

The German Labour Market in the Year 2030
The impact of immigration on employment and growth
2014 Projection

On behalf of the
German Ministry for Labour and Social Affairs

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Executive Summary

This is the second report for the project “Analysis of future labour market supply and demand in Germany based on a calculation model”, which the German Ministry for Labour and Social Affairs commissioned the Economix research institute in 2011.¹ The purpose of the report is “to provide regular and sustainably transparent, detailed and scientifically founded estimations for the future development of supply and demand in the macroeconomic labour market in Germany”. In addition, a forecast model was to be developed with a time horizon of 2030. This would serve as an early warning system to better assess possible labour shortages and would help to derive targeted measures to safeguard the skilled workforce. In addition to the updated database and calculation model in the main report², this report includes:

- Two population projections up to the year 2030 to calculate alternative migration scenarios;
- A long-term projection for labour supply until the year 2050;
- A projection for the labour market in the German states (Länder);
- A projection for the demand for skilled labour in small, medium and large local units.

Germany – an immigration country

As the most recent developments show, the German economy has used immigration to avoid labour shortages and to seize growth opportunities. The push and pull forces on immigration flows have been intensified by the economic crises in EU countries, the expansion of free movement for the new Member States in Central and Eastern Europe, and the favourable employment trend in Germany. All of these factors have led to another wave of immigration since 2010. This is all intensified by the current influx of refugees from the Middle East. Even if we assume that the current constellation will not continue, we predict that Germany will remain an immigration country in the long term. The average net immigration of 210,000 people per year, which we have used in our *low migration scenario*, is the lower limit of the probable trends up to the year 2030. Therefore, we have also included a *high migration scenario*, where we have calculated with an average annual immigration of 330,000.

Positive growth and employment effects from immigration – but the skills shortages remain

Demographic factors will prevail for the domestic population and net immigration is expected to decrease in the coming years. In the *low immigration scenario* this will cause the labour force to decline by 2.2 million to 42 million by the year 2030. In the *high migration scenario* the labour force will increase by 400,000 and will remain that way until the year 2018. However, the decline of the labour force will still cumulate to -900,000 by the year 2030. Compared to the *low migration scenario*, this is still an increase of 2.6 % resulting from migration. Because of the favourable age structure of immigrants and high labour market orientation, every percent of population growth causes labour supply to increase by 1.3 %.

Employment will benefit from the elimination of labour supply restrictions, which will be eased by immigration and the unemployment rate falling to 2.8 % in the year 2030. In the *low migration scenario* there will be 1.7 million more gainfully employed people in the year 2030 than what was projected in 2012. This figure will peak in 2018 with 42.4 million. In the years thereafter, demographic factors will prevail and the number of gainfully employed people will fall to 40.8 million by the year 2030. The employment trend is more favourable in the *high migration scenario*. The number of gainfully employed people will be 1.1 million higher in the year 2030 than in the *low migration scenario*. With high levels of immigration there will be a total of 42 million gainfully employed people in the year 2030,

¹ The report was published in German under the title “Arbeitsmarkt 2030 – die Bedeutung der Zuwanderung für Beschäftigung und Wachstum – Prognose 2014”, W. Bertelsmann-Verlag 2014.

² The first main report “The German Labour Market in the Year 2030 – A Strategic View on Demography, Employment and Education” was published in English by W. Bertelsmann-Verlag in 2013.

which is about the same as in 2013. However, even in this scenario, the demographic trend will force employment to decline after the year 2020.

According to our calculations, annual GDP growth will increase by 0.35 percentage points until the year 2030 with an annual net immigration of 100,000. The per capita income will also increase by 0.25 percentage points per year. This results from the multiplier effect of labour supply which causes employment and income to increase disproportionately in relation to labour supply. Thus, immigration not only overcomes labour shortages by providing the workers needed, but it also creates additional jobs due to a higher additional demand for goods and services.

Integrating immigrant workers and the multiplier effect that results from it are the reasons why labour shortages will not be eliminated by immigration. Even though employment and growth opportunities will both improve, we will still be confronted with more or less the same shortages at the end of the day. However, this will shift the economy and the labour market to a higher growth path.

Outlook for 2050: it will not work without a sustainable population policy

The magnitude of demographic forces becomes apparent in the long-term forecast up to the year 2050. Under the current circumstances the labour force will decrease by 8 million by the year 2050. This would mean that by 2050 we would lose 20 % of our current labour supply and the ageing of the workforce would advance rapidly. Only if the average birth rate increases steadily to 1.9 children per woman, and immigration continues at a rate of 200,000 people per year, and there is a further increase in the participation rate of women and older workers, it will be possible, if not to stop, to at least sustainably decelerate the decline in labour supply.

This requires further progress to be made in reconciling family and work as well as fundamentally restructuring family policy. It will only be possible to successfully increase the birth rate if the concept of two or three child families becomes the norm. However, this will require a fundamental change in the population's views, whereby material comfort and individuals' life plans will be less important than they are today. In addition, if female participation increases at the same time, the key elements of family policy will be to develop childcare and improve welfare facilities for the elderly. Moreover, incentives are needed to establish stronger labour market participation, such as reducing the gender pay gap and improving progression opportunities for women. Similarly, companies will be required to adjust their work organisation, the allocation of tasks and the quality of jobs to accommodate family needs and the ageing workforce and to fully develop the workforce. This involves a considerable amount of backlog demand.

Entering lifelong learning and career development

Developing a structured vocational training system which builds on existing skills is another area of accumulated needs. A suitable method of validation – especially for foreign workers – should make these skills visible and usable in the labour market. Higher salaries will show that investing in further education is worthwhile and only then is it likely that more people will participate in vocational training. This also includes supporting career opportunities by offering suitable courses to vocational training graduates. Thus, the Government's vocational training policy needs to develop the institutional and financial framework for adult education and training.

Strong divergence in regional labour markets

The regional projections show that, even two and a half decades after German reunification and despite the economic and social integration which has been achieved, there is still a stark divide between the eastern and western German states. This divide is mainly due to past demographic developments, which will cause the eastern German states to experience a decline of between 8 and 13 % in labour supply and employment by 2030. In order to counter this trend, an active labour market policy is needed; one which will spur the modernisation of the economy, expedite investments in education,

and which will make regions more attractive for foreign workers. There is also a divide between metropolitan centres and rural areas. Our projection shows that growth in the city states will on the one hand be boosted by an influx of younger and highly skilled workers, and on the other hand by the employment potential in knowledge-based services. Finally, a third division is between the two southern German states of Baden-Württemberg and Bavaria and the rest of the western area states. The southern German states already have good prospects for successful growth in the future and the regions are extremely attractive. Comparatively modern economic structures and high salaries will attract skilled workers and will further increase growth opportunities. The area states in central and northern Germany will follow the national trend as the enabling and burdening factors in these regions will balance each other out.

Skill needs by company size

Continual job losses in the industry and increased employment in the knowledge-based service sectors will change the landscape of the German economy: we anticipate that there will be more job losses in medium-sized enterprises, whereas large companies and micro-businesses will be less affected by the general decline in employment. We anticipate that the emerging shortages in the German labour market will have the greatest impact on medium-sized enterprises. Applicants competing for jobs tend to prefer large companies. Micro-businesses will profit from self-employed workers pursuing entrepreneurial activities in the service sector. That leaves medium-sized enterprises, which are likely to have the most difficulty in enforcing their employment plans in an even more competitive labour market. In addition, micro-businesses, which have put an emphasis on dual vocational training until now, will be significantly affected by the decline in the younger generation.

Because of the complexity of development in the size structure, a size-specific labour market policy would not be accurate enough. After all, the freedom of movement would undermine the credibility of such a policy. Above all, small enterprises and micro-businesses and their representatives will be encouraged to safeguard the demand for skilled labour by expanding the dual vocational training system for adults. Likewise, universities and colleges also need to increase vocational education programmes in higher education as well as other forms of continuing education and training in order to overcome skills shortages.

Conclusion

The long-term projection for the German labour market is that immigration will be able to sustainably improve the economic outlook and labour market prospects by filling unoccupied jobs. Nevertheless, the Government's strategy to develop domestic labour supply remains important and appropriate. This will make the labour market more independent and thus less affected by varying migration flows. However, it will still be difficult to control the forces of demographic change. In the long term, the main focus of labour supply policy should be on population and family policy. Even if it is not possible to stop labour supply from declining, it will at least considerably decelerate if there is a combination of increased birth rates, higher labour market participation, and a steady rate of immigration.

Overview

Task, concept and methodology

This is the second report for the project “Analysis of the future labour market supply and demand in Germany based on a calculation model”, which the German Ministry for Labour and Social Affairs asked us to carry out in 2011. The aim of the project is “to provide regular and sustainably transparent, detailed and scientifically founded estimations for the future development of supply and demand in the macroeconomic labour market in Germany”. In addition, a forecast model was to be developed which would provide an early warning system to better assess possible labour shortages and would help to derive targeted measures to safeguard skilled labour.

With this report we are not only presenting an update of our first projection from 2012³, but we have also expanded significant sections of the report:

- Two population projections up to the year 2030 to calculate alternative migration scenarios;
- A long-term projection for labour supply until the year 2050;
- A projection for the labour markets in the German states (Länder);
- A projection for the demand for skilled labour in small, medium and large enterprises.

Furthermore, the database which was used for our models up to the year 2030 has also been updated. New data such as the 2011 census has been added, and the models have been reassessed. The calculations are based on the data which was available in May 2014. Therefore, the latest updates from national accounts and employment statistics have not been included.

The need to create a separate population projection arose from the fact that the 12th coordinated population projection of the Federal Statistical Office⁴ which has been used so far has been rendered obsolete by the results of the 2011 census and by the development of immigration in the most recent past. Two population scenarios have been calculated with a time horizon of 2030. These population scenarios differ with regard to the assumptions on migration:⁵

- The *low migration scenario* assumes that the high level of immigration in 2013 will level off by 2020 and will then remain constant with an annual net immigration of 200,000. The average annual net immigration between 2014 and 2030 will be 214,000, which gives a total of 4 million people during this period.
- The *high migration scenario* assumes that the net immigration from 2020 onwards will be 300,000 per year and that this will continue until the year 2030. Thus, the average annual net immigration rate between 2014 and 2030 will be 330,000, giving a total of 5.6 million during this period.

Both variants have been calculated using the German sector model (G3M) and labour market models so that population development and economic development are interdependent. Various conclusions may be drawn from the impact of immigration when considering the differences between the *low migration scenario* and the *high migration scenario*.

³ Vogler-Ludwig, Kurt; Düll, Nicola (2013): The German Labour Market in 2030. A Strategic View on Demography, Employment and Education. W. Bertelsmann Verlag, Bielefeld.

⁴ Federal Statistical Office (2009): Bevölkerung in den Bundesländern, dem früheren Bundesgebiet und den neuen Ländern bis 2060. Ergebnisse der 12. Koordinierten Bevölkerungsvorausberechnung. Online: https://www.destatis.de/DE/Publikationen/Thematisch/Bevoelkerung/VorausberechnungBevoelkerung/BevoelkerungBundeslaender2060_5124205109005.xls?__blob=publicationFile.

⁵ We have assumed a birth rate of 1.4 children per woman in both scenarios. By the year 2060, life expectancy at birth will rise according to both variants; men will live 7.8 years longer and women will live 6.8 years longer compared to 2006/2008.

Furthermore, two long-term scenarios with a time horizon of 2050 have also been calculated. They are restricted to the supply side of the labour market and show the overall development of labour supply assuming different birth rates, migration balances and employment rates.

This report was created by a team of 12 experts under the supervision of Economix Research & Consulting (Munich). The team includes specialists from the Warwick Institute for Employment Research (Coventry, GB), Cambridge Econometrics (Cambridge, GB), Fraunhofer Institut für Arbeitswirtschaft und Organisation (IAO Stuttgart) and Institut für Sozialwissenschaftliche Forschung (ISF, München). The report has been divided into three sections:

- *Section A* covers the labour market projection on a national level;
- *Section B* deals with the federal states (Länder) in Germany;
- *Section C* projects the need for skilled workers according to company size.

A detailed annex containing the quantitative projection results has been created for each section. The model structure and the methods which have been used are set out in the methodological report.⁶

Section A – Projection for the German labour market

Labour supply

Labour supply increases due to immigration

Over the past 3 years labour supply developments have been characterised by the comparatively high rate of net immigration. On average, annual net immigration between 2010 and 2013 was around 300,000 people. The ongoing economic crisis in a number of European countries, the amendments to the free movement of workers in the new EU Member States and the favourable economic developments in Germany have all boosted the push and pull factors behind migration. This has been enhanced by the current flow of refugees from the Middle East. However, high levels of immigration were not able to stop the working-age population from declining between 2010 and 2013. The decrease of 100,000 people, however, was considerably lower than what was estimated in the 12th coordinated population projection, which predicted a negative of more than 300,000 people. Labour supply, nevertheless, has risen by half a million to 44 million people. This was not only due to a high rate of immigration but also because of increased labour participation, especially amongst women and older workers.

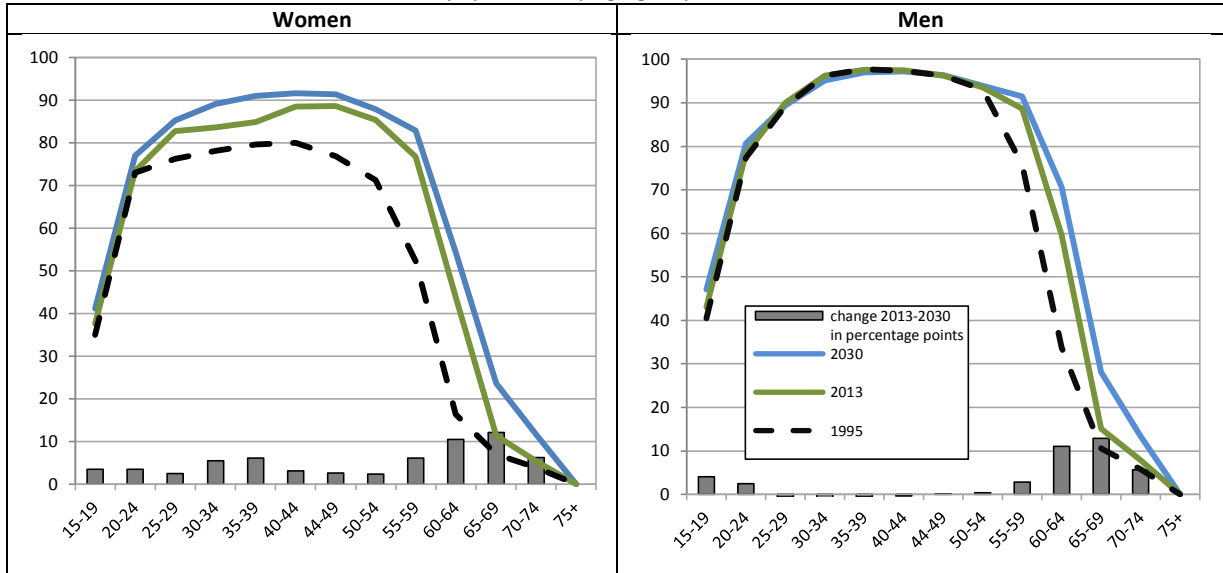
Increased female participation

In our projection we have assumed that female participation will continue to increase (Figure 1). This is based on the assumption that it will be possible to achieve participation rates such as those in Denmark, Norway and Sweden in the long run. In order to do this, policies and companies have to set the parameters to further improve the balance between family and working life, reduce the gender pay gap and offer more progression opportunities for women. The participation rate of females aged 30-39 years old will rise considerably, especially amongst mothers. By the year 2030 we anticipate that the labour force will increase by 0.8 million in total (+1.9 %) due to an increase in female participation.

⁶ Kriechel, Ben; Vogler-Ludwig, Kurt (2030): Arbeitsmarkt 2030 – Methodenbericht.W. Bertelsmann Verlag, Bielefeld. Online: https://www.wbv.de/openaccess/artikel/shop/detail/name/_/0/1/6004385w/nb/0/category/854.html#.VWbUR0bw-Ao.

Amongst younger males, we expect that the effects of shortened high school years and the trend to obtain specialised qualifications will largely compensate labour market participation. The male participation rate will drop slightly during the family phase because an increasing share of males will be preoccupied with taking care of their families.

Figure 1 Male and female participation rates
Labour force in % of the population by age group



Source: Economix

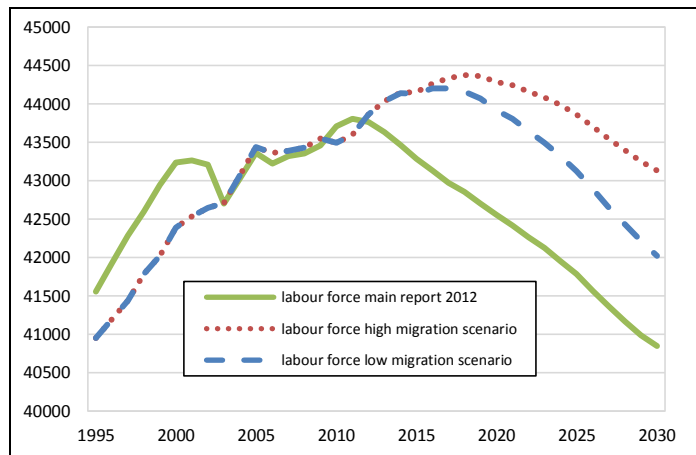
Rising participation rate of older workers

We have projected that the participation rate of 60-74 year olds will increase by 10 percentage points to 35 %. This will be linked to a supply effect of 1.8 million people in the labour force (+4.3 %) by 2030. The effects of gradually raising the retirement age to 67 years old, restricting early retirement schemes, developing more age-appropriate measures within the personnel policy and increased work-orientation among women have all been taken into account. It also includes various pension reform elements from the past few years and the resulting effects thereof, including the pension reform of 2014.

Significant gains from migration although demographic forces dominate in the long-term

In the *low migration scenario* the labour force will grow by 170,000 to 44.2 million between 2013 and 2016 (Figure 2). After this, demographic factors will prevail for the domestic population and net migration will start to decline. This will lead to a continuous decline in the labour force. In 2030 there will be 42 million workers in the labour force, which will be 2.2 million less than in 2016.

Figure 2 Number of workers in the labour force
Absolute value in 1000s



Source: Economix Y10d

In the *high migration scenario* growth will be higher (+ 400,000) and will remain that way until 2018. But even then the labour force will inevitably decline by 900,000. In this scenario, migration will contribute 116,000 people per year between 2014 and 2030 and will increase the labour force by 370,000 workers by the year 2020 and by 1.1 million workers by the year 2030. This is the equivalent of 2.6 %.

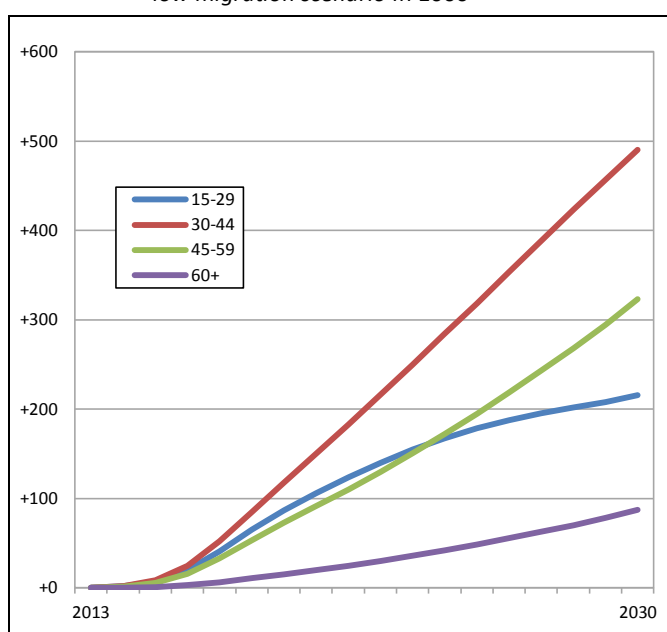
The elasticity of labour supply with respect to population growth is greater than 1. For every percent of additional population, labour supply increases by 1.3 %. This is the result of higher labour orientation and the more favourable age structure of the migrant population. Similar effects can be seen in the projection set out in our main report from 2012 when comparing the *low migration scenario* to the 12th coordinated population projection (Variant 1-W2).

Considerable improvement in age structure due to immigration

The impact of demographic change on the age structure of labour supply appears to be dramatic: according to the *low migration scenario*, the number of workers under 60 will drop by 4.2 million by the year 2030, but the number of workers aged 60 and above will increase by 3 million. This means that even a higher participation rate of women under 60 will not compensate the impact of a shrinking population in this age group. For workers aged 60 and above, population development and higher participation rates will both cause labour supply to increase.

According to our calculations, the effects of immigration are more important than an increased participation rate. Differences between the *high migration scenario* and the *low migration scenario* show that the labour force will grow, especially in the 30-44 year old age group (Figure 3). The 40-59 year old age group will also benefit but the effects of migration will be smaller among the younger and older populations. Over the period 2013-2030, an annual net immigration of 100,000 persons will increase the labour supply of 15-29 year olds by 186,000 (+2.3 %). For 30-44 year olds it will rise by 422,000 (+3 %), for 45-59 year olds it will increase by 278,000 (+1,9 %) and for those aged 60 and above it will rise by 75,000 (+1,2 %). Overall, labour supply will be 960,000 higher (+2.2%) in the year 2030 as a result of this immigration.

Figure 3 Effects of migration according to workers' age
Difference between *high migration scenario* and *low migration scenario* in 1000



Source: Economix Y17d

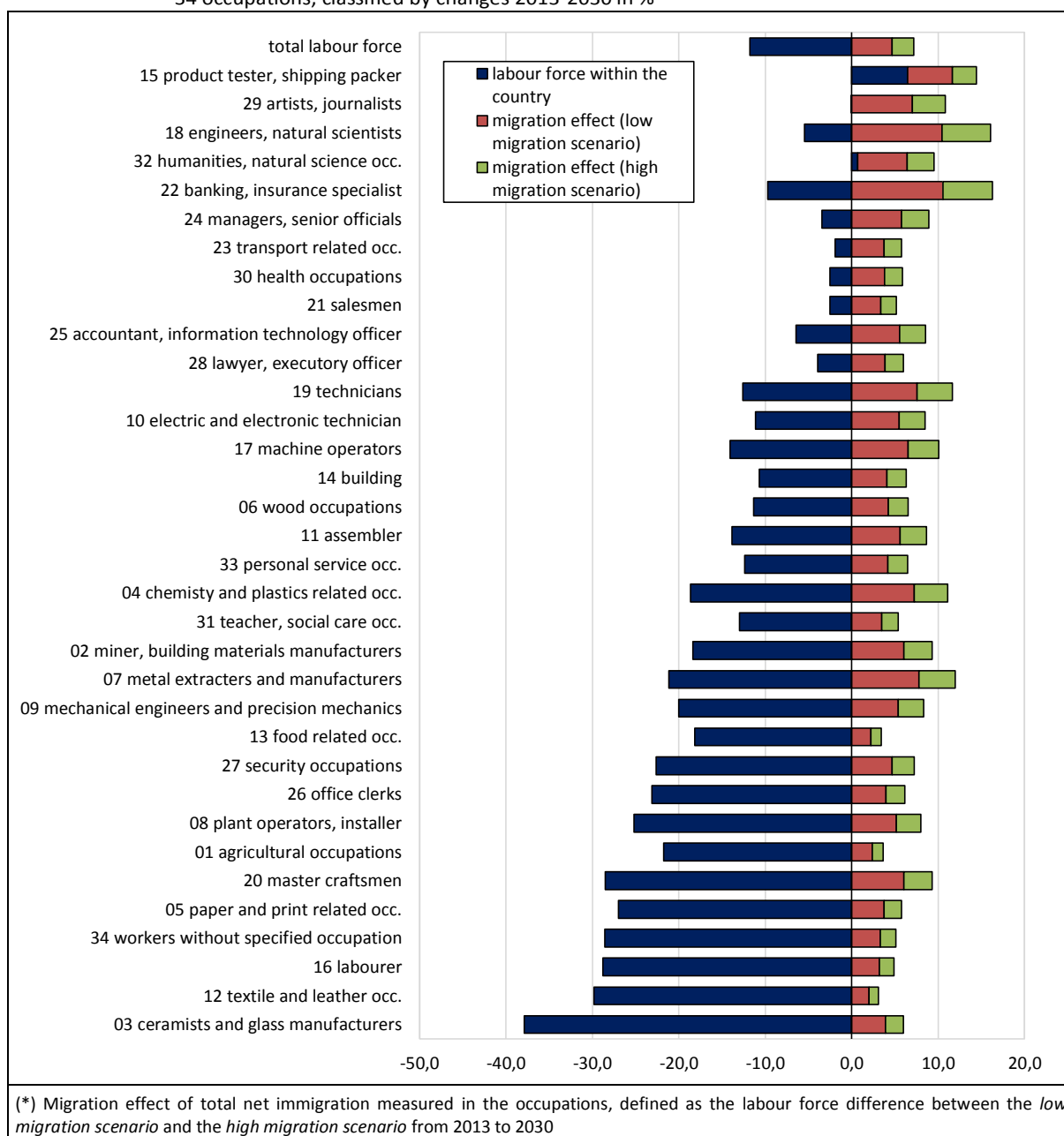
Labour force by occupation and qualification

As can be seen in Figure 4, occupations that have the highest relative growth in their workforce are: product testers, shipping packers (+14 %; +81,000 in the *high migration scenario*), artists, journalists (+11 %; +90,000), engineers, natural scientists (+11 %; +135,000), humanities and natural science occupations (+10 %; +45,000), banking and insurance specialists (+7 %; +63,000), and managers and senior officials (+5 %; +136,000). Occupations that have the largest relative decreases in their workforce are: ceramists and glass manufacturers (-32 %; -11,000), textile and leather occupations (-27 %; -44,000), labourers (-24 %; -221,000), workers without a specific occupation (-24 %; -177,000) and paper and print-related occupations (-21 %; -32,000). The decreases in absolute terms are

particularly high for office clerks (-827,000;-17 %), teachers and social care occupations (-270,000; -8 %), labourers (-221,000; -24 %) and personal service occupations (-208,000; -6 %).

The supply of domestic workers will decrease in nearly all occupations by the year 2030. On average, the labour force will shrink by 12 %, the highest loss being in the occupational group ceramists and glass manufacturers, which will lose almost 40% of its workforce. However, all occupational groups will benefit from immigration. The occupational groups that will benefit the most from immigration are banking and insurance specialists (11 % of the labour force in 2013 in the *low migration scenario* and an additional 6 % in the *high migration scenario*), engineers and natural scientists (10 % and 6 %), technicians (8 % and 4 %), managers, senior officials and master craftsmen (6 % and 4 %). There are only a few occupational groups where the workforce could grow without immigration. This particularly includes product testers / shipping packers and to a far lesser extent humanities and natural science occupations.

Figure 4 Labour force and the effects of migration by occupation
34 occupations, classified by changes 2013-2030 in %*

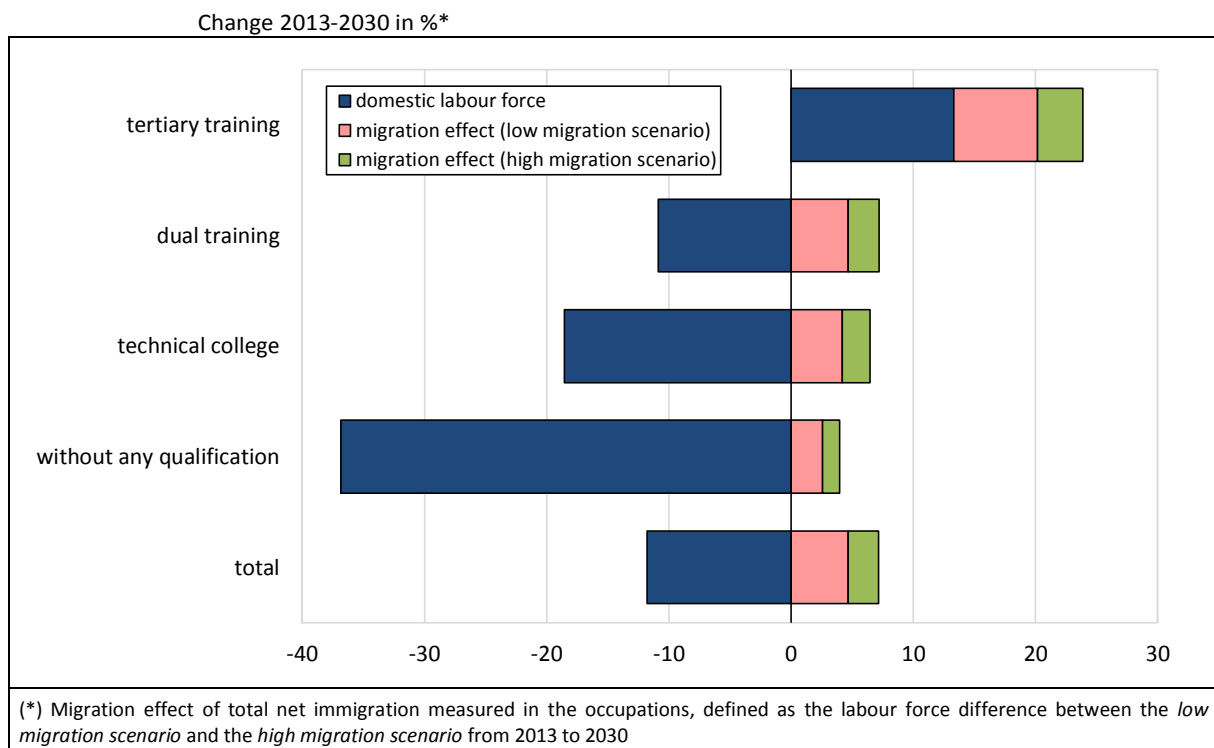


Source: Economix (Y21a), IER

The trend for higher level qualifications will significantly change the qualifications structure of labour supply in 2030. Compared to 2013, we anticipate the following in the *low migration scenario* (Figure 5):

- Labour supply of academics will increase by 2.1 million (+24%).
- The number of workers with dual vocational training will decline by 840,000 (-4 %).
- There will be 480,000 fewer workers with a technical college qualification (- 12%).
- Moreover, 2.8 million people will leave the segment of workers with no vocational training (-33 %).

Figure 5 Labour force and the effects of migration by qualification



Source: Economix (Y26a)

Outlook for 2050 – the importance of family policy, employment orientation and immigration

Demographic change is irreversible, meaning that with today’s predominant birth rate of 1.4 children per woman there are more parents than children. Thus, the population is shrinking and there are fewer and fewer native workers available in the labour market. More importantly, the population and the labour force are getting older. In the long term, labour supply will not only be contingent on net immigration, the education policy, the pension reform, the implementation of age management approaches and the full use of the female workforce. It is the birth rate which will be the pivotal point.

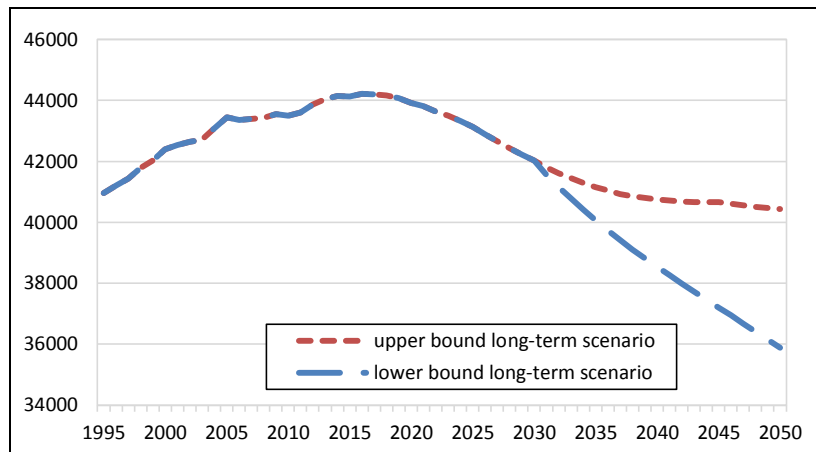
On BMAS’s request, we have developed two long-term scenarios for labour supply up to the year 2050 so that these long-term developments can be identified:

- The *lower bound long-term scenario* assumes a birth rate of 1.4 children per woman and the fall of net immigration to 200,000 per year – as in the *low migration scenario* – by the year 2020. Between 2030 and 2050 it will then drop to 50,000 per year. The participation rate of women and older workers will increase in the same way as described in the *low migration scenario* until the year 2030 and will only slightly increase thereafter.

- The *upper bound long-term scenario* assumes that the birth rate will increase to 1.9 children per woman by the year 2050. From 2030 onwards net immigration will remain constant at 200,000 per year and the female participation rate will rise after 2030 making it on par with the male participation rate.

In the *lower bound long-term scenario*, we assume that sufficient effort will be made by policy makers and companies to provide a better balance between work and family life. This will ensure a rise in the female participation rate and will stabilise the fertility rate. In the *upper bound long-term scenario*, we believe that policy makers will create even better conditions to reconcile work and family life. The female participation rate in Germany will exceed the female participation rate in Scandinavia and will lead to absolute gender equality. However, one may question whether the participation rate for both genders would be somewhat lower in a scenario where male and female participation rates are equal. In such a case, altering the working times may also be used as a balancing mechanism to reconcile work and family life and to divide the two sexes.

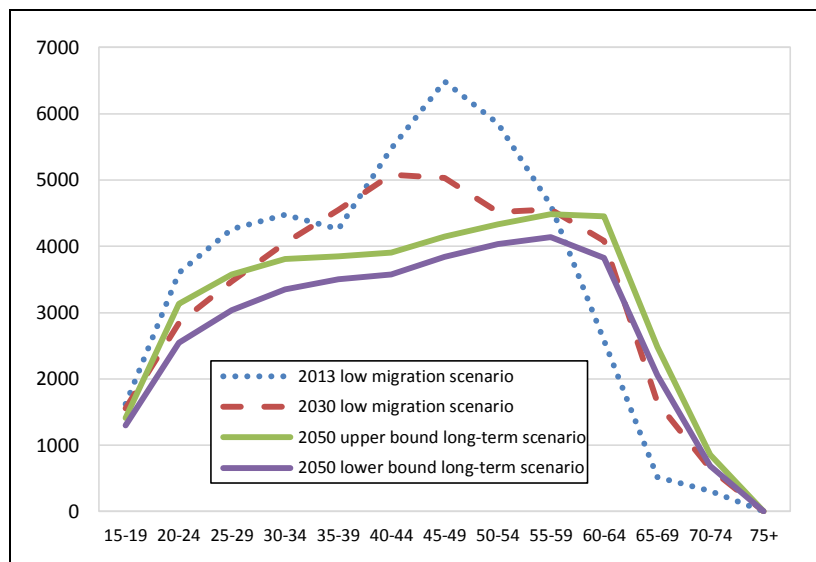
Figure 6 Long term development of the labour force up to the year 2050
in 1000s



Source: Economix (2014-A2)

The decline of the net immigration rate to 50,000 people in the *lower bound long-term scenario* is based on the assumption that demographic change also occurs in other parts of the world, especially in Europe and Asia, and will lead to labour shortages in the global labour force. The source of immigration from the traditional home countries of migrants may be less prosperous after the year 2030. Moreover, China and India may increasingly recruit from abroad while Europe will have difficulty competing in the “competition for bright minds”.

Figure 7 Age structure of the labour force up to the year 2050
in 1000s



Source: Economix (2014-A2)

The model calculations show that according to the *lower bound long-term scenario*, the decline of labour supply will continue unabated (Figure 6). The labour force will decline to 36 million by the year 2050, which is 6 million less than in 2030 and 8 million less than in 2015. Hence, Germany will lose 20 % of her current workforce by the year 2050.

According to the *upper bound long-term scenario*, the combination of increased fertility rates and a constantly high net immigration rate will lead to significantly smaller losses. We estimate that the labour force will be 40 million in the year 2050, which is 3.7 million less than in 2015. When compared to the *lower bound long-term scenario*, the relative loss for 2015 is halved (-9 %). Providing that there is an active population policy and labour market policy in place, there could be 4.5 million more workers in the labour market in the year 2050 than there would be if there was no such policy in place. All of the scenarios agree that from 2020 onwards (at the latest) labour supply will steadily decline. Counteractive measures will only slow the pace of this downward trend. This also shows that demographic change is irreversible. The trend of an ageing labour force will also continue, although not at the same pace as between 2013-2030 (Figure 7).

Demand for labour

Removing the restrictions on labour supply by means of higher immigration and lower unemployment will result in a significantly more favourable employment trend by 2030 than was previously anticipated. According to the *low migration scenario*, employment will be 1.7 million higher in 2030 than what was predicted in the 2012 projection. According to our calculations, this figure will peak in 2018 with 42.2 million people in gainful employment. However, in the years thereafter, demographic factors will prevail once again and the number of people in gainful employment will drop to 40.8 million by the year 2030.

Once again there is a much brighter outlook for the employment trend in the *high migration scenario*, wherein the number of people in gainful employment in 2030 will be 1.1 million higher than in the *low migration scenario*. All in all, there will be 42 million people in gainful employment in the year 2030, which is approximately the same figure as in 2013. However, demographic developments will cause employment to decline from 2020 onwards in this scenario too.

Sectors with shortages benefit from immigration

Both scenarios show that nearly all industrial sectors, both growing ones as well as shrinking ones, will benefit from a higher supply of labour. On one hand, sector growth estimates – such as in the business services sector – are limited by the shortage of labour. On the other hand, anticipated declines – such as in the manufacturing sector – are also affected by labour shortages. Looking to the future, we support the hypothesis that the employment of immigrants will comply with demand and thus companies with strong employment growth as well as companies with severe labour shortages will benefit from immigration.

The employment trend is presented as being more favourable, or at least less unfavourable, in nearly all industrial sectors⁷ up to the year 2030 compared to the 2012 projection (Figure 8):

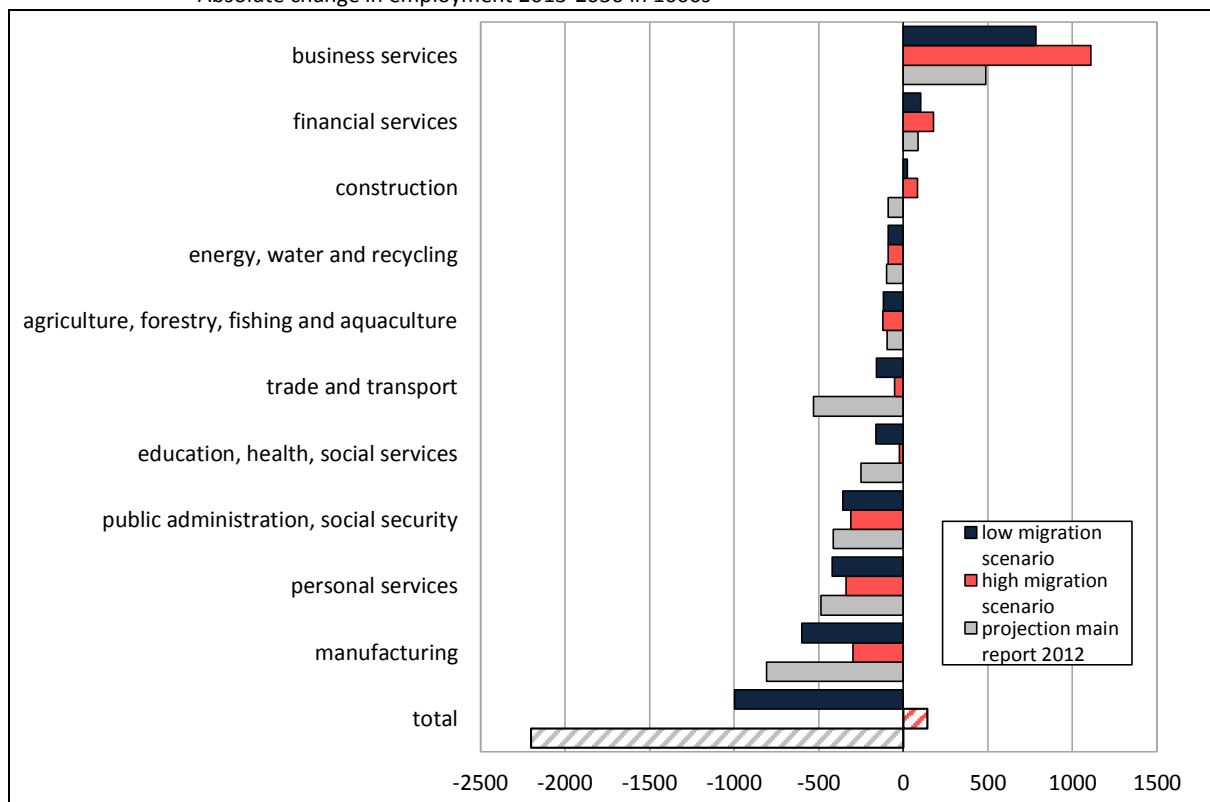
- In the business services sector, employment will increase by 300,000 in the *low migration scenario* and by a further 325,000 in the *high migration scenario*. Employment growth will double from 8 % to 16 % between 2013 and 2030. The growth rate will also double in the financial services sector from 6 % to 13 %.
- In the manufacturing sector, employment will fall by 8 % according to the *low migration scenario* (-4 % in the *high migration scenario*). That means that 300,000 jobs will be lost in the *high migration scenario* compared to the 800,000 decline projected in 2012.
- In the construction sector, the employment trend will be slightly positive (+1 % in the *low migration scenario* and +3 % in the *high migration scenario*). This can be traced back to higher population growth and altered assumptions for demand growth: The flight of investments into tangible

⁷ Regarding the classification of industrial sectors, see Annex.

assets will last for longer and there will be a much greater need for public infrastructure investments than was originally expected.

- The new projections show the trade and transport sector in a much more positive light than previously. The ½ million decline in employment, which was projected in the 2012 report, will decrease to a tenth. This will predominantly be due to a more favourable employment trend in the transport sector. We deemed it necessary to revise our assumptions by taking the strong employment growth in the logistics sector into account. We expect that employment will stagnate in the transport sector in both scenarios.
- In the education, health and social services sector, there are opposing trends underlying future employment change. Overall, a decline in the younger population reduces the need for education and a decline in the general population reduces the need for social services. However, an ageing population increases the need for health and social services. Providing there is a high level of immigration, employment in the education sector will fall from -9 % to -5 % and in the social services sector it will fall from -4 % to -1 %. On the other hand, there will be a major turnaround in healthcare: The decline of 4 % changes to an increase of 5 % in the *high migration scenario*. Immigration could eradicate severe labour shortages in this sector.

Figure 8 Sectoral employment development
Absolute change in employment 2013-2030 in 1000s



Source: Economix, CE (U4)

- The effects on employment will remain lower in the public administration, social security sector. There will be virtually no changes in job cuts because budget targets will be followed. According to the 2012 projection, employment was expected to decline by 15 % by the year 2030. This figure is slightly lower in the *low migration scenario* (-14%) and in the *high migration scenario* (-12 %).
- The sectoral employment impact will remain marginal in personal services. Job losses will decline from -8 % to -6 %. Employment in these business sectors, for example in hospitality, travel services, publishing and media, art and entertainment among others, could benefit from more fa-

avourable population development in the same way that other business sectors have done. However, labour demand will still be restricted due to the minimum wage regulation which was introduced in 2015.

- In the energy sector and the agriculture and forestry sector we can only see minor changes in both scenarios. Both sectors are in significant long-term decline meaning that the impact of immigration is low. Therefore, the decline in employment will be -19 % for the energy/water/recycling sector and -16 % in the agriculture, forestry, fishing and aquaculture sector.

According to our calculations, the macroeconomic effects of the recently introduced minimum wage regulations on employment will be minimal. In the long term, the introduction of the minimum wage will unleash the potential workforce that is needed in other areas of the labour market. Nevertheless, a longer adjustment and qualification process is still necessary in order to help absorb the sectoral and regional impacts. This is especially true for the eastern German states where, according to today's figures, approximately a fifth of the labour force earns less than the minimum wage.

Structural change in occupations – not “the end of work”

Our forecasts still focus on the most important finding from the main report of 2012; that severe job losses are to be expected in manufacturing occupations as well as in administration and office occupations. Employment in manufacturing occupations will decline by 780,000 by 2030 according to the *low migration scenario* and by 510,000 in the *high migration scenario* (Figure 9).

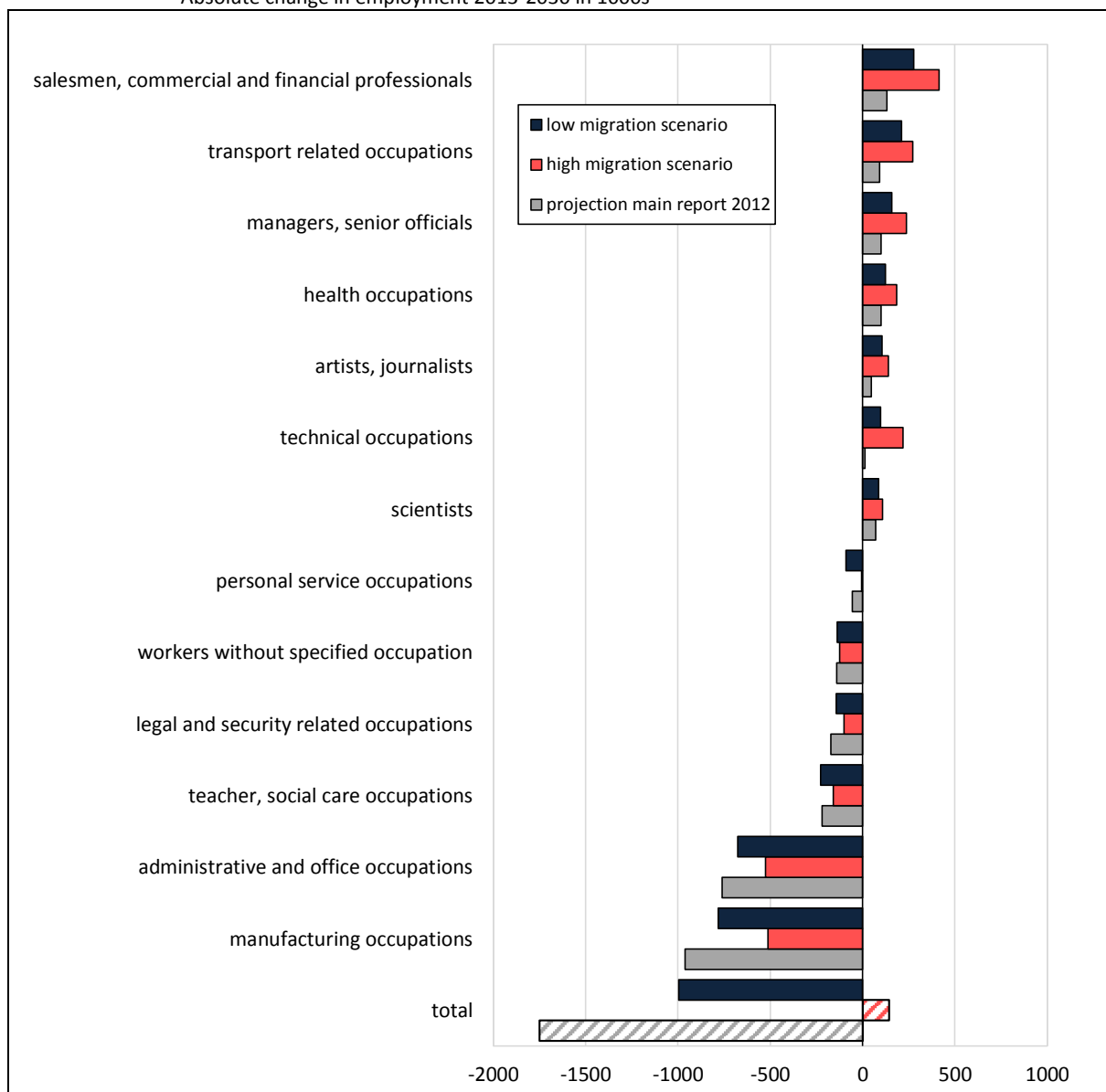
We anticipate a decline of between 520,000 and 680,000 in office jobs. In contrast to this, salesmen, commercial and financial professionals, transport related occupations, managers and senior officials will thrive. Additionally, technical and artistic professions as well as professions in healthcare can expect higher growth according to the new forecasts. The forecasts have a little effect on teachers, social care occupations, legal and security occupations, scientists, personal service occupations as well as on workers who do not have a specific occupation. Despite a higher supply of labour, demand will not change from the current trends.

In our projection, the shifting of demand between occupations is due to two major driving forces: the transfer of labour demand between individual industrial sectors, as described above, and the technological and organisational changes in employment in the individual industrial sectors. The introduction of new technologies and organisational structures in companies means that not all technical opportunities are implemented, but rather that the focus is redirected to the economic returns instead. Therefore, we do not agree with “The End of Work” theory which Rifkin propagated 20 years ago and repeated recently.⁸ Also, the impact of the current debate regarding the “Internet of Things”, which would mean that machine-to-machine communication would lead to an immense number of redundancies, only remains partial. In a situation where there are severe labour shortages, redundant workers will be recruited in areas where they are needed the most. This requires an efficient restructuring process and presents labour market policies with a difficult task. Ultimately, the labour market has to be flexible enough for the restructuring process to be successful, even if it consists of several stages. Therefore, we do not believe that it is the end of work but rather that it is a sustainable way of optimising human capital. In the end this will be the pivotal factor of future growth.⁹

⁸ Rifkin J. (1995): *The End of Work: The Decline of the Global Labor Force and the Dawn of the Post-Market Era*. Putnam Publishing Group, 1995; Rifkin J. (2014): *The Zero Marginal Cost Society: The Internet of things, the Collaborative Commons, and the Eclipse of Capitalism*. palgavemacmillan.

⁹ Page 23 in Vogler-Ludwig, Kurt; Düll, Nicola (2013): *The German Labour Market in 2030. A Strategic View on Demography, Employment and Education*. W. Bertelsmann Verlag, Bielefeld.

Figure 9 Employment by occupation
 Absolute change in employment 2013-2030 in 1000s



Source: Economix, CE (U5)

The higher level of labour supply is not distributed proportionally in either of the new forecasts for the current level of employment, but instead shows that employment follows growth. There will be strong growth in certain occupations, for example salesmen, commercial and financial professionals as well as in transport related occupations, which will be caused by a higher demand for these workers in many industrial sectors. Therefore, business services will redeploy their workforces from administrative and office jobs to salesmen, commercial and financial professionals and transport related occupations. The situation will be similar in other industrial sectors, for example in the trade and transport sector and in the financial services sector. Furthermore, transport related occupations have been rated more positively than what was projected in our 2012 report.

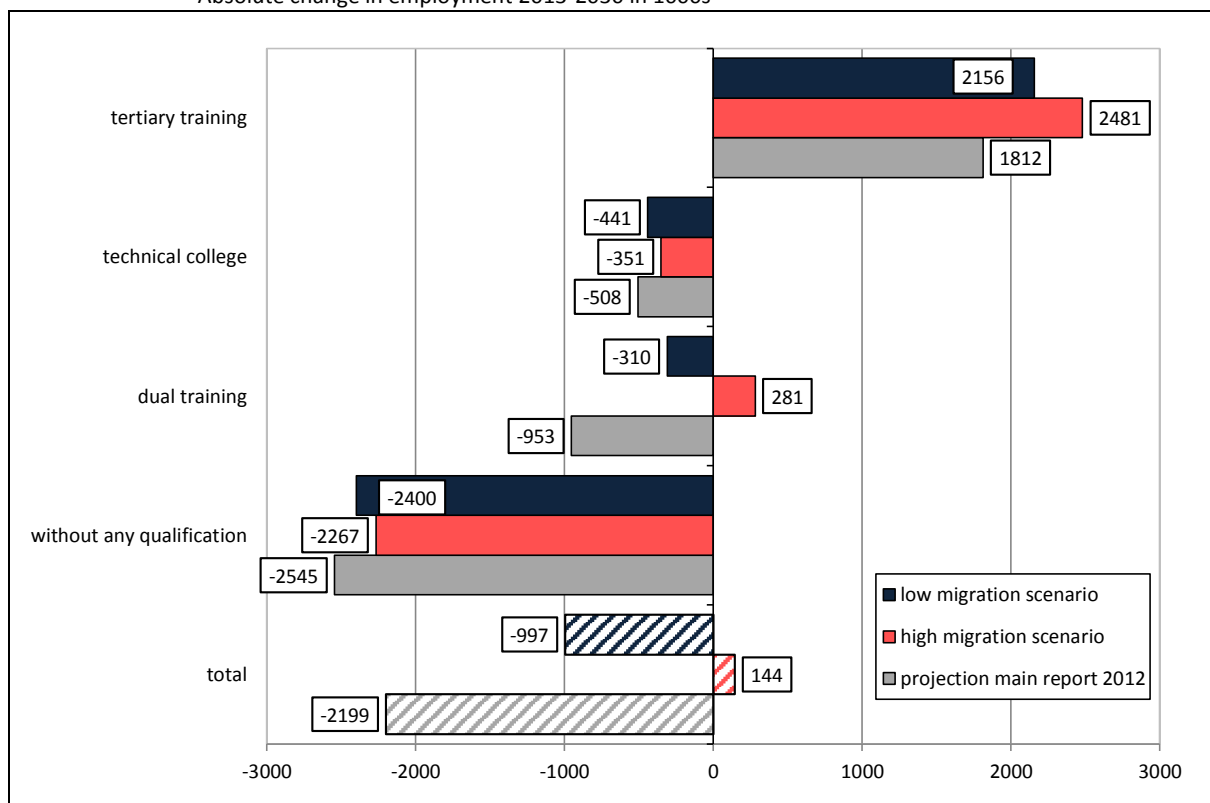
High and increasing demand for graduates

Higher labour supply flows into areas of demand where it is needed the most. Primarily, these are graduate jobs. According to the *low migration scenario*, the number of academics in gainful employment will increase by 2.2 million by the year 2030 compared to 2013 (Figure 10). This figure is 340,000

higher than what was projected in the 2012 report, and labour supply is even higher in the *high migration scenario*, which estimates an increase of 2.5 million.

There will also be strong employment growth or fewer job losses in the intermediate-skilled segment of the market which is in decline. In particular, the number of persons employed who have completed dual vocational training will decline, but to a lesser extent than what was projected in 2012. In the *low migration scenario* we anticipate a minus of 310,000, whereas in the 2012 projection the figure was -950,000. The *high migration scenario* even assumes an increase of 280,000. The positive effect can be seen in the manufacturing industry in particular where labour shortages have a particularly strong impact. It should be noted that immigration will not be able to provide such a high quantity of skilled workers who have completed dual vocational training. However, there may be suitable skilled workers who possess enough work experience that employers will consider them to be equivalent to graduates from the German vocational training system.

Figure 10 Employment by formal qualifications
Absolute change in employment 2013-2030 in 1000s



Source: Economix (U07)

Demand for people with technical training will change in a similar way in all three scenarios. According to the *low migration scenario*, there will be 440,000 job losses as opposed to a decline of 510,000 in the 2012 projection. The figure is -350,000 according to the *high migration scenario*. The moderate effects are due to slight changes in demand in the field of education and in the social services sector. The more favourable employment trend will also lead to somewhat fewer redundancies in the segment of low-qualified workers. This figure will decrease by between 2.3 and 2.4 million in both scenarios.

With the expectation of strong growth in higher education, this projection is vastly different from the BiBB-IAB projection which predicts stronger growth in the dual system.¹⁰ The predictions set out in this

¹⁰ Helmrich et al. (2012): Engpässe auf dem Arbeitsmarkt: Geändertes Bildungs- und Erwerbsverhalten mildert Fachkräftemangel. BiBB-Report 18/12. Online: http://www.bibb.de/dokumente/pdf/a12_bib-report_2012_18.pdf.

report are based on differing views regarding the structural change in sectors, occupations and qualifications. In our opinion, international competitiveness will cause the German economy to continue using her competitive advantage to produce top-quality products and services, while large portions of industrial manufacturing will be relocated to Asia. Not only will industrial mass production migrate but increasingly the production of high-tech products will, too. Germany's competitive advantage will remain in the supply of industrial and scientific services. This is why Germany needs so many highly qualified workers. Highly-trained skilled workers from the dual system will not directly benefit from this trend. On the other hand, the introduction of a large number of specific Bachelor courses will lead to a "scientification" of the upper end of the qualification segments for occupations from the dual training system. Increased permeability of the education system will mean that workers who completed the dual vocational training system will also need an additional post-qualification.

The segment with no vocational training needs to be significantly downsized for this change to occur in the qualification structure. Despite immigration it will not be possible to fully cover the demand for skilled workers. Therefore, the education strategy will focus on vocational training, continuing education and advanced qualifications for workers who lack professional qualifications. It will thus be essential that labour market policies are strengthened – as laid down in the Government's plan for skilled workers.¹¹ It will also be important to promote continued vocational training and to improve upward mobility on all qualification levels.

Occupational structure according to occupational classification 2010

For this projection our calculations are based on data obtained from the 2010 classification of occupations. The decision to change from using the 1992 occupational classification was based on parallel surveys conducted in the 2012 micro census.

According to the new classification, the projections shown in Table 1 show strong employment growth in occupational group 9 (humanities, social science, economics, media, art and culture). In the *low migration scenario*, there will be a 9% rise in employment between 2013 and 2030 in occupational group 4 (natural science, geography and computer science), occupational group 5 (transport, logistics, safety) and occupational group 6 (commercial service, merchandise trade, tourism). All other occupations with a 1-digit level show a decline. The rate of change is 2-4 percentage points higher in the *high migration scenario*.

The new occupational classification is of limited use for the purpose of this projection because all skills/qualifications have been grouped together in one field. Additionally, various occupations have been mixed together within the 2-digit level (for example managers and clerks have both been included in occupational group 71, business organisation and management). Therefore, it is not possible to distinguish either an individual's qualifications or their occupational function at an aggregate level. Some characteristics can indeed be detected at more detailed aggregate levels but the sampling error increases with disaggregation. The data from the 2010 occupational classifications needs to be supplemented with additional values from the micro census so that data regarding occupational characteristics, such as the position in a company and the qualifications, can be obtained.

¹¹ Federal Ministry of Labour and Social Affairs (2011): Fachkräftesicherung. Ziele und Maßnahmen der Bundesregierung. Online: http://www.bmas.de/SharedDocs/Downloads/DE/fachkraeftesicherung-ziele-massnahmen.pdf?__blob=publicationFile.

Table 1 **Employed persons by occupation (occupational classification 2010)**
Change 2013-2030 in %

OC 2010	Occupational field	Low migration scenario	High migration scenario
1	Agriculture, forestry and horticulture	-15,1	-13,5
2	Raw material extraction, manufacturing	-6,8	-3,6
3	Building construction, architecture, surveying technology, building services engineering	-2,1	1,1
4	Natural science, geography, computer science	5,4	9,1
5	Transport, logistics, security	3,3	6,1
6	Commercial service, merchandise trade, tourism	1,7	3,5
7	Business organisation, accounting, law and administration	-5,4	-2,5
8	Health, social services, teaching and education	-2,0	0,2
9	Humanities, social science, economics, media, art and culture	9,0	12,5
0	military	-21,6	-19,6
	Total	-2,4	0,3

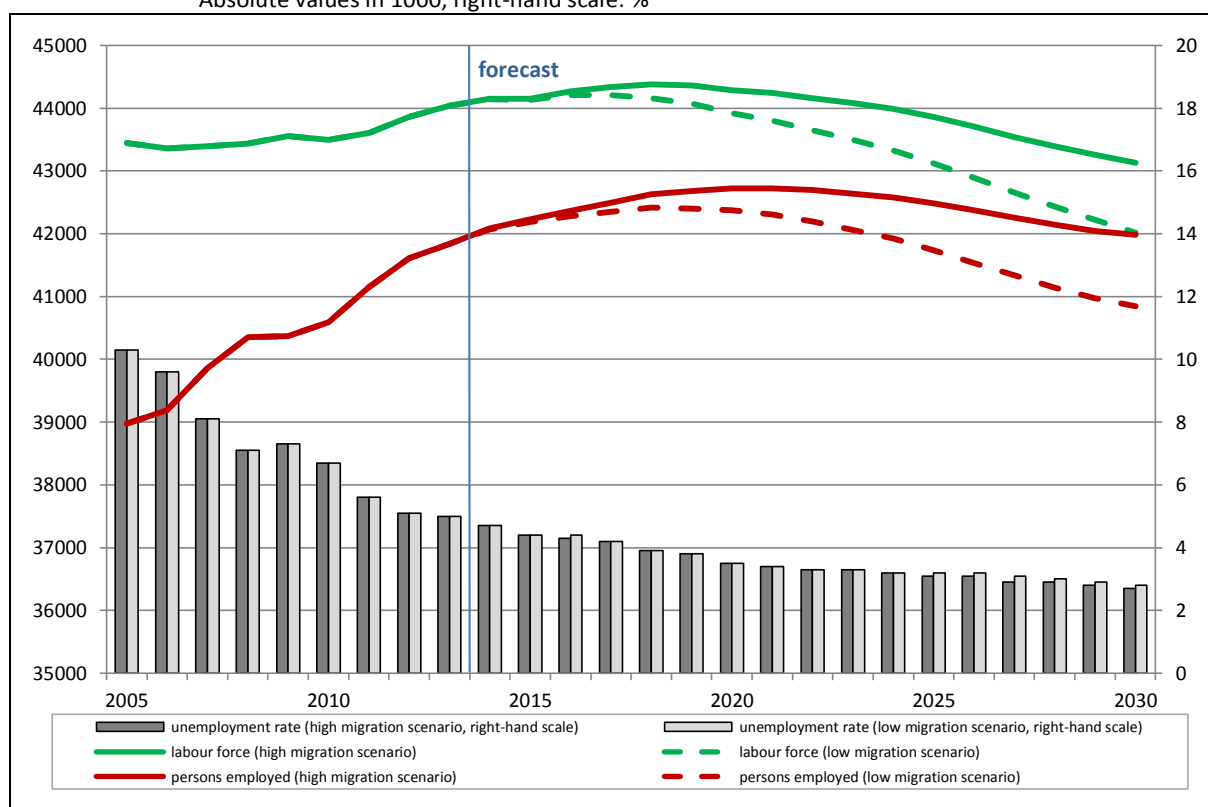
Source: Economix

Labour market performance and the skills gap

Macroeconomic development

Projections up to the year 2030 show that the favourable development on the labour market due to increased labour supply will continue for a few more years. Demographic factors will then prevail and will cause labour supply to decline (Figure 11).

Figure 11 **Labour supply and labour demand**
Absolute values in 1000; right-hand scale: %



Source: Economix, CE (U01)

A comparison of the two scenarios shows that immigration can significantly influence labour market figures:

- In the *high migration scenario* there will be 1.6 million more people in the population in the year 2030 compared to the *low migration scenario*.
- With a high rate of immigration the labour force will increase by 1.1 million in the year 2030 and employment will be 1.1 million higher than in the *low migration scenario*.
- However, the volume of hours worked will increase to a lesser extent because we have assumed a substitutive relationship between immigration and longer working hours. Annual average working hours will decrease by 30 hours, or 2 %, in the *high migration scenario*.
- The unemployment figure is only slightly different in the two scenarios because we presume that structural unemployment will remain largely unaffected by a high rate of immigration. Towards the end of the forecast period the unemployment rate will be 2.7 % - similar to the *low migration scenario*. There is a slight decline in the *high migration scenario* compared to the *low migration scenario*, which is due to higher employment growth. Thus, the potential of the unemployed will largely be exhausted. A further decline will negatively affect frictional unemployment and will thus also affect the flexibility of the labour market.
- According to our calculations, there will be an increase of 0.35 percentage points in economic growth for every 100,000 immigrants. This depends on a multitude of factors. In particular, to what extent the migrant skills supply matches employer demand and how well macroeconomic stability will be maintained. We assume that these factors will be on the rise in the forecast period.
- Income per capita will also increase, although not as much as GDP. According to the model, an increase of 0.25 percentage points is to be expected for every 100,000 immigrants.

Positive multiplier effects from immigration

The model shows the positive multiplier effect as a result of the labour pool expanding. Employment and income increase disproportionately to labour force growth. There are two reasons for this; severe labour shortages are overcome by providing workers, and the additional workers create their own jobs through their demand for goods and services. The business cycle is instantly affected by the higher rate of employment, which also improves investors' growth prospects. Investors' plans will most likely be realised due to the increase in demand. Therefore, the additional migrant labour force will not fall into unemployment, but will instead contribute to an even lower unemployment rate than what has been predicted in the *low migration scenario*. The same applies for other measures used to increase labour supply, for example higher female participation.

The skills gap

In addition to using unemployment as the macroeconomic indicator for labour market imbalance, we used two indicators to identify labour shortages:

Labour shortage indicator I, which measures the skills resources of unemployed persons, indicates how labour shortages are intensifying in the recruitment of skilled workers from the unemployed group. This is especially true for the higher education sector, but also for workers with dual vocational training or technical training. The only considerable surplus to cover labour demand is among unemployed persons without any vocational training. Probably one of the toughest tasks of labour market policy is to train these workers so they are able to take on more demanding roles. Nevertheless, upgrading the skills of these workers is the key to successfully restructuring the entire labour force. Systematic vocational training and continuing education for adult workers is crucial for this strategy

Labour shortage indicator II measures how quickly occupations (and qualifications) will adjust. It shows that in 2030 the occupations that are the most likely to have a shortage of workers are health occupations, managers and senior officials, engineers/natural scientists, artists and journalists as well as salesmen (Figure 12). On the other hand, there will be a potential surplus in labourers, office clerks, and personal service occupations. Thus, the situation regarding a shortage of occupations and a surplus of occupations is similar, if not identical, to the labour shortage I indicator. The structural change towards service occupations and more highly qualified jobs appears to be extensive.

Looking at formal vocational training there may potentially be severe skills gaps for graduates of law, economics, social sciences, linguistic and cultural studies, maths, natural science and engineering. The bottlenecks are reducing rapidly according to the model assumptions. On average there will be 9% fewer graduates from higher education between 2015 and 2030. The situation is much more balanced when looking at graduates from the dual vocational training system. In particular, shortfalls will emerge in healthcare and social professions, other manufacturing occupations, salesmen, service occupations, as well as in shipping and transport related occupations. The surpluses appear to be predominantly in administration, organisation and office occupations. Overall, in the initial stages from 2015-2020 there will be 550,000 fewer skilled workers with dual vocational training. Spanning the entire period 2015-2030 the shortage will be 3 % of the labour force. Our calculations show that in the initial stages there will be a potential surplus of 540,000 workers who completed technical training at college, giving an average surplus of 5 %. This particularly includes engineering and commercial occupations. Initially there will be a potential surplus of 1.6 million workers who do not have any vocational training, but this will mostly disappear by the year 2030. The average surplus will be 13 %.

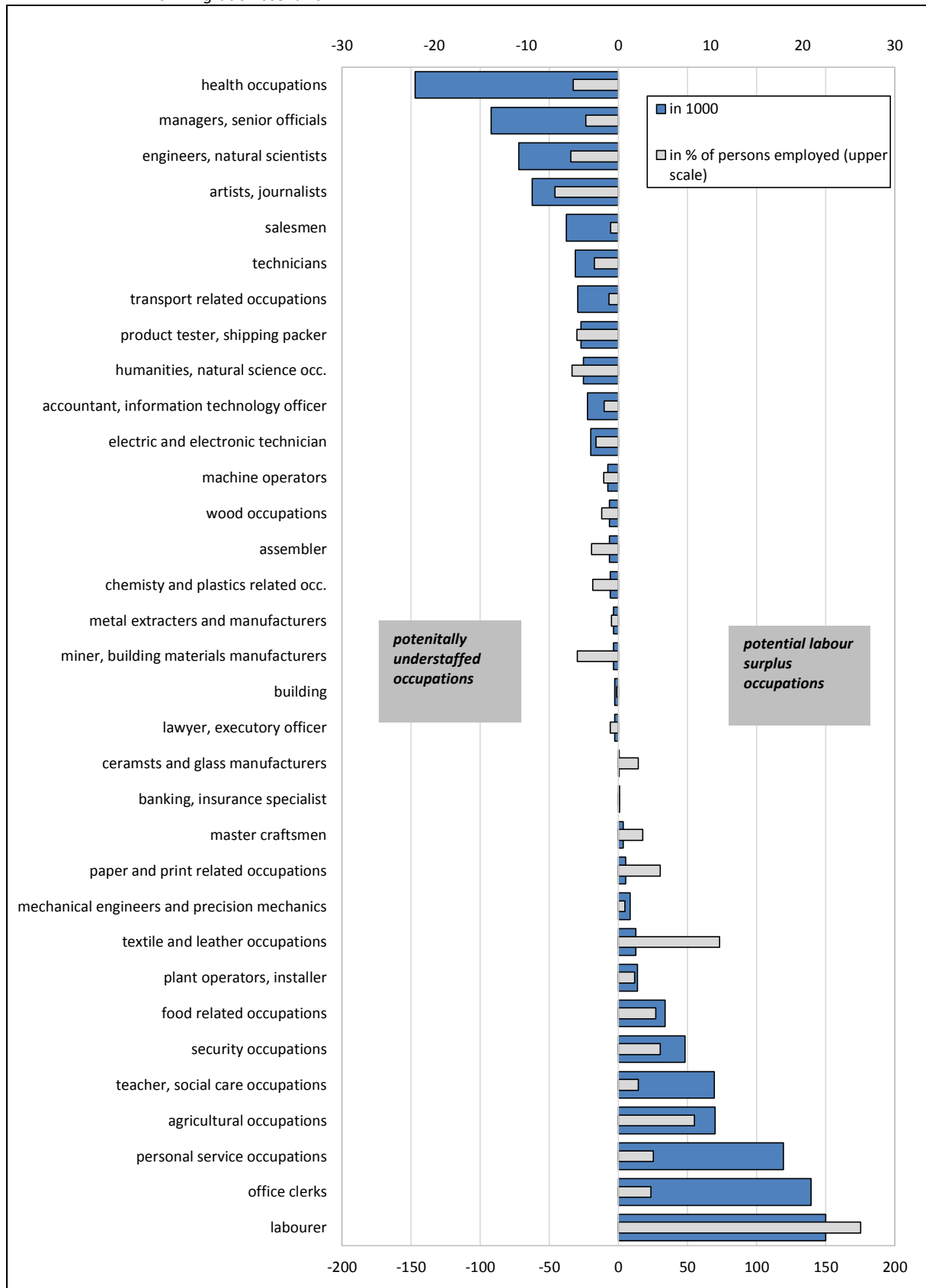
Labour shortage indicators

- *Labour shortage indicator I – dwindling unemployment potential:* This indicator measures the deviations in the structural change of employed and unemployed persons by comparing the change in the unemployment rate in occupation b (or qualification q) and the change in the employment share in the respective occupations or the respective qualifications. The difference in the normalised changes in the unemployment rate and the employment share between 2013 and 2030 is greater than zero when the unemployment rate increases more than the employment share. This indicates a surplus. On the other hand, if the difference is less than zero it indicates a shortage. The unemployment rate then declines more than the employment share.
- *Labour shortage indicator II – occupational and skills-related mobility:* This indicator measures the intensity of the structural change in employment and the resulting adjustment requirements in the occupational and skills structures. The indicator consists of the balance of the forecast employment figures according to occupation or skills with the fixed occupational/skills structure which would occur without structural change in labour supply. This is assuming that each of the structures will only remain constant for five years, after which they will adjust to the actual structure for the next five years.

High immigration will not reduce the skills gap

Possibly one of the most surprising results from this model calculation is that high immigration will not alter the number of skilled workers in the overall economy. The skills gap is actually somewhat higher under the conditions of high immigration compared to low immigration. This is due to high economic growth and a rise in employment demand caused by the multiplier effect. Thus, we came to the conclusion that in the long term high immigration will have nothing to do with reducing the shortage of skilled workers. Immigrant workers will only temporarily fill the gaps. After replenishment, labour demand will increase at least as quickly as labour supply. The positive effect of immigration does not appear in the labour market balance, but instead appears in the economic balance in the form of higher economic growth.

Figure 12 Labour shortage II: potential shortage of skilled labour in 2030 with slower occupational mobility
 Difference between demand and hypothetical supply when the occupational structure remains constant for five years
Low migration scenario



Source: Economix (U10)

The effectiveness of labour supply policies

Our projection includes a variety of labour market policies and education policies in order to achieve the predicted labour market performance. This includes expansionary measures such as higher net immigration and an increase in the participation rates of women and older workers. Population policies also come into force for the long term. We have also combined these policies in the set of measures to improve skills supply in the long-term until the year 2050 (Table 2).

As our estimates show, older workers aged 60 and above will contribute 1.8 million, the biggest part to achieving the increase in labour participation (+4.3 % of the labour force). A further 0.8 million will come from women under 60, and rising immigration will contribute 0.9 million for every 100,000 immigrants. Overall, these three measures will result in labour supply increasing by 3.6 million workers by the year 2030. As already mentioned, this will require several measures to be taken in labour market policy, the migration policy and the education policy. In turn, these figures show that an increase in labour supply cannot be achieved, or can only partly be achieved, if immigrants are not successfully integrated into the labour force, the work-family life balance is not improved, jobs are not adjusted to suit older workers etc.

Compared to today's figures, the long-term set of measures consisting of high birth rates, a continual increase in participation rates and a steady rate of immigration will result in 4.5 million additional people being part of the labour force by 2050. This figure would represent 11 % of the labour force in 2030. However, if it is not possible to sustainably increase the birth rate and simultaneously significantly increase the participation rate of women and older workers, these figures will remain an aspiration only.

Table 2 The effect of supply-side policies 2015-2030 and 2030-2050

	Contribution to changing the labour force	Labour force in 2030 in %
Measures to increase labour supply 2015-2030	3,572,000	8.5
Net immigration of 100,000 persons per year (2013 to 2030)	960,000	2.3
Rise in female participation (<60)	812,000	1.9
Rise in the participation of older workers (60+)	1,800,000	4.3
Measures to increase labour supply 2030-2050	4,545,000	10.8

Source: Economix

Conclusion

The long-term forecast for the German labour market is that immigration will be able to sustainably improve the economic outlook and the labour market prospects by filling the jobs where there is a shortage of skilled workers. Nevertheless, the Government's skills strategy is still important and is on the right track because it focuses on increasing domestic labour supply. This will cause the labour market to become less dependent on varying immigration flows.

From the perspective of this projection we believe that the Government's skills strategy, which focuses on low-skilled and disadvantaged persons, is particularly important because it contributes to rebalancing the entire qualification spectrum. We also regard the continuing education policy track to be of

major importance, even if the measures taken in this area are not to the extent that we deem necessary. The German Government's skills strategy is geared towards increasing the human capital base in the long-term and it integrates labour market policy so that short-term bottlenecks can be avoided. This appears to be the right division of labour because the shortage of skilled workers is a volatile phenomenon. Continuous training constitutes the most important element for a long-term development strategy.

In any case, the forces of demographic change will be difficult to control. Therefore, population policy and family policy should become the main focus of skills supply policies in the long term. The decline in labour supply, even if it cannot be stopped, will at least considerably decelerate if there is a combination of increased birth rates, higher labour market participation, and a steady rate of immigration.

Part B – Projection for the German states (Länder)

The forecast for the 16 German states is presented as sectoral, occupational and skills-specific projections up to the year 2030. They are based on an interdependent macroeconomic model which analyses the regional developments subject to the overall development in Germany, and takes the regional relationships into consideration. Our regional forecast is based on key settings from the *low migration scenario* on a national level. In an alternative calculation labour supply has been calculated for the *high migration scenario*. Data for the national forecast have been supplemented with national accounts time series data for the German states (Länder). Regional data from the micro census have been grouped into five-year periods to reduce the sampling error.

Significant differences in population development and ageing

The labour force potential in the German states differ with regard to age structure, employment behaviour, education and last but not least occupational mobility. All of these have a significant influence on the way the population is anticipated: the population will significantly decline in the eastern German states until the year 2030. In Saxony-Anhalt there will be a 9% decline in the population, 8 % in Thuringia and 7 % in Saxony. On the other hand, in the western German states the population will only decline by a maximum of 2 %. However, this is not the case for the Saarland for which we estimate a decline of 5 %. The population will remain static in Hessen and Rhineland-Palatinate. In Berlin, Baden-Wuerttemberg and Schleswig-Holstein the population will increase. According to our calculations the population will increase by 2 % or 3 % in Bavaria and in Hamburg.

The age structure of the working-age population will deteriorate in all of the German states. On average, the proportion of older workers (55-74 years old) to younger workers (15-34 years old) will be 1.5 in the year 2030, whereas it was 1.03 in 2013. Saxony-Anhalt will have the oldest working-age population with an age coefficient (as described above) of 1.82. The remaining eastern German states follow with 1.79 in Brandenburg and 1.75 in both Thuringia and Mecklenburg-Vorpommern. Most of the western German states will rank as the German average. This shows a clear distinction between the eastern and western German states.

Sharp downturn in labour supply in the eastern German states

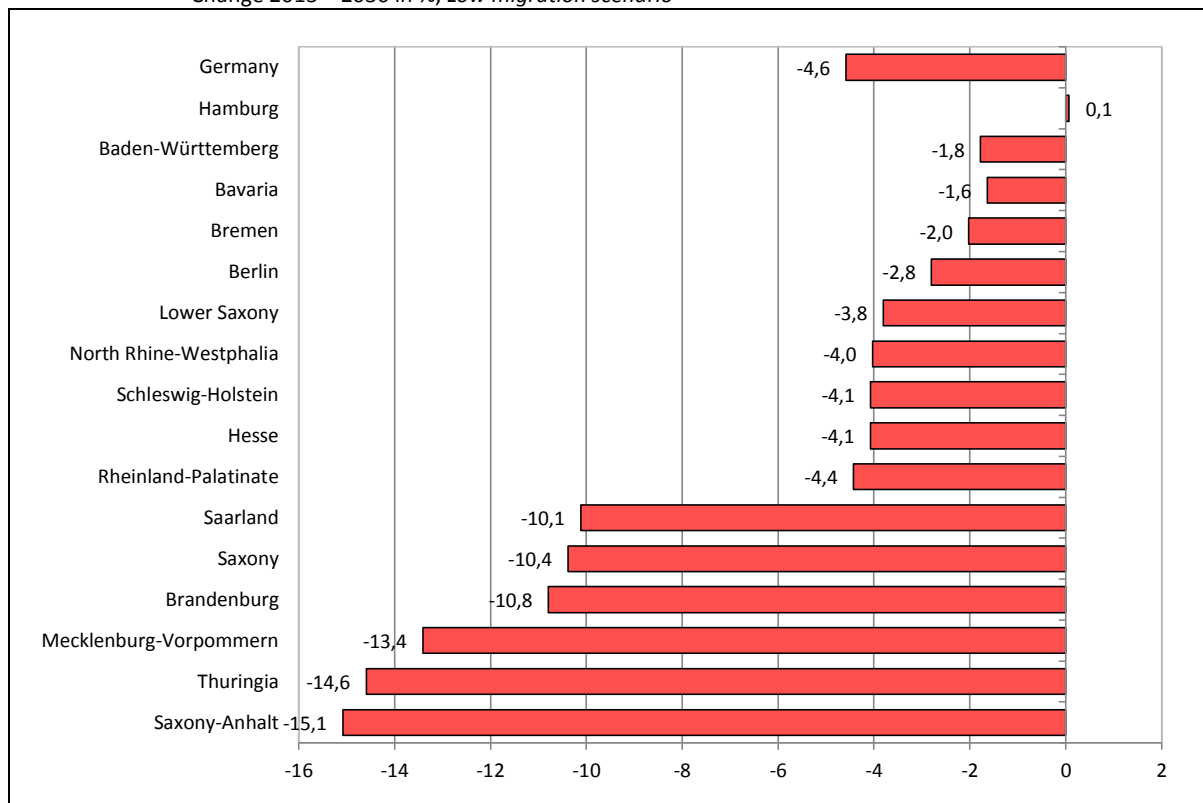
The size of the labour force shows the population trends in a much more distinct manner (Figure 13). The labour force will sharply decline in the eastern German states in particular; they will lose between 10% and 15 % of their labour supply by the year 2030. The only exception to this is Berlin, for which we expect a decline of approximately 4 %. In the western German states – except for the Saarland – the losses will be lower than the German average of -4.6 %. Hamburg will be in a position to maintain the size of its labour force. The decline in Bavaria, Baden-Württemberg and Bremen will be less than 2 %.

Due to differing age structures and varying participation rates in the different German states, the labour force restructuring process based on age looks quite different. In a nutshell, the workforce in the eastern German states and in the Saarland is getting older, predominantly because they are losing workers in the mid-range aged between 25 and 54 years old. This is not balanced out by an increase in older workers over the age of 55. In the other western German states, the ageing workforce is due to an increase in older workers and because the loss of younger workers is not as high.

The proportion of women in the labour force will increase in all of the German states. On average, this will be 47.6 % in 2030, which is approximately 0.7 percentage points higher than in 2013. We expect that the city states of Berlin and Hamburg will have the highest proportion of women, where half of

the labour force will be female in the year 2030 and where the percentage of women will grow the fastest compared to the other German states.

Figure 13 Labour force
Change 2013 – 2030 in %, *Low migration scenario*



Source: Economix (R3)

We expect that the trend for more highly qualified workers will be enforced throughout Germany. At the same time, the gap in qualification levels in the different German states will be reduced. 28 % of the labour force possessed higher education qualifications in 2013 in the city states of Berlin, Bremen and Hamburg. This figure will rise to 35 % by 2030. The proportion of the labour force with higher qualifications in the western German area states (not including the Saarland) will increase from 19 % to 26 %. The eastern German area states (including the Saarland) will also have a similar gain of between 15 % and 22 %. Thus, the regional ranking will remain the same, but the regions which have been weaker until now will finally catch up.

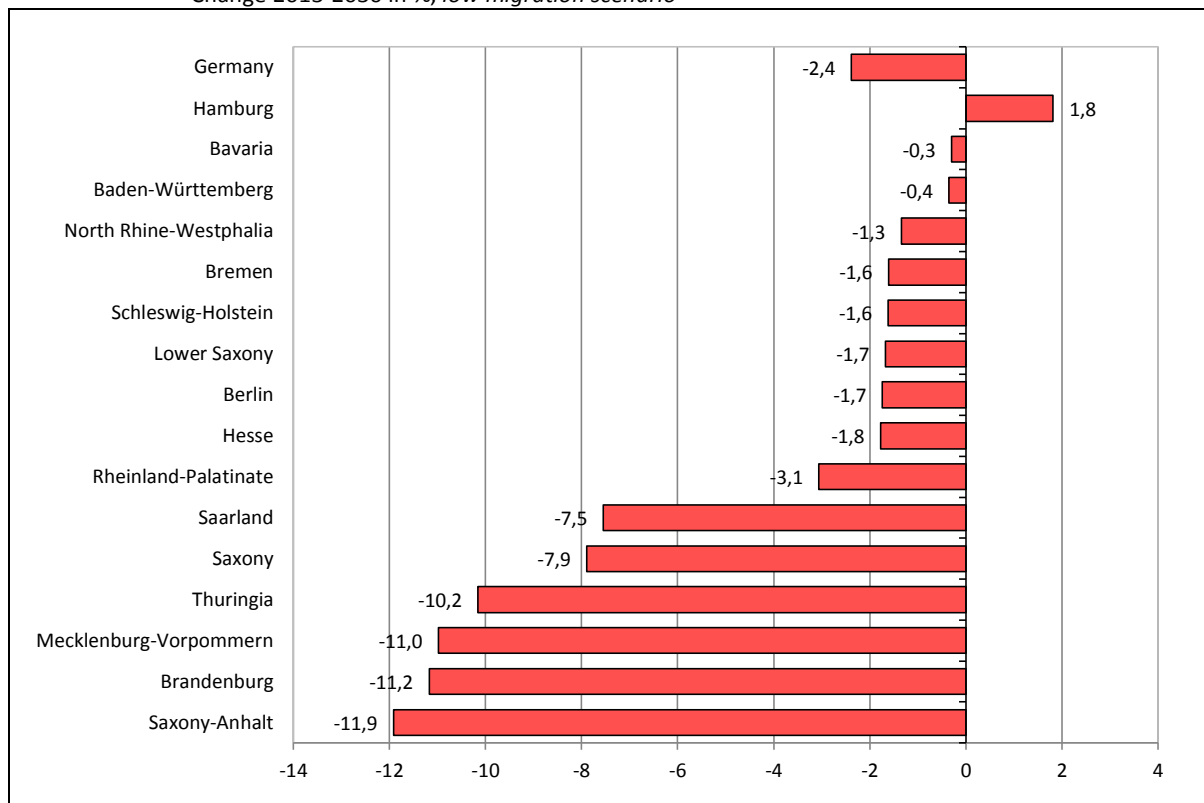
Our projection assumes that the proportion of workers who do not have any vocational training, which is currently 20 %, will significantly decrease to below 14 %. However, this figure will only decrease if the German states that have a high proportion of unqualified workers take action and enforce certain measures. This particularly includes the city states of Hamburg and Bremen, but it also includes the western German area states. They need to substantially invest in training unqualified workers, decrease the degree of illiteracy, increase further education, and include migrant children in the vocational training system. This is a challenging task that the western German states have to fulfil.

No convergence in employment trends ...

According to our projection, the way in which employment will develop in the individual German states will vary considerably: between 2013 and 2030 there will be slight employment growth of 1.8 % in Hamburg, but an 11 % decrease in employment in Saxony-Anhalt. All of the eastern German states will suffer a significant loss in employment, although Saxony will come out relatively positive with a decline

of only 8 %. In Brandenburg and Mecklenburg-Vorpommern we expect -11 %, in Thuringia -10 %. The Saarland will rate very closely to the eastern German states with -8 % (Figure 14).

Figure 14 Employment
Change 2013-2030 in %, low migration scenario



Source: Economix (E31)

The western German area states will also suffer from employment losses, but these losses will be lower than the German average of -2.4 %. The employment figures in Berlin and Bremen will decline moderately, the same as in Bavaria and Baden-Württemberg, followed by the rest of the western German states which will lose between 1 % and 3 % of their workforce.

There are a number of factors that influence these results:

- Developments in the city states will profit from employment potential in the knowledge-based services sector. A combination of well paid jobs in these sectors and the dynamics of a younger generation will cause accelerated economic development. This will cause an increasingly strong pull in other regions - especially in rural areas. Furthermore, this could lead to a more favourable flow of younger workers and highly skilled workers and migrants, which is not explicitly shown in the figures presented here.
- The same applies for southern Germany. The labour market conditions are good and Bavaria and Baden-Württemberg look like they are already on track for successful developments in the future because these regions are very attractive. Comparatively modern economic structures and high salaries will attract highly skilled workers, thus improving growth opportunities.
- The area states in mid-Germany and northern Germany will follow the national trend. Positive and negative factors will balance each other out. The metropolitan areas of Hannover, Cologne and Frankfurt will develop in much the same way as the city states. However, rural areas will be hit harder because of the decline in labour supply.
- Germany's regional policy will experience real problems when it comes to the eastern German states and the Saarland. Although these German states have a good economic structure, they will

lack the manpower needed to achieve growth. Thuringia and Saxony-Anhalt in particular will experience difficulties in the nationwide competition to attract workers. Labour outflows could become a persistent problem, which would continue to have a negative impact on growth opportunities. It will be difficult to break this vicious cycle.

According to these results, reunification and the effects resulting from workers leaving the eastern German states since reunification will create a demographic “aftershock”. This will fundamentally change the regional structure in Germany. These regions will not be able to cope with losing up to an eighth of the labour force without significant damage. Without effective countermeasures, rural areas will be drained and companies will relocate abroad. Regional markets will decline and income levels will fall.

... but eliminating regional unemployment disparities

All of the German states will profit from lower unemployment in Germany. According to both forecasts, we expect there to be a nationwide decline in unemployment from 5.0 % in 2013 to 2.8 % in 2030. We predict that especially the eastern German states will benefit from it. The unemployment figures in these German states will be 3 to 4 percentage points lower in 2030 than in the base year 2013, and will thus make a major contribution to reducing the demographic decline of labour supply. We also expect the same magnitude of relief for Berlin and Bremen. Unemployment will fall by approximately 2 percentage points in most of the western German states.

In the German states, labour supply is reacting to labour shortages by trying to balance the regional disparities with internal migration (living and working in another German state) or commuting between home and work. Commuter flows strongly depend on employment dynamics or on the level of unemployment in the regional labour markets. This paints a diverse picture: the city states will reduce the number of commuters whereas the southern area states will increase the number of commuters to their advantage. Hesse, North Rhine-Westphalia and the Saarland will increase their commuter figures somewhat. Thuringia is in a position to reduce its negative figure. However, in the eastern German states of Brandenburg, Mecklenburg-Vorpommern and Saxony-Anhalt the (net) number of commuters will increase. The same applies for the western German area states of Schleswig-Holstein and Rhineland-Palatinate.

The results of the forecast indicate that the effects of internal migration and the flow of commuters usually run in parallel. In German states such as Berlin, Brandenburg, Bremen, Mecklenburg-Vorpommern, Saxony-Anhalt and North Rhine-Westphalia, both factors will significantly contribute to the decline in labour supply and will thus lead to a comparatively high reduction of unemployment. However, both flows will be positive in Baden-Württemberg and Bavaria meaning that the decline in unemployment will remain low. Hence, the forecast assumes that an adjustment process in which workers are exchanged across domestic borders will stabilise the labour market.

Part C – Demand for skilled labour in small, medium and large enterprises

Different sized companies are competing for skilled workers in regional labour markets but their competitive advantage varies. The positioning of small, medium-sized and large local units has been the focus of the discussion on skills shortages from the beginning. This competitive situation will further aggravate the projected labour shortage in the future.¹²

Employment by company size

The German economy's size-specific transition pattern will not fundamentally change during the projected period. We can see from the previous period that the share of employment has shifted to both large local units and small local units (Table 3).

Table 3 Employment according to class size of local units

Low migration scenario

Employees per local unit	2013	2030	Change 2013-2030		Change 2000-2013
	in 1000		in 1000	in %	in %
<10	11139	10938	-202	-1,8	2,0
10-49	8987	8700	-287	-3,2	-1,7
50-499	13538	13135	-402	-3,0	-1,8
500+	8178	8071	-106	-1,3	1,6
Total	41841	40844	-997	-2,4	

Source: Economix (G1)

Growth in the class sizes is based on the anticipated structural change in the sectors. Looking at the changes in employment up to the year 2030, it is clear that job losses in large companies are primarily associated with a decline in the production of goods. The trade and transport sector, the hospitality industry and corporate services will have relative gains. Medium-sized local units will also lose employees in the manufacturing sector, as well as in the trade and transport sector, the hospitality industry, and in the public and social services sector. Employment growth in business services and financial services will not be able to compensate these losses. However, employment gains in small local units will be due to growth in business services. This will also be the case for micro-businesses, which will greatly benefit from the expansion of business services and financial services.

The sectoral analysis also shows that the size-specific redeployment of labour will differ in individual sectors of the economy. It can be expected that employment will decline in large and medium-sized local units in the manufacturing sector. However, large local units in the trade and transport sector and in the hospitality industry will experience slight growth. Medium-sized local units will predominantly be affected by the public and social services sectors.

Start-ups

We do not expect that start-ups will recover in the future. One of the reasons for becoming self-employed in the past - i.e. unemployment – will lose its power. On the other hand, growing markets in knowledge-based services will present good opportunities for entrepreneurs. Service providers from

¹² In our analysis, local unit refers to local production and service units – not companies. We define micro-businesses as having less than 10 employees, small enterprises having between 10 and 49 employees, medium-sized enterprises having between 50 and 499 employees, and large enterprises having 500 or more employees.

industrial companies, trading companies and financial companies will also increasingly be relocated, meaning that entrepreneurs will experience new dynamics. Overall, both of the aforementioned impacts will largely compensate at the macroeconomic level. We therefore anticipate that approximately 2 % to 3 % of jobs will be created in newly founded local units every year until 2030.

Entrepreneurial activities will move to the service sector, whereas the number of new manufacturing companies will decrease. We expect the strongest growth to be in the business service sector as well as in the healthcare sector and the social care sector. As a consequence, the qualifications framework will change for employees in newly founded local units. There are significantly more university and technical college graduates in new local units compared to existing local units nowadays. Unlike the recent past, it will be university graduates that will be the key contributors to new local units and their growth, and it will be the economic, technical, legal or commercial expertise which forms the basis of many local units. At the same time, the internet offers a wide range of startup opportunities which allow people to enter the market at a low cost. The trade and transport sector, technical and mechanical services and many other sectors will not only be able to offer their services directly to the market, but they will also be able to expand without having any considerable additional costs. This will strengthen the competitive advantage for new entrants and small businesses.

Development according to occupation and qualification

We expect that employment will decline in manufacturing and will affect local units of all sizes. Likewise, employment will decline in administration and clerical jobs in both large and small local units. On the other hand, employment will increase in healthcare occupations.

Large local units will orientate their professional profiles more strongly towards management, commodity trading and services as well as towards science and technology. Health professions, personal service occupations and artistic/journalistic professions in large local units will also experience employment growth.

The shift in professional profiles in medium-sized local units will proceed in a similar way. However, they will not be as severely affected by cuts in the manufacturing sector. There will be less demand for salesmen, commercial and financial professionals and managers/senior officials compared to large local units.

Compared to the other class sizes, the professional profiles in small local units will only change moderately. They will shift towards healthcare, personal services, artistic/journalistic and scientific professions. However, there will not be any demand for salesmen, commercial and financial professionals and transport related occupations. They will be less affected by the cuts in the manufacturing sector than larger local units. The decline in administration and clerical jobs will be particularly strained.

There will be strong demand for health, artistic/journalistic and scientific professions among micro-businesses. Furthermore, there will be more demand for transport related professions. This class size will be the least affected by cuts in the manufacturing sector.

There will be more employees with university degrees, which will be visible across all class sizes. In 2030, a quarter of the labour force in micro-businesses will have a tertiary education. In large local units this will be almost a third of the labour force. Small and medium-sized local units will have a smaller proportion of university graduates.

Shortages

Smaller local units will have to quickly adjust to a labour market where the flow of young workers is in constant decline. We therefore expect that there will be labour shortages in industrial professions and skilled trades. Smaller businesses will particularly be affected by this. They are the ones who will experience the most pressure because smaller businesses are more involved in the dual vocational training system. This will have a large impact on the craft sector. It cannot be denied that the redeployment of staff (from trainees/apprentices to skilled workers) will create higher labour costs. Smaller local units, which have relied on apprentices until now, will have to make organisational changes. This reorganisation should increase work performance in jobs which were previously occupied by apprentices. They will also have to prepare for the fact that a larger proportion of skills needs will have to be covered by means of dual training for adults. This will be particularly important for workers who do not have any kind of vocational training.

The labour shortages will be so severe in various occupational and skills segments of the labour market that they will affect both large and small local units. Nevertheless, we estimate that the proportion of scarce jobs to workers will increase in individual class sizes the larger the local unit. This figure will reach 40 % in 2030 for micro-businesses. However, in large local units it will be 47 %. Overall, occupational groups that have severe shortages provide a larger share of jobs in large enterprises.

However, applicants looking for jobs tend to prefer large enterprises. This will compensate for the differences between the class sizes. In the competitive struggle for workers, smaller companies will have to adapt their strategies to that of large enterprises. This means that they will have to make similarly attractive offers. They will also have to be more willing to accept foreign qualifications and work experience which was acquired outside Germany. Even so, the current debate of the general labour market situation regarding size-specific skills shortages – especially in smaller companies – is overrated.

Conclusion and recommendations

Immigration has a positive multiplier effect on the economy and the labour market...

Even if we do not assume that the present wave of immigration will continue our calculations still show that Germany will remain a country of immigration in the long term. The scenarios all come to the conclusion that immigration is certainly capable of offsetting the decline of the domestic labour force and improving the age structure of the working population. Net immigration permits employment to increase and ensures higher economic growth. The business cycle is instantly affected by the higher rate of employment, which also improves investors' growth prospects.

... but will not eliminate the shortage of skilled workers

The multiplier effect assumes that immigrant workers satisfy the qualification and performance requirements of the German labour market. These requirements must be met in order for the economic integration of immigrants to run smoothly. In our projection we have assumed that the skills level of immigrants that stay in Germany will follow the changes in labour demand. In other words, we expect the number of qualified immigrants to increase, especially the number of university graduates. We also expect there to be a comparatively high proportion of younger workers. The supply of immigrant workers will thus fill important gaps in the German labour market at a low cost.

The assumed successful integration of immigrant workers and the resulting multiplier effect are ultimately responsible for the fact that immigration will not eradicate the shortage of skilled workers. As both employment and growth opportunities improve, we will be confronted with more or less the

same shortages in the end. Nevertheless, this will put the economy and the labour market on a higher growth path.

However, the renunciation of measures to extend labour supply contains a lot of potential of distributive conflicts. There is great uncertainty whether it will simply limit growth or whether it will send the economy into a long term downward spiral. Limiting growth prospects will tempt companies to transfer their business activities abroad, in particular the competitive ones that Germany would not want to lose. Likewise, performance-oriented workers will also try their luck abroad. In particular, lower growth – possibly even negative growth – would destabilise the financing of the social system without solving the problem of an ageing population. If there are low tax contributions from employment income, financial assets will have to be used. In general, capital income will have to contribute more to maintaining the level of prosperity.

Regional differences

The regional forecast shows that, even two and a half decades after reunification and despite the economic and social integration which has been achieved, there is still a deep divide between the eastern and western German states regarding future prospects. This divide is mainly due to the demographic development of the past. The high number of young people who emigrated from the eastern German area states after the fall of the Berlin Wall sustainably weakened future developments in this region.

According to our calculations, human capital will be the bottleneck factor for economic development in the German states. Demographics and the qualifications of the working population will become more important for growth potential in the different regions as productivity moves at its maximum capacity. This is what is to be expected with such a rapid flow of information and high levels of capital mobility. Both factors will cause a rapid alignment of technological standards, internal organisation structures and, ultimately, structural change in the regions. At the same time, markets will expand due to the creation of ICT networks and will thus reduce the effects on the structural composition of regional demand. Regional economic structures will have a weaker influence on growth and will be replaced by the bottleneck factor “qualification of human capital”.

Reducing the quantitative loss of workers is the main focus in the eastern German area states and in the Saarland. Extensive schemes should form a policy to safeguard workers to increase labour supply and to create jobs. This particularly includes:

- Making smaller towns more attractive for young people.
- Creating and developing educational establishments and promoting professional development in particular.
- Creating jobs that are not discriminatory to age and keeping older workers in the labour market by enforcing vocational training and retraining.
- Promoting structural change in the economy and creating a knowledge-based service economy.
- Opening up the German states by recruiting labour from abroad and increasing domestic and foreign investments.

It is more about damage control than about reversing trends. Demographic structures will determine what happens in the long term.

Long-term focus on supply-side policy

Our outlook on the way labour supply will develop until the year 2050 is that it will only be possible to overcome demographic change in the long term if the birth rate substantially increases. Our simulation models clearly show how labour supply will develop up to the year 2050. Assuming that the average birth rate will increase steadily to 1.9 by the year 2050, the rate of immigration continues at 200,000 persons per year, and the participation rate of women and older workers increases further, it may be possible, if not to stop, to at least to sustainably slow down the decline in labour supply. If the ageing population is to be addressed as a structural problem, it will be necessary to implement a plan of action

for demographic change which is effective and which covers all policy areas in the long term. Here are our recommendations for such a policy.

Promoting female participation and improving the employability of older workers

Even though we have incorporated extensive measures in our prognosis to promote the participation of women and older workers, the framework for increasing labour supply does not seem to be exhausted yet. An intense policy to support families, which reconciles family and working life and also provides greater incentives to extend peoples' working lives, would not only increase the number of people who are employed, but would also contribute to increasing the number of hours that part-time employees work.¹³

Key elements which intend to increase female participation while simultaneously increasing the birth rate are measures which focus on improving the work-life balance. This particularly includes the large-scale expansion of full day childcare facilities and all-day schools, institutional care for elderly people, as well as greater flexibility in and a combination of care models. Furthermore, reducing the gender pay gap and improving career prospects for women are also driving forces behind increased participation.

We anticipate that the most recent pension reform will cause the participation of older workers to decline. However, it must be acknowledged that these measures are designed for people who have been insured for a long time, and for mothers who are compensated for disadvantages in their professional life. In this respect, they serve to share the burden and do not call into question the issue of raising the retirement age in the long term. In light of the pension reform, it is even more important to take measures which focus on voluntarily extending working life. These measures have to be put into place in the early stages of employment, because the ability to learn and the willingness to adapt are primarily determined by the work process. Support schemes which develop work systems that are more flexible, offer continuing professional development and create age-friendly workplaces may help to not only prepare workers for a long working life but would also motivate them to work for a long time. Companies will also be required to adjust their work organisation, the allocation of responsibilities and the quality of their workplaces to fit the ageing workforce while also realising workers' potential and raising achievement. There is a considerable amount of pent-up demand involved in this situation.

Enter adult education and advanced qualifications

There is also pent-up demand for developing a structured system for further training.¹⁴ This further training system should not only increase the number of vocational training participants, but it should also make the existing, informally acquired competences visible and applicable for the labour market by means of a suitable validation process. The reality, however, is sobering. It is only possible to validate professional skills within the framework of the examinations regulation. The number of participants is low, as is the figure for recognising professional qualifications from abroad. Institutional anchoring is missing from the German vocational training system.

This also includes supporting progression opportunities by offering appropriate courses to vocational education graduates. Modular systems seem to be the most appropriate method for increasing participation in lifelong learning. It also requires the government to promote lifelong learning, especially since there will be savings from initial vocational education because of the declining number of children. Increased participation in continuing education will not be successful if workers and companies do not receive governmental support and thus end up having to bear the direct and indirect costs of

¹³ Page 149 in Vogler-Ludwig, Kurt; Düll, Nicola (2013): The German Labour Market in 2030. A Strategic View on Demography, Employment and Education. W. Bertelsmann Verlag, Bielefeld.

¹⁴ Page 152 in Vogler-Ludwig, Kurt; Düll, Nicola (2013): The German Labour Market in 2030. A Strategic View on Demography, Employment and Education. W. Bertelsmann Verlag, Bielefeld.

continuing education alone. The education policy therefore needs to create an institutional and financial framework for continuing education.

The dual vocational training system has long faced the challenge of reducing the degree of specialization in the training regulations and has acted thereon. Yet the working world is changing much faster than what has been laid down in the regulations. The focus should be on acquiring basic competencies in the initial training, which can then be complemented with further modules during lifelong learning. Within the framework of dual vocational training, companies should be required to provide a higher degree of educational efforts - especially companies that are more interested in the workforce than in training. Lastly, the relationship between schools and companies needs to be handled in a much more flexible manner so that different educational requirements can be met, which would also ensure upward mobility. The Dutch vocational training system provides a good model for this.

The critical point in restructuring the workforce results from a decline in the number of workers that do not have a vocational qualification. We expect that the shortage of skilled workers will cause policies and companies alike to invest in training for their workers. At the lower end of the qualifications spectrum, greater efforts to integrate disadvantaged youths and the expansion of vocational training will be the driving forces. These are the conditions that need to be met so that the economy can transform its skill needs into effective demand.

Policies for a steady rate of immigration

In our projection we have shown the positive impacts of immigration. However, the key is to integrate migrant workers as smoothly as possible and make the best possible use of their skills. There is a danger that very often migrants will not be able to make full use of their human capital. As the past has shown, migrants often have to settle for jobs that are below their qualification level in the first year in order to ensure they receive an income that covers the basic costs of living. There is a risk that human capital devaluation may be permanent.

Recognition of foreign qualifications and work experience acquired outside Germany should thus not only be expanded within the existing vocational training framework, but it should also be implemented with practical methods. The vocational training policy should offer immigrant workers not only language support but also the necessary supplemental training programmes needed to adjust their professional qualifications accordingly. Expanding further education in colleges, universities and private educational institutions and making dual vocational training more accessible will benefit adults. For younger people who have a migrant background, the focus will be on helping them to enter the dual vocational training system and higher education. This has been a problem for a long time and is still being dealt with in an unsatisfactory manner.

Demand for skilled labour according to company size

We expect that the emerging shortages in the German labour market will have the greatest impact on medium-sized companies. Large enterprises will benefit from their popularity status among applicants looking for new jobs. Micro-businesses will profit from entrepreneurs in the services sector. Medium-sized enterprises are likely to have the most difficulty in implementing employment plans in a labour market that is becoming more and more competitive. Small businesses that have focused on the dual vocational training system will also be greatly affected by the decline in the younger generation.

Because of the complexity of the developments that are occurring in the various class sizes, it does not make much sense to have a size specific labour market policy, because it would not be accurate enough. The same applies for SME policies which are only conducive if they refer to key areas of growth and innovation in specific sectors or regions. A size-specific supply policy may therefore be futile because labour demand is segmented according to company size but labour supply is not. Employees' free choice to work in a company of any size undermines such a policy.

Companies that have a high proportion of workers from the dual vocational training system will be confronted with the problem that the flow from vocational training will be significantly lower. In our projection we have suggested approaching this problem by developing a general further education system which is structured and certified. Small businesses, and micro-businesses in particular, and their representation bodies need to secure the next generation of workers by developing a dual vocational training system for adults. Likewise, universities and colleges need to contribute more to solving the recruitment problem by developing a dual system in higher education and providing other forms of continuing training.

Annex

Classification of industrial sectors

44 sectors	34 sectors	10 sectors
01 agriculture, forestry, fishing and aquaculture	01 agriculture, forestry, fishing and aquaculture [1]	01 agriculture, forestry, fishing and aquaculture [1]
02 mining, extraction of rock and ores	02 basic industry [2;6-9]	02 energy, water and recycling [2;14;15]
03 food and beverages	03 consumer industry [3-5;13]	03 manufacturing [3-13]
04 textiles, wearing apparel, leather products		
05 wood, cork, straw		
06 paper products and printing		
07 refined petroleum, chemical, pharmaceutical products		
08 rubber, plastic, glass, ceramic products	02 basic industry [2;6-9]	02 energy, water and recycling [2;14;15]
09 metal production and metal working		
10 electrical equipment, electronic and optical products		
11 mechanical engineering		
12 vehicle manufacturing		
13 furniture, other manufacturing, repair	04 capital goods industry [10-12]	04 construction [16]
14 energy supply	03 consumer industry [3-5;13]	
15 water supply, waste management services	05 energy and water supply [14,15]	
16 construction	06 construction [16]	
17 wholesale trade	07 wholesale trade [17]	
18 retail trade	08 retail trade [18]	05 trade and transport [17-20;23]
19 transport, warehousing	09 transport, warehousing [19]	
20 postal and courier activities	10 postal and courier activities [20]	
21 accommodation, hotels and restaurants	11 accommodation, hotels and restaurants [21]	
22 publishing, motion picture, broadcasting	12 publishing, motion picture, broadcasting [22]	
23 telecommunications	13 telecommunications [23]	08 personal services [21;22;26;33;39;40;42-44]
24 IT, information services	14 IT, information services [24]	05 trade and transport [17-20;23]
25 financial services, insurance, financial intermediaries	15 financial services, insurance, financial intermediaries [25]	07 business services [24;27-30;32;34;41]
26 real estate	16 real estate [26]	06 financial services [25;31]
27 accounting, management consulting	17 accounting, management consulting [27]	08 personal services [21;22;26;33;39;40;42-44]
28 architecture, engineering; technical testing and analysis	18 architecture, engineering; technical testing and analysis [28]	
29 research and development	19 research and development [29]	
30 other scientific and technical services	20 other scientific and technical services [30]	
31 renting and leasing of goods	21 renting and leasing of goods [31]	
32 employment agencies	22 employment agencies [32]	07 business services [24;27-30;32;34;41]
33 travel agencies, tour operators, reservation services	23 travel agencies, tour operators, reservation services [33]	06 financial services [25;31]
34 other business service providers	24 other business service providers [34]	07 business services [24;27-30;32;34;41]
35 public administration; social security	25 public administration; social security [35]	08 personal services [21;22;26;33;39;40;42-44]
36 education	26 education [36]	09 public administration; social security [35]
37 healthcare	27 healthcare [37]	
38 social work, nursing homes	28 social work, nursing homes [38]	
39 arts, culture, gambling and betting	29 arts, culture, gambling and betting [39]	
40 sports, entertainment, recreation	30 sports, entertainment, recreation [40]	
41 interest groups	31 interest groups [41]	07 business services [24;27-30;32;34;41]
42 repair of consumer goods	32 repair of computers, personal and household goods [42]	08 personal services [21;22;26;33;39;40;42-44]
43 other personal services	33 other personal services [43]	
44 personal domestic services	34 personal domestic services [44]	