statistical Office, 2017b).

752. Unlike professions and economic sectors, the vocational training occupations recognised in Germany have not been reclassified in the context of European standardisation efforts. A look at their changes thus allows conclusions to be drawn about the related changes on the labour market that have actually taken place. Using the genealogy of the 2017 list of recognised vocational training occupations compiled by the Federal Institute for Vocational Education and Training (BIBB) (see BIBB, 2017), the GCEE has therefore determined the degree to which the titles of **vocational training occupations have changed** at different comparative points in time. To illustrate this, a table has been added as an appendix to this chapter giving an overview of the four degrees of change and the five most popular vocational training occupations in each category. [↘ TABLE 29](#)

The calculations of the GCEE show that since 2000 about one in four vocational training occupations have either been newly created or their titles greatly modified. In 2015, about **22 % of apprentices** were working in **vocational training occupations that had not existed** in their present form **in 2000**. This percentage increases to 32 % if 1990 is taken as the reference year. [↘ CHART 95 TOP RIGHT](#)

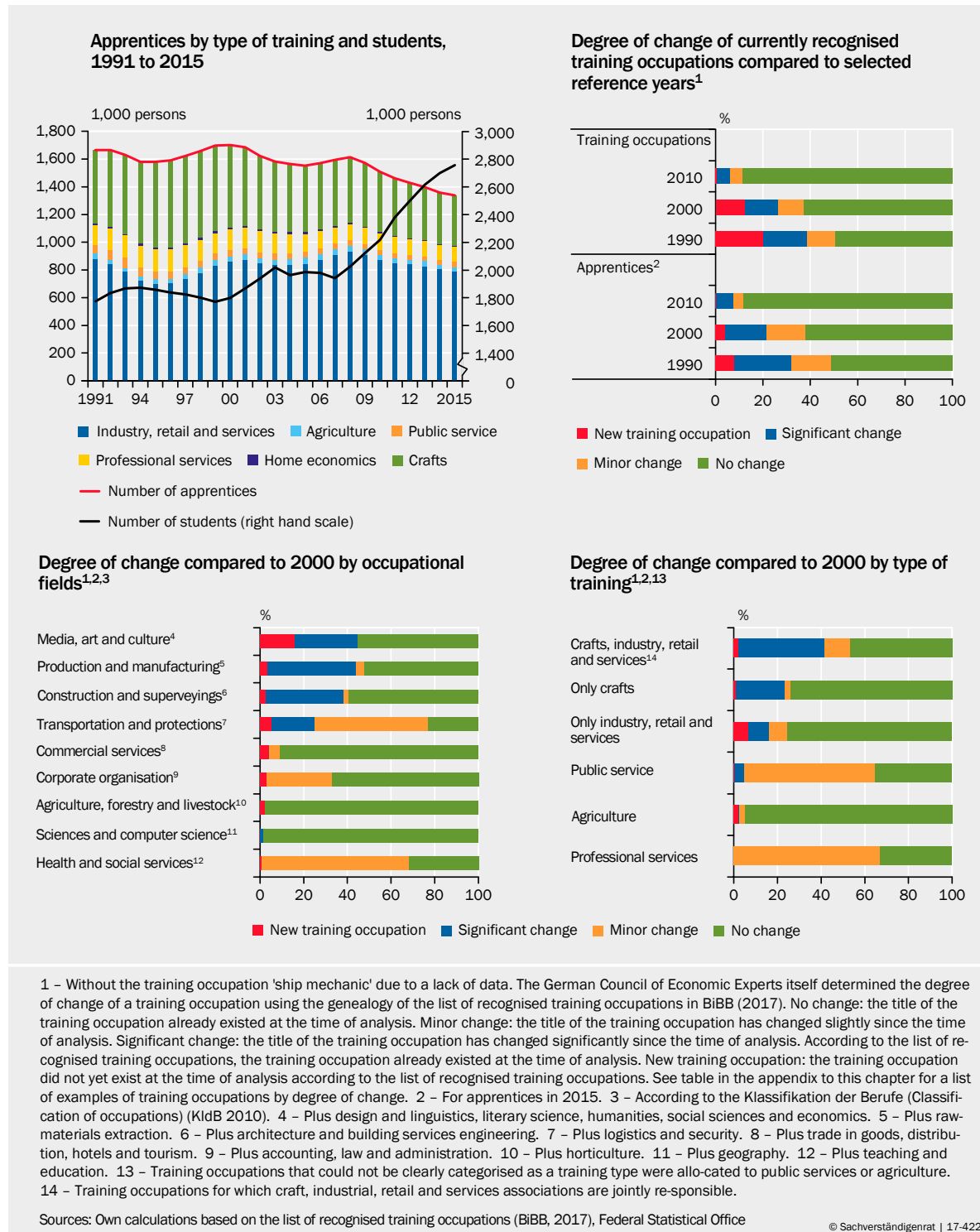
753. These percentages represent a **lower limit** for assessing the actual intensity of change in vocational training occupations. This is because most of the training regulations that are compiled in cooperation with associations, chambers of commerce and government ministries are openly formulated; their contents are constantly being adapted without necessarily changing the title of the training occupation. From the point of view of companies, the existing training system is thus flexible enough to adapt training content, rather than creating new training occupations (Arntz et al., 2016a).

This can be illustrated with the example of the '**computer specialist' training occupation**. Although the contents of this training occupation have most likely changed repeatedly as a result of continuous technical innovations, the name of the training occupation has remained the same over the period. According to the classification of the degree of change, this training occupation therefore falls under the category 'no change'. On the other hand, the changes in vocational training occupations were pronounced in the fields of 'production, manufacturing and raw-materials extraction' and in 'construction, architecture, surveying and building technology'. [↘ CHART 95 BOTTOM LEFT](#)

754. A closer look at **different types of training** reveals that especially vocational training occupations for which craft and industrial associations are jointly responsible have changed since 2000. In the subgroup of these training occupations, around 42 % of apprentices in 2015 were working in training occupations that had greatly changed or were new. In the craft sector, about one in four, in industry, commerce and services approximately one in six apprentices were working in new or greatly changed training occupations. In the public sector, agriculture and professional services, there were no or only minor changes in the titles of existing vocational training occupations compared to 2000. [↘ CHART 95 BOTTOM RIGHT](#)

↪ CHART 95

Development of training occupations, apprentices and students



Impact of automation on the labour market

755. Since the beginning of industrialisation, one of the biggest fears triggered by profound technological changes has been that **human work** might be **displaced by machines**. Looking at the economy as a whole, these fears have proved unfounded in the past. This is because they disregard the new employment opportunities that are created by technological progress as living standards

rise. Indeed, the current evidence for a possible displacement of employment is not unequivocal.

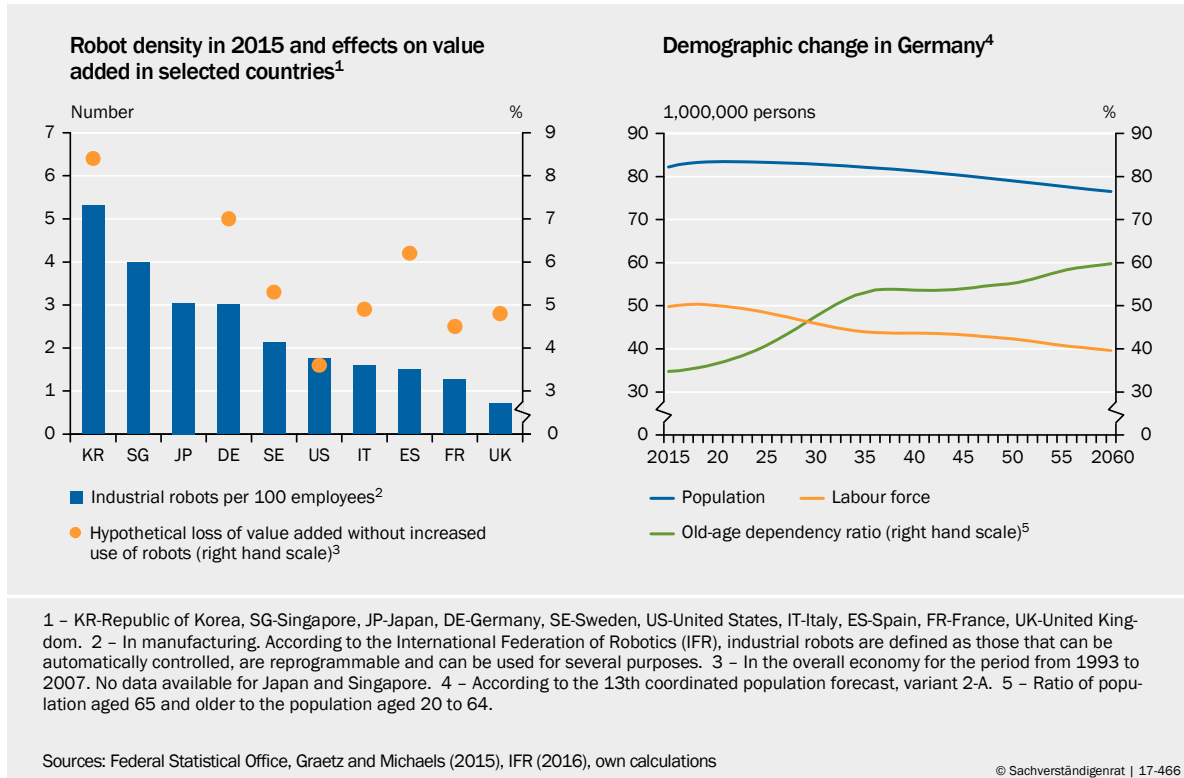
756. In the **United States**, earlier waves of automation suggest small signs of displacement effects by industrial robots. Acemoglu and Restrepo (2017), for example, show that the spread of industrial robots in the US between 1990 and 2007 caused negative equilibrium effects in the form of lower employment and wages. Industrial robots are defined those that can be automatically controlled, reprogrammed and used for several purposes. Depending on the scenarios of their calculations, the authors conclude that every additional industrial robot used per 1,000 employees in the United States reduced the employment ratio slightly by 0.2 to 0.3 percentage points and wages by up to 0.5 %.
757. Comparable effects have not been determined in **Germany**. According to Dauth et al. (2017), every additional industrial robot used between 1994 and 2014 replaced an average of two jobs in the manufacturing sector. The increased use of robots was thus responsible for around 23 % (or 275,000) of all lost jobs in this period in manufacturing. In this context, the reduction in the number of jobs is not due to job losses on the part of the current workforce, but to the fact that fewer new jobs were created than would have been without robotisation. At the same time, however, new jobs were created in the service sector by the increasing number of industrial robots, so that **overall employment has not changed significantly as a result of increased robotisation** in Germany.

On aggregate, this development does not affect wages either. However, the increasing use of robots in manufacturing goes hand-in-hand with lower wages for individuals with intermediate qualifications, while the wages of highly qualified employees rise (Dauth et al., 2017). This suggests that the increased use of robots and machines could reinforce **polarisation on the labour market**.

758. Robotisation has a positive effect on labour productivity (Dauth et al., 2017). Graetz and Michaels (2015) come to similar conclusions: without robotisation over the last 20 years in Germany labour productivity and value added would have been about 23 % lower in industries using robots. They estimate this potential loss of value added and labour productivity in the entire German economy at about 7 %. [↘ CHART 96 LEFT](#) As a result of the comparatively intensive use of robots in Germany, the **positive effects of robotisation on productivity** are higher than in other European countries and the United States. Germany's robot density in 2015 – approximately three industrial robots per 100 employees in the manufacturing sector, most of which were deployed in the automotive industry – was only exceeded worldwide by the Republic of Korea, Singapore and Japan (IFR, 2016). [↘ CHART 96 LEFT](#)
759. The above-mentioned studies on the increasing use of robots were compiled using data from the International Federation of Robotics, which says it monitors 90 % of all industrial robots per country and industry via annual reports from robot-manufacturing companies. However, only around 70 % of the listed robots can be clearly assigned to an industry, and no further categorisation is possible according to various characteristics such as the robot's size, complexity or productivity (Acemoglu and Restrepo, 2017).

↘ CHART 96

Robotisation and demographic change



Furthermore, in order to identify causal effects of robotisation at the regional level, an important assumption must be made: that the extent of robots use in relation to employment is the same in every region in a given industry. Although the results of the studies must be interpreted with care, they provide initial insights into the **basically positive economic impact of robots**, at least in this country.

760. Above all, the available results indicate that alarming reports stating that nearly 50 % of jobs in the United States will be under threat over the next 10 to 20 years – as people are replaced by machines in general and robots in particular – **are stirring up fears unnecessarily**. For example, it is likely that exploratory studies like the much-discussed analysis by Frey and Osborne (2017) overestimate the potentially negative effects of robots on employment and wages – for the simple reason that not everything that is technically feasible will turn out to be economically beneficial in practice (UNCTAD, 2017).

In addition, it seems likely that **jobs within an occupation, not entire occupations, are replaced**. According to calculations by Bonin et al. (2015) and by Dengler and Matthes (2015), less than 20 % of jobs in Germany will have a more than 70 % likelihood of being replaced by machines and thus automated in the next 10 to 20 years.

761. The percentage of employees subject to social insurance contributions who are affected by high degree of potential substitutability varies in Germany across the Länder between 8.1 % and 20.4 %. In this context, particularly regions with a greater **focus on manufacturing**, e.g. Baden-Württemberg, are associated with a higher substitutability potential (Buch et al., 2016). The strong position of

manufacturing in Germany is one of the reasons why a high percentage of jobs by international comparison will be threatened by automation in the coming years, according to the OECD (2016).

762. However, it would certainly be wrong to conclude from this that there will be a fall in employment, primarily in such industries and Länder. For it is essential to take into account that **new professions, occupations and jobs will emerge** as a result of technological change. In addition, the use of new technologies leads to cost reductions. This allows the prices of goods to fall, which is likely to generate a rising demand for goods and a higher demand for labour (Gregory et al., 2016).

Digitisation and demography as sources of continued change

763. Structural change on the labour market is likely to continue in the coming years. There is reason to assume that the **pace of change will even accelerate** because it is fed by two sources. On the one hand, **digitisation** will involve a transformation of production processes, industrial relations and value chains. On the other hand, the changing age structure of the population and the high persistence of the birth and death rates have led to a **demographic change**. In the coming decade, Germany will experience a considerable ageing of its population and, above all, of its working population. The first signs of interaction between these two phenomena can already be seen today.
764. Today, the **ageing of the society** is already reducing the number of potentially employable people by about 300,000 per year. This decline in employment is currently compensated from two sources. First, rising rates of participation in the labour market by women, older people and recognised asylum seekers are contributing about 470,000 additional workers to rising employment in 2017. Second, the increase in employment is being favoured this year by the net immigration of approximately 570,000 people (Fuchs et al., 2017b).
765. However, the peak of demographic change in Germany is yet to come. For example, even in the event of a permanent annual net immigration of 200,000 people up to 2060, the population would probably shrink by almost six million people. In the same period, the **size of the labour force** is likely to **fall by almost 10 million**. Consequently, the ratio between the number of people who are no longer of working age and those who are of working age (old-age dependency ratio) will rise from currently 35 % to 60 % in 2060 (Federal Statistical Office, 2015). ↘ [CHART 96 RIGHT](#) The demographic development is likely to vary from region to region. The decline in the working population is likely to be especially marked in east Germany, while it could even rise in the city-states and in southern Germany up to 2035, depending on the extent of net migration (Deschermeier, 2017).
766. **Digitisation offers great opportunities** to counteract looming labour shortages. The process has been ongoing since the universal spread of computers began in the 1990s, and its importance has grown rapidly through the internet, global data availability, and the networking possibilities via the 'Internet of

Things'. Thanks to improvements in information technology, the enormous amounts of data generated by thus can be analysed quickly using intelligent algorithms.

Among other things, this has led to the emergence of significant **digital platforms**, which can attain a large market share by considerable network effects.

↳ **BOX 21** Progress in the areas of sensor technology, machine learning and robotics, in conjunction with new IT-based systems – e.g. for driver assistance, smart phones and the growing networking of devices – is preparing the way for the development and introduction of autonomous systems (Hightech Forum and acatech, 2017). Their main potential spheres of action are production, transport and buildings.

767. Digitisation offers great **potential for increasing the productivity of labour**. Up to now, this potential has not yet been reflected in the development of productivity, since the annual growth of labour productivity – at less than 1 % – is still lower than in previous decades (GCEE Annual Report 2015, items 592 ff.). Disruptive developments in which an innovation completely supersedes an existing technology or service could, however, increase in the future, thus boosting labour productivity.

↳ **BOX 21**

Platform economy and economic-policy challenges

In some sectors, the digital transformation has already **fundamentally changed entire markets**. For example, commercial and non-commercial digital platforms have emerged in many areas, creating access to suppliers and buyers of products, services or ideas worldwide via the internet in a matter of seconds. This greatly reduces transaction and search costs for the participants and encourages innovation. Depending on the platform, the networked players are either exclusively companies, exclusively consumers, or both companies and consumers.

The benefit for each individual user offered by a platform increases with its size. As a result of such **economies of scale and network effects**, individual platform companies can attain a dominant position on the market. Such dominant platform companies take advantage of the global nature of digital markets and of the fact that marginal costs are close to zero. This is why today five of the ten most valuable global companies – Alphabet, Amazon, Apple, Facebook and Microsoft – can be described as platform companies (BMWi, 2017a).

Many of the new business models, especially those of the platform companies, are based on **broker-ing paid services**. These businesses, such as AirBnB or Uber, are dependent on having a sufficiently large number of people to provide the brokered services. Platforms can also serve as an agency for work. 'Crowdworking' is a flexible and cost-effective business form which allows the service providers to work in a self-determined way in their own time. However, these service providers often work as private individuals in a part-time job or as (solo) self-employed people, so they do not have the same comprehensive social security as workers and employees.

Up to now, however, **crowdworking** is not yet widespread. Even in the information economy, which is playing a pioneering role in the implementation of this new form of employment, only 5.2 per cent of the companies stated in 2016 that they used crowdworking platforms or intended to do so in the foreseeable future (BMAS, 2017a). On the one hand, not all forms of work are suited for subcontracting via a platform. On the other, small and medium-sized companies in particular express concern

that crowdworking could lead to a loss of internal corporate know-how and intellectual property rights.

At present, it is not noticeable that more flexible forms of employment are becoming established. The number of people in employment subject to social insurance contributions is still rising steadily in Germany, while the number of (solo) self-employed people is declining slightly. [↘ TABLE 11](#) The use of temporary work is not rising with the **digitisation of companies**, nor is the share of fixed-term work particularly striking in highly digitised sectors (Stettes, 2016). Overall, employment in highly digitised companies has not developed in a significantly different way in the past few years than in less digitised enterprises (Hammermann and Stettes, 2015).

In Germany, the **platform economy** is still largely in the **development phase** (Hightech Forum, 2017). In the B2C context, it is currently dominated by U.S. and increasingly Chinese companies. The development of networks in which business and science work together (innovation ecosystems) could make it possible to take advantage of synergies between different players and thus to make the German economy more competitive (acatech and BDI, 2017).

Need for action in economic policy

Policy-makers need to create a **suitable environment** for promoting innovation and, in particular, for supporting young companies during their growth phase. The fact that the digital economy registers many important patents in Germany is not enough unless a similar number of ideas are also turned into marketable products in this country.

For example, there is a wealth of regulatory and legal issues that must be addressed with regard to data protection and data security, as well as vulnerability due to the intensive use of digital technology. That legitimate concerns regarding the data security of the digital infrastructure exist is shown not only by the incidents relating to the 'Wanna-Cry' cyber-attack in May 2017, which affected and, in some cases, disabled hundreds of thousands of computers worldwide. From the point of view of companies, **increased spending on data protection and cyber security** is the most important consequence of the use of modern digital technologies (Arntz et al., 2016b).

When deciding on regulatory measures, prohibitions and restrictions, a careful balance must always be sought between more protection and the resulting obstacles to innovation. The optimum is unlikely to lie in maximising protection, nor will it always be possible to find the ideal answer from the outset in view of the speed at which changes are expected to take place. In case of doubt, therefore, **openness to innovation and a willingness to subsequently adjust regulations** in a learning system should be the guiding principles. [↘ ITEM 62](#) For example, particularly state intervention in competition should be used with caution, because what is regarded as competitive discrimination by established companies can often be simply a legitimate entrepreneurial differentiation that benefits consumers (Kronberger Kreis, 2017). Furthermore, assessing the competitive situation on multi-sided platforms requires an overall view in which more importance must be attached to factors other than market shares, e.g. network effects, the availability of user data, and the dynamics of the respective market (Monopoly Commission, 2015a).

Structural change is never an entirely smooth process, but requires social-protection measures to accompany adaptation processes. In terms of **social protection**, Germany is probably better prepared for the anticipated rapid structural transformation than comparable industrialised countries. On the one hand, Germany has much more generous wage-replacement schemes for periods of unemployment and income supplements based on family needs ('topping up', 'Aufstocken') than the United Kingdom or the United States, for example. On the other hand, not least the 'Agenda 2010' reforms have helped increase external flexibility – i.e. a rapid transition into a new job – by expanding various forms of atypical employment. In this way, long periods of unemployment and the associated devaluation of existing qualifications and skills can be avoided in many cases.

II. SECURING THE SUPPLY OF SKILLED WORKERS FOR THE FUTURE

768. The rising number of job vacancies is an indication that it is becoming increasingly difficult for companies to find suitable workers. An inadequate supply of qualified skilled workers could endanger the growth prospects of the German economy. It is therefore important to **make the right fundamental decisions today**. In particular, the aim must be to make the most of existing labour potential, permanently integrate the long-term unemployed and recognised asylum seekers into the labour market, and extend controlled immigration to skilled workers without academic qualifications from non-EU countries.

Within a **suitable regulatory framework**, digitisation can contribute towards countering impending shortages in the supply of skilled workers. Furthermore, a certain amount of catching up needs to be done when it comes to the digital infrastructure. Finally, the working population should be better prepared for the digital working world of tomorrow by providing appropriate opportunities in school education and a wide range of options in continuing vocational training.

1. Effectively counter shortages of skilled workers

769. Despite the generally good situation on the labour market, companies are evidently finding it **increasingly difficult to find suitable skilled workers**. For example, the average actual time it takes to fill job vacancies has been rising in recent years. ↘ [CHART 97 LEFT](#) Companies have adjusted their plans to this development. Compared to 2010, the time set aside for filling vacancies had risen by about 11 days to 59 days by 2016, although the dynamics of the increase has been slowing again recently (Brenzel et al., 2016).

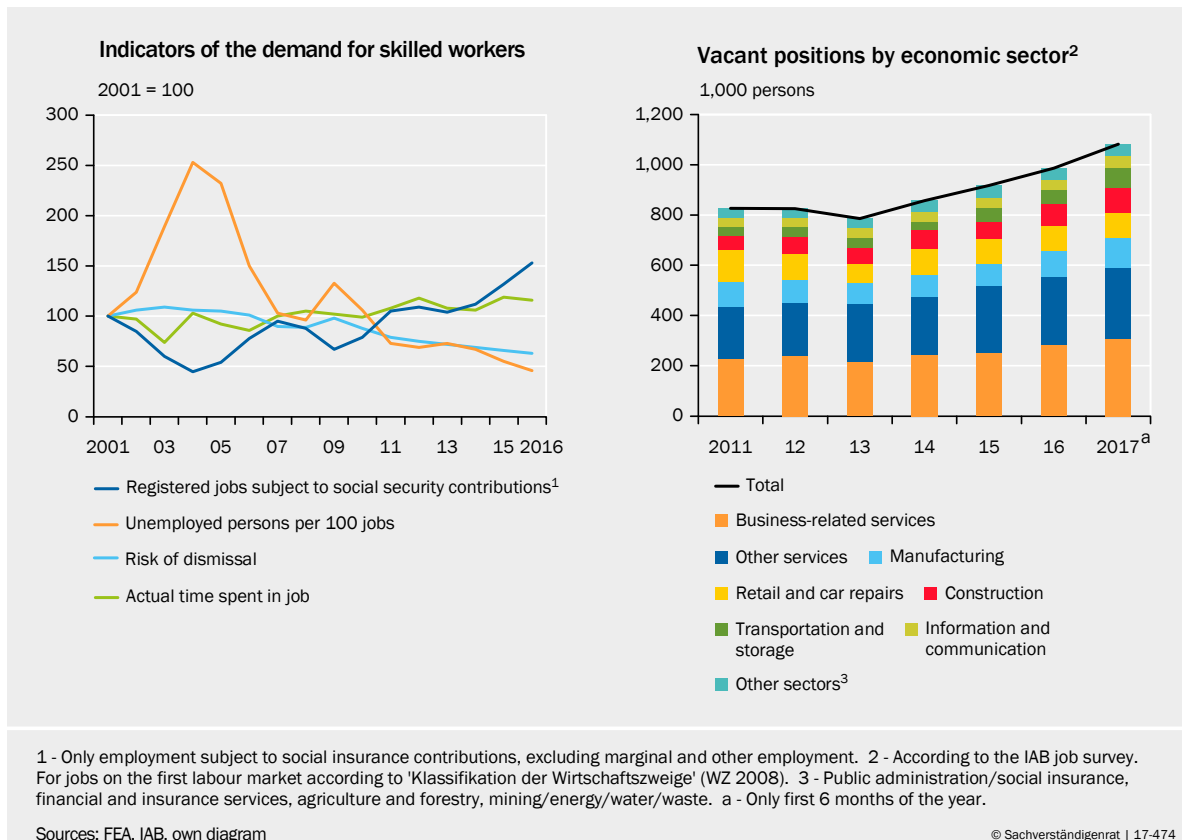
Record number of job vacancies

770. The willingness of companies to recruit more staff reached a new high in 2017. Approximately 770,000 jobs were registered at the Federal Employment Agency in September 2017. According to the IAB's job survey, there were a total of nearly 1.1 million job vacancies in the second quarter of 2017. ↘ [CHART 97 RIGHT](#) This corresponds to a 12 % **increase in vacancies** compared to the same quarter of the previous year. The increase in the number of vacancies **varies considerably between sectors of the economy**. Whereas the number of vacancies increased enormously within a year in the sectors transportation and storage (+70 %), information and communication (+35 %) and manufacturing (+24 %) in the second quarter of 2017 compared to the same quarter of the previous year, it declined in other sectors of the economy, e.g. in financial and insurance services and public administration.

771. The relation between unemployment and jobs has also fallen further in recent years due to lower unemployment. Parallel to this development, the risk of dismissal has decreased significantly (Fuchs et al., 2017a). ↘ CHART 97 LEFT While the percentage of employees who experienced a transition into unemployment within a year fluctuated between 9 % and 12 % between 1991 and 2010, it subsequently declined continuously to below 7 % in 2016. This suggests that **workers have become scarcer** and companies are increasingly holding on to their employees as a result.
772. Up to now, however, the BA's bottleneck analyses have not revealed a **wide-spread shortage of skilled workers** (Federal Employment Agency, 2017b). There are no signs of a general shortage across all occupations or regions for any of the categories 'skilled workers', 'specialists' or 'experts', since each vacancy is matched by more than two unemployed persons with suitable qualifications. Furthermore, current wage developments do not reflect a worsening skilled-labour bottleneck to date. At the aggregate level, nominal wages are currently growing only slightly more vigorously than the sum of labour productivity and consumer price inflation. ↘ ITEM 275
773. However, there are **numerous bottleneck occupations**. An occupation is classified in this way if the ratio of unemployed persons to vacancies is below two. In the 'experts' requirement category, for example, fewer than 33 unemployed persons per 100 reported vacancies were registered in 2016 in the occupations mechatronics, geriatric nursing, and refrigeration technology. The most pronounced bottleneck occupations for 'specialists' were specialist nurses and

↘ CHART 97

Development of the demand for skilled workers



nursing supervisors in the health sector. The biggest bottlenecks for 'experts' were to be found in the occupations computer science and public administration (Burstedde and Rissius, 2017).

774. Furthermore, **shortages of experts vary at the regional level**. For example, the percentage of vacancies that are advertised in occupations with shortages in Baden-Württemberg (72 %) and Bavaria (65 %) is significantly higher than the average of all Länder (52 %). On the other hand, there will be a high, demographically determined need for replacements especially in east Germany in the longer term. There, about 40 % of the workforce are already 50 years of age or older in many regions. Their jobs will therefore have to be re-staffed in the foreseeable future (Burstedde and Rissius, 2017). A regional shortage of skilled workers could prove to be a **massive locational disadvantage** in the future. It is therefore an urgent necessity to promote the mobility of workers, so that they can be deployed more flexibly wherever skilled people are needed. [↘ ITEM 689](#)

Make better use of untapped labour potential

775. The labour force is already declining as a result of the ageing of society, but this is currently being offset by the rising participation rates of women, older people and recognised asylum seekers. [↘ ITEM 764](#) Yet the labour potential is still not exhausted, especially among women and older people. More use should be made of existing **untapped labour potential** to cushion the shortages of skilled workers resulting from demographic change.
776. Framework conditions should be improved to enable people who have hitherto not been gainfully employed to start work and part-time workers to increase their working hours. An example of this would be to **further develop all-day care for children** (GCEE Annual Report 2013, items 731 ff.). Relatively low levels of investment aimed at improving people's work-life balance can have a significant impact on the labour-market participation of women. According to recent estimates, annual investment in kindergartens and schools of 10 billion euros could increase employment by almost 500,000 full-time equivalents in the space of five years (Krebs and Scheffel, 2016).
777. Furthermore, the **Working Hours Act** should be relaxed so that the personal needs of employees can be better met. An adjustment from a maximum number of hours per day to a maximum number of hours per week could help distribute working hours more flexibly over the weekdays. In addition, in view of the increasing flexibility of working hours and workplace, it might be a good idea to allow deviations from the minimum rest period of 11 hours in collective agreements. In view of the growing shortage of skilled workers in the course of demographic change, demands for a further reduction in working hours should be regarded with scepticism. Against the background of the need for flexibility in companies, it is still the correct policy not to introduce a legal entitlement to a return to full-time working, because this would create an incentive for part-time employees to unnecessarily delay their return to full-time employment.

778. In view of the high levels that have already been reached, however, long-term potential for **increasing labour-market participation** and lengthening working hours is **limited**. In 2016, the employment ratio for persons aged 15 to 64 years was already 74 %. ↘ CHART 94 LEFT Similarly, although a higher birth rate would have a positive impact on labour potential and thus on labour-market participation, the effects would not be felt for two decades. In view of the progressive ageing of the population, the shortage of qualified skilled workers is therefore likely to intensify in the future.

Encourage controlled immigration

779. In order to permanently maintain the number of potentially employable people at the current level, more than 400,000 more people would have to immigrate to Germany than emigrate every year from now on (Fuchs et al., 2017c). Thus, the recognised asylum seekers who have come into the country during the large inflow of refugees in recent years could not fill the growing number of job vacancies even if their integration were to proceed very successfully. In future, therefore, **controlled immigration will play a key role** in cushioning the effects of demographic change.

780. One of the main priorities of this active immigration policy should be to encourage **qualified skilled workers from third countries** outside the EU to immigrate to Germany. Labour-market access for qualified third-country nationals has already improved as a result of the reforms in the immigration and residence law implemented in recent years, thus providing a liberal legal framework for the immigration of foreign skilled workers (OECD, 2013; SVR Migration, 2015). The introduction of the 'EU Blue Card' and the regulations on facilitating access to the labour market for highly qualified immigrants has made it easier particularly for academically qualified specialists and people with vocational qualifications in understaffed occupations from third countries to immigrate. In view of the looming shortage of skilled workers, a future immigration policy should also take the following points into account:

- **Labour-market access** should be extended **for skilled workers with vocational training** but no academic qualifications. Instead of only granting foreign skilled workers from third countries access to the German labour market if they can prove they have a specific job in an understaffed occupation (as has been the case up to now), it would be conceivable to issue a temporary residence permit to anyone who can prove they have appropriate qualifications and language skills to enable them to embark on a self-funded job search. Similarly, the recognition of qualifications should be speeded up.
- Immigration by third-country nationals who want to start **vocational training** should be facilitated. For example, a separate form of temporary residence permit could be created for this group of people enabling them to look for an apprenticeship or trainee position in understaffed occupations.
- A general **points system** based on the Canadian model, on the other hand, **would not be expedient**, since European legislation on migration has, in the meantime, already considerably restricted the areas in which national le-

gislation can influence labour migration. Assessing potential immigrants by awarding points for such criteria as existing language skills, age and vocational qualifications involves a great deal of administrative work and is less target-oriented than creating a direct link to the labour market.

A **new immigration law** that transparently and clearly bundles the existing regulations and extends them in accordance with the proposed criteria could send an important political signal: that academically and vocationally qualified specialists and skilled workers are equally welcome in Germany (SVR Migration, 2017a).

2. Obstacles to entry into the labour market

781. Increased labour-market participation and controlled immigration are not the only ways to increase the potential labour force. Improving the integration of the unemployed into the labour market can also contribute. Considerable progress has already been made along this road with the sharp decline in unemployment in recent years. However, the remaining core of unemployed people has consolidated further over the last few years. [▶ ITEM 737](#) Particularly for this group of people as well as for recognised asylum seekers, there are **obstacles in the way of (re-)entering the labour market**, and these have actually grown in recent years.

Make access to the labour market easier, not harder

782. Although hardly any unfavourable consequences of the minimum wage have been observed up to date in view of the good economic situation, its introduction in 2015 and the increase from €8.50 to €8.84 on 1 January 2017 make **access** to the labour market more difficult for people whose level of productivity is relatively low. It therefore remains advisable to exempt internships from the minimum wage for a period of up to twelve months because they have an educational function and ease entry into the work environment. Furthermore, it would not be a good idea to abolish allowing fixed-term employment 'without stating valid reasons' as a further regulatory measure because this option enables employers to recruit staff even when production expectations are uncertain.
783. This flexibility was recently restricted by the reform of the **German Temporary Employment** (personnel leasing) **Act**. Since April of this year, leased employees must be paid the same wage as a comparable employee from the permanent workforce after nine months at the latest. In addition, they may only work for the same user company for a maximum of 18 months. Job insecurity has probably worsened for many leased employees as a result. Effects of the reform are not expected until some time in 2018, when the maximum periods are reached for the first time.

Companies' flexibility is likely to be further impaired by the reform, passed at the EU level, of the **Posting of Workers Directive**. It enshrines the principle of equal pay for equal work for all posted workers. Such a regulation on the EU

internal market is likely to significantly reduce the attractiveness of posted work and the freedom to provide services within the European Union. The aim is to prevent competition from companies that can offer services at a lower price.

784. Unlike the introduction of the statutory minimum wage, its increase at the turn of 2017 did not lead to any appreciable changes in the various forms of employment, or to switches from exclusively marginally paid employment to employment subject to social insurance contributions (vom Berge et al., 2017). **Fears** that the minimum wage might have major negative effects on employment have **not materialised** to date. However, it cannot be concluded from this that the minimum wage is not having any effects. For example, companies affected by the minimum wage have adjusted to the new framework conditions by increasing remuneration, shortening working hours and, in particular, **raising prices** (Federal Statistical Office, 2017c). For the United States, MaCurdy (2015) shows that the latter impacts mainly on people in poorer households who spend a comparatively high proportion of their income on consumer goods that are severely affected by these price increases.
785. In particular, up to now the nation-wide statutory minimum wage has only been studied under economically favourable conditions and before the entry of recognised asylum-seekers into the labour market. It will not be possible to make a reliable judgement on the effects that restricting the process of wage formation with a statutory minimum wage level will have until there has been a downturn in the currently favourable economic situation. In the case of industry-specific minimum wages, some of which have been subject to minimum-wage regulations since 1997, there have been **delayed effects** of the minimum wage, such as a narrowing wage gap between skilled and unskilled workers, and a fall in the number of people in training or qualifying as master craftsmen (Gregory, 2015).
786. Against the background of the growing demand for skilled workers and, above all, the integration of recognised asylum seekers into the labour market, it would make sense to keep the obstacles to labour-market entry as low as possible. It should be borne in mind in this context that the minimum wage, at 50 % of the median wage, was already fixed at a relatively high level in Germany at its introduction. The policy in the United Kingdom, for example, was different. After the minimum wage was introduced in 1999, the UK's Low Pay Commission did not recommend more significant increases in the minimum wage until after a phase of initial caution lasting several years. ↘ **ITEM 793** Therefore, when Germany's Minimum Wage Commission decides on the next minimum-wage increase in the summer of 2018, it should take its **orientation strictly from the monthly index** of agreed hourly wages excluding special payments.

When **deciding on its first increase** in the minimum wage in June 2016, the Minimum Wage Commission deviated from the previously agreed wage index due to the inclusion of more recent, higher wage agreements. Although a higher minimum wage raises the wages of low-wage earners in particular, the higher the level is fixed, the more it threatens existing jobs and the more difficult it becomes for the unemployed to return to the labour market.

787. Economic-policy proposals aiming to extend the **period of entitlement to unemployment benefits** should **also be rejected**, as this weakens incentives to work. Instead of further solidifying unemployment with such plans, the focus of political action should rather be on reducing it. Measures of active labour-market policies can only contribute little to reducing long-term unemployment (Kluve, 2013; GCEE Annual Report 2016, item 750). Many unemployed people are confronted with several obstacles to finding a job, e.g. a long duration of benefits, health restrictions, or poor qualifications (Achatz and Trappmann, 2011; GCEE Annual Report 2016, item 739).

The **targeted activation of the long-term unemployed** – with customised counselling, needs-oriented promotion and intensive support – is therefore more likely to be successful. More intensive advisory services combined with a better advisor/customer ratio leads to an increase in placements of the unemployed (Hohmeyer et al., 2015).

788. Moreover, **single parents** are frequently absent from the labour market for long periods. A graduated obligation to work applies in their case: If they have children under the age of three or several children between the ages of three and six, they are not obliged to take up employment. However, this probably reduces the single parents' chances of finding a job. A partial **reduction of these exemptions from the duty to work** could counteract this problem. At the same time, it should be made easier for single parents to take up work by improving overall child-care services. Until long-term unemployment is significantly reduced, the political goal of achieving full employment by 2025 (with an unemployment rate below 3 %) will remain wishful thinking.

A differing opinion

789. One member of the Council, Peter Bofinger, disagrees with the opinions expressed by the majority of Council members on the **minimum wage**.
790. Despite the continuing, good development of employment since the introduction of the minimum wage, the majority of Council members continues to regard the minimum wage as an **obstacle in the way of '(re-)entering' the labour market**. They state that even though fears that the minimum wage could have major negative effects on employment have not materialised, it cannot be concluded that the minimum wage is not having any effects. "It will not be possible to make a reliable judgement on the effects that restricting the process of wage formation with a statutory lower wage limit will have until there has been a downturn in the currently favourable economic situation."
791. Overall, no negative employment effects of the minimum wage are noticeable as yet. Instead, about a million new jobs have been created since its introduction. As illustrated by the Federal Employment Agency's minimum wage monitor, **employment in the industries particularly affected by the minimum wage** have continued to develop considerably more favourably than in other ar-

eas. In July 2017, employment in minimum-wage sectors was 3.7 % up on the previous year; the figure in the non-minimum-wage sectors was +2.8 %.

Furthermore, studies conducted for the United Kingdom's Low Pay Commission do not suggest that the minimum wage will have specific negative employment effects in a **recession** (Bryan et al., 2012).

792. Fundamentally, the 'right' level for the minimum wage – one that simultaneously guarantees both a high level of employment and an improvement in the financial situation of less-qualified workers – **can only be gauged in a cautious process**. This does not mean, however, that the relation to the median wage chosen at the time of introduction must be kept constant at all costs. The very good development of employment since the introduction of the minimum wage in January 2015 suggests that, at the next rise, the minimum wage should be **raised by more** than the increase in the index agreed by the Minimum Wage Commission (i.e. the Federal Statistical Office's index of negotiated wages which is based on hourly earnings and excludes special payments).
793. This would, in principle, correspond to the approach of the '**Low Pay Commission**' in the United Kingdom. After a 'phase of initial caution' (1999 to 2000), it deliberately increased the minimum wage by more than the average increase in wages in the years from 2001 to 2006. In 2006, it then decided that there was no longer any reason to believe that above-average increases in the minimum wage were required (Low Pay Commission, 2015).

In its comprehensive analysis of these developments, the Low Pay Commission stated in 2011: "However, the evidence available to date suggests that minimum wages do not appear to have cut employment to any significant degree. Further, the reduced hours do not appear to have reduced weekly earnings and the lower profits have not led to business closures."

794. Overall, the Low Pay Commission's approach since 1999 shows that changes in the minimum wage cannot be fixed according to a rigid formula over time. Rather, there is a need for a flexible approach that cautiously tests the leeway that is available for an improvement in the income situation in the lower segment of wage distribution. The numerous studies that have been compiled on the United Kingdom show that this is possible without triggering adverse effects on employment.

Lack of coordination between authorities is slowing down integration

795. The large number of recognised asylum seekers could lead to another rise in the number of long-term unemployed in the future. The 2016 **Integration Act** already facilitated the integration of recognised asylum seekers into the training and labour market, among other things by creating integration and language courses and improving legal certainty when starting work (GCEE Annual Report

2016, Box 25). On the other hand, the growing share of recognised asylum seekers with subsidiary protection, which initially does not involve family reunification and only grants a residence permit for one year, raises the fear that considerable obstacles stand in the way of rapid integration. Certainly, considerable efforts are needed to increase **investment in education and training** to make integration a success.

796. According to the '**challenge and encourage**' principle (*Fordern und Fördern*), participation in language and integration courses should be compulsory for anyone who is not already integrated into the education system or has proof of a job. The principle of challenging provides for the creation of reliable structures and instruments, as well as appropriate quality assurance. Last year, the number of language and integration courses was significantly increased. However, the quality standards of these courses should be standardised and scientifically evaluated. Quality assurance must be guaranteed by the state, since it is often not in the primary interest of the respective educational institution.

Furthermore, new instruments are needed for recognising existing informal competencies, such as work experience, next to the acquisition of new skills. In addition, partial qualifications offering low-threshold access to the system of vocational training and an opportunity to gradually acquire the skills required could also increase incentives for recognised asylum seekers to seek vocational training (SVR Migration, 2017b).

797. Structures that make it possible to run and coordinate language courses and qualification measures for recognised asylum seekers are taking time to build, as indicated by the fact that, up to now, the work of the individual **authorities** has **not been coordinated well enough**. Structural weaknesses in the federal system are also becoming apparent when it comes to enforcing deportations. This is the responsibility of the Länder, and most of them have transferred the task to municipal immigration authorities (BAMF, 2016). Only about 12,500 people were repatriated in the first six months of 2017. Yet on the cut-off date 31 March 2017 around 220,000 people were under an obligation to leave the country, including about 160,000 'tolerated' refugees. Most refugees who are obliged to leave the country under an enforceable decision come from Serbia (about 20,000), followed by Albania, Kosovo and Afghanistan with more than 12,000 persons respectively (Federal German Parliament, 2017).
798. A **more stringent enforcement of the obligation to leave** is necessary not least to ensure that a strict distinction is made between asylum migration and economic migration. The longer people facing deportation stay in Germany, the more the two immigration channels are likely to mix and the more difficult it becomes to justify enforcing the obligation to leave. Individuals whose applications for asylum have been rejected should therefore be deported more resolutely than hitherto. Although the return of rejected asylum seekers is often made more difficult by their country of origin being unwilling to accept them, this willingness could be increased by more cooperation within the European Union, for example by offering the country of origin the prospect of projects to promote economic cooperation (SVR Migration, 2017b).

3. Empowering people for the digital transformation

799. The progressive digitisation of the labour market offers considerable opportunities for mitigating the consequences of demographic change. Above all, impending bottlenecks in the labour supply could be countered by **improving interaction between people and machines at the workplace**, for example in the form of assistance systems. This could help overcome physical limitations and make long-term participation in working life attractive by reducing dull, routine activities and enhancing the contents of a job. In addition, digitisation offers considerable innovation potential (acatech, 2016). However, exploiting this potential requires high levels of investment in the digital infrastructure, as well as substantial educational efforts to enable the current and future workforce to adapt to the demands of the digital working environment.

Backlog demand in the digital infrastructure

800. Digitisation touches on many different facets in the world of work. Germany ranks high worldwide when it comes to progress in robot technology. [↘ ITEM 758](#) However, Germany is only average in many other areas that are important for successfully creating a digital work environment. This is illustrated in an exemplary way by the digitisation indicator developed by Fraunhofer ISI and the Centre for European Economic Research (ZEW), which measures the spread of digitisation **by international comparison** using 66 indicators in the categories of research/technology, business, society, infrastructure/state, education and digital business models. Positioned **only in the middle** of the 35 countries studied, Germany ranked far behind Finland, Sweden and Israel (acatech and BDI, 2017). [↘ CHART 98 TOP LEFT](#) The European Commission's national ranking on the digital economy comes to a similar result (European Commission, 2017). [↘ ITEM 61](#)
801. On the one hand, Germany scores relatively well in the digitisation indicator's societal category, since private households tend to have good internet equipment, and a high proportion of the population shop online. However, **a lot of catching up needs to be done** especially in the areas of education and infrastructure/state. The population's use of online continuing vocational training, the standard of computer equipment in schools, and the deployment of the internet in the classroom are all below average (acatech and BDI, 2017). However, such indicators should be interpreted with caution, since the existing non-digital infrastructure is not sufficiently taken into account. For example, digital education channels could take on a more central function in countries where the education system is less developed than in Germany.
802. In the field of public administration, the potential of digitisation has also not been used as intensively in Germany as in many other countries. Especially in the healthcare sector, there is a great deal of digitisation potential that has been insufficiently exploited to date. [↘ ITEM 57](#) These findings reveal **weaknesses in the implementation of the** Federal Government's **Digital Agenda** (Federal Government, 2017). The results of the available indicators clearly show that in-

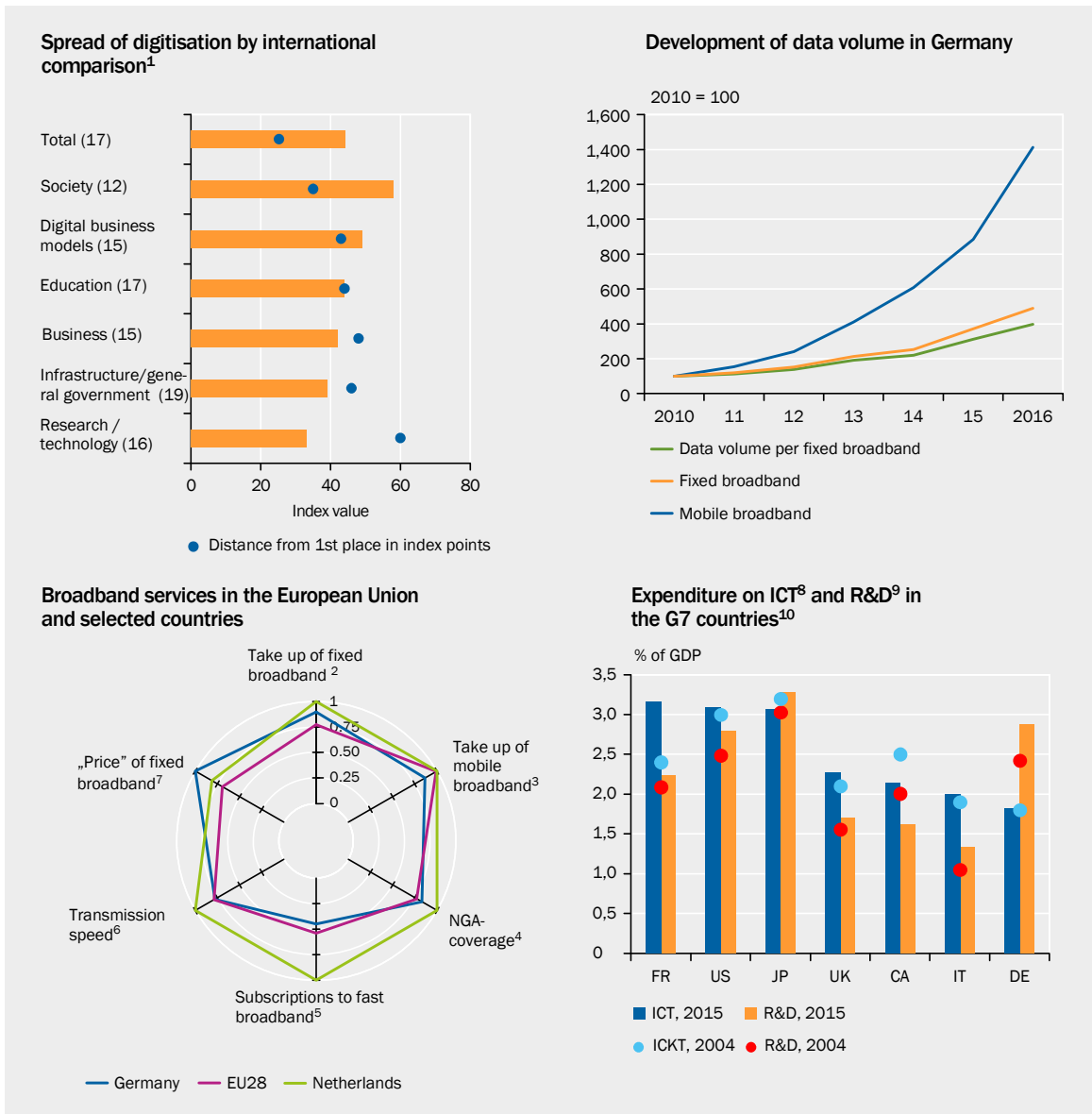
vestments and great efforts are needed on both the demand and the supply side to ensure that Germany is better prepared for the digital transformation.

803. The **volume of data in Germany is growing very quickly**. ↘ [CHART 98 TOP RIGHT](#) Since 2010, it has grown almost five-fold to 22.5 billion gigabytes for broadband landline connections. In the mobile communications sector, the increase over the same period was even more dynamic, having started at a low level. The mobile data volume totalled over 900 million gigabytes in 2016. Whereas users of broadband landline connections generated an average of 15 gigabytes of data in 2010, the figure had already risen to 60 gigabytes by 2016 (Federal Network Agency, 2017).
804. **Broadband coverage**, however, is not more pronounced than the **European Union average** and is significantly behind levels in the Scandinavian countries and the Netherlands. ↘ [CHART 4](#) Germany is about average in Europe when it comes to coverage with new broadband technologies, the use of fast broadband connections, and mean transmission speeds. ↘ [CHART 98 BOTTOM LEFT](#) According to the Federal Ministry of Economics and Energy (BMWi), 84 % of internet connections in rural areas are not future-proof because they have not yet been upgraded to take them into the gigabit range, e.g. by installing broadband cable networks (BMWi, 2017b).
805. Because of possible developments in other technologies such as the wireless technology or the technological upgrading of the copper network (vectoring), however, it would be overhasty to immediately replace most of the broadband structure with comparatively expensive fibre-optic cable connections (GCEE Annual Report 2015, item 667). A **flexible and local design of broadband promotion** that aligns investment to local needs is preferable to a hasty nationwide expansion of high bandwidths of 100 Mbit/s and more.
806. The aim should be to ensure that innovation does not falter as a result of capacity bottlenecks in the digital infrastructure, and to avoid an inadequate provision of digital services leading to a locational disadvantage. Network expansion should be pursued through private investment. **State funding programmes** to develop high-performance broadband networks can be used in places where such private investment does not materialise for lack of profitability. Such funding must, however, remain an **exception that is justified in individual cases**, and it must comply with the European Union's strict state-aid rules (Monopoly Commission, 2013, 2015b). The prices for broadband landline contracts as a percentage of disposable income have hitherto been relatively low in Germany by international comparison. ↘ [CHART 98 BOTTOM LEFT](#)
807. The potential of the digital infrastructure has not been exhausted to date, and not only on the supply side. On the demand side, **innovation-inhibiting regulations** sometimes prevent the spread of digitisation. Examples here include the restrictive handling of online pharmacies, the lack of liberalisation of the taxi market, and the innovation-inhibiting ancillary copyright law for press publishing houses (Kronberger Kreis, 2017). The trend toward strict regulation, for example with regard to stringent data-protection rules, represents an obstacle to innovation in the digital sphere. ↘ [ITEM 66](#)

808. One decisive reason for the good performance of some smaller countries such as Finland, Israel, Taiwan and Singapore is their strong specialisation in certain branches of software and technology development. Compared to these countries, Germany spends less on research and development and has a lower number of scientific publications in the field of digital technologies. The objective of an **increase in expenditure on research and development (R&D) to 3.5 % of gross domestic product (GDP)**, as formulated by the Hightech Forum – the Fed-

CHART 98

Indicators on the digital infrastructure



1 - According to the digitisation indicator of Fraunhofer ISI and ZEW. The index values were calculated on the basis of 66 indicators related to digitisation in the six sub-fields of research / technology, business, society, infrastructure / general government, education and digital business models. Figures in parentheses show position in the country ranking. 2 - For 2017. Percentage of households with at least one household member aged 16 to 74 with a fixed broadband connection. 3 - For 2017. Number of subscriptions per 100 people. 4 - For 2017. Percentage of households with Next Generation Access Technology (NGA) broadband coverage. 5 - For 2017. Percentage of fixed broadband connection contracts with a transmission speed of at least 30 megabytes per second (mbps). 6 - Average transmission speed according to 'Akamai's state of the internet report Q1 2016'. Relative to the Netherlands with 17.9 mbps. OECD average instead of EU-28 average. 7 - For 2017. Monthly cost of the least expensive fixed broadband subscription with a speed of between 12 and 30 mbps as a percentage of disposable income. Inverse relationship with Germany, where these costs amounted to 0.82 percent of disposable income. The lower these monthly costs are, the further out a country is in the circle in the graphic. 8 - Information and communication technology. 9 - Research and development. 10 - FR-France, US-United States, JP-Japan, UK-United Kingdom, CA-Canada, IT-Italy, DE-Germany.

Sources: acatech and BDI (2017), calculations by Fraunhofer ISI and ZEW, Federal Network Agency, European Commission, OECD, World Development Indicators

eral Government's advisory body on innovation policy – is a step in the right direction (Hightech Forum, 2017). Current expenditure, at just under 3 %, is slightly above the average of the OECD countries (OECD, 2017b) and at a similar level to the United States and Japan. [↘ CHART 98 BOTTOM RIGHT](#)

809. In addition, **higher investment is needed in information and communication technologies (ICT)**, for example to expand the digital infrastructure and improve data security – not least to ensure protection against cyber-attacks in the military field. None of the G7 countries invested less in ICT per year in relation to GDP than Germany in 2014. At over 3 % of GDP, ICT expenditure in the United States was almost twice as high as in Germany in 2015 (OECD, 2017c). In contrast to R&D expenditure, ICT expenditure has not increased as a percentage of GDP since 2004. [↘ CHART 98 BOTTOM RIGHT](#)

Strengthening general skills

810. It is not very likely that the **welfare gains of digitisation** will be distributed evenly throughout society in the future. Parts of the labour force will face major individual challenges, particularly in sectors with less promising future prospects. Signs of this can already be recognised in the context of globalisation in past decades. [↘ ITEM 632](#) Some workers may be **unable to meet the higher demands** made by the digital transformation on their skills and on their ability to adapt to new work processes. In such cases, the state should provide support for disadvantaged groups as they adjust to changes in the working environment. There are two basic approaches available for the state to provide assistance: strengthen people's ability to adapt, or compensate disadvantages that cannot be averted.
811. For example, the state might compensate the income losses of people who are negatively affected by the digital transformation. Germany's existing tax and transfer system is the central and demonstrably highly effective building block in this context. [↘ ITEM 833](#) However, the focus should always be on efforts to reintegrate workers who lose their jobs through structural change and get them back into the working environment as quickly as possible, so that they do not lose touch with the changing working environment. The most meaningful measures are therefore those that aim **to empower the people affected** to find their way in the digital transformation and to make positive use of it for their own benefit. In future, work will be more networked, more digital, and more flexible in terms of place and time (BMAS, 2017b). It would therefore be important to reduce people's fear of contact with new technologies.
812. Efforts are needed along the entire education chain **to strengthen general skills**. Eight out of ten companies with a relatively high digitisation level polled by the German Economic Institute (IW) see a need for adjustment in schools and academic education, particularly in relation to knowledge about modern information and communication technologies and the use of the internet as a professional medium. At the same time, says the corporate survey, the digital transformation is leading to greater demands on employees' social skills. So it is about much more than specialised expertise. Agile work organisations, working in vir-

tual teams, and decentralised decision-making structures require a well-developed willingness to collaborate, pronounced communication skills, and the ability and willingness to organise oneself and one's own work independently and on one's own responsibility (Hammermann and Stettes, 2016; Jacobs et al., 2017).

813. ICT skills pay off in the labour market by generating above-average wages (Falck et al., 2016). Better ICT skills have a higher wage effect than comparable improvements in writing or reading skills (Hanushek et al., 2015). Germany's performance is little more than mediocre in international comparisons of computer and information literacy among 8th grade pupils. For example, the country's pupil/computer ratio of 11.5 to 1 is only around the average of the EU Member States participating in the survey (Bos et al., 2014). All schools should therefore offer a specialisation in computer science as an elective subject. In addition, high priority should be given to **improving the digital infrastructure in schools**. Yet digital education is not just about computer science lessons, learning programming languages, or using digital media in the classroom. Rather, it promotes an interdisciplinary understanding of the digital transformation and the agile work processes it requires (acatech and the Körber Foundation, 2017).
814. The **proposal made by the Standing Conference of Education Ministers** (KMK) to enable every student access to the internet by 2021 (KMK, 2016) seems **unambitious** against this background. Similarly, the KMK's target that all pupils who start elementary school or lower secondary education in 2018/19 should be competent in handling digital media by the end of their compulsory education, is not particularly lofty either. An important priority of increased educational efforts should be to train the teaching staff to integrate content that is important for the digital transformation into their teaching.

Lifelong learning

815. Digitisation could accelerate the **devaluation of specific human capital**, i.e. skills that can only be used effectively in a specific company or a specific profession. This is relevant not least against the background that the working lives of the labour force of the future will be longer than in the past. Young people with occupation-specific training have better employment opportunities than those who have completed general education programmes. However, if the specific occupational skills acquired over time are no longer in demand, the danger of losing one's job later increases (Hampf and Wössmann, 2016).
816. Continuing education and training is therefore becoming **ever more important**. On the one hand, individual participation in continuing vocational training measures has tended to rise in recent decades. ↘ [CHART 99 LEFT](#) The target of an initiative launched by the Federal Government and the Länder in 2008 stated that one in two people between the ages of 18 to 64 years should take part in some form of continuing training at least once a year; this target was reached in 2015 with a participation rate of 50 % (BMBF, 2016). However, the definition of continuing training activities used in the Adult Education Survey which is conducted in the EU Member States is broadly formulated and includes not only

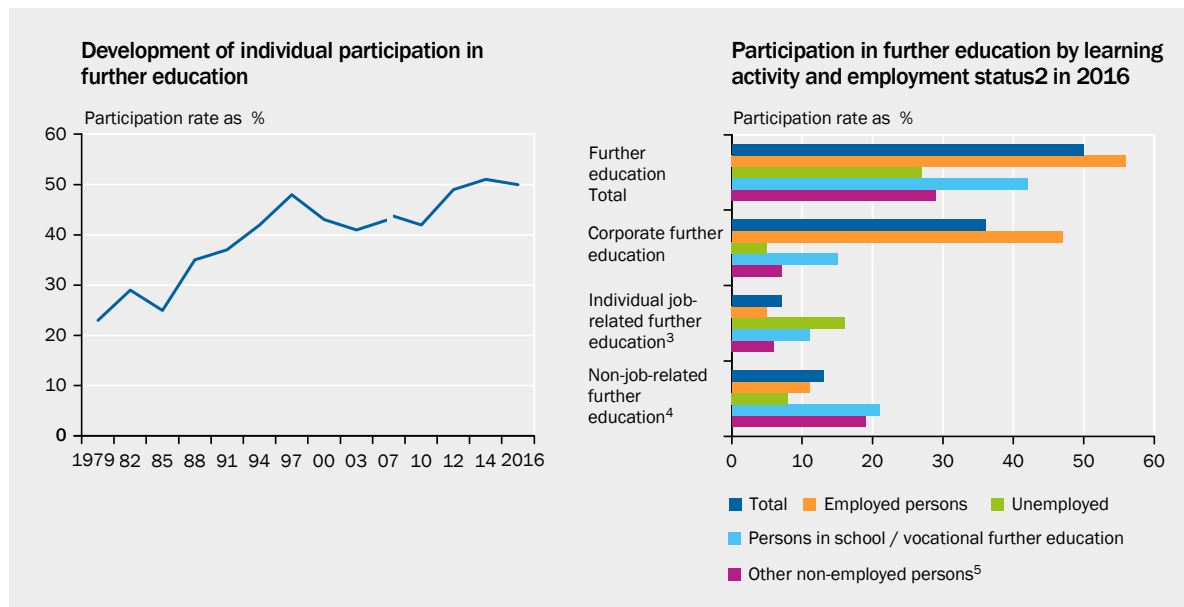
continuing vocational training, but also, among other things, private lessons during leisure time, such as driving lessons or trainer sessions for sports. The participation rate in continuing vocational training in 2016 was significantly lower at 36 % of respondents (BMBF, 2016). It stood at under 50 % among people who were gainfully employed. [↘ CHART 99 RIGHT](#)

817. Although continuing vocational training is in the interest of both companies and employees, **incentive problems** often prevent its implementation. For one thing, the demand for self-funded training is low (Görlitz and Tamm, 2016). For another, investing in the human capital of employees only pays off for the company if those employees do not move elsewhere. The most important aspect for the company is to develop the specific skills it needs (specific human capital). According to economic human capital theory, the most interesting aspect for employees, by contrast, is skills that are transferable to other jobs and companies. On-the-job models of continuing vocational training that involve counseling on personal career development – organised in cooperation with employers and the Federal Employment Agency – should therefore be particularly promising.

818. The **success of continuing vocational training** is closely linked with its quality which, however, poses **considerable measurement problems**. Continuing training programmes that are not very target-oriented, such as general continuing training vouchers, seem to be relatively ineffective overall when it comes to success on the labour market. Although low-skilled workers can benefit most from continuing training vouchers, they make less use of this opportunity

[↘ CHART 99](#)

Further education in Germany¹



1 – The data up to 2003 were collected by the Berichtssystem Weiterbildung (Reporting System on Further Training, BSW), for 2007 according to the BSW's concept and the concept of the Adult Education Survey (AES); as from 2010 only according to the AES Concept. Since 2012, the survey has been held every two years and no longer every three years. Basis until 2007: 19- to 64-year-olds. Basis since 2010: 18- to 64-year-olds. 2 – At the time of the interview. Because employment status can change in the course of a year, a person who was employed, unemployed or not employed at the time of the survey can have been gainfully employed in the last 12 months and taken part in corporate further training. 3 – Non-corporate, self-financed further education for professional reasons. 4 – Non-corporate further education for private reasons. 5 – Especially members of the labour force who are not available to the labour market..

Source: BMBF (2016)

than the more highly skilled (Schwerdt et al., 2012). Strategies of continuing vocational training should be scientifically evaluated more intensively than they have been up to now to make it possible to identify consistently successful models and training providers.

819. In this context, a systematic national certification system could help improve the acceptance of qualification measures provided and increase their transparency. Furthermore, a **lifelong matriculation number**, which already exists in several European countries, could be used to record all a person's training activities and qualifications – from academic studies to adult education courses. Austria, for example, has had good experience with this concept for decades in the field of higher education (Mordhorst, 2017).
820. An initial step in this direction was taken with the amendment of the German Higher Education Statistics Act in 2016, which makes it possible to follow students' educational careers. In this way, the amendment is contributing to an evidence-based research and science policy. Better information on educational pathways can help boost **competition between educational institutions** and improve the quality of education and continuing training.

By contrast, the GCEE is more critical in this context of the idea put forward by the Federal Ministry of Labour and Social Affairs on a 'personal employment account' ("Persönliches Erwerbstätigenkonto"). Providing young workers with start-up capital which can be used for vocational training or business start-ups is likely to lead to **considerable freeriding effects**. The capital deployed would frequently probably fail to fulfil its intended purpose.

821. A measure designed to improve qualifications is most likely to have the desired effect if it meets the needs of companies and employees alike. However, political demands for across-the-board legal regulations, such as a **legal entitlement to continuing training**, run contrary to this idea and should therefore be **rejected**. General government already offers diverse opportunities for continuing vocational training, e.g. via the BA or the *Volkshochschulen* (adult education centres). These institutions could increasingly serve to teach digital-media skills.

However, public continuing training measures for persons in gainful employment should **not displace corporate efforts**. State-organised measures are important especially for the unemployed and economically inactive, so that they can keep in touch with the changing world of work. However, the primary objective for this group of people should be to return quickly to working life. In this sense, state education and training efforts cannot be a replacement for a smoothly functioning labour market with low obstacles to entry.

II. APPENDIX

▾ TABELLE 29

The five most popular training occupations by degree of change in comparison to 2000¹

Current title		Title in 2000	Number of apprentices in 2015
New training occupation			
Total of 40 new training occupations			44.226
Including the top 5 new training occupations			24.999
1	Machine and plant operator	Did not exist	6.285
2	Vehicle painter		5.388
3	Clerk in health care		4.743
4	Event clerk		4.509
5	Sports and fitness clerk		4.074
Significant change			
Total of 46 training occupations with significant changes			230.709
Including the top 5 training occupations with significant changes			160.989
1	Motor vehicle mechatronics technician	Automotive mechanic; automotive electrician; motor-vehicle mechanic specialising in the maintenance of cars, commercial vehicles and motor cycles	62.256
2	Electronics engineer	Telecommunications electronics technician; electrician	35.394
3	Plant mechanic for sanitation, heating and air-conditioning systems	Plant mechanic specialising in apparatus engineering, welding, supply engineering; gas-fitter and plumber; central heating and ventilation engineer	31.986
4	Electronics technician for operating engineering	Energy electronics technician in the fields of plant engineering, operating technology	21.414
5	Warehouse operator	Specialist packer	9.939
Minor change			
Total of 36 training occupations with minor changes			211.680
Including the top 5 training occupations with minor changes			156.792
1	Office management clerk	Office clerk; specialised employee for office communication; clerk for office communication	49.707
2	Medical specialist	Doctor's receptionist	37.410
3	Dental specialist	Dental assistant	30.957
4	Warehouse logistics specialist	Warehouse specialist	24.597
5	Forwarding and logistics clerk	Forwarding clerk	14.121
No change			
Total of 204 occupations with no changes			788.896
Including the top 5 training occupations with no changes			238.164
1	Retail clerk	Retail clerk	60.327
2	Industrial clerk	Industrial clerk	50.295
3	Industrial mechanic	Industrial mechanic	46.428
4	Salesperson	Salesperson	42.840
5	Management assistant in wholesale and foreign trade	Management assistant in wholesale and foreign trade specialising in wholesale trade, foreign trade	38.274

1 – Without the training occupation 'ship mechanic' due to a lack of data. The German Council of Economic Experts itself determined the degree of change of a training occupation using the genealogy of the list of recognised training occupations in BiBB (2017). New training occupation: the training occupation did not yet exist in 2000 according to the list of recognised training occupations. Significant change: the title of the training occupation has changed significantly compared to 2000. Minor change: the title of the training occupation has changed slightly compared to 2000. No change: The current title of the training occupation already existed in 2000.

Sources: BiBB (2017), List of Recognised Training Occupations, own diagram

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