



MINISTRY OF LABOUR AND SOCIAL POLICY  
PROJECT BG05M9OP001-1.007-0001  
“INCREASING THE EFFECTIVENESS  
OF THE IMPLEMENTED EMPLOYMENT POLICY”



# MEDIUM-TERM AND LONG-TERM FORECASTS FOR THE DEVELOPMENT OF THE LABOUR MARKET IN BULGARIA

FACTORS OF LABOUR DEMAND, EMPLOYMENT TRENDS,  
REGIONAL AND EDUCATIONAL IMBALANCES  
(2008–2032)





# FIRST ANALYTICAL REPORT

Sofia, January 2019

PARTNERSHIP “HUMAN CAPITAL”  
(SIGMA HAT, GLOBAL METRICS, BUSINESS FOUNDATION FOR EDUCATION)



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This analysis was carried out within the implementation framework of the project “Preparation of reports with long-term and medium-term forecasts for the development of the labour market and the future demand and supply of labour in Bulgaria” under the project BG05M9OP001-1.007-0001 “Raising the effectiveness of the implemented employment policy” under OP HRD – Lot 1 “Preparation of reports with medium-term and long-term forecasts for the development of the labour market”.

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## List of Abbreviations

AIE	Average insurable earnings
AW	Average wage
CMD	Council of Ministers Decree
CPI	Consumer price index
EC	European Commission
EU-28	European Union, 28 member states
FDI	Foreign direct investment
GDP	Gross domestic product
GED	Gross external debt
GOS	Gross operating surplus
GVA	Gross value added
ICT	Information and communications technology
IMF	International Monetary Fund
ISCED	International Standard Classification of Education
LC	Labour Code
LFS	Labour force survey
LP	Labour Productivity
MES	Ministry of Education and Science
MoF	Ministry of Finance
MIE	Minimum insurable earnings
MLSP	Ministry of Labour and Social Policy
MW	Minimum wage
NACE	Classification of economic activities
NCOP	National Classification of Occupations and Positions
NDA	No data available
NSI	National Statistical Institute
NSSI	National Social Security Institute
OP	Operational Programme
p.p.	Percentage point
PPS	Purchasing power standard
ULC	Unit labour costs



# EXECUTIVE SUMMARY

## Labour market forecasting: importance, practice and model framework

In the past few years, issues relating to labour market imbalances, skills supply and demand, and the role of education have become a focal point for the attention and sensitivities of employers, trade unions, public administration and the general public. Structural mismatches in the labour market are affecting a growing number of enterprises, organisations and labour providers worldwide, including in the EU and Bulgaria.

Preparing long-term forecasts for the demand and supply of labour and skills is a challenge to economic practice, and such forecasting is generally done in the leading economies. In Bulgaria long-term labour market forecasting began in 2013-2014, when a *Labour Market Forecasting Model for Bulgaria* was developed.<sup>1</sup> The model is consistent with good international practice in this field, and includes mathematical and statistical tools operated in specialised software environments (Python, R, EViews, PSPP, Excel, VBA). In 2018 it was updated and upgraded.<sup>2</sup> Its methodological

framework includes eight interconnected modules, and it has the following forecasting parameters: 120 occupations, 35 economic activities, 28 provinces, 3 educational attainment levels, sex, 6 age groups.

## Labour market in EU and Bulgaria in the period 2008-2017

### Employment, unemployment, labour productivity

The labour market dynamic in the past ten years has followed the cycle of economic development. After a lasting period of employment decline between 2009 and 2013, which was the result of slow and unstable recovery from the impact of the global financial and economic crisis, labour demand began to rise in 2014, due to steady economic growth. This in turn facilitated a drop in unemployment rate, which in 2017 almost recovered its pre-crisis level.

In the period 2014–2017 employment began to grow gradually. In EU-28 countries the employment rate increased by an average of 0.9 p.p., reaching 67.7% at the end of the period, and the unemployment rate fell from 10.2% in 2014 to 7.6% in 2017. Labour productivity in the

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<sup>1</sup> Under the project “Medium-term and long-term forecasts for the development of the labour market and knowledge and skills needs in Bulgaria” under the project BG 051PO001 – 6.1.09 – 0001 “Development of a system for forecasting labour demand by given characteristics under OP HRD”

<sup>2</sup> Under the project “Preparation of reports with long-term and medium-term forecasts for the

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development of the labour market and the future demand and supply of labour in Bulgaria”, under the project BG05M9OP001-1.007-0001 “Increasing the effectiveness of the implemented employment policy” under OP HRD – Lot 1 “Preparation of reports with medium-term and long-term forecasts for the development of the labour market”.

EU-28 started to grow, reaching a rate of about 0.8%, mainly as a result of increased production rates – average year-on-year GDP growth in the period was 1.5%, while employment increased by just 0.6% in the three years. 2014 marked the beginning of a three-year period in which the growth of the Bulgarian economy accelerated and reached its potential GDP<sup>3</sup>.

In 2017 the number of employed in Bulgaria totalled 3,150.3 thousand, and the unemployment rate dropped to its lowest value after 2008 (6.2%). In recent years, labour productivity in the country has enjoyed a consistently higher than average EU-28 growth, and in the period 2008-2017 the accumulated increase in real labour productivity in the Bulgarian economy totalled 25.4%.

### Innovation, technological intensity, professional knowledge and skills

According to the latest European Innovation Scoreboard<sup>4</sup>, which assesses countries' innovation performance using a Summary Innovation Index, as of 2017 Bulgaria was a modest innovator, with an index value below 50% of average EU and ranking second to last among EU member states.

In the past ten years there has been a slow restructuring of employment from lower- to higher-value-added industries, and yet the structure of employment of the Bulgarian economy remains less favourable than EU-28's.

In terms of industries' technological intensity<sup>5</sup>, the structure of employment in *Manufacturing* shows that *low-technology* continued to domi-

nate the Bulgarian economy, although overall for reference period 2008–2017 its share dropped by 3.3 p.p. to 56.4% in 2017 (to compare, the share of low-technology in the EU-28 in the same year was 35.4%). This was counterbalanced by a rise in the share of employed in *medium-low-technology* (with an overall change for the reference period amounting to 1.8 p.p. and an end value of 23.8% in 2017) and in *medium-high technology* (with a change of 1.6 p.p. and a 16.2% share in 2017). At the same time, the share of employment in *high-technology* in *Manufacturing* in Bulgaria did not show any improvement in the decade despite the need for accelerated technological development in connection with the convergence objective<sup>6</sup>, and levelled off around the 2008 rate (3.7% in 2008 over 3.6% in 2017). To compare, the share of employment in *high-technology* in the EU-28 in 2017 totalled 6.9%.

The distribution of employed in *Services* into *knowledge-intensive services* and *less knowledge-intensive services* also shows that there was no significant difference in structure in 2017 over 2008. *Less knowledge-intensive services* continued to enjoy a bigger share in employment (51.5% in 2008 and 52.3% in 2017). This slight increase was at the expense of *knowledge-intensive services*<sup>7</sup>, whose share dropped (from 44.6% in 2008 to 43.0% in 2017). At the same time, in 2017 in the EU-28 the share of employed in *less knowledge-intensive services* was 43.8%, and that in *knowledge-intensive services* was 52.0%. An improvement was observed in the share of employed in *high-tech knowledge-intensive services*, as in Bulgaria their share in 2008 totalled 3.9% (exactly as much as in the EU-28 in the same year), and in 2017 it rose to 4.7% (marking a higher growth over the EU-28, where the 2017 share was 4.2%).

<sup>3</sup> The potential GDP of a given economy refers to the level of production which is sustainable over the long run. It is associated with the concept of full employment.

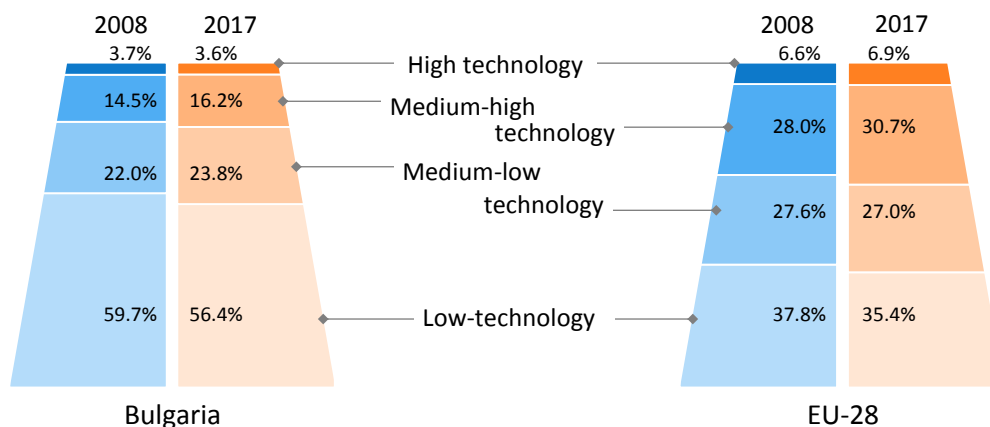
<sup>4</sup> European Innovation Scoreboard 2018, European commission, [https://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards\\_en](https://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_en)

<sup>5</sup> The breakdowns are based on Eurostat's classification of manufacturing industries according to technological intensity and of services according to knowledge intensity, available here: [https://ec.europa.eu/eurostat/cache/metadata/Annexes/htec\\_esms\\_an3.pdf](https://ec.europa.eu/eurostat/cache/metadata/Annexes/htec_esms_an3.pdf)

<sup>6</sup> Convergence of incomes to average EU levels.

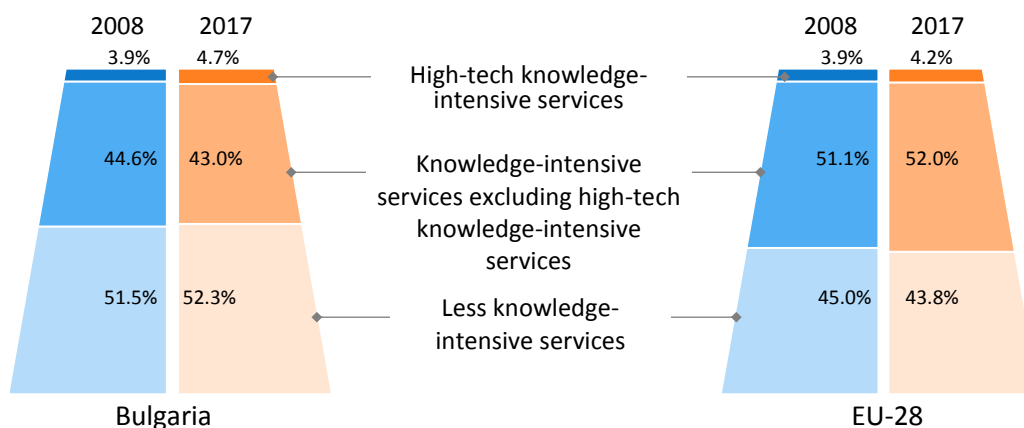
<sup>7</sup> For the purpose of the comparison, *high-tech KIS* have been excluded from *knowledge-intensive services*.

### STRUCTURE OF EMPLOYMENT IN MANUFACTURING ACCORDING TO TECHNOLOGICAL INTENSITY OF ECONOMIC ACTIVITIES



Source: Eurostat, own calculations

### STRUCTURE OF EMPLOYMENT IN SERVICES ACCORDING TO KNOWLEDGE INTENSITY OF ECONOMIC ACTIVITIES



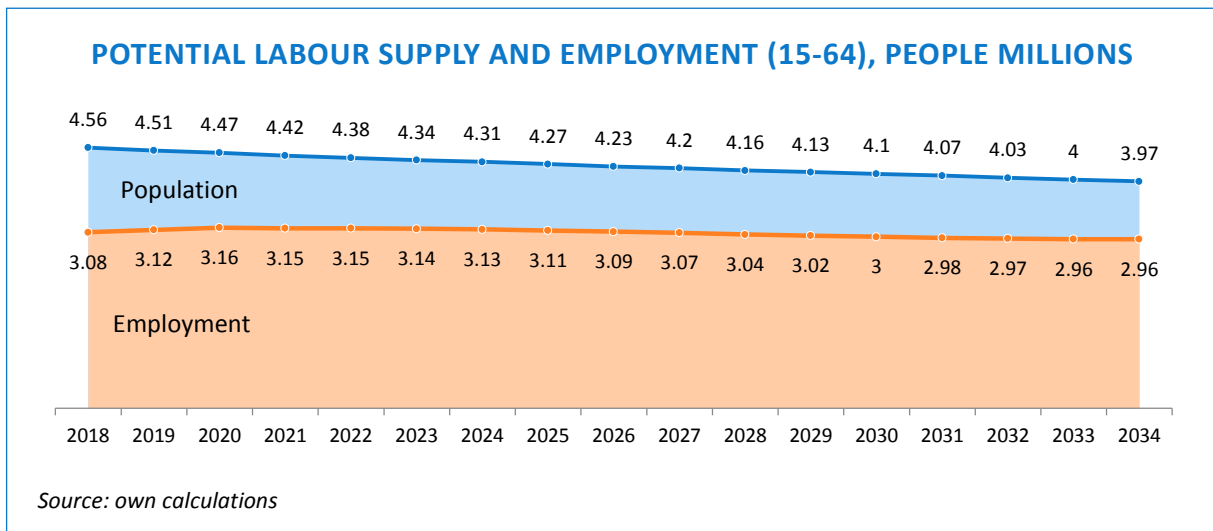
Source: Eurostat, own calculations

## Medium-term and long-term labour market forecasts for Bulgaria: 2018–2032

### Employment and education

In 2022 the working age population (15-64) is expected to total 4,381.7 thousand, 182.1 thousand less than in 2018 (down by 4.0%). The decrease in population and in labour supply will have a negative impact on the labour market in next few years. In 2020, in case of favourable macroeconomic development, employment will peak temporarily (at 3,155.2

thousand), but as early as the following year low birth rate, high mortality, outward migration and ageing of the population will lead to a steady and gradual decline in the number of employed in the medium and in the long term. Projections suggest that in 2022 employment will total 3,151.2 thousand, 70.8 thousand more than in 2018 (up by 2.3%), and the employment rate of the population will be 71.9%. In the long term, the number of working age population (15-64) will fall, and in 2032 it will stand at 4,034.2 thousand, amounting to a fall of 529.5 thousand (11.6%) from 2018 to 2032. In 2032 the total employed population is expected to be 2,962.7 thousand, down by 114.7 thousand compared to 2018, where the em-



employment decline in the period 2018-2032 will amount to 3.7%. In the same period, the employment rate of the population will increase steadily from 67.5% to 73.5%.

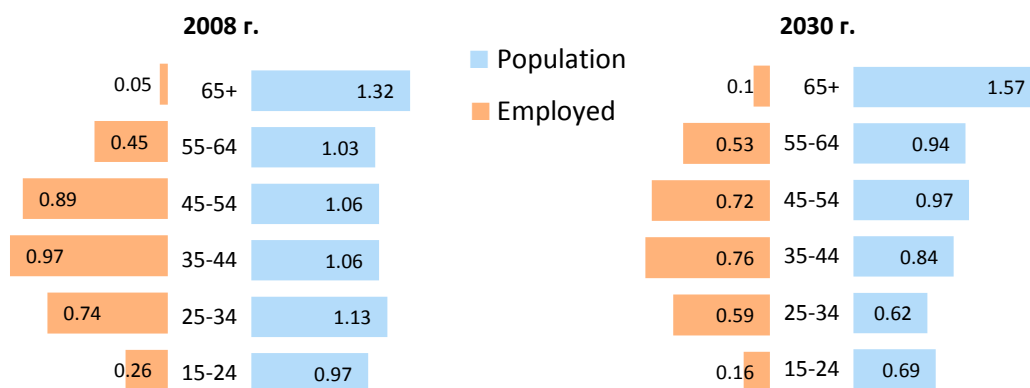
In 2022 the total population with Lower secondary or lower education aged 15-64 will be 1,188.6 thousand, and in 2032 – 960.6 thousand. The estimated shares of this population for both 2018 and 2022 will be 27.1%. In the period 2019–2021 there will be a slight increase in the value of this indicator, after which the trend is most likely to be reversed, and the it will fall to 23.8% in 2032. The number of upper secondary graduates in the working age population will total 2,098.0 thousand in 2022, and 1,961.1 thousand in 2032. The share of this group will experience slight fluctuations, but it will stay relatively stable with an estimated value of 48.8% in 2018, and 47.9% and 48.6% respectively in 2022 and 2023. The population aged 15-64 with tertiary education will total 1,095.2 thousand in 2022 and 1,112.5 thousand in 2032. Given the overall population decrease, this slight growth in the total will mean a substantial growth in proportion. As for the share of the working age population with tertiary education, it is expected to grow from 24.1% in 2018 to 25.0% in 2022 to 27.6% in 2032.

The structure of employment by educational attainment level suggests that there will be a significant drop in the total of employed in the 15-64 age group with Lower secondary or lower education, as from 337.9 thousand in 2018,

their number will go down to 312.5 thousand in 2022, and to 226.0 thousand in 2032 (down by 33.1% in the period 2018–2032). The employment rate for the population with this attainment level will decrease gradually, from 27.3% in 2018 to 26.3% in 2022 to 23.5% in 2032. The number of employed with upper secondary education in 2022 will be 1,814.2 thousand, and in 2032 – 1,736.9 thousand. The expected 1.6% drop in the period 2018-2032 will generally follow the trend of overall employment decrease, albeit to a much smaller extent. The employment rate for upper secondary graduates will increase significantly, from 79.3% in 2018 to 86.5% in 2022 to 88.6% in 2032. The number of tertiary education graduates in employment from the age group 15-64 will total 1,024.6 thousand in 2022 and 1,002.9 thousand in 2032, with an expected growth rate of 2.6% in the period 2018-2032. The employment rate for the population with upper secondary education will increase significantly from 79.3% to 88.6%, and for those with tertiary education the growth will move up from 88.7% to 92.9%. The employment rate for tertiary education graduates will increase from 88.7% in 2018 to 93.6% in 2022, after which the indicator will decrease slightly, and in 2032 it will total 90.1%.

The expected restructuring of employment by educational attainment will be due to a number of factors, among which demographic processes related to the shrinking and ageing of the working age population, an overall change in the educational structure of the population

## COMPARISON OF STRUCTURE OF EMPLOYMENT AND POPULATION BY AGE GROUP IN 2008 AND 2030, PEOPLE MILLIONS



Source: NSI, own calculations

(in the period 1985-2011 the share of the population with tertiary education trebled), changes in the needs, attitudes and expectations of employers leading to increasing demand for human resources with tertiary education, as well as others.

### Employment by economic activity

The process of convergence to the averages economic indicators in EU member states underpinning the forecasting model implies cohesion with the socio-economic development of European economies. This will involve restructuring in both the private and the public sectors. On the one hand, the external environment and European markets have an impact on private sector development, and, on the other, the restructuring of predominantly public sectors should be the result of streamlined education, healthcare and public administration policies. The forecasts are based on the assumption that by 2032 Bulgaria's socio-economic development will attain its goal, and the structure of employment by economic activity will become increasingly similar to those of the selected member states.<sup>8</sup>

In the medium and in the long term the two leading sectors<sup>9</sup> with the highest number of

employed will be *Manufacturing and Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles*. The forecasts show that the number of their employees will continue to exceed 1 million, where in 2022 it will total 1 129.9 thousand, and in 2032 – 1 021.5 thousand. In case of gradual convergence to the specified average values of the economies of Hungary, Estonia and Slovenia, the role of *Manufacturing* will grow despite the expected employment decrease. In 2022 the number of employed in the sector will amount to 631.5 thousand, and in 2032 – to 641.2 thousand. The absolute change in employment in the period 2018-2032 will total 43.4 thousand, and the percentage change will be 7.3%. This scenario will mean that there will be a significant simultaneous shrinking of *Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles* – from 524.1 thousand in 2018 to 498.4 thousand in 2022 to 380.3 thousand in 2032. The total employment reduction in the sector during 2018-2032 will amount to 143.8 thousand (down by 27.4%), as a result of both overall employment decline and the expected restructuring of the economy.

Another sector with a significant impact on labour market development will be *Construction*, where employment is expected to total 246.2 thousand in 2022 and 250.6 thousand in

<sup>8</sup> Estonia, Hungary and Slovakia.

<sup>9</sup> In accordance with NACE 2008, economic activities identified by a letter code (A to U) in the classification are called sectors, and where the letter is followed by

a number, they are called segments. In this analysis, segments are referred to as industries or economic activities, and the two are used interchangeably.

## MEDIUM-TERM AND LONG-TERM EMPLOYMENT FORECASTS BY ECONOMIC ACTIVITY (A21), PEOPLE THOUSANDS

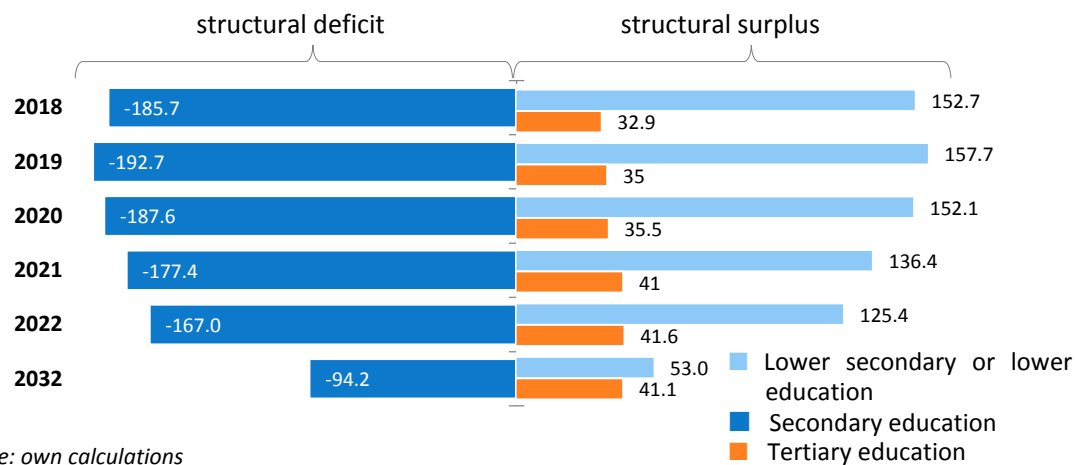
	2022	2032	Change 2022–2032	Growth 2022–2032
Manufacturing	631.5	641.2	9.7	1.5%
Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	498.4	380.3	-118.1	-23.7%
Construction	246.2	250.6	4.4	1.8%
Public Administration	236.4	249.4	13.0	5.5%
Education	196.0	230.9	34.9	17.8%
Transportation and Storage	215.0	206.2	-8.8	-4.1%
Human Health and Social Work Activities	175.6	194.3	18.7	10.7%
Accommodation and Food Service Activities	160.1	129.4	-30.8	-19.2%
Professional, Scientific and Technical Activities	111.5	107.9	-3.6	-3.2%
Administrative and Support Service Activities	104.0	93.8	-10.2	-9.8%
Information and Communication	94.4	91.5	-2.9	-3.1%
Financial and Insurance Activities	63.6	57.8	-5.8	-9.1%
Arts, Entertainment and Recreation	52.2	55.2	3.0	5.7%
Other Service Activities	57.8	54.9	-2.9	-5.0%
Electricity, Steam, Gas and Air Conditioning Supply	37.7	30.2	-7.5	-19.9%
Water Supply; Sewerage, Waste Management and Remediation Activities	33.3	29.6	-3.7	-11.1%
Real Estate Operations	16.7	26.2	9.5	56.7%
Mining and Quarrying	26.1	13.0	-13.0	-50.0%

Source: NSI, own calculations

2032. The projected change in employment in the sector for the period 2018–2032 will amount of 177.5 thousand (up by 7.6%). As regards the priority sector of *Information and Communication*, the forecasts show that it will retain its role in the labour market, and will enjoy a slight increase in the share of employed in total employment. In 2022 the sector is expected to employ 94.4 thousand people, and in 2032 – 91.5 thousand. Medium-term forecasts anticipate some recovery in the sector, shown by an employment growth of 3.2 thousand (up by 3.5%) in 2018–2022. The pro-

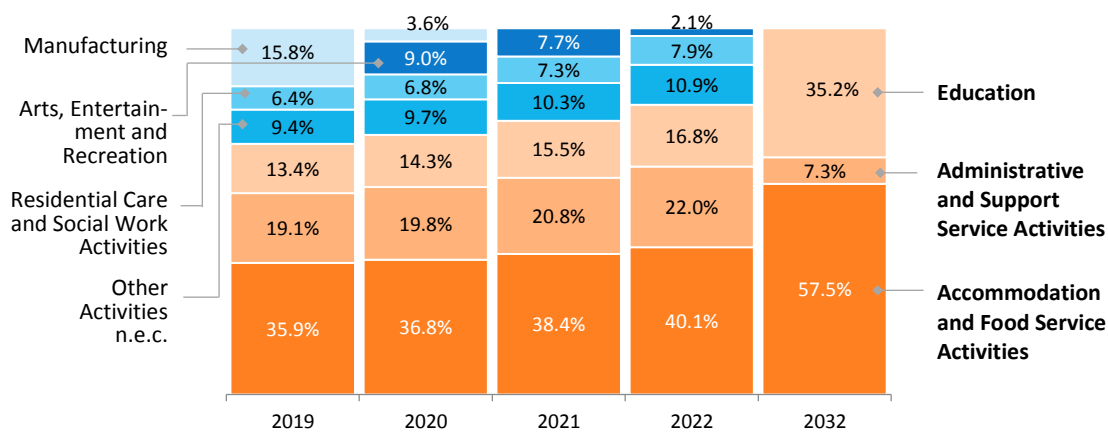
jected long-term overall employment decline will not affect the sector significantly, and it will retain its employment rate, with just a slight increase of 0.280 thousand (up by 0.3%) in 2018–2032. These forecasts correspond to a scenario for technological and investment development of the industry similar to the one seen in recent years. In effect, the sector will retain its key role for the economy in spite of its limited growth potential. The underlying reasons for this will be: lack of new major domestic and foreign investment; expected major difficulties in finding skilled human re-

## MISMATCH BETWEEN PERSONS IN EMPLOYMENT BY EDUCATIONAL ATTAINMENT LEVEL AND THE NEED FOR SUCH PERSONS, THOUSANDS PERSONS



Source: own calculations

## SHARE OF SHORTAGE OF UPPER SECONDARY GRADUATES IN TOTAL STRUCTURAL DEFICIT



Source: own calculations

sources; shrinking of the share of large companies in the sector over micro-enterprises etc.

The current structure of employment by economic activity in Bulgaria is characterised by lower than average EU shares of *Public Administration*, *Education* and *Human Health and Social Work Activities*. In 2017 the share of employed in *Public Administration* in total employment was 7.0%, that in *Education* was 5.4%, and in *Human Health and Social Work Activities* it was 5.1%.<sup>10</sup> Whereas in recent years the share of employed in *Public Administration* has approximated average EU-28

rates, in *Education* and *Human Health* this indicator has had some of the lowest values,<sup>11</sup> with the country lagging significantly behind the other member states.<sup>12</sup> Therefore, the medium- and long-term expectations for the sectors are to strengthen their roles. The largest employment increase is projected for *Education*, where the number of employed in 2022 will total 196.0 thousand, and in 2032 – 231.0

<sup>11</sup> The only country to have lower share values is Romania.

<sup>12</sup> Based on Eurostat data, in 2017 the values of these indicators for the EU-28 were as follows: the share of *Education* in employment was 7.6%, and the share of *Human Health* was 11.0%.

<sup>10</sup> Based on Eurostat's Labour Force Survey.

thousand, amounting to a total increase of 23.7 thousand (up by 13.8%) in 2018–2022. The absolute change in employment in the sector in 2018–2032 will be 58.6 thousand (up by 34.0%). The next ranking sector is *Human Health and Social Work Activities*, where employment is anticipated to total 175.6 thousand in 2022, and 194.3 thousand in 2032. The expected change for the period 2018–2022 is 16.0 thousand (up by 10.0%), and for 2018–2032 it is 34.7 thousand (21.8%). In 2022 employment in *Public Administration* will amount to 236.4 thousand, and in 2032 to 249.4 thousand. The expected employment increase over the entire forecasting period is 29.5 thousand (up by 13.4%). The projected changes imply an improvement in quality and access to education and healthcare through structural reforms, as well as strengthening of the role of these two sectors in the socio-economic development of the country. The anticipated expansion of *Public Administration* will affect all of its structures (including state agencies, NSSI, NSI, executive agencies, specialised territorial administrations, the judicial system, structural bodies of the Ministry of Interior etc.) This expansion will not by itself void the need for sector reforms to increase labour productivity and optimise administration. The process of Bulgaria’s socio-economic cohesion will bring about structural and institutional changes to ensure efficient functioning of the economy and of the state in line with established member states’ practices.

As a result of the relative technological lag behind the EU-28, as well as given the specificities of employment structure in Bulgaria and the key role of *Wholesale and Retail Trade, Transportation, Manufacturing and Construction*, in 2032 employment is expected to be highest in the following occupations: *Shop Salespersons* (162.9 thousand), *Administration Professionals* (121.0 thousand), *Heavy Truck and Bus Drivers* (105.6 thousand), *Manufacturing Labourers* (92.6 thousand) and *Mining and Construction Labourers* (73.7 thousand). *Shop Salespersons, Waiters and Bartenders, Other Sales Workers* and other sales-related occupations will retain their leading role in the labour

market, but in the long term their employment significance will gradually decrease as a result of the convergence process, population decline and shrinking consumption. At the same time, due to the need to strengthen the role of *Education* and *Human Health*, a high increase in the number of employed teachers, nurses and midwives is expected in 2032.

## Labour market imbalances

### Educational imbalances

The labour market will experience structural surpluses of employed with *tertiary education* and *Lower secondary or lower education*. Projections show an increase in the structural surplus of tertiary education graduates, and in 2022 their number in positions with lower educational requirements will total 41.6 thousand, and in 2032 it will be 41.1 thousand. As regards the population with Lower secondary or lower education, the current mismatch is expected to be largely overcome in the long term, as the number of employees in occupations with higher qualification requirements is expected to total 125.4 thousand in 2022, and 53.0 thousand in 2032. In effect, this population will be employed, but in positions with higher qualification requirements than the ones currently held.

The forecasts show current and expected significant structural deficits of *upper secondary* graduates across sectors.

In the medium term the structural deficit of upper secondary graduates will gradually decrease, and in 2022 such deficits will affect a total of 165.0 jobs that will experience shortages in the supply of the required human resources. At the end of the long-term period, i.e. in 2032, these deficits will amount to 94.2 thousand. Such jobs will be given to persons with a lower or a higher than the required qualification. The biggest deficits of upper secondary graduates will be in *Accommodation and Food Service Activities, Administrative and Support Service Activities, Education, Manufacturing, Residential Care and Social Work Activities, and Arts, Entertainment and Recreation*.

## Regional imbalances

At regional level there will be sufficient supply of labour with Lower secondary or lower education. Given the significant regional mismatch in labour compensation and ongoing internal and external migration processes, structural deficits of jobseekers with upper secondary and tertiary education can be expected.

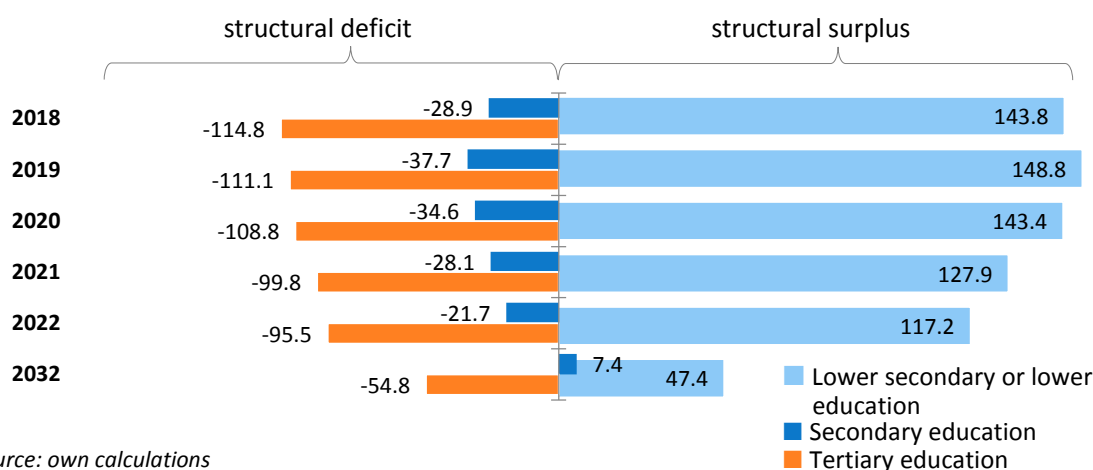
In addition to its sectoral dimension, the shortage of human resources with upper secondary education will also have a regional one. This deficit, however, will be gradually overcome. In the medium term (2022), it is expected to total 21.6 thousand, but by 2030 a balance will have been achieved between the supply and demand for labour with upper secondary education. In the long term, after 2031, small structural surpluses are expected to emerge.

Regional asymmetry will also be observed in the supply and demand for labour with tertiary education. The forecasts point to an aggravation of the problem in the medium term, and in 2022 the structural deficit of staff with tertiary education in regions with relatively lower pay rates and higher migration is expected to total 185.0 thousand. In the long term, this shortage will begin to decrease regionally, and in 2032 its estimated size will be 161.3 thousand. In effect, this will mean that despite the overall improvement in the educational structure of the labour force and the growing share

of higher education graduates in employment, in regions characterised by relatively low pay rates, lack of investment appeal, socio-economic underdevelopment, negative demographic processes etc., these structural changes will not be felt.

The expected imbalances will have only regional significance, and will not result in overcoming the long-term structural deficit of upper secondary graduates, nor in reducing the structural surplus of labour with tertiary education in the total economy. Labour market mobility and migration processes make it difficult to pinpoint specific regions where these structural deficits will be felt; however, they are expected to be most common in the regions with the lowest pay rates. As regards employees with completed upper secondary education, the lowest relative pay rates can be found in the provinces of Vidin, Haskovo and Blagoevgrad (amounting to 76-77% of the national average wage for employees with upper secondary education). Furthermore, there is a well-pronounced mismatch in regional remuneration levels for employees with tertiary education, with Pernik, Vidin, Silistra and Targovishte provinces ranking as the ones with the lowest earnings (amounting to 60-64% of the national average wage for employees with tertiary education).

### REGIONAL MISMATCHES BETWEEN PERSONS IN EMPLOYMENT BY EDUCATIONAL ATTAINMENT LEVEL AND THE NEED FOR SUCH PERSONS



## Factors, consequences and policy challenges

Structural employment mismatches and the existence of *underemployment* and *overemployment* in the labour market<sup>13</sup> are the result of current imbalances between employers' technologically-driven needs and the supply of labour with different educational attainment levels. To a certain extent, these occur in every single labour market; however, if they are significant, they may prevent the effective functioning of the labour market, the production process, and long-term economic development.

Some of the underlying factors for these structural mismatches are: rapid change in the educational structure of the population, in particular of the working age population, which has led to oversupply of labour with tertiary education<sup>14</sup>; advance of new information and communications technology, shaping a demand for new skills; uncompetitive pay rates for skilled labour, resulting in redirecting jobseekers to labour markets and/or positions with higher pay levels etc.

Overcoming the technological lag vis-à-vis other EU member states is a challenge to for the government and business. The low technological intensity of the Bulgarian economy, along with the demographic processes in the country, is the cause of the persistent shortage of labour with upper secondary education. In effect, jobs for which no such candidates can be found in the labour market will be occupied by people with a higher or a lower than the required educational level. This is the reason behind the expected overemployment of human resources with Lower secondary or lower education and the underemployment of tertiary education graduates.

Recently observed trends in the EU<sup>15</sup> and relevant forecasts suggest that having a university degree will secure employment, but the degree in itself cannot guarantee that the jobs secured by tertiary education graduates will necessarily require university education. The already existing underemployment trend for employed tertiary education graduates will persist in Bulgaria. A growing number of university graduates will not be able (because of lack of jobs and/or of competitive knowledge and skills) or willing (because of uncompetitive pay) to work in positions requiring tertiary education.

The forecasts highlight the following major medium-term and long-term problems in the labour market: continuing decline of the working age population and ageing of the labour force; shortage of skilled upper secondary graduates and surplus of tertiary education graduates at national level; increasing regional asymmetry and significant deficits of human resources in economically underdeveloped regions; low technological intensity of economic activities; and, last but not least, uncompetitive pay for skilled labour, which is the underlying cause of negative migration processes among younger age groups and the shortage of skilled labour in some economic activities

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<sup>13</sup> See working definitions in annexes.

<sup>14</sup> For example, according to NSI and Eurostat data, in 1992 the share of tertiary education graduates in the population totalled 7.9%, whereas by 2011 it had already gone up to 18.3%.

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<sup>15</sup> CEDEFOP (2018): Skills forecast: trends and challenges to 2030, Cedefop Reference series 106

## CHAPTER 1

# INTRODUCTION

### 1.1 Labour Market Forecasting

In the past few years, issues relating to labour market imbalances, skills supply and demand, and the role of education have become a focal point for the attention and sensitivities of employers, trade unions, public administration and the general public. Structural mismatches in the labour market are affecting a growing number of enterprises, organisations and labour providers worldwide, including in the EU and Bulgaria.

On the one hand, labour market analysis is an integral part of macroeconomic theories – the size of employment is a determining factor for economic growth; human capital is at the basis of socio-economic development; the unemployment rate to a large extent conditions the stability of the political system, the state of public finances, inequalities etc.

On the other hand, modern lifestyle is characterised by high mobility of human resources, which in turn reinforces regional asymmetries in the labour market. Labour market forecasting is therefore essential not only for the implementation of short-term macroeconomic policies, but also for long-term strategic decision-making as a driver of national development.

Preparing long-term forecasts for the demand and supply of labour and skills is a challenge to economic practice. Labour market processes are complex, and their underlying factors are numerous and diverse. It is not always possible to precisely identify, formulate and measure skills requirements in the labour market. Despite ongoing improvements, available statistics cannot fully encompass all of these processes and skills. Practice shows that the development of such forecasting models requires a lot of effort, and their improvement and effective application for adequate policy making can take years. For these reasons, long-term labour market forecasts are generally prepared for the leading economies, with the following three approaches adopted as modelling standards:

- The approach of the European Centre for the Development of Vocational Training (CEDEFOP), which aims to systematically include all EU member states;
- The approach of the US Bureau of Labour Statistics, introduced and continuously improved since the end of the Second World War;
- The MONASH model for the Australian economy, whose first working version dates back to the early 1970s and which has been significantly expanded and improved since then. Its logic has been adopted by Finland and Denmark, which have developed and are actively using their own models.

## 1.2 labour market Forecasting model for BULGARIA used by MLSP

Long-term labour market forecasting in Bulgaria began in 2013-2014, when a *Labour Market Forecasting Model for Bulgaria* (LMFM-BG) was developed under the project “Medium-term and long-term forecasts for the development of the labour market and knowledge and skills needs in Bulgaria” under the project BG 051PO001 – 6.1.09 – 0001 “Development of a system for forecasting labour demand by given characteristics under OP HRD”. The model has a modular structure, and its methodological framework is consistent with good international practice in this area. In essence, it is a mathematical and statistical toolkit operated in specialised software environments (Python, R, EViews, PSPP, Excel, VBA) and specifically tailored to the Bulgarian labour market with the purpose of realistically reflecting the structure of the national economy and generating output that is consistent with the historical development of reference indicators. The main assumptions underpinning the model are related to technological development and economic growth, the convergence process and demographic dynamics.

In 2018 the model was updated and upgraded under the project “Preparation of reports with long-term and medium-term forecasts for the development of the labour market and the future demand and supply of labour in Bulgaria”, under the project BG05M9OP001-1.007-0001 “Increasing the effectiveness of the implemented employment policy” under OP HRD – Lot 1 “Preparation of reports with medium-term and long-term forecasts for the development of the labour market”. The methodological framework of the LMFM-BG 2.0 model includes eight interconnected modules:

- 1) Module for forecasting employment by educational attainment level at macroeconomic level;
- 2) Module for forecasting employment by economic activity;
- 3) Module for forecasting employment by educational attainment level at sector level and identifying structural imbalances in the labour market;
- 4) Module for forecasting the length of registration as unemployed by educational attainment level, sex, age and region;
- 5) Module for forecasting employment by occupation;
- 6) Module for forecasting employment by sex;
- 7) Module for forecasting employment by age group;
- 8) Medium-term forecasting module.

The forecasts have the following parameters: 120 occupations, 35 economic activities, 28 provinces, 3 educational attainment levels, sex, 6 age groups.

## 1.3 Scope of the Report

This report describes the main outputs of the implementation of the first stage of the project “Preparation of reports with long-term and medium-term forecasts for the development of the labour market and the future demand and supply of labour in Bulgaria” under the project BG05M9OP001-1.007-0001 “Increasing the effectiveness of the implemented employment policy” under OP HRD – Lot 1 “Preparation of reports with medium-term and long-term forecasts for the development of the labour market”. The activities included in this first stage are as follows:

- Update and upgrade of the labour market forecasting model for Bulgaria, including development of an additional medium-term forecasting module;

- Preparation of medium-term labour market forecasts with forecasting horizon 2018–2022 and preparation of long-term labour market forecasts with forecasting horizon 2023–2032.

The report consists of two parts – an analytical part and a technical part, structured as follows:

- Analytical part
  - *Part 1. Labour Market: Factors and Trends*, which includes an analysis of the factors of labour demand, a presentation of the medium-term and the long-term employment forecasts by educational attainment level, economic activity, administrative and territorial area (province), occupation, sex, and age group, and an overview of the forecasts for *key* economic activities: an outline of employment dynamics in the sectors currently having and expected to have the highest number of employed (Manufacturing, Wholesale and Retail Trade, Construction, Transportation, Public Administration, Education, Human Health). In addition, the ICT sector, which in recent years has shown high employment growth and has played a strong role in boosting technological intensity, has also been included here. The sector has generated substantial value added, and the development of its employment increase potential will have a positive impact on the development of the Bulgarian economy. For short, in the analysis these sectors are referred to as *key* sectors.
  - *Part 2. Labour Market Imbalances*, which includes an analysis of educational and regional imbalances in the labour market. The projected sectoral mismatches for each educational attainment level and the expected regional imbalances are presented here.
  - *Part 3. Summary of Findings and Conclusions*, which includes an overview of the key results, findings and conclusions.
- Technical part (Annexes)
  - *Technical Notes*, which provide information about the methodological framework of the forecasting model, an overview of the main modules and the demographic and macroeconomic forecasts used, as well as a description of the model updating and upgrading procedures. In addition, the section includes methodological notes with a glossary of the key terms used in the model and in the analysis, milestones in the economic interpretation of the forecasts, and guidelines for their users.
  - *Employment and Business Dynamics in Selected Key Sectors in the period 2008-2017*, whose inclusion was motivated by the fact the forecasts highlight leading sectors in which future employment dynamics will be the result of ongoing business processes in recent years. The section includes a review of employment dynamics and business indicators for the sectors with the highest employment numbers (Manufacturing, Wholesale and Retail Trade, Construction, Transportation). Given its key role in recent years, Agriculture, Forestry and Fishing has also been included in the sector analysis. In addition to which, the ICT sector, which in recent years has shown high employment growth and has played a strong role in boosting technological intensity, has also been included here. The sector has generated substantial value added, and the development of its employment increase potential will have a positive impact on the development of the Bulgarian economy.
  - *Detailed Forecasts*, i.e. the medium-term (2018-2022) and the long-term (2023-2032) labour market development forecasts for 120 occupations, 35 economic activities, 28 provinces, 3 educational attainment levels, sex and age groups.

# PART 1

## LABOUR MARKET: FACTORS AND TRENDS

## CHAPTER 2

# LABOUR MARKET: FACTORS AND TRENDS

## 2.1 External environment: labour market in the EU

### 2.1.1 Economic activity in EU-28

In the period 2008–2010, when the EU economies were going through a severe financial and economic crisis, the employment rate in the EU-28 (for the age group 15-64) dropped from 65.7% to 64.1%. This was most strongly felt in the countries most affected by the recession and the debt crisis in the Euro area – Ireland, Greece, Spain and Portugal. In Ireland problems arose as a result of the government's bailout plan for six of the country's largest banks, which led to a substantial increase in government debt in international financial markets. Similar problems affected the economies of Spain, Cyprus and Greece, driving the latter to conclude a number of agreements with the Troika<sup>16</sup> on servicing the country's foreign debt.

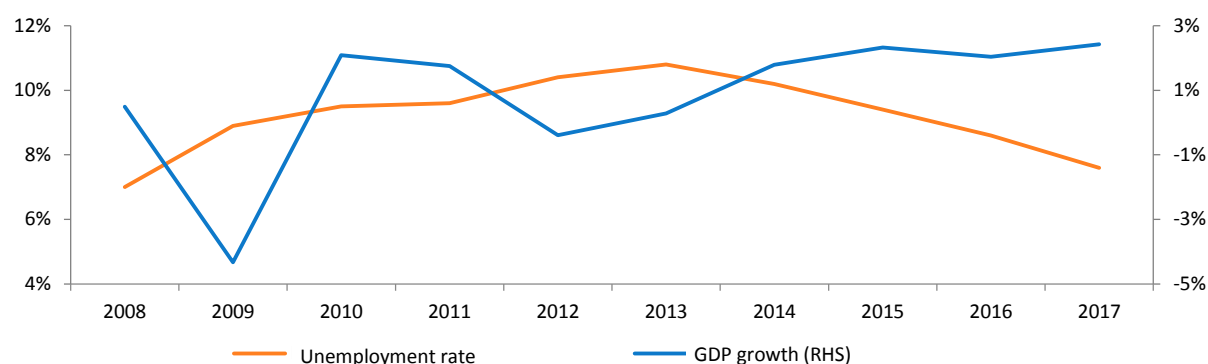
In the three years that followed, 2011–2013, marked by a slow and gradual post-crisis recovery, the employment rate in the EU-28 levelled off around 64.1%. During this period investment activity remained low and did not contribute to new job creation. In countries where economic recovery was relatively faster than in others the employment rate began to rise – by 2.2 p.p. in Latvia, 2 p.p. in Lithuania, 2.4 p.p. in Estonia, 2 p.p. in Malta, and by about 0.4–0.7 p.p. in Germany and the UK. This growth, however, was offset by an ongoing decline in employment in the other EU member states, leaving the employment rate almost unchanged. In the Euro area the most significant drops in employment rate were registered in Greece, Cyprus and Portugal, i.e. the countries where the financial system was most affected by the crisis, and which experienced the most difficulties in servicing their foreign debts.

In the period 2014–2017 employment started to grow steadily as a result of increased economic activity. In the EU-28 it rose by an average of 0.9 p.p., reaching 67.7% at the end of the period. Employment growth was seen in all member states, in particular in Portugal, Lithuania, Spain, Croatia, Slovakia, as well as in others. In Euro area countries growth was lower than in the EU-28, mainly due to slowdowns in employment growth in Belgium, France, Austria and Germany.

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<sup>16</sup> Troika refers to the institutional group formed by the European Commission, the European Central Bank and the International Monetary Fund.

Graph 1: GDP dynamic and unemployment rate in EU-28, %



Source: Eurostat

### 2.1.2 Unemployment

In the period 2008–2010, due to weakened economic activity and low labour demand, the unemployment rate for the age group 15–74 in EU-28 member states rose by an average of 1.3 p.p., much like in Euro area countries, where the increase rate was similar. This was most pronounced in the Baltic countries, where unemployment rose by about 6 p.p. on average. The growth of unemployment by sex in the EU was also highest in those countries, with male unemployment outpacing female unemployment by an average of 0.5 p.p. in the reference period. Unemployment by age, in particular for the age group entering the labour market (below 25), increased significantly, by an average of 2.8 p.p. in 2008–2010, meaning that young people were the first to be affected as a result of reduced economic activity.

In addition to youth unemployment, another particular trend in the period 2008–2010 was the increase in long-term unemployment. The long-term unemployment rate for the age group 15–74 in 2008–2010 rose by an average of 0.6 p.p., with structural problems affecting mainly countries like Latvia, Lithuania and Estonia, as well as southern countries like Spain and Greece, all of which were hit by low economic activity, production optimisation processes, and the beginning of the debt crisis in Euro area countries.

The unemployment rate by educational attainment level for the population aged 15–74 in the EU-28 in the period 2008–2010 increased most for the least-skilled, by an average of 2.2 p.p., followed by the group of upper secondary graduates, with an increase rate equal to that of the economy (1.3 p.p.), and the highly-skilled, where the increase amounted to just 0.8 p.p. These trends were due to, among others, optimisation processes, closures of low-productivity activities, lost foreign market shares etc. The dynamic of the unemployment rate by educational attainment level in Euro area countries remained similar to that in EU-28 countries.

In the period 2011–2013 the unemployment rate in EU-28 countries rose as a result of previously postponed redundancies, low production activation rates, savings needs, initiated reforms etc. The unemployment rate increased on average by a further 0.4 p.p. in EU-28 countries, and by 0.6 in Euro area countries. The indicator's dynamic was conditioned by peripheral European countries affected by debt and structural problems in the labour market, such as Spain, Greece, Italy and Portugal, as well as by newer member states such as Cyprus, Slovenia and Bulgaria. The average increase by sex was identical for both male and female unemployment, with the highest numbers of unemployed in Spain, Greece, Italy and Portugal, as well as in new member states like Cyprus and Croatia.

The age group mostly affected by unemployment resulting from low economic activity and the debt crisis was that of young people below 25, where the average growth in the unemployment rate in the EU-28 was 0.8 p.p., while in Euro area countries the dynamic was even less favourable, with a growth of 1 p.p. This was caused by high unemployment in southern countries like Greece, Cyprus, Spain,

Italy, Croatia and Portugal. This deteriorated position is indicative of the lasting impact of the crisis on this group.

A similar increase was observed in the unemployment rate by level of educational attainment in the period 2011–2013, when people with Lower secondary or lower education were affected the most, and their unemployment rate rose by an average of 1.2 p.p. in the EU-28 and by 1.4 p.p. in the Euro area. The increase for upper secondary graduates amounted to 0.3 p.p. in EU-28 countries, and for those with tertiary and higher attainment levels it was 0.5 p.p. The continued dismissals of population with lower educational attainment levels is indicative of the trend for the higher skilled, and therefore more productive, population to remain in employment at times of economic restructuring.

As a result of these processes and the persistent impact of the crisis, the long-term unemployment rate continued to rise – in EU-28 countries by a further 0.4 p.p. for the age group 15–74, and, due to economic declines, by the slightly higher 0.5 p.p. in the Euro area, where it mostly affected peripheral countries like Greece, Spain, Italy, Portugal, Latvia and Lithuania.

In the period 2014–2017 the unemployment rate in EU-28 countries gradually started to decrease as a result of improved economic activity, investment growth, employment stabilisation etc. For the age group 15–74 it dropped from 10.2% in 2014 to 7.6% at the end of the period. Due to ongoing debt issues in some Euro area countries, the unemployment rate there decreased from 11.6% in 2014 to 9.1% in 2017. Above average EU-28 rates were reported by Croatia, as well as by almost half Euro area countries – Greece, Spain, Cyprus, France, Italy, Latvia, Lithuania, Portugal and Slovakia. As regards the sex dimension, female unemployment in the EU-28 was higher than male unemployment. In addition to the above countries, higher than average EU unemployment rates for both sexes were also seen in Bulgaria, Estonia, Slovenia and Ireland.

The youth unemployment rate also fell, despite remaining twice as high as for the age group 15–74. Above average EU-28 rates were reported in 11 of the 28 member states: Belgium, Bulgaria, Greece, Spain, France, Croatia, Italy, Cyprus, Portugal, Romania and Slovakia. Structural problems in the labour market, as well as the measures taken at European level still failed to produce the desired results.

Unemployment rates by level of educational attainment similarly decreased in 2014–2017, but continued to affect in particular the lower-educated, whose unemployment total was twice the EU average. A drop was also recorded for tertiary and upper secondary graduates, whose annual unemployment rates remained below the average EU-28 throughout the period. Due to ongoing problems in some Euro area countries, long-term unemployment rates there were higher than in the EU-28. In spite of this tendency, there was a drop in the long-term unemployment rate in 2014–2017. Most EU-28 countries retained a higher than average EU long-term unemployment rate, with Greece, Spain, Portugal and Slovakia topping the list.

### 2.1.3 Labour productivity in EU-28

At the beginning of the reference period labour productivity in EU-28 countries fell as a result of overall economic decline. In 2008 the first signs of recession began to affect GDP growth. The main contributor was the Industry dynamic, while Services and Agriculture continued to report GVA growth. The slowdown in economic activity in the EU-28 was accompanied by a 1% growth in employment in 2008. Agriculture reported a 2% year-on-year decline in employment, while in Industry there was a slight growth in employment of 0.3%. Services' contribution was higher (1.6%), mainly due to *Real Estate Activities, Professional, Scientific and Technical Activities, Administrative and Support Service Activities, ICT and Wholesale and Retail Trade*. In 2009 EU countries experienced a significant drop in GDP, resulting in a drop in employment in almost all economic activities. The only exceptions were *Public Administration, Education, and Human Health and Social Work Activities*, which reported an increase of 1.7%, most likely due to employment promotion programmes and the measures of European governments in response to the recession, as well as *Arts, Entertainment and Recreation, Other Service Activities, Activities of Households as Employers, Undifferentiated Goods-*

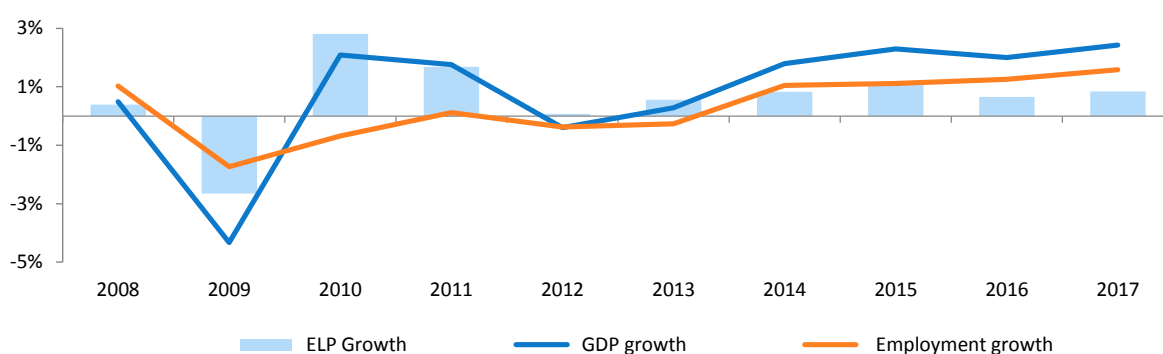
and Services-producing Activities of Private Households for Own Use, Activities of Extraterritorial Organisations and Bodies, in which a slight growth of 0.1 % was reported by EU-28 countries in 2009.

In 2010 and 2011, again driven by GDP growth, labour productivity took on an increase trend. Debt-affected countries without access to international financial markets continued to report drops in GDP as a result of risk premiums on issued bonds and corresponding lower investment rates, as well as because of the deepening of the recession: Greece (-5.5% in 2010 and -9.1% in 2011), Spain (-1% in 2011), Latvia (-3.9% in 2010), Romania (-2.8% in 2010), and Portugal (-1.8% in 2011). At the level of economic activity, almost all industries reported positive dynamics in earnings per person employed on an annual basis, with the value added dynamic staying negative only in 2010 in *Agriculture* (-3.6%) and in *Arts* (-0.3%).

In 2012 employment in the EU-28 continued to decline, mostly as a result of the indicator dynamic in debt-affected Euro area countries such as Greece, Portugal, Spain, Cyprus, as well as in some newer member states like Romania and Bulgaria. Favourable employment developments were reported by small and open economies like Malta, Luxembourg, Lithuania and Estonia. By economic activity, the highest decline rates in labour productivity were recorded in *Industry* (-3%) and *Agriculture* (-5.6%), whereas *Services* continued to have positive contribution in the course of the year (0.6%). As regards industrial activities in 2012, labour productivity declined most in *Construction* (-5%). At the same time, in *Services* almost all activities except for *Financial and Insurance Activities* and *Arts, Entertainment and Recreation, Other Service Activities, Activities of Households as Employers, Undifferentiated Goods- and Services-producing Activities of Private Households for Own Use, Activities of Extraterritorial Organisations and Bodies* reported a drop in earnings per person employed on an annual basis. The highest growth in labour productivity in 2012 was in higher-value-added activities: *ICT* (2.7%), *Real Estate Activities* (1%), and *Professional, Scientific and Technical Activities* (0.6%).

In the period 2013–2015 labour productivity in EU-28 countries began to increase gradually, reaching a rate of about 0.8%, mostly as a result of increased production rate – year-on-year GDP rose on average by 1.5% in the period. Some of the main reasons behind GDP growth in the EU-28 were increased domestic demand and increased investment activity. Overall, GDP growth was reported by countries like Ireland, Malta, Luxembourg and Romania. Certain Euro area countries, such as Greece, Spain and Cyprus, struggled with continued recession, low investment rates, low consumption, and, as a result, negative economic activity.

Graph 2: **Dynamic of labour productivity by factor, % on an annual basis**



Source: Eurostat, own calculations

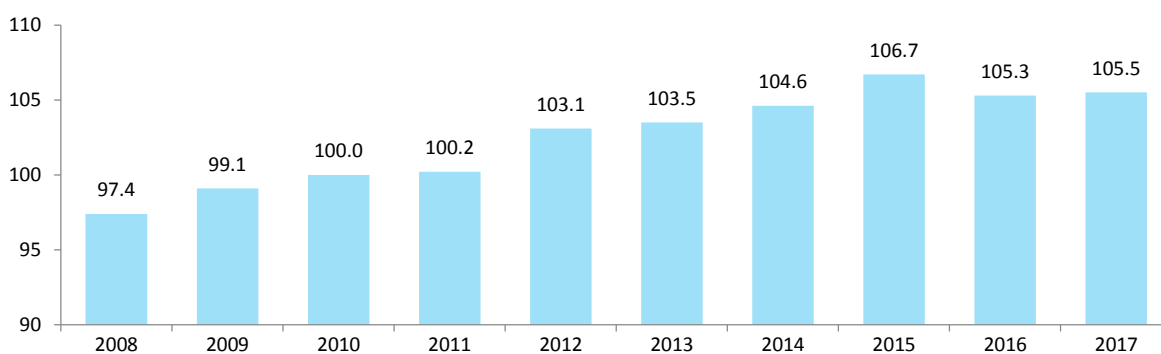
2016 and 2017 saw some volatility in the dynamic of labour productivity, while employment continued to increase steadily. There was further accelerated GDP growth, driven by stable domestic demand, and employment increase in EU-28 countries. The latter was most prominent in newer non-Euro area member states, while almost all older EU-28 members reported growths below the EU-28 average (1.4%) – France (1.1%), Italy (1.2%), Finland (1.2%), UK (1%). By sector, employment growth

was mostly driven by Industry, where the number of employed increased by an average of 1.7% on an annual basis, compared to 1.5% in Services. The biggest contributor in Industry was *Construction* – with an increase rate of 2%, and in Services – *ICT*, where the year-on-year employment growth was 3.4%, as well as *Professional, Scientific and Technical Activities*, and *Administrative and Support Service Activities*, with an average growth of 2.9%.

#### 2.1.4 Labour costs in EU-28

In the course of the whole reference period 2008–2017 nominal unit labour costs (ULC) in the EU-28<sup>17</sup> increased. During the crisis years 2008–2009 ULC experienced relatively weak growth, mainly due to increase in labour compensations. In 2010–2011 ULC remained relatively constant. The generally high job loss rate at the time resulted in an increase in labour productivity, comparable to that in labour compensations. In 2012–2015 the growth in compensation per person employed accelerated and significantly outpaced the growth in labour productivity, a persistent trend that was mostly due to employment reductions. In 2016 and 2017 ULC dropped and cost competitiveness improved mainly as a result of accelerated growth in labour productivity.

Graph 3: **Nominal ULC index in EU-28, 2010=100**



Source: Eurostat

In 2008 most new member states of the EU reported high nominal ULC growth rates – between 7% and 19% on an annual basis (Baltic countries, Poland, Czech Republic, Bulgaria, Slovakia). This was the final year of very high economic growth in those countries during the whole reference period, when the growth in compensation per person employed (within the 7-17% range) significantly outpaced the growth in labour productivity.

In 2009 labour productivity declined in almost all EU-28 countries. In some, however, this was coupled with compensation reductions (Romania, Poland, Latvia and Ireland), leading to consolidation of ULC. In others, such as Portugal and Bulgaria, the slight increase in generated income could not offset the increase in compensation per person employed, resulting in a rise in nominal ULC on an annual basis. Overall, in EU-28 states the combination of negative labour productivity (-2.7%) and decrease in compensation per person employed (by 1%) led to a 1.7% increase in ULC in 2009.

Nominal ULC growth in economic activities in 2008 and 2009 was mainly due to increased Industry costs. The agricultural sector reported consolidation in labour costs in 2008, resulting from a 2% drop in employment in the context of increased newly generated income by person employed; however, as early as 2009, nominal ULC in the sector recorded a rise as a result of the increase in compensation per person employed, while the generated income rate remained unchanged. Nearly half services activities reported ULC drops in the period – *ICT*, *Financial and Insurance Activities* and *Real*

<sup>17</sup> The country analysis excludes Malta, the reason being the lack of Eurostat data on constant-price GVA for the reference period.

*Estate Activities.* They generated cost competitiveness mainly through cost drops per person employed, while labour productivity increased by an average of 0.8% in the period.

The period 2010–2011 was characterised by improvement in ULC due to labour cuts and increased productivity in the context of growth in compensation per person employed. 2010 saw another drop in the number of employed. Labour productivity in 2010–2011 rose in almost all member states, except for Greece, which continued to implement the restrictions imposed by foreign investors as holders of the bulk of the Greek national debt. As a result of these savings, the recession continued in 2010–2011, leading to a 9.1% decline in GDP in 2011 and a 17.9% peak in unemployment. In Bulgaria, Czech Republic, Lithuania and Sweden the growth in compensations significantly outpaced production growth, resulting in a growth in ULC. Improved cost competitiveness was reported by Ireland, Estonia and Latvia. In some of these countries employment continued to decline, resulting in an increase in labour productivity ahead of the increase in compensations.

In 2012 GDP growth in most European economies accelerated, resulting in higher employment over the previous year and a relatively higher increase in compensations; nominal ULC also rose, most rapidly so in countries like Bulgaria, Lithuania, Latvia, Estonia, Finland, Sweden and UK. Greece, Spain and Portugal had not yet come out of the recession, and reported drops in the compensation per person employed, as well as in employment. Euro area countries which had the most serious debt problems and had signed agreements with the Troika<sup>18</sup> were included in ECB's interest-free support programme after September 2012, which was one of the underlying factors for their increased economic activity and employment in the years which followed, together with fiscal consolidation measures and structural reforms.

In 2013–2014 there was a slowdown in nominal ULC growth in the EU-28. The compensation per person employed continued to increase, but the period also saw an accelerated growth rate in labour productivity. The Baltic countries and Bulgaria reported the highest ULC growths, between 3% and 8%, resulting from a 5-9% increase in the compensation per person employed in the context of unchanged or increased employment, and, albeit to a smaller degree, from labour productivity growth. Countries in which ULC dropped in the period were Czech Republic, Greece, Cyprus, Croatia, Hungary and the UK.

In 2014, in the context of increased compensations per person employed and higher labour productivity, ULC rose in more than half European countries. Such dynamics were seen in Bulgaria, Romania, the Baltic countries, Austria and the UK. Improved cost competitiveness was reported by Czech Republic, Ireland, Greece, Croatia, Cyprus, Hungary, Slovenia, Sweden, Portugal and others. It was due to the drop in compensation per person employed in the context of reduced numbers of employed and increased economic activity. Only in Greece, Croatia and Portugal the improvement in ULC took place within the context of reductions in value added. Still, there was evidence of recession exit in those countries, accompanied by an employment increase and corresponding drops in employment rates for the age group 15-64 and for young people (15-24).

In 2015 there was a new decline in cost competitiveness at EU-28 level. In the course of the year ULC rose most in the UK, the Baltic countries and Bulgaria, by 3-11%, while in countries like Ireland, Cyprus, Hungary, Romania, Netherlands and Sweden they dropped below their previous year's levels. The growth in ULC was conditioned by a growth in compensation per person employed, which surpassed productivity growth in those countries. Conversely, improvement in ULC was also due to more income generation, at the expense of lower labour costs growth.

In 2016 ULC improved by between 0.6 and 9.3% in the UK, Poland, Cyprus, Croatia, Finland and Spain. This positive dynamic was due to higher labour productivity and lower labour costs in the context of increased employment. All new EU-28 member states, except for Cyprus, reported a higher growth in compensations over newly generated income.

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<sup>18</sup> Arising from the need to recapitalise their systematically important banks.

In 2017 the ULC rate in the EU-28 remained almost unchanged on an annual basis due to the parallel dynamics and mutual balancing of the changes in compensation per person employed and labour productivity. Countries like Ireland, Finland and the UK continued to improve their cost competitiveness as a result of reduced labour costs, while others, such as the Baltic countries, Bulgaria, Romania, Hungary, Slovakia and Poland, reported competitiveness declines due to the high growth in compensation per person employed in the context of increased employment on an annual basis.

## 2.2 Macroeconomic environment

In 2008 Bulgaria found itself at the end of a period of high economic growth, having started as early as the beginning of the decade. In 2004–2008 the annual growth rate of constant-price GDP was in the 6-7% range, well above the potential growth of the national economy. The main driver of this growth was domestic demand, in terms of both consumption and investment. In 2008 final consumption increased by 3.1%, and investment – by 22% on an annual basis. High investment activity was paralleled by a high growth in FDI, whose value in 2008 was EUR 6,665 million, as well as by intense credit activity on behalf of commercial banks. The credit growth during this period, further fuelled by the increased flow of debt financing from foreign banks to their local subsidiaries, was between 15 and 30%, which triggered the introduction of special measures by the BNB to curb credit growth. Foreign investors' increased interest in Bulgaria, which during the period was reflected in both FDI flow and debt financing flow, was conditioned by high investment profitability, as well as by the country's EU accession in early 2007, placing investment in Bulgaria in the wider EU context.

As a result of good economic development, all labour market indicators continued to improve in 2008. The number of employed reached 3,815 thousand, and the unemployment rate dropped to 5.7%, below the average EU rate. In the years to follow these values were used as benchmarks for labour market recovery of pre-crisis levels of employment, unemployment and economic activity of the population.

High labour demand during the period led to a high annual increase in the average wage. In 2008 its nominal growth was 11.8%, which in turn was one of the underlying factors for the relatively high inflation in the period, which totalled 12.3%, the highest annual consumer price growth after 2000.

2008 also showed signs that the turmoil in the global economy would have a negative effect on the economic dynamic in Bulgaria. Despite the high inflow of FDI to Bulgaria, in 2008 it dropped by nearly 20% over the previous year. A similar slowdown in growth was observed in the wage dynamic, which in turn slowed down the dynamic of final consumption compared to the three previous years.

In 2009 the Bulgarian economy had its first year of economic downturn after 1997. Constant-price GDP fell by 3.6% on an annual basis, with final consumption shrinking by 4.8% and investment plummeting by 17.7%. A decrease in GVA was reported in almost all sectors<sup>19</sup> of the economy, most strongly so in Agriculture and Industry, as well as in Wholesale and Retail Trade. Construction, which eventually became the sector most struck by the crisis, continued to report real GVA growth, but in 2010 it also started to decline.<sup>20</sup>

External financial flows to Bulgaria, both as FDI and debt financing, shrank sharply, and FDI more than halved compared to 2008, totalling EUR 2,800 billion. Commercial banks similarly curbed their credit activities, in view of both the expected unfavourable development of the local economy and adverse developments in other countries whose economies were considered to be just as risky as the

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<sup>19</sup> In accordance with NACE 2008, economic activities identified by a letter code (A to U) in the classification are called sectors, and where the letter is followed by a number, they are called segments. In this analysis, segments are referred to as industries or economic activities, where the two are used interchangeably.

<sup>20</sup> This decline was repeated in five of the next seven years.

Bulgarian. The so-called periphery countries in the EU and the Euro area (Greece, Portugal, Ireland, Spain, the Baltic countries etc.) also reported steep GDP falls, and some even struggled to service their external debts (a problem that was not relevant to Bulgaria both during and after this period), to an extent where potential bankruptcies were also considered

Labour market indicators deteriorated accordingly. The number of employed dropped, and the unemployment rate grew until 2007 rates were practically restored. The nominal growth of the average wage slackened, dropping to 6.4%. Due to declining demand, inflation also slowed down to 2.8%. If the hot topic of discussion in the years before had been the potential overheating of the Bulgarian economy, in 2009, with all signs of recession present, the main question was how deep and how lasting the recession would be.

The next years showed that the decline of the Bulgarian economy was limited to just one year, and a slow but steady recovery had commenced as early as 2010. In the next four years (2010–2013) the growth rate of the Bulgarian economy fluctuated between 0.5 and 2%, which could be identified as generally slow. A main driver of economic recovery in this period was external demand, with exports of goods and services enjoying a double-digit growth (at constant prices) in almost each reference year. Consumption also had a positive contribution to the growth of the economy, even though its increase was also very limited and remained below the 2% mark in each of 2010, 2011 and 2013.

In 2010 investment fell at the same rate as the year before (17.7%), but in 2011 the decline was already significantly smaller (-4.4%). Investment demand began its slow recovery only in 2012 (at a rate of 1.8%); however, initially it was rather unstable (in 2013 investment recorded only minimum growth – 0.3%). Credit growth during this period was virtually nil, and commercial banks were extra cautious when funding new investment projects. This was the period of rapid accumulation of non-performing loans in the economy, and by the end of 2013 their share reached 16.8% of the total size of loans to the non-financial sector (6.4% by the end of 2009). The main funding source in 2012 and 2013 were European programmes and national budget co-financing, which facilitated stabilisation and slight investment growth in the period.

The economic sectors with highest GVA growth in the period were *Manufacturing* and *Information and Communication*, mostly to do with their export-oriented activities. The majority of the other economic activities performed tentatively, alternating minimum-decline and minimum-growth years, and the only two sectors to retain their negative dynamics throughout the period were *Construction* and *Financial and Insurance Activities*.

In this period employment continued to decline and unemployment to grow, in spite of the tentative and slow economic recovery. In 2012 the number of employed fell to its lowest point during the reference period (2,934 thousand), and in 2013 their average annual number remained virtually unchanged. The number of unemployed (436.3 thousand) and the unemployment rate (13.0%) both peaked in 2013. The nominal growth of the average wage stabilised, fluctuating around the 6% mark. As a result of GDP and employment dynamics, labour productivity resumed its relatively high annual growth rates, which were still close to the real growth of the average wage.

2014 marked the start of a three-year period of accelerated development of the Bulgarian economy and attainment of its potential growth. In that year the real annual GDP growth rate stayed relatively low (1.8%), but in 2015–2017 it was already in the 3.5–4% range. Once more, the major driver of growth (in particular during 2015–2016) was external demand; however, now the importance of final consumption for economic growth also increased. In 2015–2017 consumption increased by between 3.3 and 4.3% on an annual basis. This was facilitated by both individual consumption (backed up by wage income growth in the country) and government consumption.<sup>21</sup> Investment (except for 2016) showed consistent annual growth, in the 3–3.5% range.

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<sup>21</sup> The government's goal in the period, it should be noted, was to achieve a balanced state budget.

Nearly all economic sectors achieved GVA growth in the period. Only *Construction* and *Agriculture* retained their unsteady performance, alternating years of growth with years of relatively steep declines. In 2017 Construction remained about 25% below its pre-crisis (registered in 2009) rate, and Agriculture – about 10% below (compared with 2008).

FDI flow during the period remained negligible (with 2014 reporting an all-time low, when FDI amounted to EUR 803 million). Still, a gradual increase trend began to appear, and in 2017 FDI grew to EUR 1,896 million, thus surpassing the totals of the first crisis years (2010–2013). During this period commercial banks repaid substantial parts of their loans to foreign financial institutions, and the size of the external debt fell substantially, mainly due to the drop in private debt.<sup>22</sup> In 2017 private external debt amounted to about 55% of GDP, whereas in 2010 its share exceeded 85%.

In 2017, albeit slowly, the credit process also began to recover. Business loans rose by 1.6% and personal loans rose by 6.5% on an annual basis. As for personal house loans, they increased even faster (by 7.4%). This was a period of exceptionally low interest rates on both deposits and loans, driven by the monetary policy of the European Central Bank (ECB), in particular the quantitative easing and zero interest rate programme.

During this period employment in the economy quickly began to increase, and in 2017 the number of employed reached 3,150 thousand.<sup>23</sup> The unemployment rate also decreased rapidly, reaching its lowest value since 2008 at 6.2% in 2017. Although neither indicator had as yet recovered its pre-crisis (2008) level, it is important to note that this labour market dynamic happened in the context of unfavourable demographic processes and steadily declining population in the country. As a result, the economic activity rate of the population in the period 2014–2017 exceeded the 2008 value (which for the age group 15–64 was 71.3% in 2017 and 67.8% in 2008), and the employment rate in 2017 was also higher than in 2008 (66.9% and 64% respectively for the age group 15–64). Thus, even if the number of employed was still lower than in 2008, almost all economic activities reported labour shortages, and employers identified this as a much more severe problem for the future expansion of activities than in the economic boom period (2007–2008).<sup>24</sup>

As a result of increased labour demand, nominal wage growth accelerated once more, rising by 8% on an annual basis in 2016 and by 9.4% in 2017. This dynamic did not lead to acceleration of inflation in the country, which stayed very low during the period. In 2014–2016 the Bulgarian economy went through a period of deflation, with the negative price index in the country being one of the lowest among all EU countries. This price dynamic was fully conditioned by the dynamic of international prices of group commodities such as crude oil and fuels, groceries etc.

### 2.3 Employment and unemployment

In 2017 the number of employed in the total economy was 7.6% lower than in 2008. The main reason for this was lower employment in Construction and Manufacturing, and, to a lesser extent, reduced employment in Agriculture, Forestry and Fishing, as well as in some service sectors, such as Public Administration, Education, Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles.

<sup>22</sup> The size of Bulgaria's external government debt during the entire reference period was very low, and the country was one of the three member states with the lowest share of the GDP indicator in the EU.

<sup>23</sup> Based on LFS data.

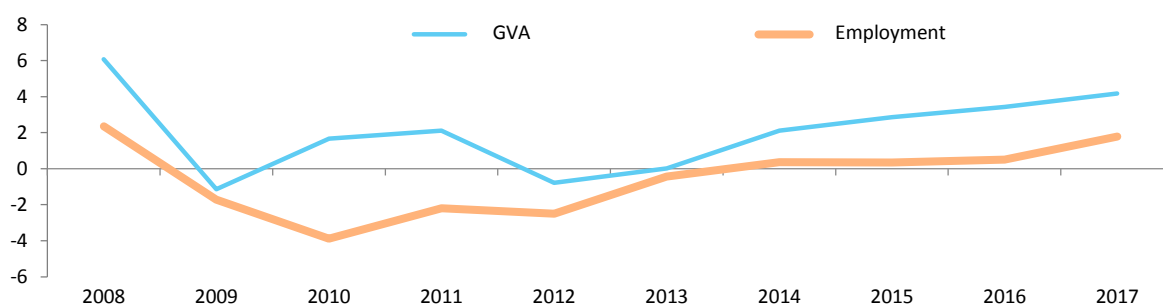
<sup>24</sup> Data on labour shortages are based on observations of business trends in Manufacturing, Construction, Services and Trade. NSI sounds out entrepreneurs from these sectors, and some of the questions in the survey forms concern limiting factors for enterprise operations. One of these refers specifically to labour shortages.

Overall, the labour market dynamic in the past ten years has followed the cycle of economic development. After a lengthy period of employment decline between 2009 and 2013, which was the result of slow and unsustainable economic recovery from the impact of the global financial and economic crisis, labour demand began to rise in 2014, due to steady economic growth. This in turn facilitated a drop in unemployment rate, which in 2017 almost regained its pre-crisis level.

Although the economic and financial crisis hit global markets in 2008, its impact on the employment dynamic in the country was first felt in 2009, mainly in export-oriented activities, when the total number of employed dropped by 1.7%<sup>25</sup>, as well as in 2010, when the drop in employment was already 3.9%

The labour market responded to economic processes somewhat late, both in terms of shrinking and recovery of jobs. Thus, in spite of the ongoing process of steady albeit slow recovery of new income growth in the economy, the economic dynamic remained unstable until 2013, and the number of employed continued to drop. Only in 2014, when economic demand accelerated substantially, was there a trend reversal in the employment dynamic. Initially, employment growth stayed moderate (0.4–0.5% annually), but by 2017 the average annual rate had increased to 1.8%. Real value added in the economy surpassed its 2008 level as early as 2010; yet, the number of employed in 2017 remained lower than before the crisis.

Graph 4: Real GVA growth and real employment growth, %



Source: Eurostat

Economic sectors<sup>26</sup> showed high heterogeneity in employment dynamics immediately after the onset of the crisis and in the years of unsteady economic growth until 2013, while in the period of accelerated economic activity and rising labour demand after 2014, variation in employment fluctuation was significantly lower. Industrial sectors were more affected by the crisis than other sectors, and were therefore characterised by higher and longer employment declines. The main contributor to the overall drop in employment in the period 2009–2013 was *Manufacturing*, where the average decline rate totalled 4.7%, accounting for more than 40% in the total drop in employment. Employment reduction in *Construction* was also significant in the period, amounting to 9.5% on average per year, which was mainly conditioned by shrunk economic activity in *Construction of Buildings*, characterised by turbulent economic development just before the onset of the crisis. Another strong factor for employment decline in the years before 2013 was *Agriculture, Forestry and Fishing*, accounting for over 19% of total employment in the country. The high volatility of its economic dynamic, including employment, was determined by both situational factors common to all economic sectors and specific factors related to seasonal and climatic specificities.

<sup>25</sup> According to definition of employed person in the National Accounts (ESA 2010).

<sup>26</sup> Economic sectors are considered at 21-sector level (NACE Rev. 2, Nomenclature A21), and priority is given to the sectors with the largest share and corresponding contribution to employment dynamics in the period 2008–2017.

In contrast to *Manufacturing and Agriculture, Forestry and Fishing*, employment decline in *Services* between 2009 and 2013 was much smaller. Moreover, the job cuts process started at different times in the various economic activities in the sector, and did not affect all of them. The highest drop in employment, and corresponding contribution to the overall employment decline in the economy, was in *Public Administration*. This was driven by the need to optimise and consolidate budget expenditure with a view to reduce budget deficit in the period 2009–2010. Over the next three years the employment dynamic in the sector remained generally negative, due to structural reforms and increased cost effectiveness. Restructuring efforts in the public sector also affected *Education* and *Human Health and Social Work Activities*; however, their impact on employment was more strongly felt in the former. The number of employed in *Education* dropped by an average of 1.5% on an annual basis in the period 2009–2013, where optimisation in public *Education* was higher in 2009 and 2010, and smaller in 2011–2012.<sup>27</sup> As regards *Human Health and Social Work Activities*, a significant drop in employment was registered only in 2010. After that, the number of employed in public healthcare showed only slight fluctuations around a more or less steady level, whereas in private healthcare, accounting for over 20% of total sector employment in the period, their number tended to grow.<sup>28</sup>

Other *Services* sectors with negative contributions to the total employment dynamic in the economy in the period 2009–2013 were *Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles, Transportation and Storage*, and *Accommodation and Food Service Activities*. It is worth noticing that sectors that are more heavily dependent on domestic demand, such as *Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles* and *Accommodation and Food Service Activities*, resorted to employment reductions two years after the other sectors, i.e. employment decline here was most obvious between 2011 and 2013. In contrast, employment reductions in *Transportation and Storage* began as early as 2009, as the sector is dependent on both domestic demand and foreign demand in terms of exports and, above all, *Land Transport*.

We should also mention two sectors in *Services* that experienced drops in economic activity in individual years, which, however, did not have any significant negative impact on employment. *Information and Communication* was the only sector not to report any annual decrease in employment between 2009 and 2013. This was exclusively due to the dynamic development of *IT* activities, where labour demand increased steadily. *Professional, Scientific and Technical Activities* suffered from some employment reduction in the period 2011–2012, but overall the average annual decline in the period 2009–2013 remained very low, and the number of employed was relatively close to its 2008 rate.

After 2014 the economic cycle transitioned to the phase of sustainable upward development, which had a positive impact on labour demand in almost all economic activities. Employment growth was significantly more homogenous both in the three major economic sectors (*Agriculture, Industry and Services*), and within separate economic activities.

Due to its large share in total employment, amounting to about 17.4% on average for the whole period 2009–2017, *Manufacturing* was the biggest contributor for the positive employment dynamic, even if its growth rate of 1.3% on average in the four years was not the biggest. The highest average annual job growth rates were seen in *Information and Communication* and *Professional, Scientific and Technical Activities*. Each of the latter showed a tendency to continuously increase its share in total employment, to 2.7% and 3.2% respectively in 2017, and high employment growth meant that their contributions would be comparable to other sectors', like *Transportation and Storage* and *Ac-*

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<sup>27</sup> It should be noted that *Education* data in the National Accounts cover both the public and the private sector. For this reason, an additional source of information about sector employment was used – NSI's Annual Statistics on Employment and Labour Costs, where the number of employed is split into public and private sector.

<sup>28</sup> Similar to *Education*, data on *Human Health and Social Work Activities* in the National Accounts include both public and private sector employment. For this reason, an additional source about sector employment was used – NSI's Annual Statistics on Employment and Labour Costs, where the number of employed is split into public and private sector.

*accommodation and Food Service Activities*, which in spite of having lower employment growth rates in the period still enjoyed larger shares.

Table 1: **Average annual employment dynamic by economic activity, %**

	2009–2013 <sup>29</sup>	2014–2017
<b>Total</b>	<b>-2.1</b>	<b>0.8</b>
<b>Agriculture, Forestry and Fishing</b>	<b>-2.3</b>	<b>0.4</b>
<b>Industry</b>	<b>-5.6</b>	<b>0.7</b>
<b>Manufacturing</b>	-4.7	1.3
<b>Construction</b>	-9.5	-0.5
<b>Other Manufacturing Activities</b>	-2.0	-0.8
<b>Services</b>	<b>-0.2</b>	<b>0.9</b>
<b>Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles</b>	-0.5	0.3
<b>Transportation and Storage</b>	-1.6	2.5
<b>Accommodation and Food Service Activities</b>	-1.0	1.7
<b>Information and Communication</b>	3.5	5.0
<b>Professional, Scientific and Technical Activities</b>	-0.6	3.5
<b>Public Administration</b>	-2.5	-0.9
<b>Education</b>	-1.5	0.0
<b>Human Health and Social Work Activities</b>	1.2	0.8
<b>Other Service Activities</b>	2.6	0.6

Source: Eurostat, own calculations

*Agriculture, Forestry and Fishing* continued to alternate years of employment growth and employment decline in the period 2014–2017, but overall also had a positive impact on total employment in the country. The strong volatility in the economic dynamic in the industry, coupled with its significant share in total employment, determined its major impact on the development of employment in the economy.

*Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles* remained the sector with the slowest recovery of labour demand, with employment numbers fluctuating around the pre-2016 level, and experiencing a more significant increase only in 2017. Regardless of the increase in value added, the employment dynamic was curbed by negative developments in *Retail Trade*, being the leading factor for total employment growth in the sector, which was related to increased competition on the part of large chain stores.

<sup>29</sup> The two time periods in the table were chosen based on the fact that 2013 was the last year to see employment decline (0.4%) after 2009 (according to National Accounts data, on which the analysis has been based).

Table 2: **Number of persons employed and structure of employment in Manufacturing according to technological intensity of industries and in Services according to knowledge intensity<sup>30</sup> in Bulgaria**

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
<b>Manufacturing</b>										
Number of persons employed, totals, people thousands	769.2	713.7	630.8	592.6	603.4	576.2	584.3	597.5	588.8	601.1
High-technology	28.8	24.1	19.9	21.6	23.9	24.7	24.3	26.0	24.7	21.5
Medium-high-technology	111.9	92.4	81.0	78.6	82.9	88.8	86.9	92.5	94.5	97.2
Medium-low-technology	169.4	160.9	147.4	137.5	140.8	126.6	131.8	142.9	140.2	143.2
Low-technology	459.1	436.3	382.5	354.9	355.9	336.1	341.3	336.1	329.5	339.2
Structure, %										
Manufacturing, totals	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
High-technology	3.7	3.4	3.2	3.6	4.0	4.3	4.2	4.4	4.2	3.6
Medium-high-technology	14.5	12.9	12.8	13.3	13.7	15.4	14.9	15.5	16.0	16.2
Medium-low-technology	22.0	22.5	23.4	23.2	23.3	22.0	22.6	23.9	23.8	23.8
Low-technology	59.7	61.1	60.6	59.9	59.0	58.3	58.4	56.3	56.0	56.4
<b>Services</b>										
Number of persons employed, totals, people thousands	1882.6	1874.9	1850.3	1829.8	1824.1	1851.6	1871.9	1915.2	1912.3	1984.6
Knowledge-intensive services (KIS)	913	911.4	889.3	870.8	875.7	890.6	914.5	944.8	933.4	946.7
of which High-tech KIS	73.8	68.3	73.3	69.3	69.9	74	72.7	86.8	91.4	93.3
Less knowledge-intensive services (LKIS)	969.6	963.5	961	959	948.4	960.9	957.4	970.4	978.8	1037.9
Structure, %										
Number of persons employed, totals	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Knowledge-intensive services (KIS)	48.5	48.6	48.1	47.6	48.0	48.1	48.9	49.3	48.8	47.7
of which High-tech KIS	3.9	3.6	4.0	3.8	3.8	4.0	3.9	4.5	4.8	4.7
Less knowledge-intensive services (LKIS)	51.5	51.4	51.9	52.4	52.0	51.9	51.1	50.7	51.2	52.3

Source: Eurostat, own calculations

Reduced employment continued to dominate *Construction* and *Public Administration* in the period 2014–2017. *Construction* was the sector reporting the slowest overall post-crisis recovery of general economic activity. In 2014–2015 employment in *Civil Engineering* recorded a rise, which managed to stabilise and even increase total employment in the sector. This was due to rapid absorption of European funding at the end of the previous programming period. In 2016–2017, after start of the second programming period and the technological timespan required for the preparation of new projects,

<sup>30</sup> These breakdowns are based on Eurostat's classification of manufacturing industries according to technological intensity and of services according to knowledge intensity, which is available here: [https://ec.europa.eu/eurostat/cache/metadata/Annexes/htec\\_esms\\_an3.pdf](https://ec.europa.eu/eurostat/cache/metadata/Annexes/htec_esms_an3.pdf). In accordance with the methodology, manufacturing industries with a two-digit code in NACE 2008 are divided into four groups according to their technological intensity, namely: low-technology, medium-low-technology, medium-high-technology and high-technology. Services activities at the same level are split into high-tech knowledge-intensive activities and less knowledge-intensive activities. The data on number of persons employed are taken from Eurostat's Structural business statistics, as the National Accounts at the level of 64 economic activities (NACE Rev. 2, Nomenclature A64) do not provide full disaggregated data on some activities, which could lead to distortion in the disaggregated data on employed.

employment in *Civil Engineering* dropped once more. Employment in *Construction of Buildings*, whose share declined significantly after 2009 but continued to account for around 40% of total employment in the sector in the last four years, stabilised only in 2016 and increased in 2017. Thus, they contributed to the stabilisation of total employment in *Construction* in the last year of the reference period.<sup>31</sup>

Efforts to raise efficiency in Public Administration continued in the period 2014-2017, and the number of employed dropped by 0.9% on average. Further optimisation of public sector employment also dominated Education and Human Health; however, whereas in the former it conditioned a stabilisation of total employment in the sector at a relatively constant level, in the latter private sector dynamics resulted in an overall increase in employment.

Ongoing changes in employment by economic activity in the last ten years led to a slow restructuring of employment – from lower- to higher-value-added industries.

In the past ten years there has been a slow restructuring of employment – from lower- to higher-value-added activities. Still, the structure of the Bulgarian economy has remained less favourable than EU-28's.

The structure of employment in *Manufacturing* according to industries' technological intensity shows that low-technology economic activities continued to dominate employment in Manufacturing, although for the whole reference period 2008-2017 their share dropped by 3.3 p.p. to 56.4% in 2017. This was counterbalanced by a rise in the share of medium-low-technology – by 1.8 p.p. to 23.8%, and of medium-high technology – by 1.6 p.p. to 16.2%, while the share of high-technology levelled off around the 2008 rate (3.6% in 2017). Regardless of the generally positive trends, the structure of employment in Manufacturing in Bulgaria remained less favourable than average EU-28. The latter was more concentrated in high-technology and medium-high technology, which together accounted for 37.6% in 2017, against a significantly lower share of low-technology (35.4%), and a more or less comparable to Bulgaria share of medium-low technology. Also, compared to the pre-crisis period, on average EU countries showed a different profile of the change in the structure of employment in Manufacturing, namely a drop in the shares of low-technology and medium-low technology against a rise in those of medium-high technology. This shows that the restructuring of employment in Manufacturing in Bulgaria was slowly catching up with the structure in more developed economies.

The breakdown of employed in Services into knowledge-intensive activities and less knowledge-intensive activities shows that there was no significant difference in structure in 2017 over 2008. Activities relying to a smaller extent on specific knowledge and skills continued to enjoy a bigger share in employment (52.3% by 2017), which even slightly rose at the expense of knowledge-intensive services, whose share dropped to 47.7%. However, one positive trend that should be noted was the increase in the share of employed in high-technology knowledge-intensive services. Similarly to Manufacturing, the comparison of the structure of employment in Services in Bulgaria to average EU-28 reveals some differences, namely that in more developed economies the share of knowledge-intensive services was dominant (56.2% over 43.8% for less knowledge-intensive services in 2017). Still, it is worth mentioning that in the past three years Bulgaria enjoyed a comparative advantage over the EU, namely the higher share of employed in high-technology knowledge-intensive services (4.7% against 4.1% on average for the EU-28 in the period 2015–2017).

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<sup>31</sup> Data on employment in *Construction* in the National Accounts do not provide details on employment in the separate segments of the sector. For this reason, an additional source of information was used – Eurostat's Structural business statistics.

**Table 3: Number of persons employed and structure of employment in Manufacturing according to technological intensity of industries and in Services according to knowledge intensity<sup>32</sup> in EU-28**

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
<b>Manufacturing</b>										
Number of persons employed, totals, people thousands	38088.7	35205.6	33765.5	33897.8	33465	33066.8	33629.8	33927.4	34551.7	35077.3
High-technology	2532.5	2383.2	2332.7	2371.7	2343	2349	2344.4	2359.2	2397.8	2413.7
Medium-high technology	10667.4	9863.8	9495.4	9698.9	9696.5	9691	9974.4	10277.9	10597.8	10771.2
Medium-low technology	10498.1	9725.9	9384	9441.1	9315	9051.1	9142.4	9129.1	9294.7	9478.5
Low-technology	14390.7	13232.7	12553.4	12386.1	12110.5	11975.7	12168.6	12161.1	12261.4	12413.9
Structure, %										
Manufacturing, totals	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
High-technology	6.6	6.8	6.9	7.0	7.0	7.1	7.0	7.0	6.9	6.9
Medium-high technology	28.0	28.0	28.1	28.6	29.0	29.3	29.7	30.3	30.7	30.7
Medium-low technology	27.6	27.6	27.8	27.9	27.8	27.4	27.2	26.9	26.9	27.0
Low-technology	37.8	37.6	37.2	36.5	36.2	36.2	36.2	35.8	35.5	35.4
<b>Services</b>										
Number of persons employed, totals, people thousands	149633.9	149710.6	149198.6	149961	150518.8	151475.4	153928.2	156383.4	159342.1	161700
Knowledge-intensive services (KIS)	82271.8	83320.6	83533.8	84152.4	84595.9	84724.1	86525.8	87956.2	89493.5	90880.7
of which High-tech KIS	5851.8	5777.2	5771.8	5936.3	6063.8	6072.8	6211.7	6401.8	6528	6749.6
Less knowledge-intensive services	67362.1	66390.1	65664.8	65808.6	65922.9	66751.3	67402.4	68427.2	69848.7	70819.3
Structure, %										
Number of persons employed, totals	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Knowledge-intensive services (KIS)	55.0	55.7	56.0	56.1	56.2	55.9	56.2	56.2	56.2	56.2
of which High-tech KIS	3.9	3.9	3.9	4.0	4.0	4.0	4.0	4.1	4.1	4.2
Less knowledge-intensive services	45.0	44.3	44.0	43.9	43.8	44.1	43.8	43.8	43.8	43.8

Source: Eurostat, own calculations

Bulgaria is classified as a modest innovator, which hinders the acceleration of employment restructuring of the economy towards higher-value-added activities.

<sup>32</sup> See footnote to previous table for details of the classification used.

Table 4: Innovation index for Bulgaria

		Performance in Bulgaria relative to average EU 2010 in		Performance in Bulgaria relative to average EU 2017 in
		2010	2017	2017
Framework conditions	<b>Summary Innovation Index</b>	49.5	48.0	45.4
	<b>Human resources</b>	32.0	64.7	54.2
	New doctorate graduates	30.8	101.3	72.7
	Population with tertiary education	56	71.6	63.2
	Lifelong learning	5.2	12.5	12.2
	<b>Attractive research systems</b>	27.1	31.8	28.0
	International scientific co-publications	38.5	62.3	38.3
	Most cited publications	26.8	28.4	27.4
	Foreign doctorate students	23.6	26.0	23.5
	<b>Innovation-friendly environment</b>	50.1	70.7	52.9
	Broadband penetration	88.9	133.3	75.0
	Opportunity-driven entrepreneurship	27.1	33.6	31.2
Investments	<b>Finance and support</b>	90.7	22.7	21.0
	R&D expenditure in the public sector	32.7	9.7	10.1
	Venture capital expenditures	165.0	39.2	32.1
	<b>Firm investments</b>	66.4	57.5	51.4
	R&D expenditure in the business sector	9.1	45.8	41.2
	Non-R&D innovation expenditures	141.2	106.7	97.6
	Enterprises providing ICT training	64.3	28.6	25.0
Innovation activities	<b>Innovators</b>	33.6	12.3	14.3
	SMEs product/process innovations	38.0	9.3	11.3
	SMEs marketing/organisational innovations	23.3	14.4	17.4
	SMEs innovating in-house	40.0	13.0	13.9
	<b>Linkages</b>	34.1	32.3	32.0
	Innovative SMEs collaborating with others	23.1	19.1	19.0
	Public-private co-publications	27.2	27.1	26.9
	Private co-funding of public R&D expenditures	52.9	51.2	50.5
	<b>Intellectual assets</b>	46.6	86.6	85.8
	PCT patent applications	8.9	17.5	18.2
	Trademark applications	106.2	127.0	112.4
Design applications	37.1	121.0	125.3	
Impacts	<b>Employment impacts</b>	87.2	103.0	102.4
	Employment in knowledge-intensive activities	36.4	58.4	52.9
	Employment in fast-growing enterprises	123.4	134.8	144.1
	<b>Sales impacts</b>	45.6	34.3	33.0
	Medium and high tech product exports	18.3	40.6	38.4
	Knowledge-intensive services exports	18.7	43.3	41.3
	Sales of new-to-market/firm innovations	109.3	16.3	16.2

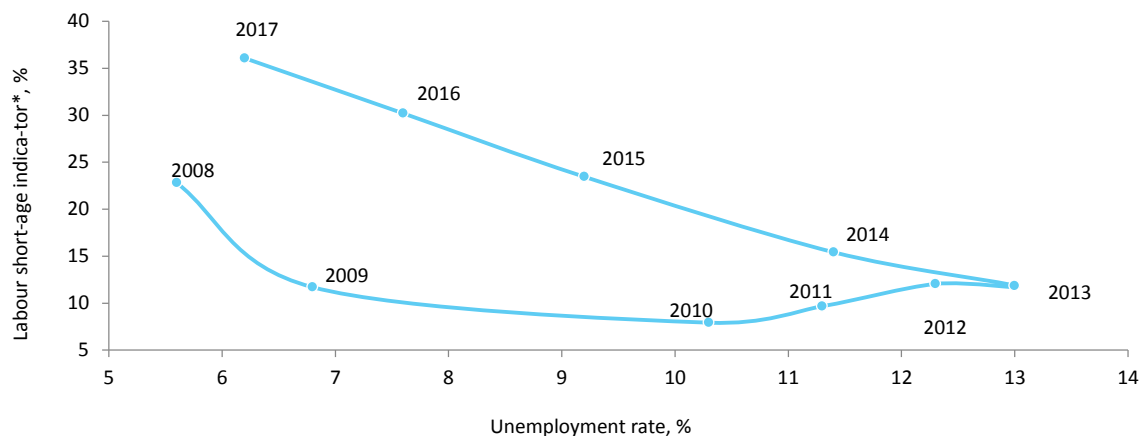
Key: ■ – normalised performance below 50% of EU average; ■ – normalised performance between 50 and 90% of EU average; ■ – normalised performance between 90 and 120% of EU average; ■ – normalised performance above 120% of EU average; Data in red show a decline in performance compared to 2010.

Source: European Innovation Scoreboard 2018

According to the latest European Innovation Scoreboard,<sup>33</sup> which assesses countries' innovation performance using a Summary Innovation Index, as of 2017 Bulgaria was classified as a modest innovator, with an index value below 50% of the EU average, ranking second to last among EU member states. The measurement framework includes four key groups of indicators – framework conditions, investments, innovation activities, and impacts, consisting of 10 innovation dimensions and capturing in total 27 indicators. 2017 index data for Bulgaria showed that overall *employment impacts* and *intellectual assets* were the strongest innovation dimensions, whereas *finance and support* and *SMEs innovation activities* and *linkages* had the most limiting impact on innovation activity in the country. The framework conditions dimension showed improvement in all three areas over 2010, which was particularly obvious for *new doctorate graduates*, *international scientific co-publications* and *broadband penetration*. *Investments in the public and business sectors* tended to decline, which was also the case for *SMEs innovation activities*. In contrast to improved performance under *employment impacts*, *sales impacts* deteriorated. This was mainly related to *sales of new-to-market innovations* as *exports of goods and services with high value added* increased.

The relationship between labour demand and labour supply in the economy can be illustrated by a Beveridge curve. It shows the performance efficiency of the labour market, where, in times of economic growth, job vacancies, which represent demand, increase, and the unemployment rate, a measure of supply, drops. The reverse pattern is typical of periods of economic decline. An important sign of effective labour market performance is whether there is a shift along the curve or of the curve. The latter indicates a mismatch between demand and supply, which is mostly associated with various skill needs arising from the restructuring of the economy in the process of transitioning from a decline cycle to a growth cycle.

Graph 5: **Beveridge curve for Bulgaria**<sup>34</sup>



\* Percentage of companies in industry having indicated labour shortages as a limiting factor for the production process.

Source: Eurostat, own calculations

Along with the drop in employment in late 2008 and early 2009, the unemployment rate took on an increase trend, and from an all-time low at 5.6% in 2008 it reached its peak in the 10-year reference period at 13% in 2013.<sup>35</sup> After that, a process of steady unemployment decrease began, parallel with

<sup>33</sup> European Innovation Scoreboard 2018, European commission, [https://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards\\_en](https://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_en)

<sup>34</sup> The percentage of companies in industry having indicated labour shortages as a limiting factor for the production process was chosen as an indicator of labour demand. The data were sourced from Eurostat's business surveys in industry. The indicator is widely used in constructing Beveridge curves for the purpose of international comparison, but is also suitable for Bulgaria as the job vacancy rate was relatively constant over time and therefore did not fully reflect the dynamic changes in the labour market in the past ten years.

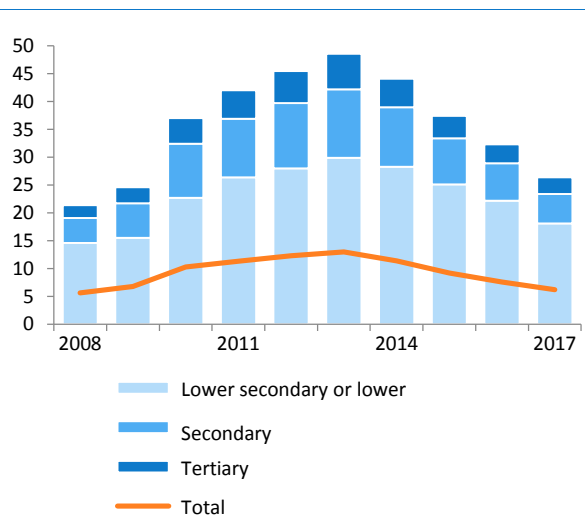
<sup>35</sup> Based on Eurostat's Labour Force Survey.

a steady increase in labour demand. By 2017 the unemployment rate (6.2%) had almost recovered its pre-crisis level, but it is worth mentioning that labour demand exceeded the 2008 rate as early as 2016. In effect, the performance of the labour market after 2013 moved along a right-shifted curve, and the movement of potential free labour resources to an all-time low considering the significantly higher labour demand rate testified to a mismatch between supply and demand. It should be noted that labour shortages, as indicated by employers, occurred in the framework of labour force reductions. In 2017 the labour force (within the age group 15+) was smaller than in 2008 by over 200 thousand people, showing that negative demographic developments, along with the fact that in the same period the decline in working age population amounted to 0.5 million, also have an impact on unemployment reduction and rapid exhaustion of some of the potential labour resources

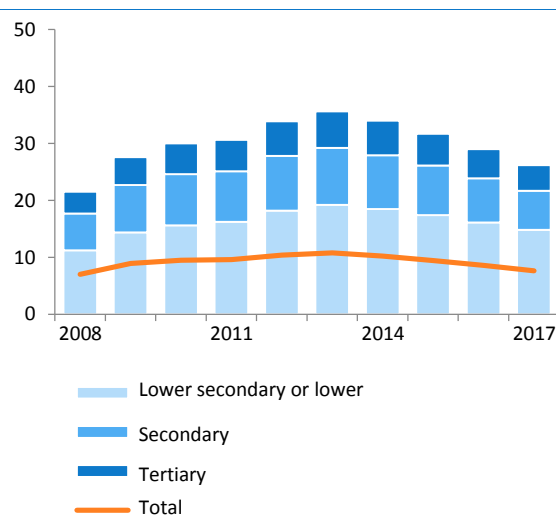
The structure of the unemployment rate by educational level indicates that people with a lower attainment experienced the most serious problems in the labour market.

Graph 6: **Unemployment rate by educational attainment level, %**

a) Bulgaria



b) EU-28



Source: Eurostat

Prior to 2013 the fastest increase in unemployment rate was reported for the population with Lower secondary or lower education, and, compared to its 2008 value of 14.6%, the indicator doubled, reaching 29.9%. Although unemployment among upper secondary and tertiary education graduates also rose, the significantly higher values for the group with the lowest attainment levels showed that it would be the first to experience cuts when employers need to optimise labour resources. In 2013, the year when unemployment peaked, the unemployment rates by educational attainment exceeded the average EU-28 values, with just unemployment for tertiary education graduates levitating around the average EU level.

Unemployment for people with upper secondary and tertiary education in Bulgaria was below the EU average, whereas for people with Lower secondary or lower education it exceeded the EU average.

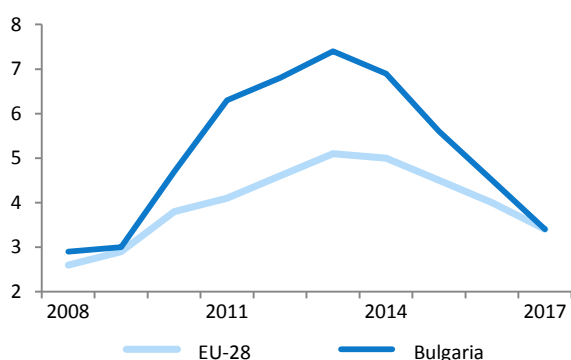
**Graph 7: Structure of new participants in active labour market measures, %**



Source: Eurostat, own calculations

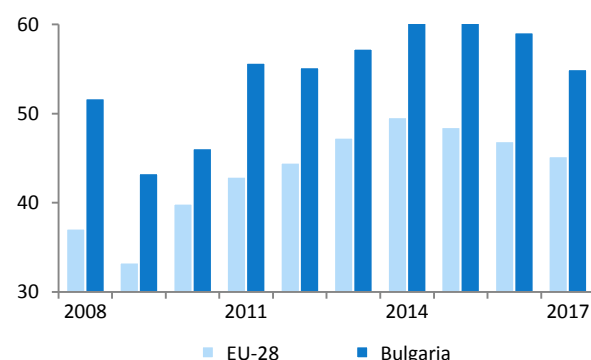
With the recovery of labour demand after 2014, which gradually spread through a growing number of sectors and affected all qualification levels, the unemployment rate for all educational attainment levels began to fall. Once more, the drop was most pronounced for the group with the lowest educational level, which was likely a result of the government's efforts to streamline active labour market policies towards training and improving employability through work in the real sector of the economy while reducing participation in direct subsidised employment. Comparing unemployment rates by educational attainment for Bulgaria and the EU shows that in 2017 the differences in rate compared to 2008 in Bulgaria were identical to the EU. While unemployment for tertiary and upper secondary education graduates in Bulgaria was below the EU average, the 18.1% rate for people with Lower secondary or lower education exceeded the EU average (14.8% in 2017) by 3.1 p.p. Thus, the gap between the Bulgarian and the average EU unemployment rate by educational attainment level from the pre-crisis period were essentially restored.

**Graph 8: Long-term unemployment rate, %**



Source: Eurostat

**Graph 9: Share of long-term unemployed in total unemployment**



Source: Eurostat

The high unemployment rate for the lower educational attainment levels and the lasting retention of the status of unemployed in the labour market were some of the chief factors behind the formation of structural unemployment in Bulgaria. As a result of redundancies of generally low-skilled labour and ongoing structural changes in the economy, before 2013 the long-term unemployment rate (over 12 months) grew rapidly and peaked at 7.4%, the highest value in the entire 10-year period. The following years marked a new reduction cycle for the indicator, and in 2017 its rate equalled that in the EU. Despite the drop in the long-term unemployment rate, the share of long-term unemployed in the total number of unemployed remained high and substantially above the EU-28. This shows that the trend of rising labour demand, emerging since 2014, first and foremost benefited those with

relatively short-term unemployment status, as they are easier to re-employ in the labour market. In contrast, long-term unemployed find it harder to rebuild their working habits and skills, and one of the main channels to re-join employment is through active labour market measures. After 2016 the share of long-term unemployed in Bulgaria started to decline, but its value continued to exceed the EU average by about 10 p.p.

Table 5: **Unemployment rate by age group, %**

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
<b>Bulgaria</b>										
15-24	12.7	16.1	21.9	25.0	28.1	28.4	23.8	21.7	17.2	12.9
25-34	5.7	6.9	11.5	13.4	13.8	15.3	12.8	10.0	8.6	7.0
35-44	4.3	5.5	8.2	9.1	10.0	10.3	9.6	7.8	6.4	5.4
45-54	4.9	5.8	8.6	9.2	10.2	10.2	9.4	7.8	6.6	5.3
55-64	5.5	6.3	9.0	8.8	10.4	12.4	11.7	8.7	7.3	5.9
65+	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA
<b>EU-28</b>										
15-24	15.6	19.9	21.1	21.7	23.2	23.7	22.2	20.3	18.7	16.8
25-34	7.5	10.0	11.0	11.2	12.3	12.8	12.0	11.0	10.0	8.8
35-44	5.6	7.2	7.9	8.0	8.8	9.3	8.9	8.1	7.4	6.6
45-54	5.2	6.5	7.0	7.0	7.7	8.1	7.8	7.4	6.6	5.9
55-64	5.1	6.2	6.7	6.8	7.3	7.7	7.4	7.0	6.5	5.8
65+	1.5	1.6	1.6	1.6	2.0	2.1	2.3	2.1	1.9	2.0

\*NDA – no data available

Source: Eurostat, own calculations

Unemployment structure by age group in the past ten years has shown that the increase in unemployment rate, which dominated the period before 2013, was almost offset by the downward trend seen after that year, when the most significant drops were recorded for the age groups 15-24 and 25-34. Between 2008, when the unemployment rate in Bulgaria was more favourable than the average EU-28, and 2013 the highest rise was seen in youth unemployment, which hit 28.4% and surpassed the EU average by almost 5 p.p. Young people are most vulnerable in times of crisis, as they have less experience and work skills compared to other employed, and are often not engaged under permanent employment contracts. Rapid growth in unemployment in the years before 2013 was also observed for the age group 25-34, whereas for the aged 35-44, 45-54 and 55-64 rises were significantly smaller, and the values were closer. Overall, between 2010 and 2013 all age groups recorded higher unemployment rates than the EU average. After 2014 a rapid decrease trend in indicator value was seen, which was mostly typical for the younger age groups. In 2017 the youth unemployment rate dropped to 12.9%, recovering its 2008 level, and kept at around 4 p.p. below the EU-28 average. The values for the age groups 25-34 and 35-44 were still higher than in the pre-crisis period, even after having dropped below the EU average as early as 2015. The unemployment rates for the age groups 45-54 and the older 55-64 also almost recovered their 2008 values, with only the latter fluctuating around, rather than below, the EU average rate. Caution should be taken to avoid any prejudiced interpretation of the rapid drop in youth unemployment in recent years and the attained favourable rates over the EU, as, except for 2017, this dynamic was not accompanied by any corresponding growth in the youth employment rate. In fact, the dynamic of youth unemployment was strongly affected by the shrinking of the workforce in the younger age cohorts, as a result of both

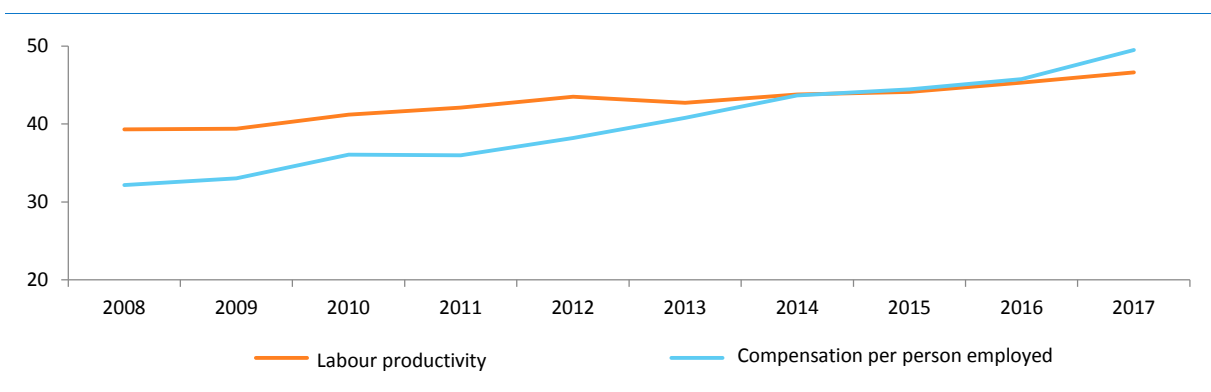
negative demographic developments and negative net migration flows, which had the most impact on the younger age groups between 20 and 39.<sup>36</sup>

In conclusion, we can see that some of the main problems of the Bulgarian labour market at national level were the slow restructuring of employment towards sectors with a higher value added, labour shortages and mismatches between supply and demand, high unemployment for the population with lower educational attainment levels, and high long-term unemployment rate.

## 2.4 Labour productivity and unit labour costs

Increasing the labour productivity of the Bulgarian economy is the main driver of convergence to average earnings rates in developed EU economies. In the past ten years labour productivity in Bulgaria has enjoyed a higher growth rate than average EU, which has contributed to a gradual increase in income rate in the country measured in purchasing power standards (PPS), as well as to an approximation of average EU-28 values. In 2008 the gap between labour productivity and income rate in Bulgaria totalled around 7 p.p.; however, in the years which followed it was quickly closed, and in 2017 the compensation rate per person employed was slightly higher than the labour productivity rate in PPS, with both indicators calculated as a percentage of the average values for the EU-28.

Graph 10: Labour productivity and compensation per person employed in PPS, EU-28=100



Source: Eurostat, own calculations

In the past ten years labour productivity in Bulgaria has grown at a steadily higher than the average EU rate, and by 2017 the level of compensation per person employed in PPS had almost equalled labour productivity in PPS calculated on the basis of the average values of the two indicators for the EU-28.

In the period 2008–2017 the average rate of increase in labour productivity in the Bulgarian economy totalled 2.6%<sup>37</sup>, and was almost five times the EU average (0.4%).<sup>38</sup> This was driven by higher GVA growth and greater decrease in employment during the economic crisis and the recovery period in the years leading to 2013. Lower employment growth rates in Bulgaria over EU-28 were reported after 2014, when economic growth accelerated. Thus, during the whole reference period 2008–2017 the higher average annual labour productivity growth in Bulgaria over the EU was attained at the

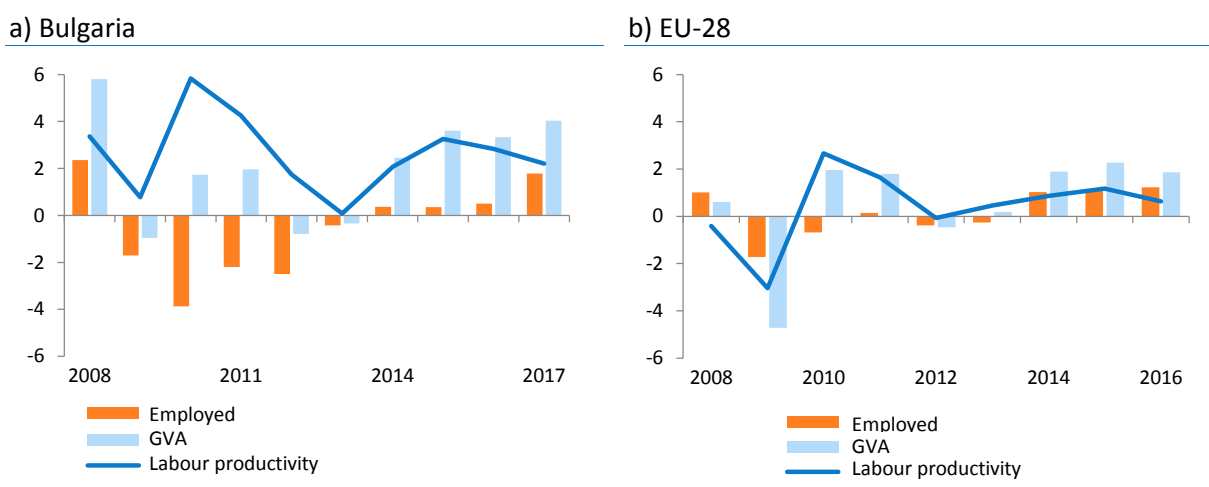
<sup>36</sup> Based on Labour Force Survey and demographic statistics.

<sup>37</sup> Labour productivity is calculated as gross value added (GVA) at 2010 prices (less conditional rent) to number of employed ratio according to the National Accounts (ESA 2010), based on Eurostat data.

<sup>38</sup> EU-28 data refer to the period 2008–2016.

expense of a drop in employment, whereas, on average, the number of employed in member states was recovering. In 2017 employment in Bulgaria was lower by 7.6% than in 2008, whereas in the EU-28 the number of employed recovered its pre-crisis rate as early as 2016, and in 2017 it had already exceeded the 2008 value by 2%.

Graph 11: **GVA, labour productivity and employment dynamics in Bulgaria, %**



Source: Eurostat, own calculations

In the whole reference period between 2008 and 2017 the accumulated increase in real labour productivity in the Bulgarian economy amounted to 25.4%. Almost all economic sectors<sup>39</sup> had positive contributions, the most significant<sup>40</sup> being those of *Manufacturing and Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles. Information and Communication, Financial and Insurance Activities and Accommodation and Food Service Activities* also contributed strongly to increasing labour productivity in the period. Only four sectors had negative contributions to the overall increase in labour productivity in the period – *Administrative and Support Service Activities, Agriculture, Forestry and Fishing, Electricity, Gas, Steam and Air Conditioning Supply, as well as Construction*, with the biggest negative contribution.

<sup>39</sup> Economic activities are considered at 21-sector level (NACE Rev. 2, Nomenclature A21) and Eurostat data are used.

<sup>40</sup> The contributions of economic sectors to the variation in labour productivity in the total economy and their decomposition into three groups of factors reflecting intra-sector productivity, the effect of the change in the share in employment and the dynamic effect of the change in the share in employment and the growth in labour productivity have been calculated using the following formula:

$$\frac{P_t - P_{t-1}}{P_{t-1}} = \sum_{i=1}^n \left[ \left( \frac{P_{it} - P_{it-1}}{P_{it-1}} \right) * \frac{Y_{it-1}}{Y_{t-1}} \right] + \sum_{i=1}^n \left[ \left( \frac{P_{it-1}}{P_{t-1}} \right) * \left( \frac{H_{it}}{H_t} - \frac{H_{it-1}}{H_{t-1}} \right) \right] + \sum_{i=1}^n \left[ \left( \frac{P_{it-1}}{P_{t-1}} \right) * \left( \frac{H_{it}}{H_t} - \frac{H_{it-1}}{H_{t-1}} \right) \right]$$

where:

$P_t$  stands for labour productivity in the total economy over period  $t$ ,

$Y_t$  stands for value added (less conditional rent) in the total economy over period  $t$ ,

$H_t$  stands for employment in the total economy over period  $t$ ,

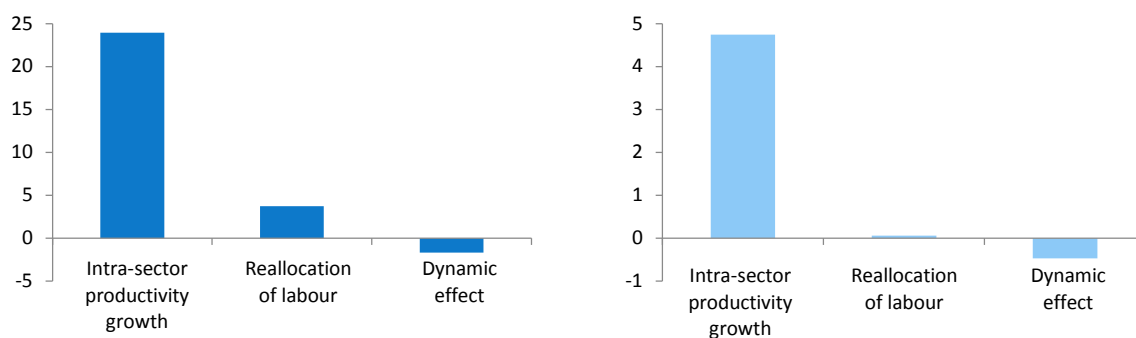
$i_t$  stands for individual economic activities over period  $t$

Source: A Shift-Share Decomposition Analysis of Labour Productivity Growth in Singapore, Economic survey of Singapore, 2017, Ministry of Trade and Industry.

Graph 12: Decomposition of labour productivity growth according to factor contributions, p.p.

a) Bulgaria, 2008–2017

b) EU-28, 2008–2016



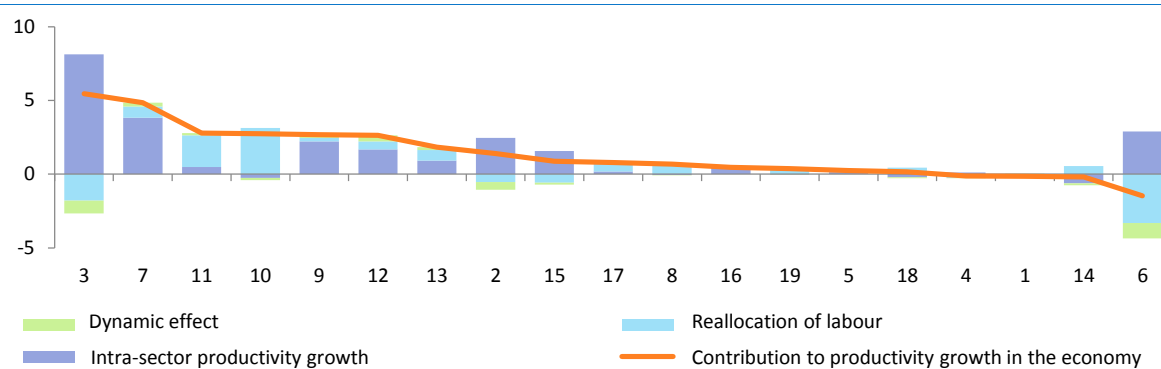
Source: Eurostat, own calculations

The decomposition<sup>41</sup> of labour productivity into three groups of factors<sup>42</sup> shows that the main contribution to the increase of this indicator was the growth in internal productivity in the majority of sectors. Another positive, although significantly smaller, contributor was the component representing the change in the reallocation of employment from activities with lower VA to activities with higher VA. The most significant sectors for the positive contribution of this factor were *Information and Communication* and *Financial and Insurance Activities*, which at baseline (2008) enjoyed relatively higher labour productivity rates, both in terms of averages in the economy and compared to the other economic activities. It should be noted that the growth in employment share in *Information and Communication* even offset the drop in intra-sector productivity registered in the past ten years. Other sectors where the effect of increased employment share determined a positive contribution to total labour productivity were *Human Health and Social Work Activities*, *Transportation and Storage*, *Other Service Activities* and *Arts, Entertainment and Recreation*. With the exception of *Human Health and Social Work Activities*, where there was also a rise in intra-sector productivity, in the other three above-mentioned sectors the growth in employment share managed to compensate for the decline in labour production. The third component, representing the dynamic effect of the change in employment share and in labour productivity, had a small but also negative impact on the change in total productivity in the economy. The most notable negative contributions were those of *Manufacturing* and *Construction*, both of which enjoyed relatively high growths in labour productivity, but this was coupled with employment reductions and a shrinking of the share in the total structure of employment in the reference period.

<sup>41</sup> See formula in previous footnote.

<sup>42</sup> The three groups of factors determine the contributions of intra-sector productivity, the static effect of the change in employment share, and the dynamic/mixed effect of the change in the employment share and in labour productivity.

Graph 13: **Decomposition of contributions from factors to labour productivity growth in Bulgaria by economic activity, 2008–2017, p.p.**



Key: 1 – Agriculture, Forestry and Fishing; 2 – Mining and Quarrying; 3 – Manufacturing; 4 – Electricity, Gas, Steam and Air Conditioning Supply; 5 – Water Supply; Sewerage, Waste Management and Remediation Activities; 6 – Construction; 7 – Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles; 8 – Transportation and Storage; 9 – Accommodation and Food Service Activities; 10 – Information and Communication; 11 – Financial and Insurance Activities; 12 – Real Estate Activities; 13 – Professional, Scientific and Technical Activities; 14 – Administrative and Support Service Activities; 15 – Public Administration; 16 – Education; 17 – Human Health and Social Work Activities; 18 – Arts, Entertainment and Recreation; 19 – Other Service Activities; 20 – Activities of Households as Employers and undifferentiated goods- and services-producing activities of households for own use; 21 – Activities of Extraterritorial Organisations and Bodies; 20 and 21 – NDA, so not shown in graph.

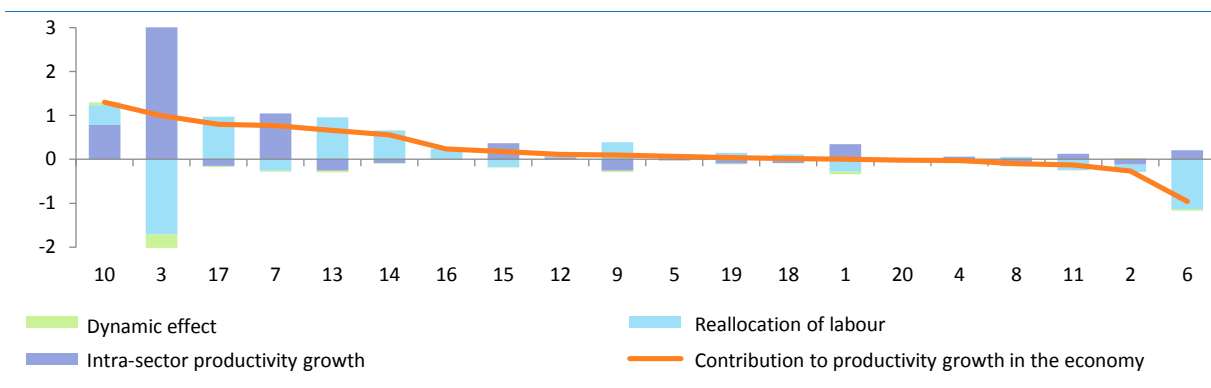
Source: Eurostat, own calculations

Comparisons of the decomposition of labour productivity by factor and economic activity in Bulgaria and in the EU revealed a number of similarities. Much like in Bulgaria, some of the leading contributing sectors to the 4.3% increase in total labour productivity in the EU in the period 2008-2016 were *Manufacturing* and *Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles*, as well as the top-ranking *Information and Communication*. As regards the latter, it should be noted that in the EU it enjoyed growth in both labour productivity and in employment share, unlike Bulgaria, where labour productivity dropped. *Human Health and Social Work Activities* also ranked among the biggest contributors, whereas *Accommodation and Food Service Activities* and *Financial and Insurance Activities*, which were some of the leading sectors in the Bulgarian economy, had much smaller and even negative contributions in the EU. With the exception of *Construction*, which in the EU also had the most negative contribution to the increase in total labour productivity, the remaining sectors with negative contributions – *Financial and Insurance Activities*, *Mining and Quarrying* and *Transportation and Storage* – were different from Bulgaria.

In the decomposition of labour productivity by group of factors and economic sector most important for the growth in total productivity in the EU was also the growth in labour productivity in individual sectors, but, unlike Bulgaria, this component had a negative contribution in a much higher number of sectors. The contribution of the second component, which measures the effect of the change in employment share, also had a small positive impact, but there were certain differences from the Bulgarian economy, as on average the EU had a significantly higher number of sectors in which this effect was decisive for the positive impact on labour productivity in the total economy. This group includes *Human Health and Social Work Activities*, *Professional, Scientific and Technical Activities*, *Administrative and Support Service Activities*, *Accommodation and Food Service Activities*, and *Education*. With the exception of the latter, there was a drop in individual productivity in all of the other sectors. Similarly to Bulgaria, the positive impact of the second component on total labour productivity was curbed by *Manufacturing* and *Construction*, which had the biggest negative contributions to the reallocation of labour resources. As regards the dynamic effect of the aggregate change in employment share and in labour productivity, sectors had slight negative contributions to the overall indicator dynamic on average for the EU-28, with *Industry* and *Agriculture* ranking first. Those were the two sectors with some of the highest growth rates in labour productivity in the period 2008-2016, accompanied by a decrease in share in total employment structure. It should be noted that the aggregate negative contribution of the third component in the EU-28 was greater than the positive contri-

bution of the second component, which was another difference from the size of contributions in Bulgaria, where the reallocation of labour resources to better performing sectors offset the negative impact of the dynamic factor on the increase in productivity in the economy.

Graph 14: **Decomposition of contributions from factors to labour productivity growth in EU economic activity, 2008–2016, p.p.**



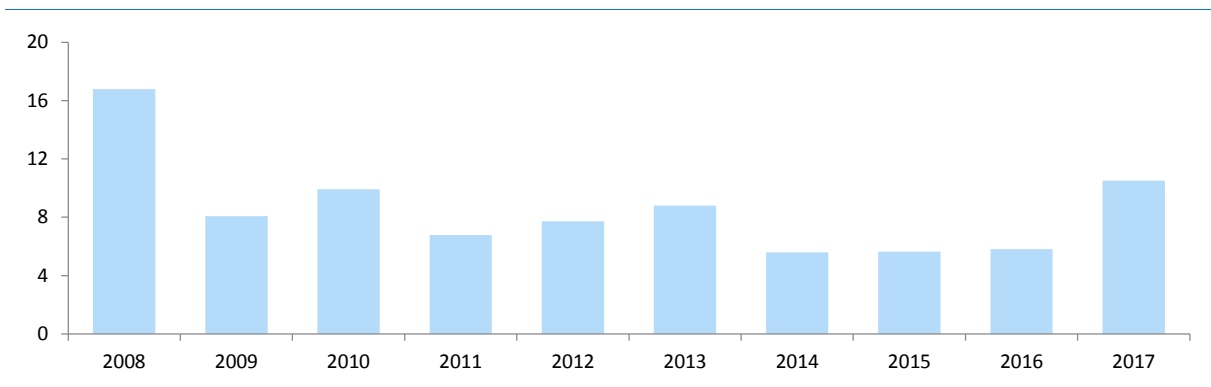
Key: 1 – Agriculture, Forestry and Fishing; 2 – Mining and Quarrying; 3 – Manufacturing; 4 – Electricity, Gas, Steam and Air Conditioning Supply; 5 – Water Supply; Sewerage, Waste Management and Remediation Activities; 6 – Construction; 7 – Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles; 8 – Transportation and Storage; 9 – Accommodation and Food Service Activities; 10 – Information and Communication; 11 – Financial and Insurance Activities; 12 – Real Estate Activities; 13 – Professional, Scientific and Technical Activities; 14 – Administrative and Support Service Activities; 15 – Public Administration; 16 – Education; 17 – Human Health and Social Work Activities; 18 – Arts, Entertainment and Recreation; 19 – Other Service Activities; 20 – Activities of Households as Employers and undifferentiated goods- and services-producing activities of households for own use; 21 – Activities of Extraterritorial Organisations and Bodies; 20 and 21 – NDA, so not shown in graph.

Source: Eurostat, own calculations

The steady increase of labour productivity in the Bulgarian economy in the past ten years has been one of the main factors of income growth in the country.

The steady increase in labour productivity in the Bulgarian economy in the past ten years has been one of the main factors of income growth in the country. With the onset of the economic crisis, the dynamic of the compensation per person employed generally slowed down compared to the double-digit growth rates in the pre-crisis period. Despite the alternation of periods of growth rate acceleration and slowdown, the nominal growth in compensation per person employed to the amount of 8.3% on average in the years before 2013 remained higher than the average annual growth of 6.9% in the period after 2014. At the same time, labour demand also began to recover, although a more significant increase in value (10.5%) was recorded only in 2017. In the whole reference period since 2009 the average annual growth in compensation per person employed totalled 7.7%, amounting to a near doubling of the 2008 rate.

Graph 15: **Dynamics of compensation per person employed in Bulgaria, %**



Source: Eurostat, own calculations

Table 6: **Average annual increase in compensation per person employed and in labour productivity in the period 2009–2017, %**

	Compensation per person employed, nominal growth	Labour productivity, real growth
Total	7.7	2.6
Agriculture, Forestry and Fishing	10.5	0.1
Mining and Quarrying	9.8	8.0
Manufacturing	8.2	4.5
Electricity, Gas, Steam and Air Conditioning Supply	5.9	0.6
Water Supply; Sewerage, Waste Management and Remediation Activities	7.1	1.7
Construction	8.6	3.2
Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	9.1	3.5
Transportation and Storage	7.1	0.1
Accommodation and Food Service Activities	7.8	8.0
Information and Communication	9.5	-0.3
Financial and Insurance Activities	0.8	1.0
Real Estate Activities	6.1	7.7
Professional, Scientific and Technical Activities	8.6	2.7
Administrative and Support Service Activities	9.6	-2.5
Public Administration	5.1	2.3
Education	6.8	1.3
Human Health and Social Work Activities	8.2	1.1
Arts, Entertainment and Recreation	9.6	-1.2
Other Service Activities	11.4	0.7

Source: Eurostat, own calculations

Economic sectors showed high degree of heterogeneity in income growth in different years; still, several groups with similar patterns can be identified in the reference period. The first includes sectors having a higher-than-average annual nominal growth in compensation per person employed, coupled with a higher-than-average real growth in labour productivity. These were: *Mining and Quarrying, Manufacturing, Construction, Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles, Accommodation and Food Service Activities and Professional, Scientific and Technical Activities*. The second group comprises of sectors having a lower-than-average income growth, coupled with a lower-than-average growth in labour productivity, such as *Electricity, Gas, Steam and Air Conditioning Supply, Water Supply; Sewerage, Waste Management and Remediation Activities, Transportation and Storage, Financial and Insurance Activities, Public Administration and Education*. With the exception of *Education*, another common characteristic in this group was that the average labour production rate in the ten-year reference period was higher than the average for the economy. *Financial and Insurance Activities* was one of the sectors with the highest labour productivity, and the employment increase in this sector contributed to the growth in labour productivity in the total economy. This, however, did not result in any significant income growth; in fact, the sector had

the lowest average annual growth in compensation per person employed in 2009–2017 of just 0.8%. The latter was related to a change in the sector’s employment qualification structure, where employees increased mostly in the medium-qualification range, while the higher range sustained a drop, hindering the growth of average in-sector earnings.<sup>43</sup> The situation in the other sector having a significant contribution to the productivity dynamic in the total economy as a result of an increase in employment share – *Information and Communication* – was different. The number of employees here grew above all in the higher qualification levels, resulting in a high average annual income growth.<sup>44</sup> Given these developments, it is difficult to account for the decline in labour productivity in the sector during the reference period. *Information and Communication* fit into the third group of sectors, characterised by a higher-than-average increase in income, coupled with a drop in labour productivity. The other sectors associated with this category were *Administrative and Support Service Activities* and *Arts, Entertainment and Recreation*. The fourth group included two sectors having the highest average annual increase in compensation per person employed (10.5% and 11.4%), coupled with a levelling-off or minimal increase in average annual labour productivity – *Agriculture, Forestry and Fishing* and *Other Service Activities*. Two sectors cannot be assigned to any of the above groups. The first – *Real Estate Activities* – had a lower-than-average annual growth in compensation per person employed but a higher-than-average rate of increase in labour productivity. The second, where the average annual income growth rate was higher than the national average but labour productivity increase was lower, was *Human Health and Social Work Activities*.

Comparing the accumulated increase in compensation per person employed and real labour productivity in the whole period between 2008 and 2017 shows that income growth outpaced the productivity dynamic in almost all economic sectors, which in turn resulted in an increase in nominal unit labour costs (ULC)<sup>45</sup>. Only three economic sectors followed a different development trend – *Mining and Quarrying*, *Financial and Insurance Activities* and *Real Estate Activities*.

Table 7: **Change in compensation per person employed, labour productivity and nominal ULC in 2017 compared to 2008, %**

	Compensation per person employed, nominal growth	Labour productivity, real growth	Nominal ULC, growth
Total	93.9	25.4	54.6
Agriculture, Forestry and Fishing	143.4	-0.1	143.5
Mining and Quarrying	91.2	98.4	-3.6
Manufacture	103.1	48.4	36.9
Electricity, Steam, Gas and Air Conditioning Supply	65.0	3.2	59.9
Water Supply; Sewerage, Waste Management and Remediation Activities	63.5	13.0	44.8
Construction	108.0	31.6	58.0
Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	118.6	33.5	63.7

<sup>43</sup> Based on employment data by occupational group from NSI’s annual employment and labour costs statistics, 2010-2016.

<sup>44</sup> Based on employment data by occupational group from NSI’s annual employment and labour costs statistics, 2010-2016.

<sup>45</sup> Nominal unit labour costs (ULC) are calculated as nominal compensation per person employed to gross value added (less conditional rent) per person employed at 2010 prices ratio.

	Compensation per person employed, nominal growth	Labour productivity, real growth	Nominal ULC, growth
Transportation and Storage	77.4	-0.7	78.6
Accommodation and Food Service Activities	95.6	93.9	0.9
Information and Communication	122.8	-4.6	133.4
Financial and Insurance Activities	2.7	6.9	-3.9
Real Estate Activities	64.9	76.4	-6.5
Professional, Scientific and Technical Activities	109.7	25.6	66.9
Administrative and Support Service Activities	122.3	-23.0	188.6
Public Administration	54.5	22.5	26.2
Education	77.8	9.8	62.0
Human Health and Social Work Activities	94.5	5.8	83.8
Arts, Entertainment and Recreation	101.4	-14.7	136.0
Other Service Activities	135.0	-1.3	138.1

Source: Eurostat, own calculations

The faster rise in income over labour productivity led to an increase in the share of labour in value added, represented as employment compensation. In the total economy this share increased by over 10 p.p. compared to 2008, and reached 54%<sup>46</sup> in 2017, with only four sectors reporting decreases – *Mining and Quarrying, Electricity, Steam, Gas and Air Conditioning Supply, Financial and Insurance Activities* and *Public Administration*. Comparing performance under this indicator with EU-28 averages shows that the share in Bulgaria was lower than in the total EU economy by 4.4 p.p.<sup>47</sup>, which was also the case for 43% of economic sectors. This group also includes *Manufacturing*, which is directly exposed to competitive pressure in foreign markets. The relatively lower share of labour in value added in *Manufacturing* compared to the EU-28 and the increase in the country's export shares in global and EU imports in the past ten years makes it possible to conclude that the increase in nominal ULC did not have any negative impact on the competitiveness of the economy. Markedly higher values of the share of employment compensation in value added compared to the EU average and, respectively, a lower level of operating surplus, as a profit rate indicator, were seen in *Accommodation and Food Service Activities, Real Estate Activities, Information and Communication, Administrative and Support Service Activities*, as well as *Water Supply; Sewerage, Waste Management and Remediation Activities, Mining and Quarrying, Public Administration* and *Professional, Scientific and Technical Activities*. The accumulated increase in labour productivity in the first two sectors balanced out the reported income growth, but in *Information and Communication* and *Administrative and Support Service Activities* labour productivity declined. Taking into account the bigger shares of compensations in value added in the latter two sectors, the developments observed are indicative of lower efficiency and profitability than the average EU.

<sup>46</sup> Employment compensation at current prices to gross value added (less conditional rent) at current prices ratio.

<sup>47</sup> The comparison refers to 2016, as aggregate EU-28 data for 2017 are not available.

Table 8: **Share of employment compensations in gross value added in 2016, %**

	<b>Bulgaria</b>	<b>EU-28</b>
Total	52.4	56.8
Agriculture, Forestry and Fishing	28.2	29.0
Mining and Quarrying	43.1	37.5
Manufacturing	49.5	55.1
Electricity, Steam, Gas and Air Conditioning Supply	28.5	28.4
Water Supply; Sewerage, Waste Management and Remediation Activities	52.7	45.7
Construction	53.3	53.5
Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	48.3	57.6
Transportation and Storage	50.7	56.0
Accommodation and Food Service Activities	76.0	56.5
Information and Communication	64.4	52.4
Financial and Insurance Activities	30.4	53.2
Real Estate Activities	27.4	12.0
Professional, Scientific and Technical Activities	61.5	56.0
Administrative and Support Service Activities	69.9	59.7
Public Administration	80.5	75.1
Education	83.6	83.9
Human Health and Social Work Activities	73.5	74.6
Arts, Entertainment and Recreation	43.8	52.7
Other Service Activities	59.7	55.3

Source: Eurostat, own calculations

Along with obvious factors, such as increased labour productivity and convergence to average pay rates in the EU, the income dynamic in the country also reflected the changes in the qualification structure of employees.

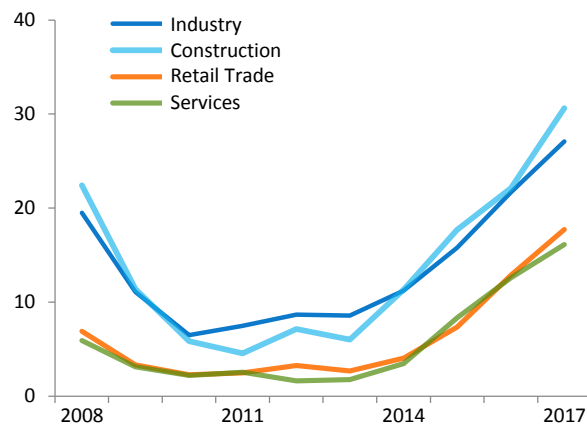
The higher increase in compensation per person employed in comparison with labour productivity in the ten-year reference period is also indicative of the impact of other contributing factors for income growth. Along with some obvious ones, such as increased labour productivity and convergence to average pay rates in the EU, the income dynamic in Bulgaria also reflected the changes in the qualification structure of employees.<sup>48</sup> Immediately after the onset of the crisis and during the years of slow economic recovery before 2013, employers optimised labour costs mainly through dismissals of medium- and low-skilled workers, resulting in a rise in the average wage. The so-called skills effect on

<sup>48</sup> Based on employment data by occupational group from NSI's annual employment and labour costs statistics, 2010-2016.

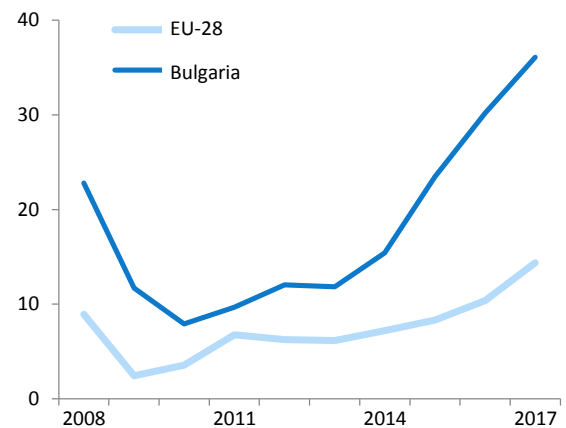
income dynamics could also be seen in the period after 2014, when labour demand started to grow, and the number of employees increased mainly among the highly-skilled. Income growth was also affected by increases in the minimum wage, amounting to 109% in 2017 over 2008, as well as by the annual update of minimum insurable earnings for occupational groups and economic activities. Last but not least, we should also mention labour shortages, considered by employers to be one of the main limiting factors to business development. The issue has become increasingly prominent in recent years, and the share of employers reporting labour shortages as a limiting factor for their economic activities recovered its pre-crisis levels as early as 2015–2016, and permanently exceeded them in all monitored sectors of the economy in 2017. Thus, in the context of high demand in the economy and in the labour market, labour shortages force employers to raise salaries in an attempt to find suitably skilled labour. Given the negative demographic developments and the negative net migration flow limiting potential labour supply, labour shortages are likely to continue to affect income dynamics in the country.

**Graph 16: Share of employers reporting labour shortages as an obstacle to their activities**

a) Bulgaria



b) Comparison between Bulgaria and the EU 28



Source: NSI, Eurostat, own calculations

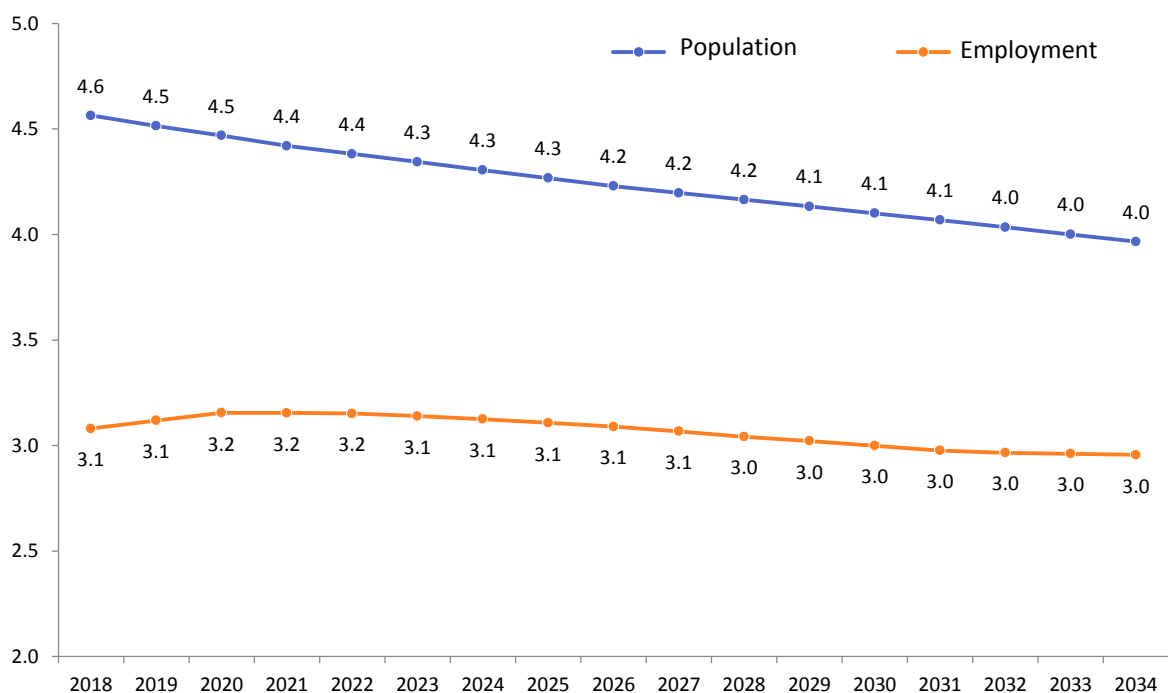
## CHAPTER 3

# MEDIUM-TERM AND LONG-TERM EMPLOYMENT FORECASTS

### 3.1 Macroeconomic employment forecast by educational attainment level

The number of the working age population follows the dynamic of total population in Bulgaria (according to NSI's basic demographic forecast scenario). In the course of the whole forecasting period from 2018 to 2032 the working age population is expected to decrease by 529.5 thousand (11.6%).

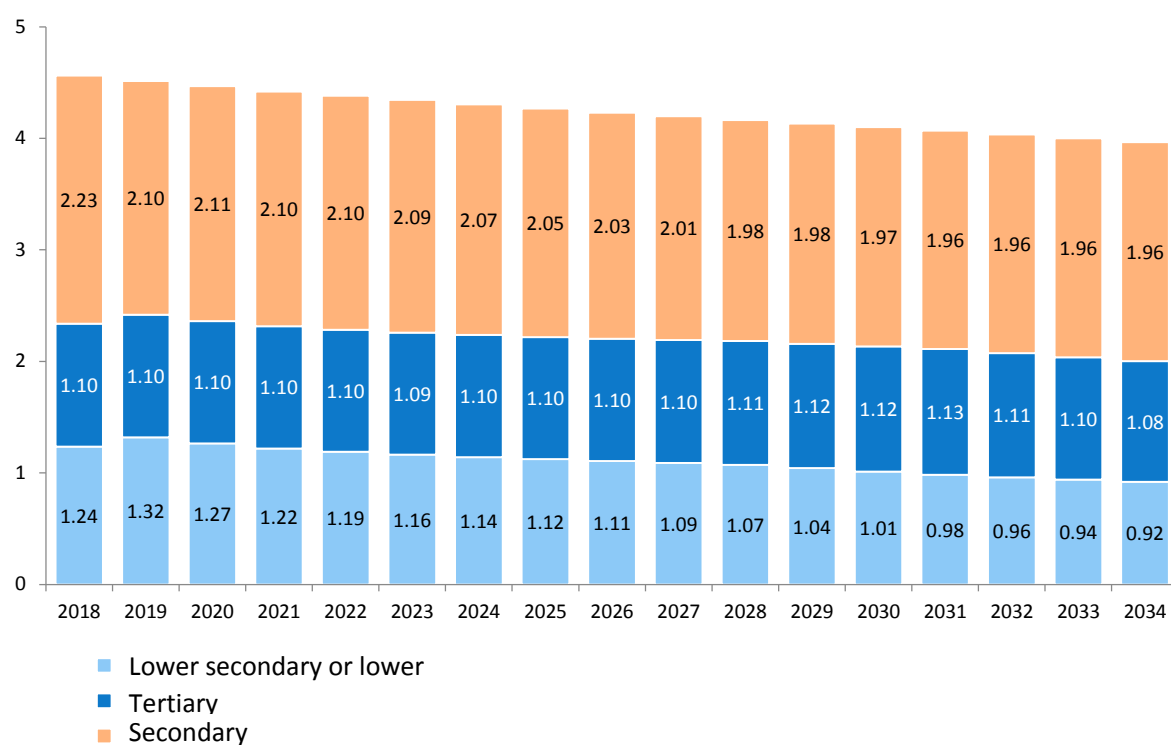
Graph 17: Potential labour supply and employment (15-64 year-olds), people millions



Source: Own calculations

- In the period 2018 to 2022 the working age population will drop from 4,563.7 thousand to 4,381.7 thousand, with an absolute change of 182.1 thousand. In percentage terms the cumulative decrease will amount to 4.0%. This is a seriously high value given the relatively short timeframe, and should be taken into account when estimating the growth potential of the economy. In the absence of new technology investment to offset the drop in employment, the economic growth rate will not be able to keep the pace of the past few years.
- In the period 2023 to 2032 the decline is expected to continue, with an estimated number of the working age population in the final year to the amount of 4,034.2 thousand (down by 7.9%). In the absence of significant socio-economic changes to counteract negative demographic processes, the predicted short-term problem of limited economic growth will further exacerbate in the long term. Effective growth stimulation would be possible to achieve by significantly increasing investment in innovation and high-technology industries.

Graph 18: **Potential labour supply: population (15-64 year-olds) by educational attainment level, million persons**



Source: own calculations

As regards the educational structure of the working age population, the forecasts anticipate the following positive trends:

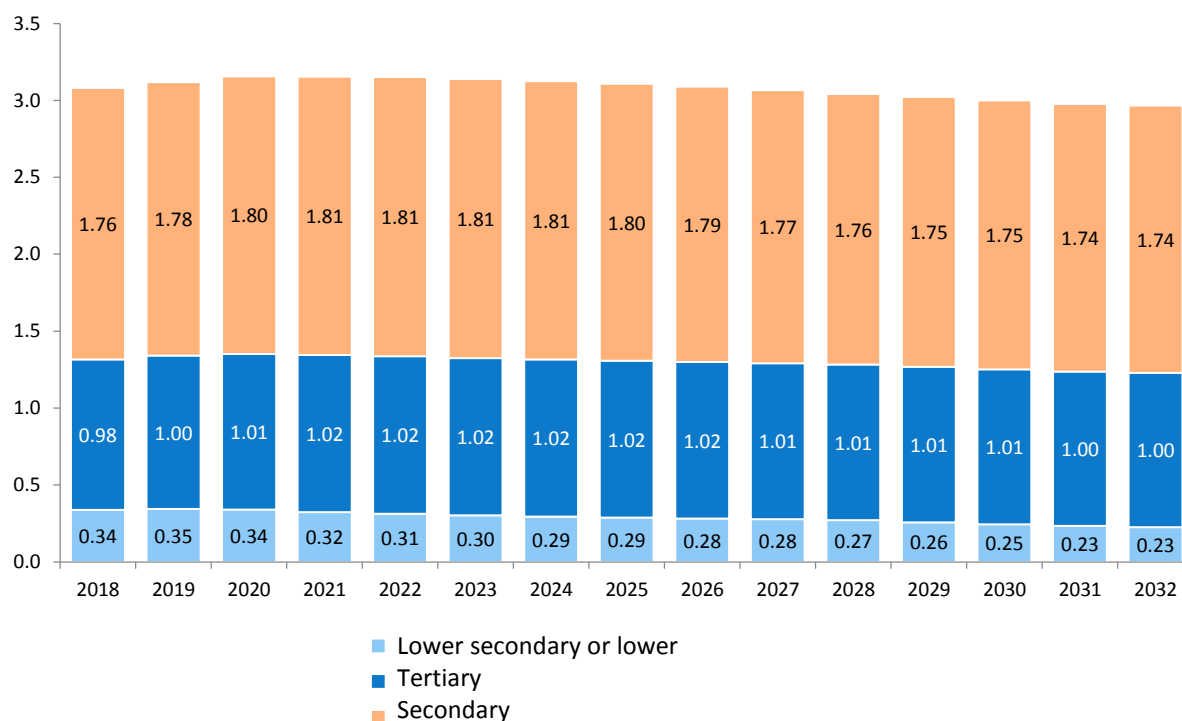
- In 2022 the population with Lower secondary or lower education aged 15-64 will total 1,188.6 thousand, and in 2032 it will be 960.6 thousand. Its share in both 2018 and 2022 will amount to 27.1% (as a result of an expected slight increase in the indicator during 2019–2021, after which the trend will be reversed), and will fall to 23.8% in 2032.

- The number of upper secondary graduates in the working age population will total 2,098.0 thousand in 2022, and 1,961.1 thousand in 2032. Its share will show only slight fluctuations and will remain relatively constant, with an estimated value of 48.8% for 2018, and 47.9% and 48.6% respectively for 2022 and 2032.
- The population aged 15-64 with completed tertiary education will total 1,095.2 thousand in 2022 and 1,112.5 thousand in 2032. Given the overall population decline, the number of tertiary education graduates will grow only slightly but their share will increase steadily, from 24.1% in 2018 to 25.0% in 2022 to 27.6% in 2032.

The forecasts indicate that in the medium term employment will increase from 3,080.4 thousand in 2018 to 3,151.2 thousand in 2022, with a growth total of 70.8 thousand (2.3%). Starting in 2022 until the end of the forecasting period employment is projected to decline in line with negative demographic processes. In 2032 the number of employed will be 2,965.7 thousand, with a decrease total of 114.7 thousand (down by 3.7%) during 2018–2032. Overall in the period, the employment rate of the population aged 15-64 will increase steadily from 67.5% in 2018 to 71.9% in 2022 to 73.5% in 2032.

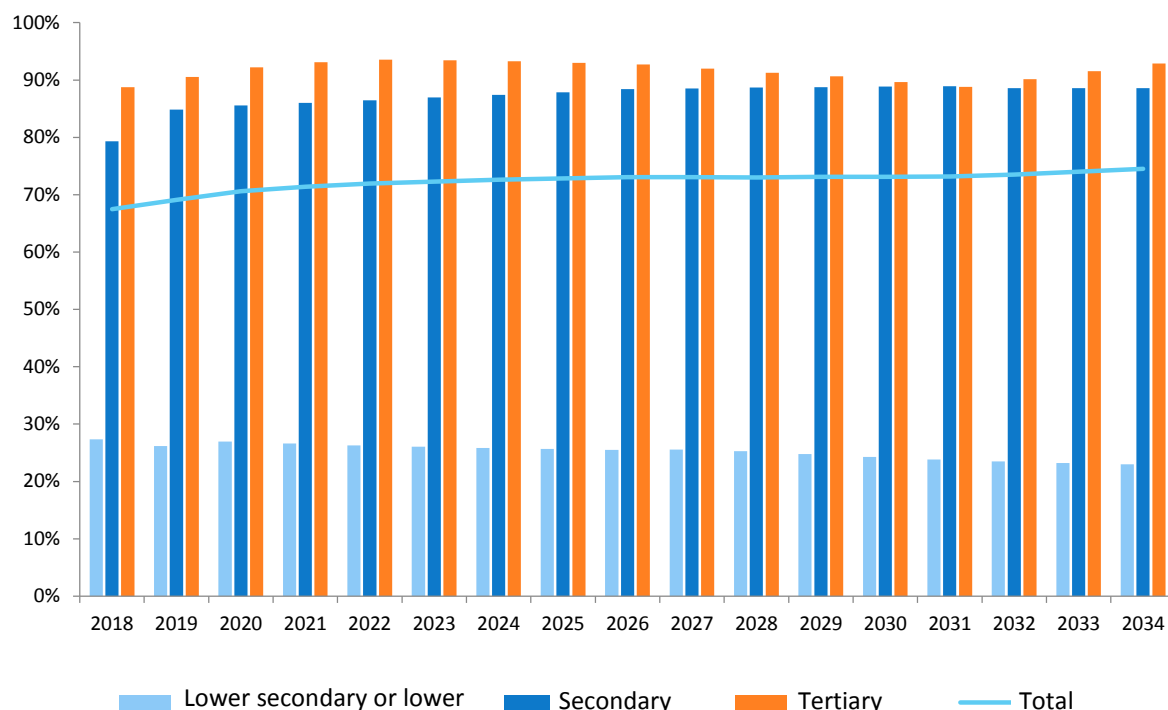
The structure of employment by educational attainment level will sustain a major drop in the number of employed aged 15-64 with Lower secondary or lower education, as from 337.9 thousand in 2018 their total number will fall to 312.5 thousand in 2022, and to 226.0 thousand in 2032 (down by 33.1% in the period 2018-2032). The employment rate of the population with this educational attainment will gradually decrease from 27.3% in 2018 to 26.3% in 2022 to 23.5% in 2032.

Graph 19: **Employed persons (15-64 year-olds) by educational attainment level, people millions**



Source: own calculations

Graph 20: Employment rate (15-64 year-olds) by educational attainment level, %



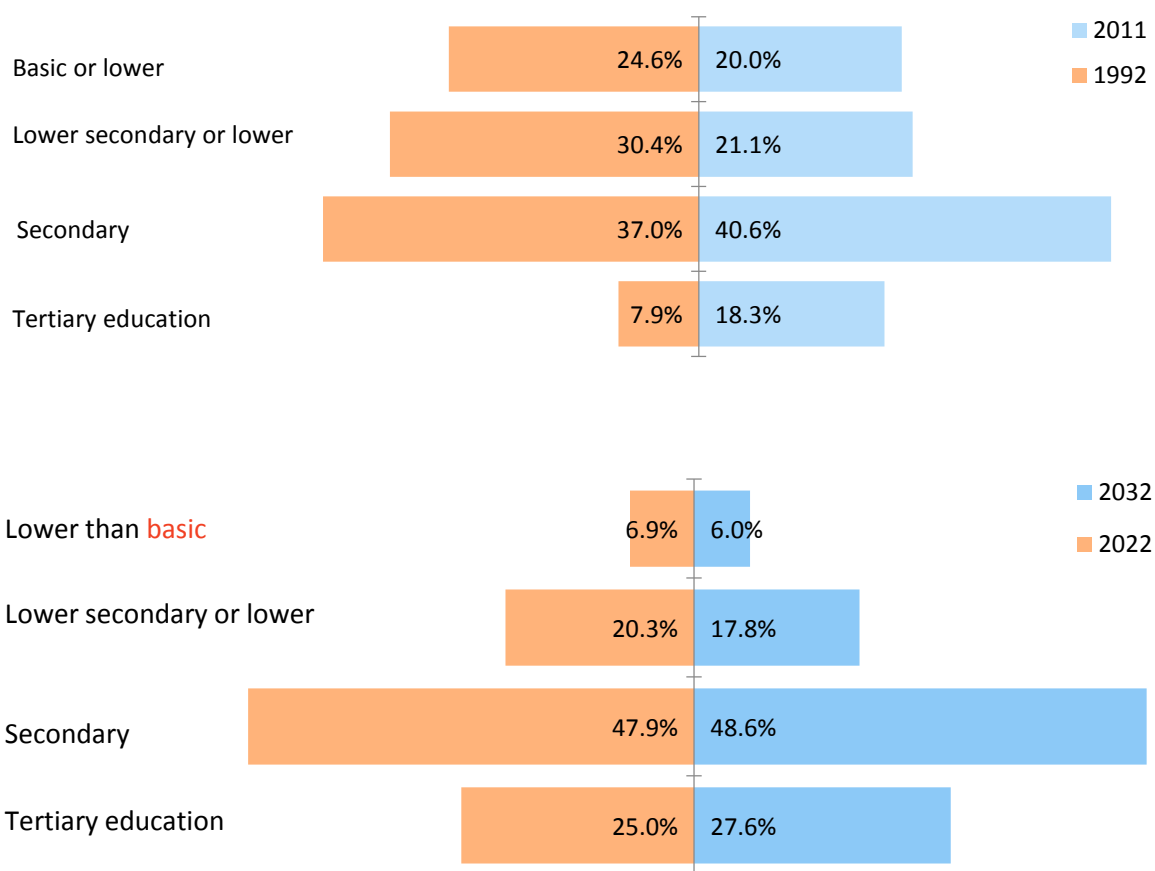
Source: own calculations

The number of employed with upper secondary education in 2022 will be 1,814.2 thousand, and in 2032 its total will be 1,736.9 thousand. The projected 1.6% drop for the period 2018-2032 will generally reflect the overall employment decline but to a much smaller degree. The employment rate for upper secondary graduates will grow steadily from 79.3% in 2018 to 86.5% in 2022 to 88.6% in 2032.

The total employed tertiary education graduates in the age group 15-64 will be 1,024.6 thousand in 2022 and 1,002.9 thousand in 2032, with an expected growth rate of 2.6% for the period 2018-2032. The employment rate for upper secondary graduates will increase steadily from 79.3% to 88.6%, and for tertiary graduates it will grow from 88.7% to 92.9%. The employment rate for tertiary education graduates will rise from 88.7% in 2018 to 93.6% in 2022, after which the indicator will drop slightly, and in 2032 it will total 90.1%. One of the underlying factors for the restructuring of employment by educational characteristics is the overall change in the educational structure of the population in recent decades. In 1992 the share of tertiary education graduates in the population was 7.9%, and in 2011 it already totalled 18.3% (in the period 1985-2011 the share of tertiary education graduates in the population trebled).<sup>49</sup> At the same time, the forecasts indicate that these trends will persist in the medium and in the long term. At the beginning of the transition period the majority of the population had Lower secondary or lower education (55.0%). In 2032 this share will shrink to 23.8%, whereas that of tertiary education graduates in the working age population will reach 27.6%.

<sup>49</sup> Based on NSI census data.

Graph 21: Educational structure of total population (1992 and 2011) and working age population (2022 and 2032), %



Source: NSI, own calculations

The expected restructuring of employment by educational characteristics will be the result of several factors:

- First, the overall change in the educational structure of the population, especially as regards the growth in the share of the population with completed tertiary education.
- Second, the increase in the number of highly skilled employees, leading to a change in employers' attitudes and expectations about qualification requirements. For example, because of structural mismatches in the labour market in recent years tertiary education graduates have tended to be employed in jobs previously done by staff with upper secondary education. Updates of job descriptions for such positions will continue to follow these market trends, and in future tertiary education graduates will be increasingly in demand for such jobs.
- Last but not least, the required convergence to the average values of economic indicators in the EU-28 within a negative demographic development context poses a need to maintain and even speed up the rate of increase in labour productivity. This is in turn tied up with improving the educational structure of the labour force. The latter is also due to structural changes and new requirements to economies and the quality of human resources within a wider global context.

## 3.2 Employment forecasts by economic activity

The sectoral structure of employment seen in recent years suggests that *Manufacturing* and *Wholesale and Retail Trade* will retain their leading positions in the labour market. The employment forecasts are based on the assumption that the development of the Bulgarian economy will follow a trajectory of convergence to the economies of selected Eastern European member states.<sup>50</sup> In some categories these economies are similar to Bulgaria's, but they are more advanced in terms of socio-economic development. The forecasts below reflect the development of the economy according to a smooth convergence scenario, resulting from market- and/or regulatory-based structural changes in the economy.

In 2022 the sectors with the highest number of employed will be:

- *Manufacturing* – 631.5 thousand;
- *Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles* – 498.4 thousand;
- *Construction* – 246.2 thousand.

Nearly every second employed person will work in one of these three sectors, and they will retain their leading positions in the labour market in 2032 as well, with employed totals of 641.2 thousand (*Manufacturing*), 380.3 thousand (*Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles*) and 250.6 thousand (*Construction*).

The sectors with the smallest number of employed in 2022 will be: *Real Estate Operations* (16.7 thousand), *Mining and Quarrying* (26.1 thousand) and *Water Supply; Sewerage, Waste Management and Remediation Activities* (33.3 thousand), with employment in these three sectors accounting for 2.6% of total employment.

In 2032 the three bottom ranking sectors will be again the same; however, the forecasts indicate that *Mining and Quarrying* will have become the sector with the lowest number of employed: *Mining and Quarrying* (13.0 thousand), *Real Estate Operations* (26.2 thousand) and *Water Supply; Sewerage, Waste Management and Remediation Activities* (29.6 thousand).

In the medium term, 2018-2022, the biggest absolute positive changes in employment are expected to be in:

- *Manufacturing* – 33.6 thousand;
- *Education* – 23.7 thousand;
- *Public Administration* – 16.5 thousand;
- *Human Health and Social Work Activities* – 16.0 thousand.

The most significant decreases in the number of employed can be expected in:

- *Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles* – 25.7 thousand;
- *Accommodation and Food Service Activities* – 5.3 thousand;
- *Mining and Quarrying* – 4.2 thousand;
- *Electricity, Steam, Gas and Air Conditioning Supply* – 1.3 thousand.

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<sup>50</sup> For more information about the choice of convergence objective, see the methodological framework of the model in *Annex 8.1 Technical Notes*

Table 9: **Medium-term and long-term employment forecasts by economic activity (A21), people thousands**

	2022	2032	Change 2022-2032	Growth 2022-2032
Manufacturing	631.5	641.2	9.7	1.5%
Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	498.4	380.3	-118.1	-23.7%
Construction	246.2	250.6	4.4	1.8%
Public Administration	236.4	249.4	13.0	5.5%
Education	196.0	230.9	34.9	17.8%
Transportation and Storage	215.0	206.2	-8.8	-4.1%
Human Health and Social Work Activities	175.6	194.3	18.7	10.7%
Accommodation and Food Service Activities	160.1	129.4	-30.8	-19.2%
Professional, Scientific and Technical Activities	111.5	107.9	-3.6	-3.2%
Administrative and Support Service Activities	104.0	93.8	-10.2	-9.8%
Information and Communication	94.4	91.5	-2.9	-3.1%
Financial and Insurance Activities	63.6	57.8	-5.8	-9.1%
Arts, Entertainment and Recreation	52.2	55.2	3.0	5.7%
Other Service Activities	57.8	54.9	-2.9	-5.0%
Electricity, Steam, Gas and Air Conditioning Supply	37.7	30.2	-7.5	-19.9%
Water Supply; Sewerage, Waste Management and Remediation Activities	33.3	29.6	-3.7	-11.1%
Real Estate Operations	16.7	26.2	9.5	56.7%
Mining and Quarrying	26.1	13.0	-13.0	-50.0%

Source: own calculations

The highest percentage growth rates will be in *Real Estate Operations* (39.4%), *Education* (13.8%) and *Human Health and Social Work Activities* (10.0%), and the deepest percentage employment declines will be seen in *Mining and Quarrying* (13.8%), *Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles* (4.9%), *Electricity, Steam, Gas and Air Conditioning Supply* (3.5%).

In the long term, 2023–2032, as a result of negative demographic processes, overall employment decline and gradual convergence of the economy to the average values of economic development indicators in the EU (mainly due to technological progress and globalisation), the biggest changes will be as follows:

- Sectors with projected employment decrease:
  - *Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles*, where the number of employed is expected to drop by 106.9 thousand (down by 21.9%);
  - *Accommodation and Food Service Activities*, where employment will decrease by 27.9 thousand (down by 17.8%);
  - *Mining and Quarrying*, with a total of 11.7 thousand fewer employed (down by 47.3%).
- Sectors likely to experience employment boost:
  - *Education*, where the number of employed is expected to grow by 30.7 thousand (up by 15.3%);
  - *Human Health and Social Work Activities*, in which employment will increase by 12.8 thousand (up by 9.1%);
  - *Public Administration and Defence; Compulsory Social Security*, with an employment growth of 11.0 thousand (up by 4.6%);
  - *Manufacturing*, where employment is expected to grow by 7.1 thousand (up by 1.1%).

The projected changes imply an improvement in quality and access to education and healthcare through structural reforms and strengthening of the role of these two sectors in the socio-economic development of the country.

Moreover, the anticipated expansion of *Public Administration* will affect all of its structures (including state agencies, NSSI, NSI, executive agencies, specialised territorial administrations, the judicial system, etc.) This expansion will not by itself void sectoral reform needs to increase labour productivity and optimise administration. The process of Bulgaria's socio-economic convergence will bring about structural changes, including institutional ones, to ensure efficient functioning of the economy and strengthening of the role of public administration in line with established European practice.

### 3.3 Expected regional dimensions of employment

Regional employment forecasts follow the dynamic of the total employment indicator. In the medium term the number of employed is expected to increase slightly, but in the long term there is likely to be a decline as a result of unfavourable demographic processes.

In 2022 Sofia-Capital City province will enjoy the highest employment rate, with a total of 906.8 thousand employed (accounting for 30.7% of employment in the country), followed by the provinces of Plovdiv, with 293.7 thousand employed (9.9% of employment in the country), and Varna, with 202.3 thousand employed (6.8% of employment in the country). Other major contributors will be the provinces of Burgas, Stara Zagora and Blagoevgrad, in each of which the number of employed will exceed 100 thousand.

The lowest employment rates in 2022 will be in Silistra, where the expected number of employed will total 20.9 thousand (0.7% of employment in the country), Vidin – with a total of 23.3 thousand employed (0.8% of employment in the country), and Razgrad – with 32.6 thousand employed (1.1% of employment in the country). Other regions with similarly low number of employed will be the provinces of Lovech, Montana, Targovishte and Yambol, in each of which the number of employed will be less than 40 thousand.

In 2022–2032 the number of employed will drop in all provinces; however, the top three will retain their labour market positions, where nearly every second person employed will work in one of them. In 2032 employment in Sofia-Capital City will fall to 871.7 thousand (down by 35.0 thousand compared to 2022), employment in Plovdiv will total 282.4 thousand (down by 11.3 thousand compared to 2022), and in Varna it will amount to 194.5 thousand (down by 7.8 thousand compared to 2022).

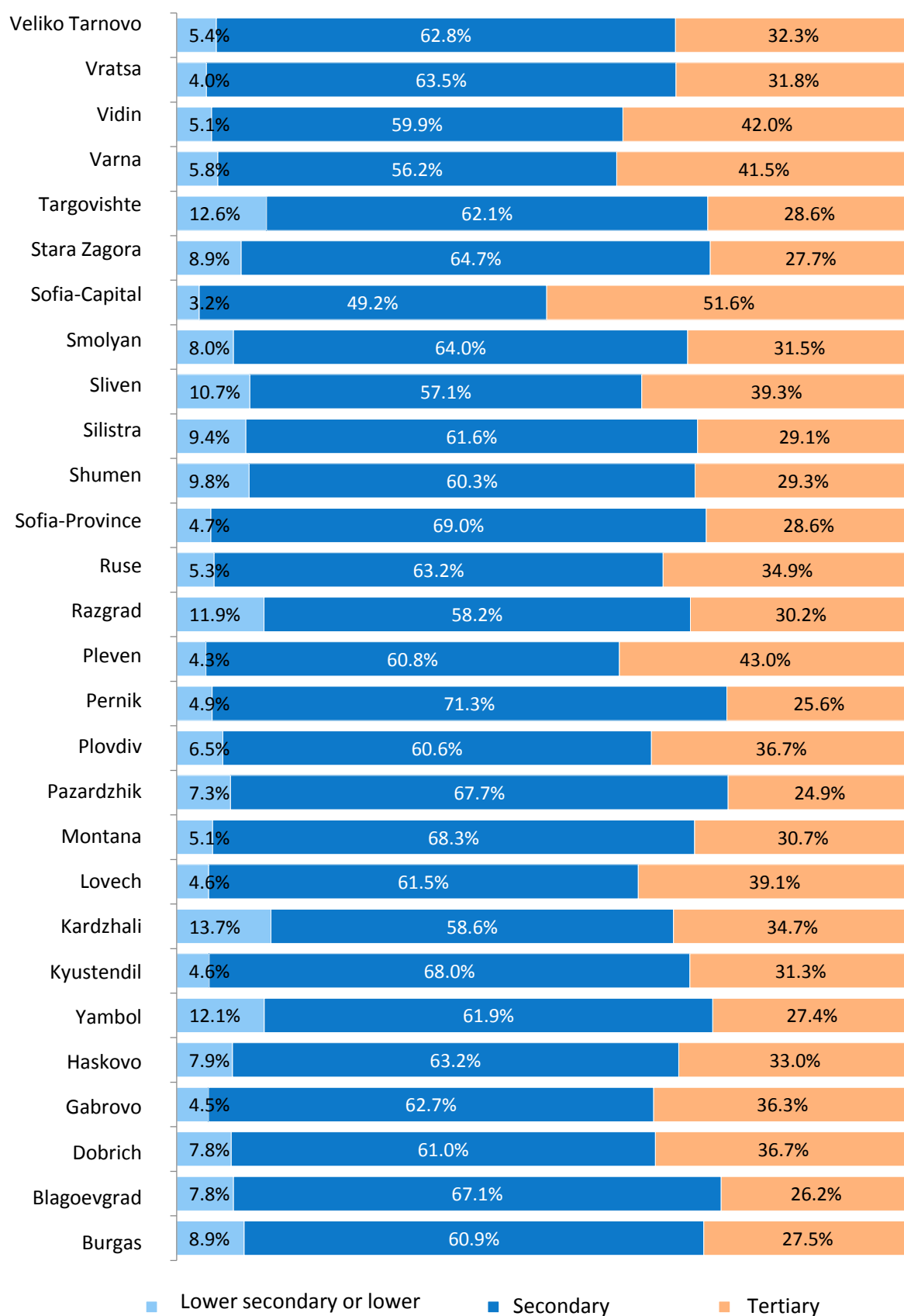
Table 10: **Medium-term and long-term employment forecasts by province, people thousands**

	<b>2022</b>	<b>2032</b>
Sofia-Capital City	906.8	871.7
Plovdiv	293.7	282.4
Varna	202.3	194.5
Burgas	155.2	149.2
Stara Zagora	137.3	132.0
Blagoevgrad	122.9	118.1
Veliko Tarnovo	92.9	89.3
Ruse	88.9	85.5
Haskovo	78.6	75.5
Pleven	78.1	75.1
Sofia-Province	77.7	74.7
Pazardzhik	69.5	66.8
Vratsa	51.5	49.5
Kardzhali	49.6	47.6
Shumen	49.4	47.5
Smolyan	49.3	47.4
Dobrich	49.3	47.4
Sliven	47.3	45.5
Gabrovo	47.2	45.3
Kyustendil	43.1	41.4
Pernik	40.7	39.1
Yambol	38.9	37.4
Targovishte	37.3	35.9
Montana	36.8	35.4
Lovech	35.8	34.4
Razgrad	32.6	31.4
Vidin	23.3	22.4
Silistra	20.9	20.1

Source: own calculations

In the medium term, 2022, human resources with Lower secondary or lower education will be most in demand in the provinces of Sofia-Capital City, with a need total of 28.8 thousand (3.2% of total expected jobs in the region), Plovdiv – with 19.1 thousand (6.5% of total expected jobs in the region), Burgas – with 13.8 thousand (8.9% of total expected jobs in the region), Stara Zagora – with 12.2 thousand (8.9% of total expected jobs in the region), and Varna – with 11.8 thousand (5.8% of total expected jobs in the region).

Graph 22: Structure of human resource needs by educational attainment level and province in 2022, %



Source: own calculations

The need for labour with upper secondary education will be highest in Sofia-Capital City, where in 2022 demand is expected to total 445.6 thousand (49.2% of total expected jobs in the region), Plovdiv – 178.0 thousand (60.6% of total expected jobs in the region), Varna – 113.7 thousand (56.2% of total expected jobs in the region), Burgas – 94.5 thousand (60.9% of total expected jobs in the region), and Stara Zagora – 88.8 thousand (64.7% of total expected jobs in the region).

The demand for tertiary education graduates in the same year will be highest in the provinces of Sofia-Capital City, with an expected demand total of 468.0 thousand (51.6% of total expected jobs in the region), Plovdiv – with 107.9 thousand (36.7% of total expected jobs in the region), Varna – with 84.0 thousand (41.5% of total expected jobs in the region), Burgas – with 42.6 thousand (27.5% of total expected jobs in the region), and Stara Zagora – with 38.1 thousand (27.7% of total expected jobs in the region).

In the long term, 2032, human resources with Lower secondary or lower education will be most in demand in Sofia-Capital City, with a need total of 27.7 thousand, Plovdiv – with 18.4 thousand, Burgas – with 13.3 thousand, Stara Zagora – with 11.8 thousand, and Varna – with 11.3 thousand. The need for labour with upper secondary education will be highest in Sofia-Capital City, where in 2032 demand is expected to total 428.7 thousand, Plovdiv – 171.1 thousand, Varna – 109.3 thousand, Burgas – 90.8 thousand, and Stara Zagora – 85.4 thousand. The demand for tertiary education graduates will be highest in Sofia-Capital City, with an expected demand total of 458.6 thousand, Plovdiv – with 106.5 thousand, Varna – with 82.5 thousand, Burgas – with 39.9 thousand, and Stara Zagora – with 37.0 thousand.

### 3.4 Employment forecasts by occupation

In the period 2018-2022 the following employment dynamic by major occupational groups can be expected:<sup>51</sup>

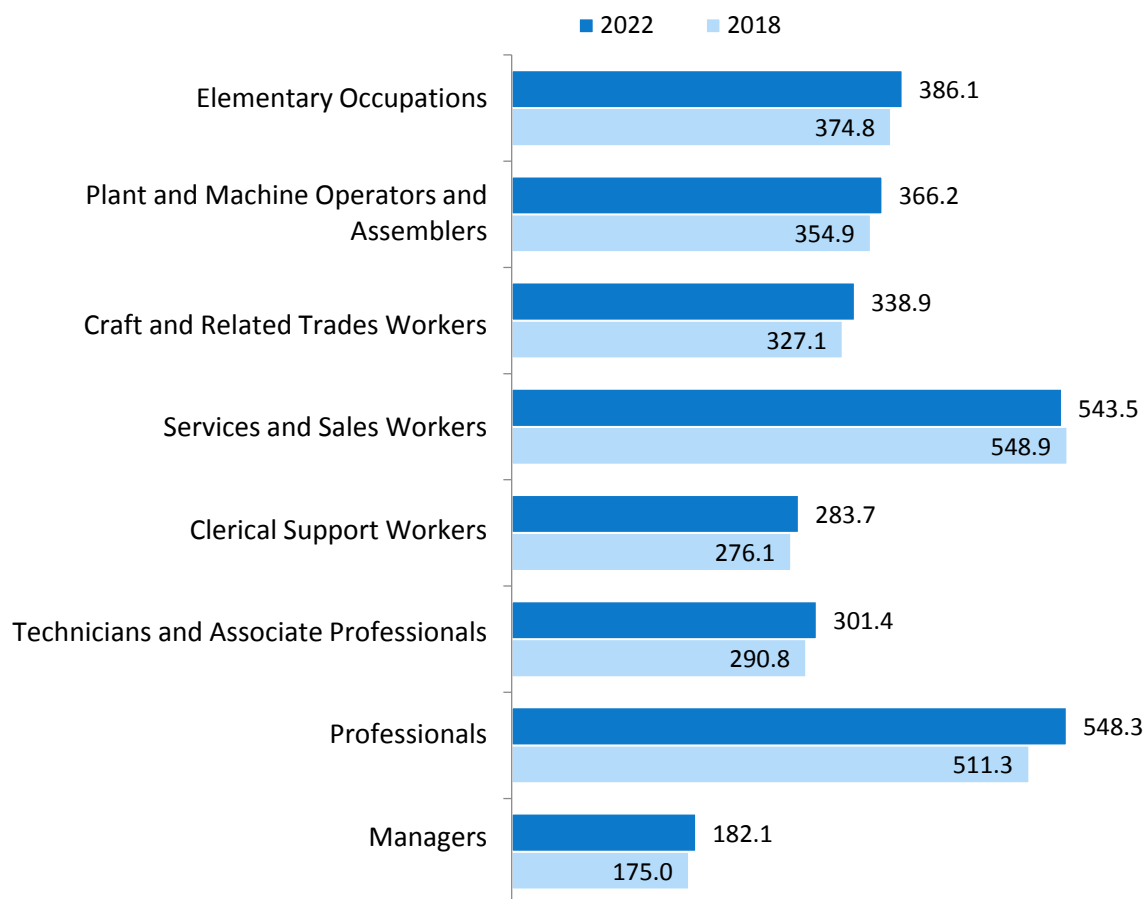
- In 2022 the number of employed *Professionals* is expected to reach 548.3 thousand (representing an absolute change of 37.1 thousand and a percentage growth of 7.2% over 2018), and in the medium term this major group will outpace all others (including the 2018 market leader *Services and Sales Workers*). The share of *Professionals* in total employment will be 18.6%, and nearly every fifth person employed will have this occupation. The highest number of *Professionals* will be engaged in *Education* (131.0 thousand), *Public Administration* (102.7 thousand) and *Human Health and Social Work Activities* (89.0 thousand).

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<sup>51</sup> Due to limitations in detailed labour market statistics, the technical specifications of the model do not include modelling and forecasting of the employment structure of *Agriculture, Forestry and Fishing*. For this reason, the sector is not featured in the forecasting results. The medium-term forecasts refer to the 9 major groups of occupations as defined in the National Classification of Occupations and Positions, major group 6 of which is *Skilled Agricultural, Forestry and Fishery Workers*. Although not very common, some enterprises outside of *Agriculture, Forestry and Fishing* employ and will continue to employ *Skilled Agricultural, Forestry and Fishery Workers*. The forecasts show that the number of employed in such occupations in sectors other than *Agriculture, Forestry and Fishing* will be negligible in the Bulgarian labour market, as in 2022 it will total just 6.3 thousand. At the same time, employment in *Agriculture, Forestry and Fishing* is expected to be significantly higher, amounting to 184.6 thousand in 2022 and 116.5 thousand in 2032. While it is not possible to estimate the proportion of these totals that will be engaged as *Skilled Agricultural, Forestry and Fishery Workers*, it is very likely to be substantial. If this occupation was to be represented in the non-agricultural sectors here, misleading conclusions might have been made to the effect that it would not be in demand. Because of this, as well as in view of the fact that it accounts for 0.002% of total employment in the reference sectors, this major group of occupations has been excluded from the analytical report, but has been featured in the detailed forecasts.

- Forecasts for 2022 show that the second most common major group will be *Services and Sales Workers*, providing employment to a total of 543.5 thousand or 18.4% of all employed (approximately every fifth person employed). In the period 2018-2022 there will be a slight decrease (down by 5.4 thousand or 1.0%) in the number of employed in this major group. The majority of staff in such positions will be employed in *Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles* (242.3 thousand), *Accommodation and Food Service Activities* (101.2 thousand), and *Administrative and Support Service Activities* (49.2 thousand).
- In 2022 *Elementary Occupations* will employ a total of 386.1 thousand (accounting for 13.1% of total employment). The expected employment growth will amount to 11.3 thousand (up by 3.0% compared to 2018). The highest number of staff in *Elementary Occupations* will be in *Manufacturing* (118.5 thousand), *Construction* (73.5 thousand), and *Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles* (58.3 thousand).
- The next major group, with a 12.4% share in employment, will be *Plant and Machine Operators and Assemblers*, whose employment will be 366.2 thousand, with a corresponding absolute increase of 11.3 thousand (up by 3.2%) in the period 2018-2022. The highest number of employed in such occupations will be in *Manufacturing* (154.5 thousand), *Transportation and Storage* (91.8 thousand), and *Construction* (36.2 thousand).
- In 2022 the number of *Craft and Related Trades Workers* will reach 338.9 thousand, and their share in total employment will amount to 11.8%. The absolute growth compared to 2018 will total 11.8 thousand (up by 3.6%). These occupations will be most common in *Manufacturing* (193.2 thousand), *Construction* (57.0 thousand), and *Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles* (31.1 thousand).
- Forecasts for 2022 as regards *Technicians and Associate Professionals* indicate that the number of employed in such occupations will reach 301.4 thousand, with a corresponding share in total employment of 10.2%. Absolute employment growth over 2018 in this major group will total 10.6 thousand (up by 3.6%). The highest number of *Technicians and Associate Professionals* are expected to be employed in *Public Administration* (60.7 thousand), *Manufacturing* (46.1 thousand), and *Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles* (33.9 thousand).
- Employment forecasts for *Clerical Support Workers* show that in 2022 their total will be 283.7 thousand, accounting for 9.6% of employment. The absolute change compared to 2018 will amount to 7.5 thousand (up by 2.7%). The highest number of employed in this major group will be in *Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles* (49.5 thousand), *Transportation and Storage* (36.4 thousand), and *Manufacturing* (33.5 thousand).
- The major group with the smallest share in employment, amounting to 6.2%, will be *Managers*. In 2022 their number will be 182.1 thousand (up by 4.1% over 2018), and the highest number of *Managers* will be employed in *Public Administration* (32.1 thousand), *Manufacturing* (26.1 thousand), and *Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles* (24.3 thousand).

Graph 23: Employment by occupation in 2018 and 2022, people thousands



Source: own calculations

For the long term, forecasts by occupational group<sup>52</sup> show that in 2032 the following occupations will enjoy the highest employment rates:

- *Shop Salespersons* – 162.9 thousand;<sup>53</sup>

<sup>52</sup> In accordance with the technical specifications of the model, long-term forecasts cover 120 occupational groups from NCOP-2011.

<sup>53</sup> Objective reality shows that there is a significant lag in the economic development of the Bulgarian economy, especially as regards technological intensity. In the past decades this has solidified and further enhanced the position of the Trade sector in business and employment structure. NSI data reveal that in 2017 a total of 141.1 thousand enterprises (41.4%) operated in *Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles*, as well as that 94.4% of them employed between 0 and 9 employees. This was the reason for the high employment share of the sector, representing around 15% of total employment in the country in the period 2008-2017, with *Trade* playing an important role in labour market dynamics. This role is not linked with any high investment rate, as in recent years investment activity in the sector has been consistent with its low intensity in the total economy, and where there is evidence of such in the sector, it mostly refers to investment in construction (mainly of buildings and other facilities). Despite the estimated shrinking of the sector as a result of expected technological development and convergence processes, employment reductions will be moderate, at an average rate of about 1-2% per year. Therefore, the most sought-after occupation in recent years, as well as the one that will be most in demand in the near future will be related to the core business of the sector – sales of goods and services, in which *Shop Salespersons* are actively engaged. This occupation does not necessarily require tertiary education and is not traditionally associated with any major problem of finding, hiring and releasing human resources. Employment in the sector will decrease gradually, and this will affect *Shop Salespersons*, but given the substantial baseline (relatively high number of employed), absolute reductions will also be significant.

- Administration Professionals – 121.0 thousand;
- Heavy Truck and Bus Drivers – 105.6 thousand;
- Manufacturing Labourers – 92.6 thousand;
- Mining and Construction Labourers – 73.7 thousand.

The biggest changes in the period 2023-2032 will be as follows:

- Absolute decrease in number of employed:
  - *Shop Salespersons* – by 39.4 thousand;
  - Waiters and Bartenders – by 10.7 thousand;
  - Other Sales Workers – by 6.4 thousand.
- Percentage decrease in employment:
  - Mining and Mineral Processing Plant Operators – with an employment decline of 21.3%;
  - *Street Vendors (excluding Food)* – with an employment decline of 20.3%;
  - *Shop Salespersons* – with an employment decline of 19.5%;
  - Retail and Wholesale Trade Managers – with an employment decline of 19.5%.
- Absolute increase in number of employed:
  - Secondary Education Teachers – by 6.9 thousand;
  - Primary School and Early Childhood Teachers – by 5.9 thousand;
  - Nursing and Midwifery Professionals – by 4.3 thousand.
- The highest percentage increases in employment growth can be expected in the following teaching occupations:
  - *Secondary Education Teachers* – with an employment growth of 15.3%;
  - Primary School and Early Childhood Teachers – with an employment growth of 15.3%;
  - University and Higher Education Teachers – with an employment growth of 15.3%;
  - *Vocational Education Teachers* – with an employment growth of 15.0%;
  - *Other Teaching Professionals* – with an employment growth of 13.2%.

**Table 11: Forecasts for most sought-after occupations in the labour market (top 30), people thousands**

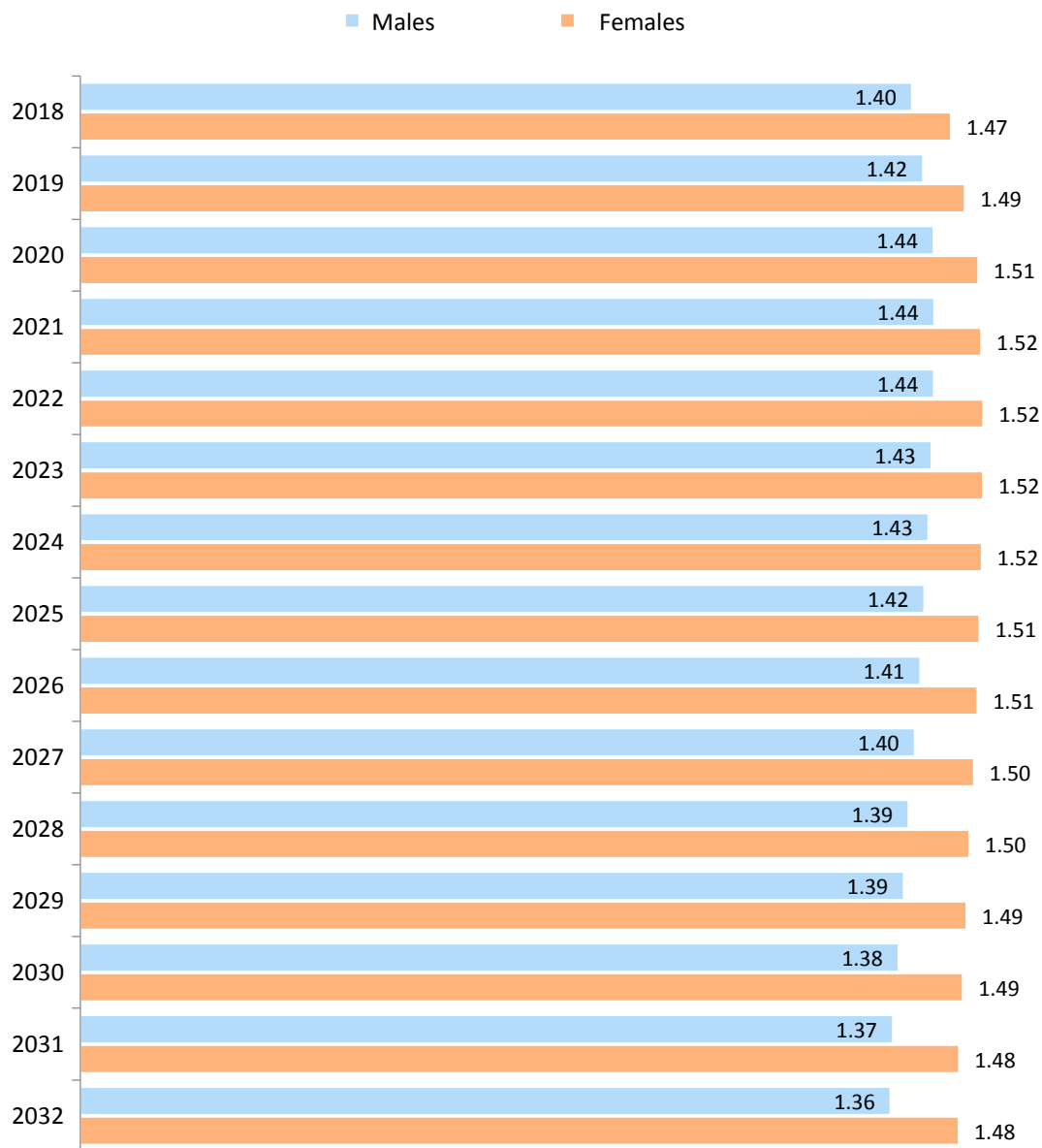
<b>№</b>	<b>Occupations, NCOP11 (3-digit code)</b>	<b>2023</b>	<b>2032</b>	<b>Change 2023-2032</b>	<b>Growth/ Decline, %</b>
1	Shop Salespersons	202.2	162.9	-39.4	-19.5%
2	Administration Professionals	119.2	121.0	1.8	1.5%
3	Heavy Truck and Bus Drivers	111.3	105.6	-5.7	-5.1%
4	Manufacturing Labourers	93.7	92.6	-1.1	-1.2%
5	Mining and Construction Labourers	74.8	73.7	-1.1	-1.4%
6	Other Elementary Workers	72.2	67.4	-4.7	-6.5%
7	Protective Services Workers	65.0	60.7	-4.3	-6.7%
8	Material Recording and Transport Clerks	64.9	59.8	-5.1	-7.9%
9	Textile, Fur and Leather Products Machine Operators	56.7	57.0	0.3	0.5%
10	Waiters and Bartenders	66.2	55.5	-10.7	-16.2%
11	Garment and Related Trades Workers	54.6	54.7	0.1	0.2%
12	Government Regulatory Associate Professionals	52.5	54.6	2.1	4.0%
13	Domestic, Hotel and Office Cleaners and Helpers	54.0	54.1	0.1	0.2%
14	Nursing and Midwifery Professionals	48.4	52.8	4.3	9.0%
15	General Office Clerks	54.1	52.6	-1.6	-2.9%
16	Finance Professionals	54.1	52.5	-1.6	-2.9%
17	Secondary Education Teachers	45.2	52.1	6.9	15.3%
18	Physical and Engineering Science Technicians	52.2	50.7	-1.5	-2.9%
19	Blacksmiths, Toolmakers and Related Trades Workers	46.4	46.5	0.1	0.3%
20	Car, Van and Motorcycle Drivers	47.9	44.9	-3.0	-6.2%
21	Primary School and Early Childhood Teachers	38.6	44.5	5.9	15.3%
22	Business Services and Administration Managers	44.7	44.5	-0.3	-0.6%
23	Personal Care Workers in Health Services	39.9	42.8	2.9	7.3%
24	Machinery Mechanics and Repairers	45.7	40.9	-4.8	-10.5%
25	Administrative and Specialised Secretaries	41.2	40.6	-0.6	-1.4%
26	Other Clerical Support Workers	35.7	35.7	-0.1	-0.2%
27	Tellers, Money Collectors and Related Clerks	36.7	35.5	-1.2	-3.1%
28	Cooks	39.3	35.1	-4.2	-10.7%
29	Numerical Clerks	35.7	33.8	-2.0	-5.5%
30	Managing Directors and Chief Executives	33.2	31.7	-1.4	-4.3%

Source: own calculations

### 3.5 Employment forecasts by sex and age

In 2022 the expected number of employed females will be 1.52 million, and that of employed males will be 1.44 million.<sup>54</sup> In 2032 employed females are expected to total 1.48 million, and employed males – 1.36 million. Female employment will be slightly higher than male, where the share of employed females will rise steadily from 51.1% in 2018 to 52.0% in 2032, and the share of employed males will drop from 48.9% to 48%.

Graph 24: **Employment by sex, 2018–2032, people millions**



Source: own calculations

<sup>54</sup> The employment forecast by sex is based on available data from NSI’s Structural Survey on Earnings and Labour Costs. Due to methodological specificities, there is some inconsistency in employment structure by sex with the Labour Force Survey (LFS). In 2017 LFS found the share of males in total employment to be 53.4%, and that of females - 46.6%. Substantial differences in the estimations of these shares can be seen in Construction, Transportation and Public Administration, the reason being that LFS covers hidden employment in some Public Administration activities not included in the Structural Survey on Earnings and Labour Costs.

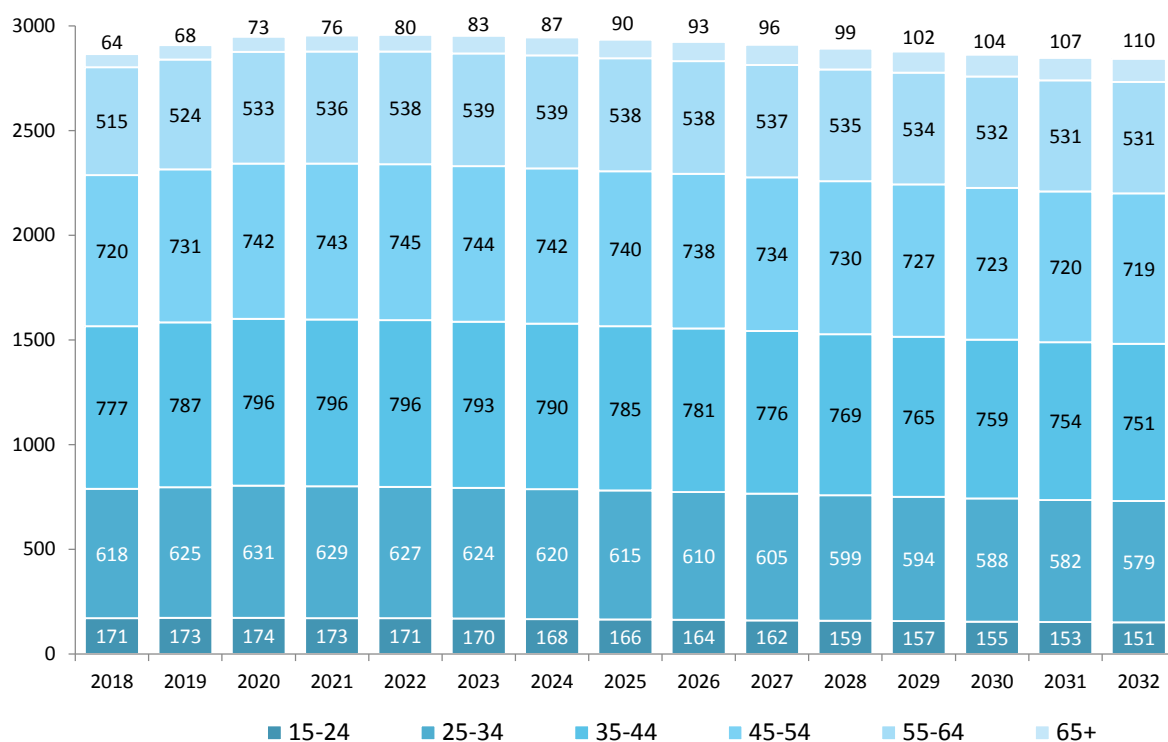
In 2022 the highest numbers of employed males will work in *Manufacturing* (318.6 thousand), *Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles* (225.2 thousand), *Construction* (206.7 thousand), and *Transportation and Storage* (155.3 thousand). In the same year the highest numbers of employed females will work in *Manufacturing* (312.9 thousand), *Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles* (273.2 thousand), *Public Administration* (157.8 thousand), *Education* (157.0 thousand), and *Human Health* (138.9 thousand).

Current trends will persist in the long term, and in 2032 the highest numbers of employed males will be seen in *Manufacturing* (323.5 thousand), *Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles* (171.8 thousand), *Construction* (210.4 thousand), and *Transportation and Storage* (149.0 thousand). In the same year the highest number of employed females will be seen in *Manufacturing* (317.7 thousand), *Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles* (208.5 thousand), *Public Administration* (166.5 thousand), *Education* (185.0 thousand), and *Human Health* (153.7 thousand).

Detailed medium-term and long-term projections indicate that employment will continue to shrink in almost all age groups:

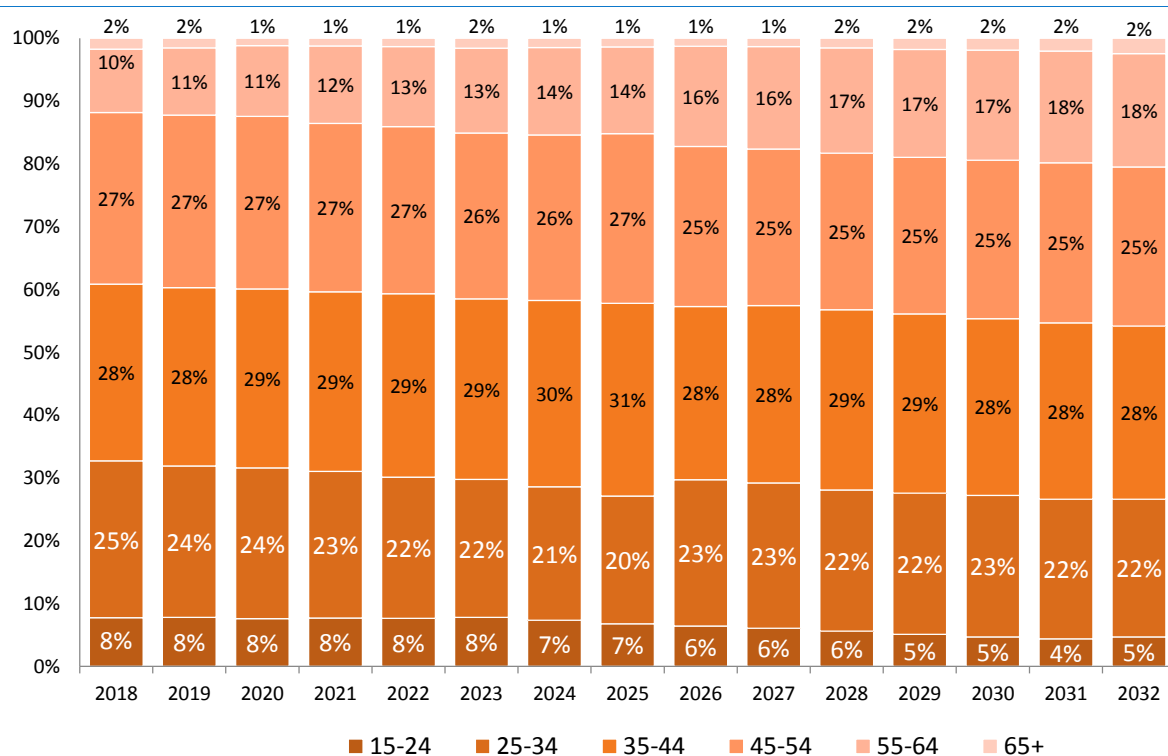
- In 2022 the expected employment total in the age group 15-24 will be 171.3 thousand, and in 2032 – 151.1 thousand (down by 11.6% in the period 2022-2032). The share of employed in this age group in total employment will drop from 5.7% at the start of the period to 5.3% at the end.
- The total employed in the age group 25-34 in 2022 will be 627.4 thousand, and in 2032 – 579.1 thousand (down by 7.7% in the period 2022-2032). The share of the age group in total employment will also decrease – from 21.1% to 20.4%.
- The expected total of employed in the age group 35-44 in 2022 will be 795.7 thousand, and in 2032 – 751.2 thousand (down by 5.6% in the period 2022-2032). There will be a slight drop in its share in total employment – from 26.9% at the beginning of the period to 26.4% at the end.
- The number of employed in the age group 45-54 is expected to total 744.5 thousand in 2022 and 719.1 thousand in 2032 (down by 3.4% in the period 2022-2032). The share in total employment will remain relatively constant, at 25.2% and 25.3% respectively at the beginning and at the end of the period.
- In 2022 employment in the age group 55-64 is expected to total 537.8 thousand, and in 2032 – 531.5 thousand (down by 1.2% in the period 2022-2032). The share of employed in this group in total employment will increase slightly from 18.2% to 18.7%
- In the age group 64 and over employment in 2022 is expected to total 79.9 thousand, and in 2032 – 110.2 thousand (up by 38.0% in the period 2022-2032). This group will have the smallest share, but it will nevertheless increase from 2.8% to 3.9%.

Graph 25: Employment forecasts by age group, 2018–2032, people thousands



Source: own calculations

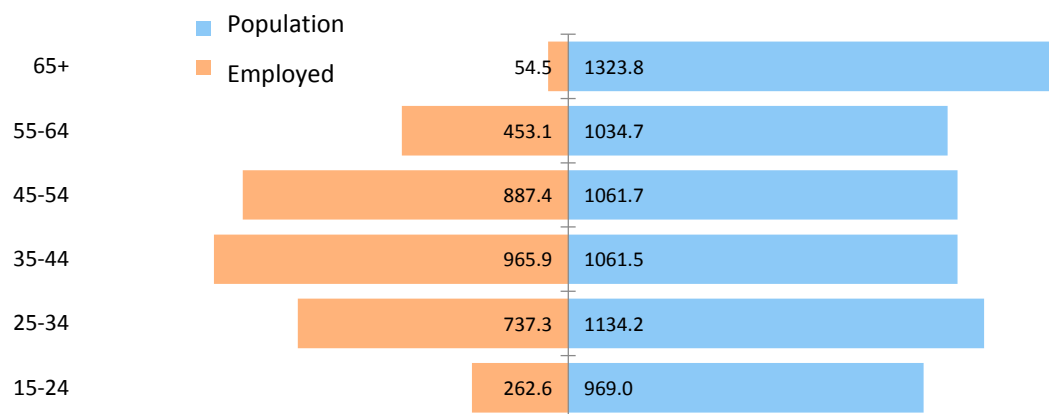
Graph 26: Structure of employment by age group, 2003–2017, %



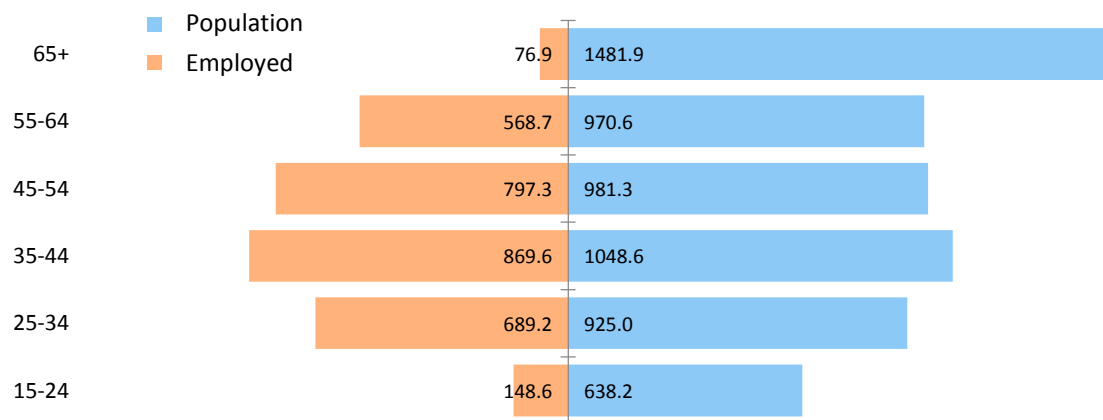
Source: NSI

Graph 27: Comparison of the structure of employment and population by age group in 2008, 2017 and 2030, people millions

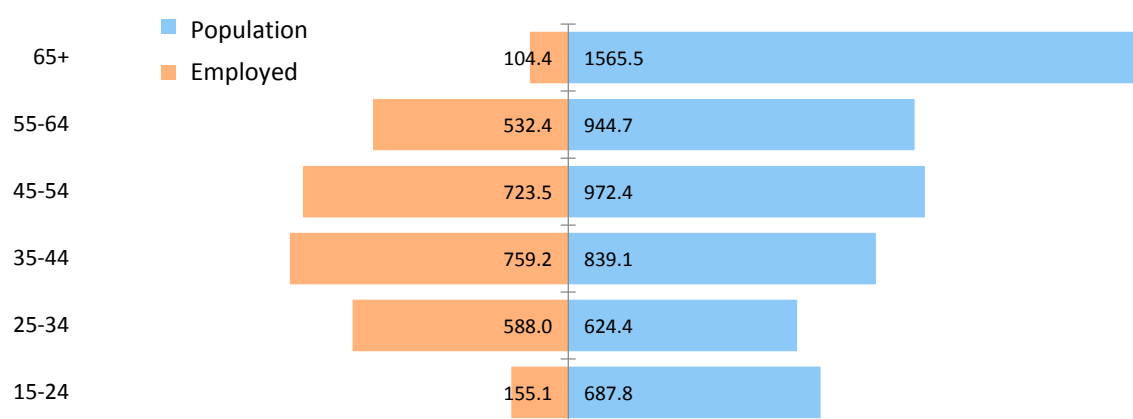
**2008**



**2017**



**2030**



Source: NSI, own calculations

In recent years the dynamic of the structure of employment has followed different trajectories in the different age groups, with both decline trends (in the younger age groups 15-24 and 25-34) and growth trends (in the older age groups 55-64 and 65 and over). The forecasts suggest that these trends will persist, and the shrinking share of younger employed will continue to be accompanied by a corresponding increase in the share of older employed in the long term. Most employed are aged 35-54, and their 2018 share of 52.2% is expected to drop to 51.7% in 2032. The share of employed in the age group 15-34 will decrease from 27.6% in 2018 to 25.7% in 2032, while that of employed aged 55 and over will increase from 20.2% in 2018 to 22.6% in 2032.

Labour force and employment follow the trends in the population dynamic. The expected deterioration in the age structure of employment will continue to be a consequence of the negative demographic processes in recent decades – low birth rate, high outflow migration among younger people, high mortality rate. The population in the age group 15-34 decreased from 2.1 million in 2008 to 1.5 million in 2017, and NSI forecasts suggest that by 2030 it will have gone further down to 1.3 million. At the same time, the population aged 55 and over rose from 2.3 million in 2008 to 2.5 million in 2017, and forecasts show that these totals will be retained. Whereas in 2008 there was a relative balance in the population by age group, with only a slight prevalence of the population aged 65 and over, the long-term expectations are that it will experience a strong increase in share, at the expense of the population under 34, which is expected to shrink significantly.

## CHAPTER 4

# EMPLOYMENT FORECASTS FOR SELECTED KEY SECTORS

This part looks at employment dynamics in the sectors that are and will continue to be characterised<sup>55</sup> by the highest number of employees (industry, trade, construction, transport, public administration, education, health). In addition, the ICT sector<sup>56</sup> has also been included, having been demonstrating a high employment growth rate over the past few years and contributing to an increased technological intensity. It is equally important to note that the ICT sector has been generating a significant value added and the development of its employment growth potential will have a positive impact on the development of Bulgarian economy. For ease of reference, these eight sectors are referred to as key sectors in this analysis.

### 4.1 Expected employment dynamics in the key sectors

The process of convergence to the European economy, embedded in the forecast model, suggests cohesion with the social and economic development of the given convergence goal (synthetic economy at the level of the socio-economic development of Hungary, Estonia and Slovakia for the period 2013-2017<sup>57</sup>). On the one hand, European markets influence the development of the private sector, on the other, the restructuring of the public sectors is to be determined by a targeted policy in the field of education, health and public administration. The forecasts are produced based on the assumption that in 2032, Bulgaria, in terms of its social and economic development, will converge to the set goal and the employment structure by economic activities will be more closely aligned with that of the EU members' states economies.

In the medium and long run, the two leading sectors, which will be characterised by the highest number of employees, are the *processing industry and trade; repair of motor vehicles and motorcy-*

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<sup>55</sup> Employment structure, as per LFS 2016 data, was used to identify these sectors.

<sup>56</sup> This analysis uses a narrow definition of the ICT sector, namely sector *J Production and distribution of information and cultural products; telecommunications* (NACE 2008).

<sup>57</sup> For more details about the statistical procedures, based on which the convergence goal has been determined, see the methodology of the initially developed model and technical notes on the update in Appendix 8.1.

cles. Forecasts show that the number of the persons employed there will continue to exceed 1 million.

In a scenario of a gradual convergence to the goal chosen, the role of manufacturing will increase despite the expected employment decline. In 2022, the number of the people employed in the sector will be 631.5 thousand, in 2032 – it will reach 641.2 thousand and the absolute change of employment in the sector for the period 2018-2032 will amount to 43.4 thousand (percentage change of 7.3%). In terms of the employment structure in the manufacturing sectors, forecasts show that:

- The leading economic activity in *manufacturing* in terms of employment, will be *manufacture of textiles, leather and related products*, which in 2022 will be employing 156.4 thousand people (accounting for 24.8% of the employment in the sector), and in 2032 this number will reach 158.8 thousand.
- The next important economic activity is *manufacture of food products, beverages and tobacco products*; in 2022 the number of employees will amount to 114.0 thousand (18.1% of the employment in the sector, and in 2032 it will reach 115.7 thousand;
- The third important sector is economic activity *manufacture of basic metals and fabricated metal products except machinery*, with an expected number of employees in 2022 amounting to 79.6 thousand (with a share of 12.6% of the employment in the *processing industry*), and in 2032, employment will reach up to 80.8 thousand;
- The lowest levels of employment in the sector's industries will be observed in economic activities *manufacture of coke, and refined petroleum products* (2.4 thousand employees in 2022, accounting for 0.4% of the employment in the sector and 2.5 thousand employees in 2032), *manufacture of medicinal substances and products* (9.8 thousand persons employed and a share of 1.6% of the sector in 2022, and 10.0 thousand employees in 2032) and *manufacture of computer, electronic and optical products* (with 10.0 thousand employees in 2022, accounting for 1.6% of the employment in the sector and 10.2 thousand employees in 2032).

Table 12: **Medium and long-term employment forecasts by manufacturing industries, thousand**

<b>Manufacturing</b>	<b>2022</b>	<b>2032</b>	<b>Employment share in the sector, %</b>
Manufacture of food products, beverages and tobacco products	114.0	115.7	18.1%
Manufacture of textiles, leather and related products	156.4	158.8	24.8%
Manufacture of wood, paper and paper products; printing	40.8	41.5	6.5%
Manufacture of coke and refined petroleum products	2.4	2.5	0.4%
Manufacture of chemical products	15.6	15.9	2.5%
Manufacture of medicinal substances and products	9.8	10.0	1.6%
Manufacture of rubber, plastics and mineral products	58.6	59.5	9.3%
Manufacture of basic metals and fabricated metal products, except machinery	79.6	80.8	12.6%
Manufacture of computer, electronic and optical products	10.0	10.2	1.6%
Manufacture of electrical equipment	25.1	25.5	4.0%
Manufacture of general and special-purpose machinery	37.4	38.0	5.9%
Manufacture of vehicles	28.8	29.2	4.6%
Other manufacturing; repair and installation of machinery and equipment	52.8	53.6	8.4%

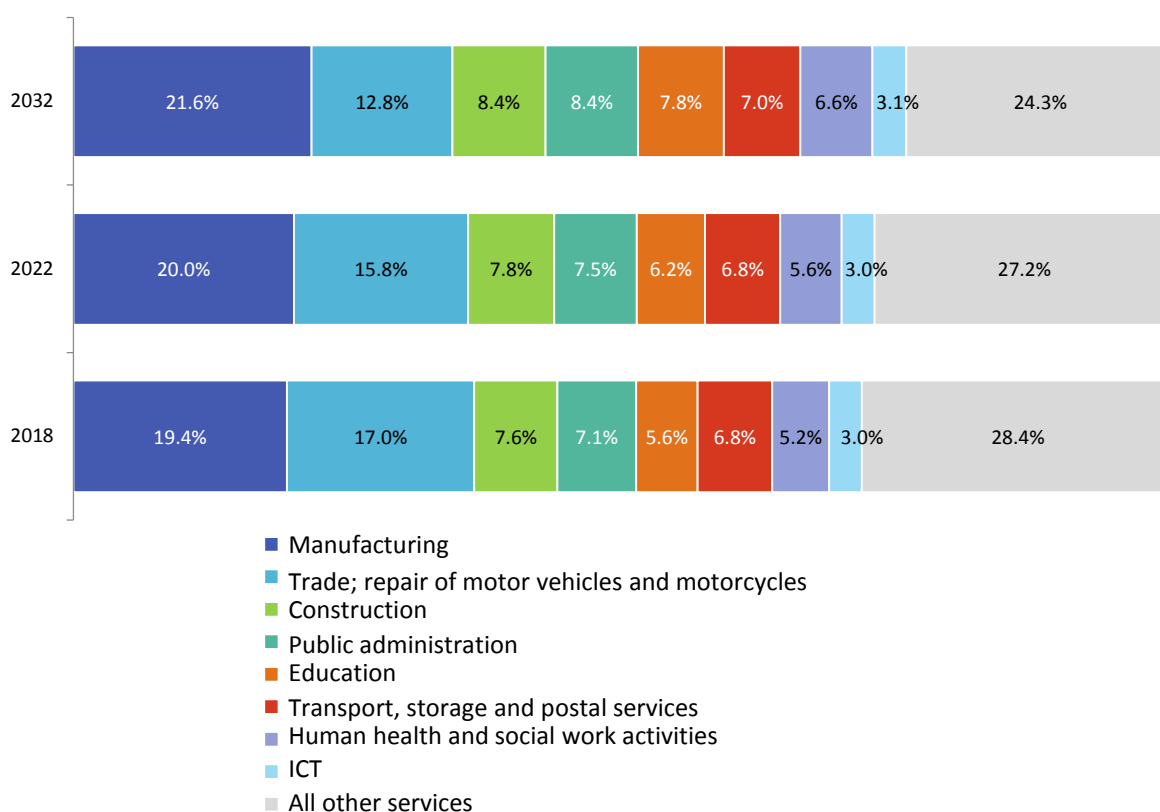
Source: NSI, own calculations

Given a scenario for development, resulting in attainment of the convergence goal, a significant contraction in the following sectors is expected: *trade; repair of motor vehicles and motorcycles*, with the expected number of employees in 2022 being 498.4 thousand, in 2032, it is expected to decrease to 380.3 thousand; and the absolute decline in employment for the period 2018-2032 will amount to 143.8 thousand (a drop of 27.4%). The contraction of the trade sector will be the result of both the general decrease in employment and the expected restructuring of the economy.

*Construction* will continue to have a significant impact on the labour market. In 2022, the employment in the sector is expected to amount to 246.2 thousand and in 2032 – 250.6 thousand, with the employment growth for the period amounting to 13.4 thousand (a growth of 7.6%).

The forecasts for the key sector for economic development *production and distribution of information and cultural products; telecommunications*, show that these activities will keep their role at the labour market, with a slight increase expected in the employees’ share in the total employment. Certain buoyancy is expected in the sector in the next few years: in 2022, the number of employees will amount to 91.5 thousand, with an expected growth of 3.5% in the number of the persons employed in the period 2018-2022. The long-term forecasts for decline in the total employment will not have an impact on the sector: there will be no change in the number of the people employed in it, with their number amounting to 91.5 thousand in 2032. In a scenario, with no significant foreign and domestic investments made in the sector, there is a limited potential for significant employment increase.

Graph 28: **Employment structure forecasts: key sectors’ share in the total employment**



Source: NSI, own calculations

The current employment structure by economic activities in Bulgaria is characterised by lower shares of the sectors *public administration, education and human health and social work activities* than the average ones for the EU-28. Based on Eurostat data from the Labour Force Survey, in 2017, the share of those employed in economic activity *public administration* in the total employment is 7.0%, the share of *education* – 5.4%, and the share of *human health and social work activities* – 5.1%. While in the recent years, the share of the employed in the *public administration* sector has attained a level close to the average EU levels, the *education* and *health* sectors occupy the last positions<sup>58</sup> in terms of size and based on these indicators, the country is significantly lagging behind the rest of the EU member states<sup>59</sup>. The medium and long-term expectations envisage strengthening of the role of these three sectors.

The highest growth is to be attained in the *education* sector – in a scenario of a gradual convergence to the goal set, in 2022, the number of the persons employed in the sector is to reach 196.0 thousand, and in 2032 – 230.9 thousand. The absolute growth in the number of the employed during the period 2018-2032 amounts to 58.6 thousand (a growth of 34.0%). The increase will involve not only the public sector but also private organisations and enterprises engaged in economic activity *education*. Even though the projected changes are significant, they are in line with the EU goals set in the field of development of education and training, as well as with the policy pursued by MES and MLSP, namely: engaging the children in the pre-school education system from an earlier age; linking the social support measures with a requirement for mandatory attendance at school of the children of families receiving social benefits; ensuring efficient support and inclusion in the education process of the students with special educational needs; strengthening the role of life-long learning and vocational training (Bulgaria is at the bottom of the ranking among the EU member states and the levels of the respective indicators are considerably lower than the average ones for the EU-28<sup>60</sup>); introduction of efficient measures for early school drop-out prevention, etc. All these measures and policies require additional investments in the creation of new jobs and have to do with the efficient expansion of the education sector.

Table 13: **Employment projections for the key sectors**

	2018	2019	2020	2021	2022	2032
Manufacturing	597.8	610.1	622.3	627.2	631.5	641.2
Construction	232.8	237.7	242.5	244.5	246.2	250.6
Trade; repair of motor vehicles and motorcycles	524.1	521.2	517.9	508.4	498.4	380.3
Transport, storage and postal services	208.6	211.6	214.5	214.9	215.0	206.2
Production and distribution of information and cultural products; telecommunications	91.2	92.6	94.0	94.2	94.4	91.5
Public administration	219.9	225.5	231.0	233.8	236.4	249.4
Education	172.3	179.3	186.4	191.3	196.0	230.9
Human health and social work activities	159.6	164.6	169.7	172.7	175.6	194.3

Source: Own calculations

<sup>58</sup> Romania is the only other country with lower shares of those specified.

<sup>59</sup> Based on Eurostat data, the 2017 values of these indicators for the EU-28 are as follows: the share of the *Education* sector in employment is 7.6%, and that of *Health* – 11.0%.

<sup>60</sup> For more information, please see European Commission (2018): Education and Training Monitor 2018: Bulgaria.

The other sector of significance for the social and economic cohesion of Bulgaria and the EU is *human health and social work activities*. Ensuring access to quality health services for the population in a medium and long-term run will require domestic and foreign investments and targeted policy for human resources development in the sector, incl. incomes policy. The implementation of the respective investments and measures in the sector is to be invariably linked with the recruitment of new human resources and the creation of new jobs. In 2022, 175.6 thousand people are to be engaged, and in 2032 – 194.3 thousand, with the absolute growth for the period 2018-2032 amounting to 34.7 thousand (10.0%).

## 4.2 Qualified labour force demand in the key sectors

The medium and long-term forecasts for the qualified labour force demand in the key sectors show that:

- In 2022, people with Lower secondary or lower education will be in the highest demand in the activities of *manufacturing* (62.3 thousand), *construction* (25.6 thousand) and *trade and repair of motor vehicles and motorcycles* (14.3 thousand). The most substantial absolute changes are expected in the first two activities, while a certain decrease is expected in the demand for persons with Lower secondary or lower education in the *trade* sector. In 2032, the highest demand for such human resources will be registered in these three sectors as follows: *manufacturing* (63.2 thousand), *construction* (26.0 thousand) and *trade and repair of motor vehicles and motorcycles* (10.9 thousand).
- It is expected that secondary school graduates will be in the highest demand. In 2022, the key sectors under consideration will require nearly 1.5 mln. persons with such qualification. The *manufacturing sector* will be the leading contributing factor to this demand – this same year, it will require 474.0 thousand persons, followed by *trade; repair of motor vehicles and motorcycles* (376.9 thousand), *construction* (173.3 thousand) and *transport, storage and communications* (169.0 thousand). Similarly to the processes related to the demand in basic education labour force, in this case also the highest absolute growth is expected in *manufacturing* and *construction*, and the most significant absolute decline – in the *trade* sector, where the expected decline for the period 2018 – 2032 amounts to 89.3 thousand. In 2032, the highest demand in such human resources will be observed in the sectors: *manufacturing* (481.3 thousand), *trade and repair of motor vehicles and motorcycles* (287.6 thousand) and *construction* (176.4 thousand).
- The number of people with high education, who will be in demand in the key sectors, is expected to amount to 704.7 thousand in 2022. The highest number of jobs requiring such qualifications will be available in the following activities: *public administration* (152.5 thousand) and *education* (131.8 thousand). In 2032, the demand for university degree holders in these sectors will be as follows: *public administration* (160.9 thousand) and *education* (155.3 thousand). These two sectors will register the most significant absolute changes in the demand for such human resources for the whole period covered by the projection (2018-2032). For the same period, the highest decline in the demand for university degree holders is expected to be registered in the activities *trade; repair of motor vehicles and motorcycles* (30.9 thousand).

Table 14: Human resources demand by educational attainment level, thousand

	2018	2019	2020	2021	2022	2032
<b>Lower secondary or lower education</b>						
Manufacturing	58.9	60.2	61.4	61.8	62.3	63.2
Construction	24.2	24.7	25.2	25.4	25.6	26.0
Trade; repair of motor vehicles and motorcycles	15.1	15.0	14.9	14.6	14.3	10.9
Transport, storage and postal services	8.6	8.7	8.8	8.8	8.8	8.5
Production and distribution of information and cultural products; telecommunications	0.3	0.3	0.3	0.3	0.3	0.3
Public administration	3.5	3.6	3.7	3.8	3.8	4.0
Education	7.0	7.3	7.6	7.8	7.9	9.4
Human health and social work activities	8.4	8.6	8.9	9.0	9.2	6.2
<b>Secondary education</b>						
Manufacturing	448.8	458.0	467.1	470.8	474.0	481.3
Construction	163.9	167.3	170.7	172.1	173.3	176.4
Trade; repair of motor vehicles and motorcycles	396.3	394.2	391.6	384.4	376.9	287.6
Transport, storage and postal services	164.0	166.3	168.6	168.9	169.0	162.1
Production and distribution of information and cultural products; telecommunications	31.1	31.5	32.0	32.1	32.1	31.1
Public administration	74.5	76.4	78.3	79.2	80.1	84.5
Education	49.5	51.5	53.5	54.9	56.3	66.3
Human health and social work activities	86.2	89.0	91.7	93.3	94.9	75.7
<b>Tertiary education</b>						
Manufacturing	90.1	92.0	93.8	94.5	95.2	96.6
Construction	44.7	45.7	46.6	47.0	47.3	48.2
Trade; repair of motor vehicles and motorcycles	112.7	112.1	111.4	109.3	107.2	81.8
Transport, storage and postal services	36.1	36.6	37.1	37.1	37.2	35.7
Production and distribution of information and cultural products; telecommunications	59.9	60.8	61.7	61.9	62.0	60.0
Public administration	141.8	145.4	149.0	150.8	152.5	160.9
Education	115.9	120.6	125.3	128.6	131.8	155.3
Human health and social work activities	65.0	67.0	69.1	70.3	71.5	70.2

Source: Own calculations

### 4.3 Leading occupations in the key sectors

The medium and long term demand of specific qualifications depends on the profile, technological development and employment forecasts for each of the key sectors. The occupations, which are expected to be in the highest demand, are as follows:

- Almost one third of the jobs available in the *manufacturing sector* will be meant for Manufacturing Labourers (in 2022, their number will be 53.9 thousand, and in 2032 – 54.8 thousand), *Textile, Fur And Leather Products Machine Operators* (in 2022 their number will be 53.5 thousand, and in 2032 – 54.4 thousand) and *Garment and Related Trades Workers* (in 2022 their number will be 51.3 thousand and in 2032 – 52.1 thousand). The expected employment growth is determined also by the high level of capacity utilisation achieved and the process of recovery of investments that has been underway in the recent years. Apart from this, Bulgarian economy is strongly linked with the EU economy and faces competitive pressure to expand its production capacity and to orient business activities to industries with greater added value. These processes are directly linked to increased demand and labour hiring, and improvement of employment structure in terms of technological intensity.
- Nearly one third of the jobs in *construction* will be taken by *Mining and Construction Labourers* (in 2022, their number will amount to 57.0 thousand, and in 2032 – to 58.1 thousand) and *Building Construction Labourers and Related Trades* (in 2022, their numbers will amount to 18.9 thousand, and in 2032 – 19.2 thousand). Another occupation, which will have a leading role for the industry is *Heavy Truck and Bus Drivers* (in 2022, the number of these drivers will be 14.8, and at the end of the long-term period – the number of the people employed in this profession will amount to 15.1 thousand). These expectations are in line with the sector's development in the recent years: here the process of recovery from the crisis was taking place at the slowest pace and the potential employment levels have not been reached yet. The economic buoyancy in the related economic activities will also contribute positively to the employment growth in the *construction sector*: the development of the housing market shows signs of increased demand and positive expectations about employment in the *real estate transactions*. The accelerated absorption of EU funds will also have a positive impact on employment in the sector.
- In 2022, over one third of the persons employed in *trade activity; repair of motor vehicles and motorcycles* will be employed as *Shop Salespersons*, with their number amounting to 179.2 thousand (accounting for 36.0% of the employment in the sector). Projections indicate that there will be a decline in these positions at the labour market and in 2032 they will drop to 136.7 thousand. Other two occupations of significance in the sector will be *Other Sales Workers* (in 2022, the number of the people employed in this position will be 28.8 thousand, and in 2032 – 22.0 thousand) and *Material Recording and Transport Clerk* (in 2022 – 21.9 thousand and in 2032 – 16.7 thousand). While the forecasts for the previous two sectors indicated stable demand and weak growth in the number of the employed, in this case, employment decline is expected, which will have an impact on all occupations in the sector. In the medium term, the leading occupations in *trade* will have a relatively greater significance, which will, however, tail off in the long run. The main reason for this will be the negative trend registered by the *retail trade*, which has been the leading one in the sector in terms of employment over the past few years. On the other hand, the decrease in the retail trade activities in the long run are the result of the declining and aging population (the number of consumers is constantly decreasing), income inequality and the relatively low level of income compared to the rest of the European countries (EU member states and other), and last but

not least, the continued consolidation of the sector and a growing competition among the large commercial chains.

- Nearly one third of the employed in activity *transport, storage and postal activities*, will be *Heavy Truck and Bus Drivers* (in 2022, the number of the persons employed in these jobs will be 70.5 thousand, and in 2032 – 67.6 thousand). Two other occupations of significance for the industry are *Material Recording and Transport Clerk* (in 2022, the number of the employed in this job will be 11.7 thousand and in 2032 – 11.2 thousand) and *Physical and Engineering Science Technicians* (their number in 2022 will be 9.6 thousand, and in 2032 – 9.2 thousand). The main reason for the medium term employment growth in the sector is the stable growth in domestic demand and the export, which suggest a positive impact on the whole sector, land transport in particular. In addition, the forthcoming legislative developments at EU level, concerning the international transport services will have an impact on labour demand in the sector.
- The occupation in greatest demand in sector *production and distribution of information and cultural products; telecommunications* will be *Software and Applications Developers and Analysts*, which in 2022 will cover 20.0 thousand, and in 2032 – 19.4 thousand, which will account for 21.2% of the employees in the sector (every fifth person in the sector will be a developer). Other occupations of significance in this economic activity are *Database and Network Professionals* (their number in 2022 will be 5.7 thousand, and in 2032 – 5.5 thousand) and *Telecommunications and Broadcasting Technicians* (their number in 2022 will amount to 5.6 thousand, and in 2032 – to 5.4 thousand).
- Nearly one third of the employed in *public administration* sector will be *Administration Professionals* (the number of the employed in this profession in 2022 will be 73.7 thousand, and in 2032 – 77.8 thousand). Every fifth employee will be employed as *Government Regulatory Associate Professional* (in 2022 the number of the *Associate Professionals* will amount to 48.2 thousand, and in 2032 – to 50.9 thousand). The third most important occupation in the sector is *Business Services and Administration Managers* (in 2022, the number of *managers* will be 16.7 thousand, and in 2032 – 17.7 thousand, or 7.1% of the persons employed in the sector).
- Teachers will be in the greatest demand in the *education sector* – the jobs for *secondary education teachers (5<sup>th</sup>-12<sup>th</sup> grade)* in 2022 will amount to 44.2 thousand, and in 2032 – to 52.0 thousand (22.5% of the employees in the sector); and those for *primary school teachers (1<sup>st</sup>-4<sup>th</sup> grade) and early childhood teachers* – to 37.7 thousand in 2022 and to 44.4 thousand in 2032 (19.2% of the persons employed). Another important occupation for the sector, which is expected to engage every tenth employee, will be *Teaching Professionals Not Elsewhere Classified* (in 2022 their number will be 20.0 thousand, and in 2032 – 23.6 thousand).
- In 2022, there will be 46.0 thousand (one fourth of the persons employed in the sector) *Nursing and Midwifery Professionals* in sector *human health and social work activities*, and in 2032 – 50.9 thousand. The next most significant occupation in the sector will be *Personal Care Workers in Health Services* (with a share of 18.0% and employing 31.6 thousand in 2022 and 35.0 thousand persons employed in 2032). The number of *medical doctors* in demand will amount to 24.4 thousand in 2022 and 27.0 thousand in 2032 – accounting for 13.9% of the employees in the health sector.

Table 15: Projections for Top 3 occupations (number of persons employed, thousand)

		2022	2032	Share in the employment in the sector, 2032
<b>Manufacturing</b>				
1	Manufacturing Labourers	53.9	54.8	10.4%
2	Textile, Fur and Leather Products Machine Operators	53.5	54.4	10.3%
3	Garment and Related Trades Workers	51.3	52.1	9.9%
<b>Construction</b>				
1	Mining and Construction Labourers	57.0	58.1	23.2%
2	Building Frame and Related Trades Workers	18.9	19.2	7.7%
3	Heavy Truck and Bus Drivers	14.8	15.1	6.0%
<b>Trade; repair of motor vehicles and motorcycles</b>				
1	Shop Salespersons	179.2	136.7	36.0%
2	Other Sales Workers	28.8	22.0	5.8%
3	Stock and Transport Clerks	21.9	16.7	4.4%
<b>Transport, storage and postal activities</b>				
1	Heavy Truck And Bus Drivers	70.5	67.6	32.8%
2	Stock and Transport Clerks	11.7	11.2	5.4%
3	Physical and Engineering Science Technicians	9.6	9.2	4.5%
<b>Production and distribution of information and cultural products; telecommunications</b>				
1	Software and Applications Developers and Analysts	20.0	19.4	21.2%
2	Database and Network Professionals	5.7	5.5	6.1%
3	Telecommunications and Broadcasting Technicians	5.6	5.4	5.9%
<b>Public administration; compulsory social security</b>				
1	Administration Professionals	73.7	77.8	31.2%
2	Government Regulatory Associate Professionals	48.2	50.9	20.4%
3	Business Services and Administration Managers	16.7	17.7	7.1%
<b>Education</b>				
1	Secondary Education Teachers (5 <sup>th</sup> -12 <sup>th</sup> grade)	44.2	52.0	22.5%
2	Primary School (1 <sup>st</sup> -4 <sup>th</sup> grade) and Early Childhood Teachers	37.7	44.4	19.2%
3	Other Teaching Professionals	20.0	23.6	10.2%
<b>Human health and social work activities</b>				
1	Nursing and Midwifery Professionals	46.0	50.9	26.2%
2	Personal Care Workers In Health Services	31.6	35.0	18.0%
3	Medical Doctors	24.4	27.0	13.9%

Source: Own calculations

#### 4.4 Employment by sex and age in the key industries

In the medium and long run, relative gender employment equality will be observed in the sectors: manufacturing, trade; repair of motor vehicles and motorcycles and production and distribution of information and cultural products; telecommunications. The sectors where it is expected that male employees will outnumber the female ones are construction and transport, storage and communications. The sectors where women will significantly outnumber the men employed will be education and human health and social work activities.

Table 16: **Medium and long-term employment forecasts by sex, thousand people**

<b>Male employment</b>	<b>2022</b>	<b>2032</b>	<b>Share in the total male employment in the key sectors, 2032</b>
Manufacturing	318.6	323.5	23.7%
Construction	206.7	210.4	15.4%
Trade; repair of motor vehicles and motorcycles	225.2	171.8	12.6%
Transport, storage and communications	155.3	148.9	10.9%
Production and distribution of information and cultural products; telecommunications	55.0	53.3	3.9%
Public administration; compulsory social security	78.6	83.0	6.1%
Education	39.0	46.0	3.4%
Human health and social work activities	36.7	40.7	3.0%

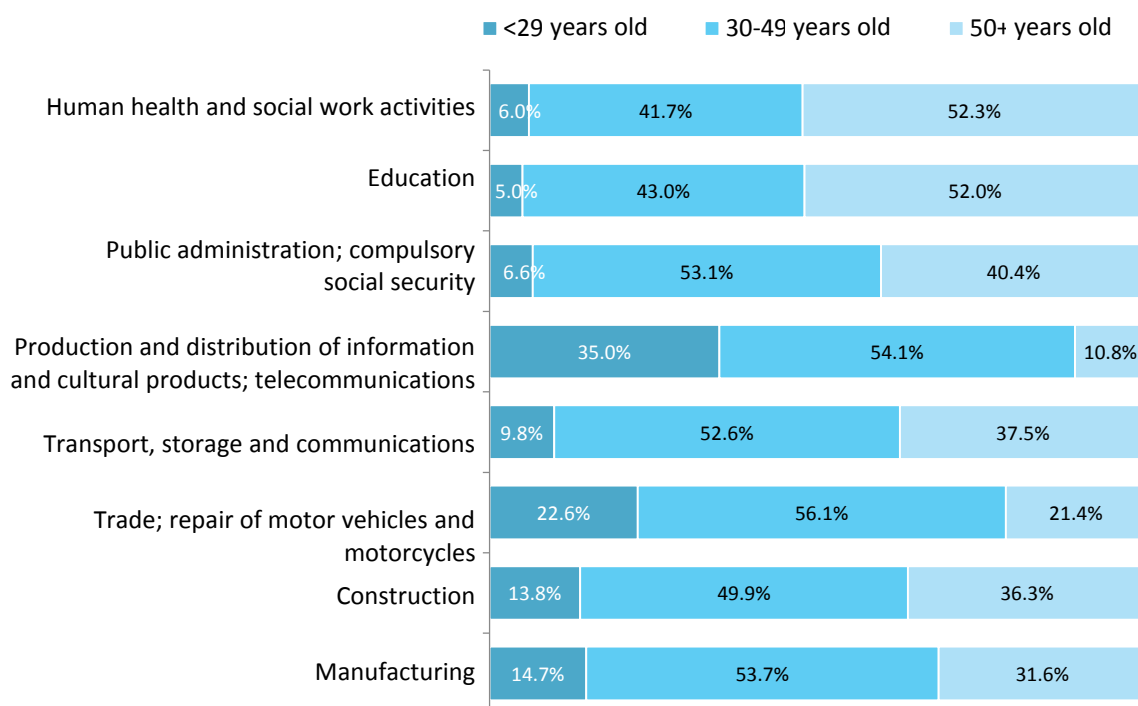
<b>Female employment</b>	<b>2022</b>	<b>2032</b>	<b>Share in the total female employment in the key sectors, 2032</b>
Manufacturing	312.9	317.7	21.5%
Construction	39.5	40.2	2.7%
Trade; repair of motor vehicles and motorcycles	273.2	208.5	14.1%
Transport, storage and communications	59.7	57.3	3.9%
Production and distribution of information and cultural products; telecommunications	39.4	38.2	2.6%
Public administration; compulsory social security	157.8	166.5	11.3%
Education	157.0	184.9	12.5%
Human health and social work activities	138.9	153.7	10.4%

Source: Own calculations

In 2022, male employees in the key sectors will be engaged mostly in *manufacturing* (318.6 thousand) and *construction* (206.7 thousand); they will be least represented in *human health and social work activities and education* (36.7 thousand). In 2032, the number of the male employees in these sectors will be as follows: *manufacturing* (323.5 thousand), *construction* (210.4 thousand); they will be least represented in *human health and social work activities and education* (40.7 thousand).

In 2022, female employees in the key sectors will be mostly engaged in *manufacturing* (312.9 thousand) and *trade* (273.2 thousand) and least represented in *production and distribution of information and cultural products; telecommunications* and *construction* (39.4 thousand). In 2032, the number of women employed in these sectors will be as follows: *manufacturing* (317.7 thousand), *trade; repair of motor vehicles and motorcycles* (208.5 thousand), and they will be least represented in *production and distribution of information and cultural products; telecommunications* and *construction* (38.2 thousand).

Graph 29: **Employment age structure, 2022**



Source: Own calculations

A relatively low age of the employees will be observed in the following sectors:

- *Production and distribution of information and cultural products; telecommunications*: in 2022, 68.8 thousand of the employees will be under 40 years old (their share in the total employment in the sector will amount to 72.9%), and in 2032, their number will be 66.7 thousand.
- *Trade; repair of motor vehicles and motorcycles*: in 2022, 266.6 thousand of the employees will be under 40 (the share of this group in the total employment in the sector will amount to 53.5%), and in 2032, their number will amount to 203.4 thousand.

In the medium and long run, the highest share of employees aged 20-29 will be observed in the following sectors: *Production and distribution of information and cultural products; telecommunications*

(34.8% of all the persons employed in the sector) and *trade; repair of motor vehicles and motorcycles* (21.8% of all the persons employed in the sector).

The medium and long-term forecasts show that there will be two sectors where we will observe relative aging of the employees:

- *Education and human health and social work activities*: in 2022, the number of the employees in *education* aged over 50 is expected to amount to 102.0 thousand (52.0% the employed), and in 2032 – to 120.2 thousand.
- *Human health and social work activities*: the forecasts for employees over 50 for 2022 show that their number will be 91.9 thousand (52.3% of the employees in the sector), and for 2032 – their number will be 101.7 thousand.

In the medium and long run, the sectors where employees over 60 will have the highest share are as follows: *Human health and social work activities* (17.5% of all the employees in the sector) and *education* (13.7% of all the employees in the sector).

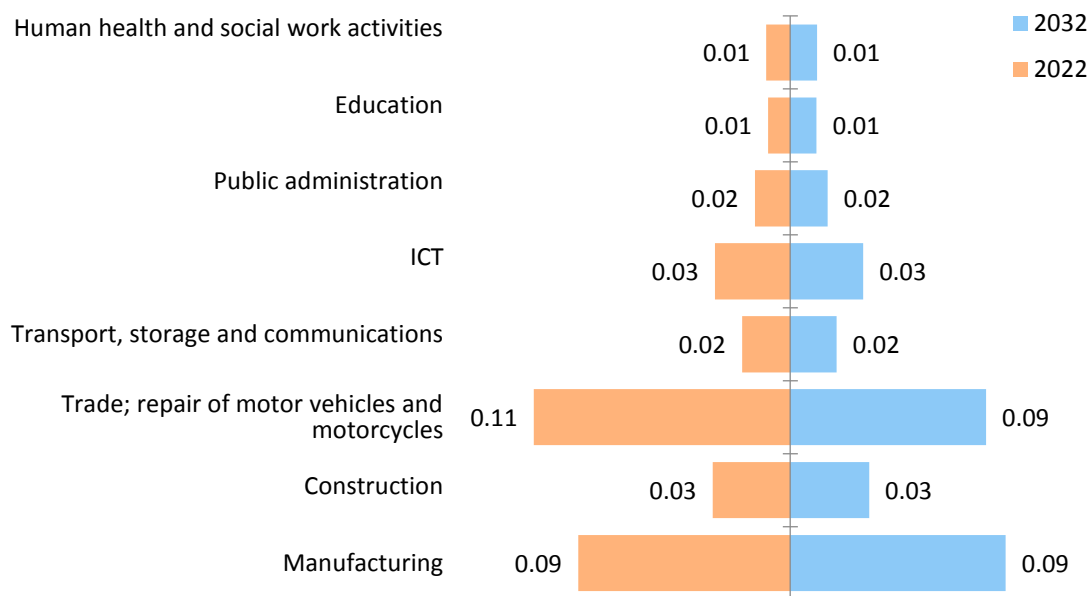
Table 17: **Medium and long-term employment forecasts by age groups, thousand people**

	< 20	20-29	30-39	40-49	50-59	60+
<b>2022</b>						
Manufacturing	2.7	90.4	158.7	180.2	153.2	46.3
Construction	0.8	33.2	60.2	62.7	60.9	28.4
Trade; repair of motor vehicles and motorcycles	4.0	108.6	154.0	125.3	77.6	28.9
Transport, storage and communications	0.4	20.7	49.3	63.9	63.6	17.0
Production and distribution of information and cultural products; telecommunications	0.2	32.8	35.7	15.4	7.6	2.6
Public administration	0.0	15.5	51.3	74.1	72.1	23.3
Education	0.1	9.7	29.2	55.0	75.2	26.8
Human health and social work activities	0.1	10.5	25.0	48.2	61.1	30.8
<b>2032</b>						
Manufacturing	2.7	91.8	161.1	182.9	155.5	47.1
Construction	0.8	33.8	61.3	63.8	62.0	28.9
Trade; repair of motor vehicles and motorcycles	3.0	82.8	117.5	95.6	59.2	22.1
Transport, storage and communications	0.4	19.9	47.3	61.3	61.0	16.3
Production and distribution of information and cultural products; telecommunications	0.2	31.8	34.6	14.9	7.4	2.5
Public administration	0.0	16.4	54.2	78.2	76.0	24.6
Education	0.1	11.4	34.4	64.8	88.6	31.6
Human health and social work activities	0.1	11.6	27.6	53.3	67.6	34.1

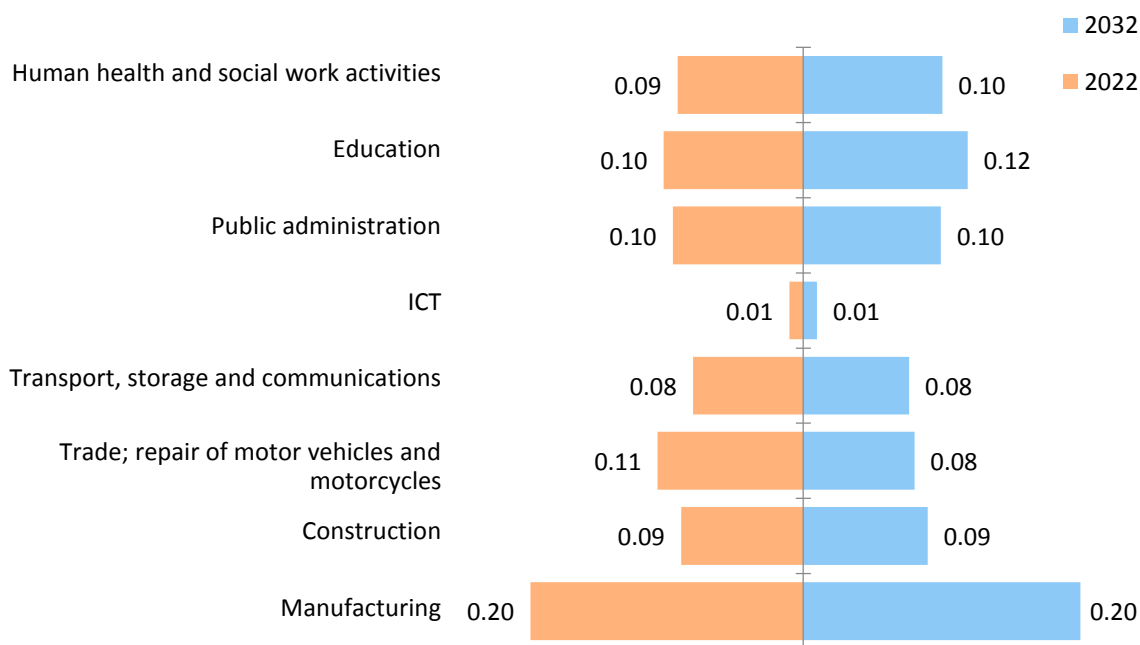
Source: Own calculations

Graph 30: **Employment structure forecasts for employees from age groups up to 29 and over 60 by sectors, mln persons.**

**Age group up to 29 years old**



**Age group 60 and over**



Source: NSI, own calculations

# PART 2

## LABOUR MARKET IMBALANCES

## CHAPTER 5

# EDUCATIONAL IMBALANCES

### 5.1 Mismatch between labour supply and labour demand by educational attainment level in Bulgaria and EU-28: 2008–2017

The mismatch index (MI) between labour demand and labour supply is the sum total of the differences between the shares of the working age population by educational attainment level and the shares of employed by educational attainment level in total employment.<sup>61</sup>

The mismatch was highest for the population with Lower secondary or lower education, and, in years of declining labour demand its value significantly exceeded the value in years of economic growth and high labour demand. This again demonstrates that in worsened economic conditions the first to lose their jobs are the people with low or with no educational attainment. Their subsequent reintegration into the labour market can only take place well after the recovery of relatively high economic activity in the country.

The mismatch index for tertiary education graduates was higher than for upper secondary graduates throughout the whole period of the analysis. Between 2008 and 2017 the share of the population and of employed with Secondary and Lower secondary or lower education in the country declined gradually, while that of tertiary education graduates increased steadily, and so did the labour supply of people with such educational and qualification characteristics. This also explains the fact of entrepreneurs constantly highlighting the lack of staff with technical-school degrees as a deterrent to further production growth.

It should also be noted that the total mismatch index for Bulgaria dropped significantly in 2016 and 2017, mainly due to the improved balance between labour demand and labour supply for the population with the lowest educational attainment level, where the supply decreased faster than the demand.

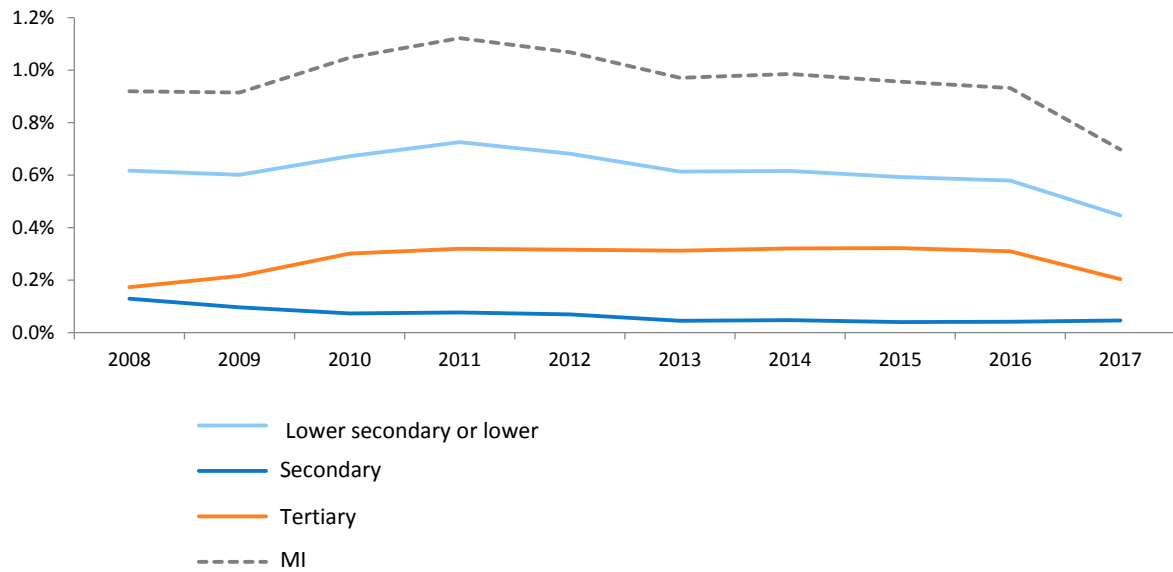
In 2009 the mismatches in the EU-28 sharpened as a result of the crisis, and their recovery did not begin until 2014, together with the acceleration in the growth of Community economies. It is worth

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<sup>61</sup> MI is calculated by the formula  $MI_t = \sum (Sit - Dit)^2$  for each  $i = 1, 2, 3$ ; where  $Sit$  is the share of the working age population with  $i$  educational attainment level over  $t$  period, and  $Dit$  is the share of employed with  $i$  educational attainment level over the same  $t$  period. The educational attainment levels are: Lower secondary or lower education, Secondary education and Tertiary education. All calculations made refer to the age group 25-64 and are based on Eurostat data.

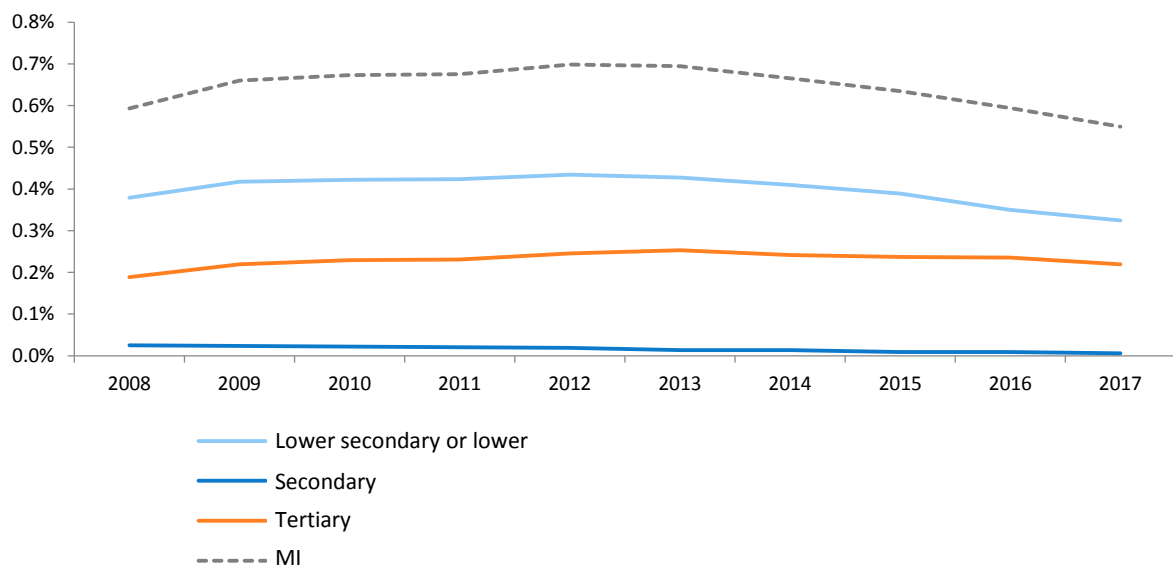
mentioning that mismatches were not as pronounced in the EU as in Bulgaria, and were mostly related to people with Lower secondary or lower education, for whom the supply significantly exceeded the demand throughout the period. Tertiary education graduates in the EU enjoyed a higher demand than supply in the post-crisis period and until the end of 2013, when the trend was reversed. Near the end of the reference period there was another improvement in the balance between labour supply and labour demand in the EU-28, in particular regarding Lower secondary or lower education, which was due to the faster drop in the share of supply over demand for labour with such qualifications.

**Graph 31: Mismatch between labour demand and labour supply in Bulgaria by educational attainment level in the period 2008–2017**



Source: Eurostat, own calculations

**Graph 32: Mismatch between labour demand and labour supply in EU-28 by educational attainment level in the period 2008–2017**

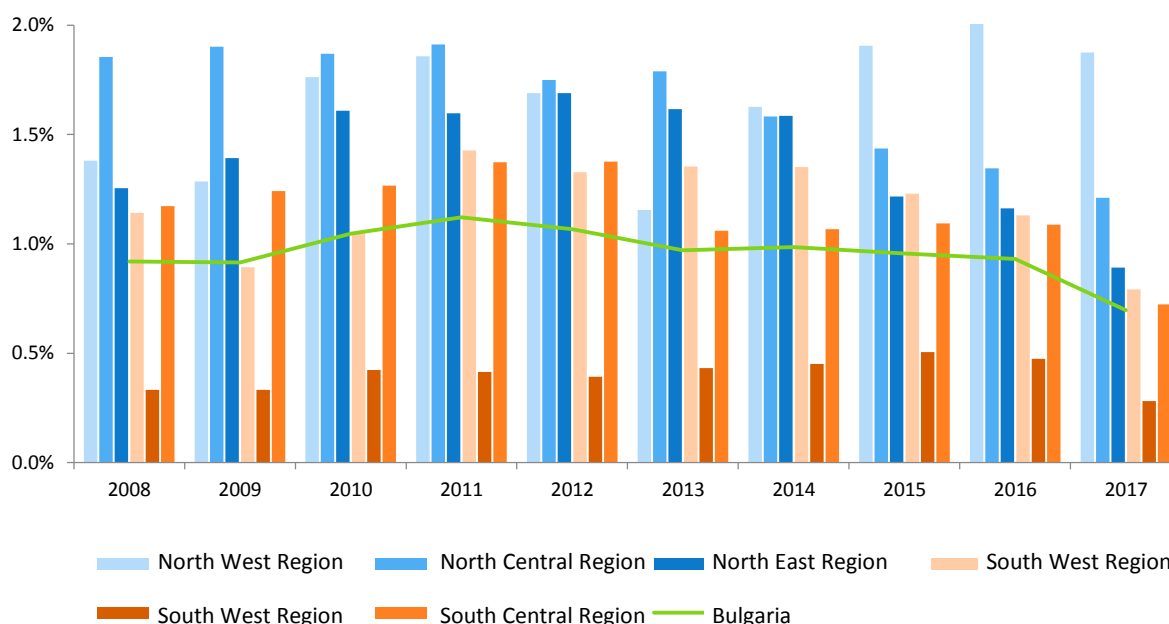


Source: Eurostat, own calculations

In EU countries the mismatches by educational attainment level were less pronounced than in Bulgaria, mainly in regard to the population with Lower secondary or lower education, and in Bulgaria the supply of labour with this attainment level significantly exceeded the demand.

The MI dynamic by region and by educational attainment level in Bulgaria varied significantly. Only South East Region had a lower than the national average MI in the entire reference period. North Central and North West regions were at the other end of the spectrum, with the sharpest mismatches in most reference-period years. It should be noted, however, that there has been a divergence in indicator dynamics between these two regions since 2013, and whereas in North Central Region the MI began to drop and to approximate the values for other three regions, where the mismatches were closer to the national average, for North West it deepened, and in 2016–2017 the region stood out as the one with the sharpest mismatches in labour supply and labour demand by educational attainment level. A further important observation is that during the reference period the mismatch between labour supply and labour demand for tertiary education graduates in the region was rising.

Graph 33: **Mismatch between labour demand and labour supply in Bulgaria by region in the period 2008–2017**



Source: Eurostat, own calculations

In the period 2010–2012 MI growth was due to a faster decrease in demand over supply of labour mostly as regards the population with the lower educational attainments, while at the same time the number of employed tertiary and upper secondary graduates was growing at a faster rate than the corresponding population growth in almost all regions. North East and South Central regions were the only ones to report a steady increase in the mismatch between labour demand and labour supply in the period 2010–2012, due to both greater decrease in demand over supply of labour with lower educational attainments, and greater increase in demand over supply of labour with tertiary education.

In 2013–2015 there was a gradual decrease in the MI rate in the country, which was due to the narrowing of the gap between the supply and demand for labour with Lower secondary or lower education, where the drop in the number of employed was sharper than the corresponding drop in the

population with this attainment level in North Central, North East and South East regions. At the same time, in those regions the labour supply rate outpaced the demand for tertiary education graduates, and mismatches began to diminish accordingly.

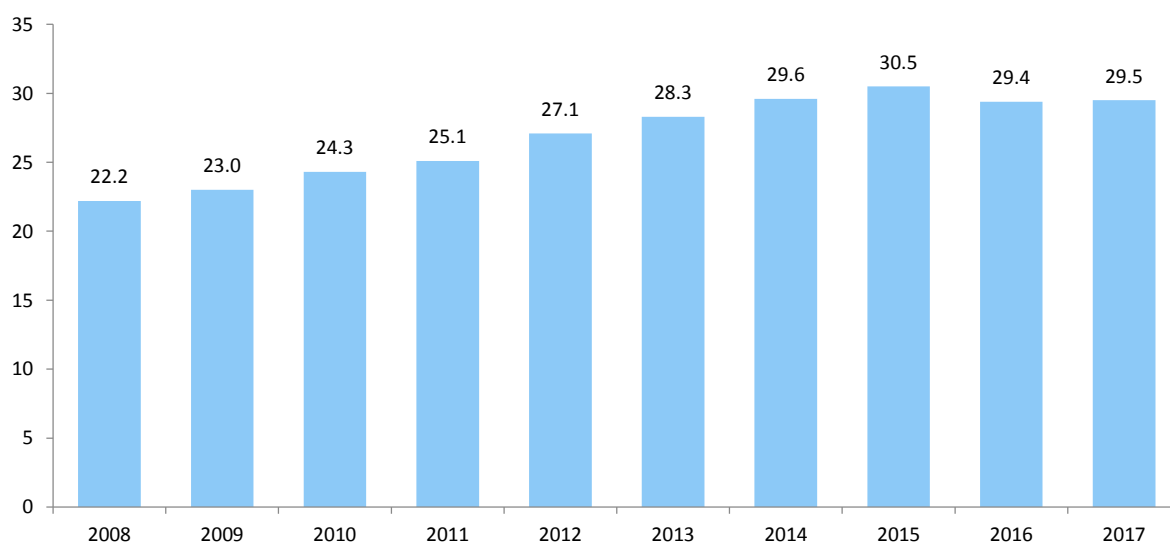
The period 2016–2017 saw an improvement in the match between labour demand and labour supply in all regions except for North West. There mismatches increased, as the share of the corresponding population grew faster than the demand for labour with Lower secondary or lower education. As regards upper secondary graduates, however, labour demand in the region exceeded the supply, resulting in a corresponding MI growth in the last three years. The narrowing of the gap between labour demand and labour supply in all other regions was mainly due to the better match as regards both *Lower secondary or lower* and *tertiary* educational attainment levels.

## 5.2 Mismatch between education and occupation: 2008–2017

Eurostat data<sup>62</sup> point to a growing number of tertiary education graduates in occupations requiring lower qualifications. This trend began with the onset of the economic crisis and peaked in 2015, when over one-third of this population was employed in occupations with lower qualification requirements.

One of the underlying factors for this process was lower labour demand during the crisis period and the relatively higher flexibility of the population with higher education and qualifications, as well as the ability to start a new job even when it does not match the attained level.

Graph 34: **Share of overqualified population aged 15-64 in occupations with lower qualification requirements in the period 2008–2017, EU-28, %**



Source: Eurostat, own calculations

<sup>62</sup> According to Eurostat annual data for *Employees by educational attainment level, sex, age and occupation, %*, overqualified persons are persons who have attained tertiary education and who work in occupations such as: clerical support workers, services and sales workers, skilled agricultural, forestry and fishery workers, craft and related trades workers, plant and machine operators and assemblers or in elementary occupations.

### 5.3 Projected medium-term and long-term structural mismatches by educational attainment level: 2018–2032

The needs for human resources with a particular educational attainment level in different economic activities will be based on the structure of occupations in terms of qualification requirements. These needs at the macroeconomic level are contrasted with the labour supply resulting from demographic and socio-economic processes; as well as at the level of employment, determined by technological development, economic convergence processes and macroeconomic dynamics. In this way structural mismatches in employment are identified and estimated. They, however, are not an indicator of unemployment or of cessation of production in a given sector, but rather of a mismatch between the available and the required human capital in individual economic activities. The labour market operates in such a way that once vacancies are filled with staff having the particular qualifications required, any mismatch that may subsequently occur will be compensated for by a natural shift of human resources to occupations requiring lower or higher qualifications.

The forecasts point to serious current and potential structural deficits of *upper secondary* graduates across sectors. In the medium term these deficits will decrease gradually, and in 2022 they will affect 165.0 thousand occupations, which will experience insufficient supply of the required human resources. At the end of the long-term horizon, in 2032, these structural deficits will total 94.2 thousand, and the vacancies will be filled by people having either a lower or a higher than the required qualification.

At the same time, the labour market will experience structural surpluses of employed with *tertiary* and *Lower secondary or lower education*. The forecasts suggest an increase in the structural surplus of tertiary education graduates, where in 2022 their number in occupations with lower educational requirements is expected to total 41.6 thousand, and in 2032 – 41.1 thousand.

As regards the population with Lower secondary or lower education, the mismatch that can be currently observed is expected to be largely overcome in the long term, as the number of employed in occupations requiring higher qualifications in 2022 is expected to be 125.4 thousand, and in 2032 – 53.0 thousand. In fact, these people will be employed, but in occupations with higher qualification requirements.

Table 18: **Mismatch between persons in employment by educational attainment level and the need for such persons, thousands persons**

	2018	2019	2020	2021	2022	2032
Lower secondary or lower education	152.7	157.7	152.1	136.4	125.4	53.0
Secondary education	-185.7	-192.7	-187.6	-177.4	-167.0	-94.2
Tertiary education	32.9	35.0	35.5	41.0	41.6	41.1

*Key: A negative difference (mismatch) indicates a structural deficit of an educational attainment level that will be filled (offset) by persons having a different level than the one sought. A positive difference (mismatch) indicates a structural surplus of an educational attainment level that will be reallocated where there are deficits.*

*Source: own calculations*

The expected structural mismatches in employment will not affect economic activities in the same way. Contrasting the demand and the supply of a particular educational attainment level is conditional on the motivation and the ability of jobseekers to start work in a particular industry. Motivation and choice are in turn affected by the attractiveness of economic activities in terms of the pay rate for the different educational levels (varying return on education by sector), the degree of labour

market mobility, and other factors affecting jobseekers' choices. These comparisons can highlight the economic activities characterised by structural deficits.

The projected attractiveness of economic activities in terms of pay rate per educational attainment level has been calculated on the basis of the convergence objective underpinning the model (current structure and pay rate in Eastern European member states<sup>63</sup>). The ranking of employees' preferences for economic activities (in terms of pay rate) points to a significant and steady lag in pay rate in some sectors. Therefore, least popular with employees with Lower secondary or lower education is *Public Administration*, while for those with upper secondary and tertiary education this is *Accommodation and Food Service Activities*.

The level of labour market mobility also affects employees' choices of economic activity in which they are occupied. The forecasts have been prepared in consideration of the current limited mobility factor, and, as a matter of fact, none of the economic activities can be expected to be fully depopulated. After all, the projected structural deficits are not expected to affect all economic activities, but just those with relatively low pay rates and therefore least popular with jobseekers. To a certain extent, the reduction of structural deficits in the long term will be due to an overall shrinking of employment, as well as to an expected shrinking of some sectors (a result of the convergence process for the Bulgarian economy).

Table 19: **Ranking of jobseekers' preferences for economic activities by educational attainment level, forecasting horizon 2022**

Rank	Lower secondary or lower education	Secondary education	Tertiary education
<b>Most popular</b>			
1	Electricity, Gas, Steam and Air Conditioning Supply	Electricity, Gas, Steam and Air Conditioning Supply	Water Supply; Sewerage, Waste Management and Remediation Activities
2	Mining and Quarrying	Mining and Quarrying	Electricity, Gas, Steam and Air Conditioning Supply
3	Information and Communication	Information and Communication	Financial and Insurance Activities
4	Financial and Insurance Activities	Financial and Insurance Activities	Information and Communication
5	Manufacturing	Water Supply; Sewerage, Waste Management and Remediation Activities	Mining and Quarrying
<b>Least popular</b>			
14	Accommodation and Food Service Activities	Human Health and Social Work Activities	Education
15	Education	Administrative and Support Service Activities	Administrative and Support Service Activities
16	Administrative and Support Service Activities	Education	Other Service Activities
17	Public Administration	Other Service Activities	Arts, Entertainment and Recreation
18	Other Service Activities	Accommodation and Food Service Activities	Accommodation and Food Service Activities

Source: own calculations

<sup>63</sup> The list includes Czech Republic, Estonia, Croatia, Latvia, Lithuania, Hungary, Poland, Romania, Slovenia and Slovakia.

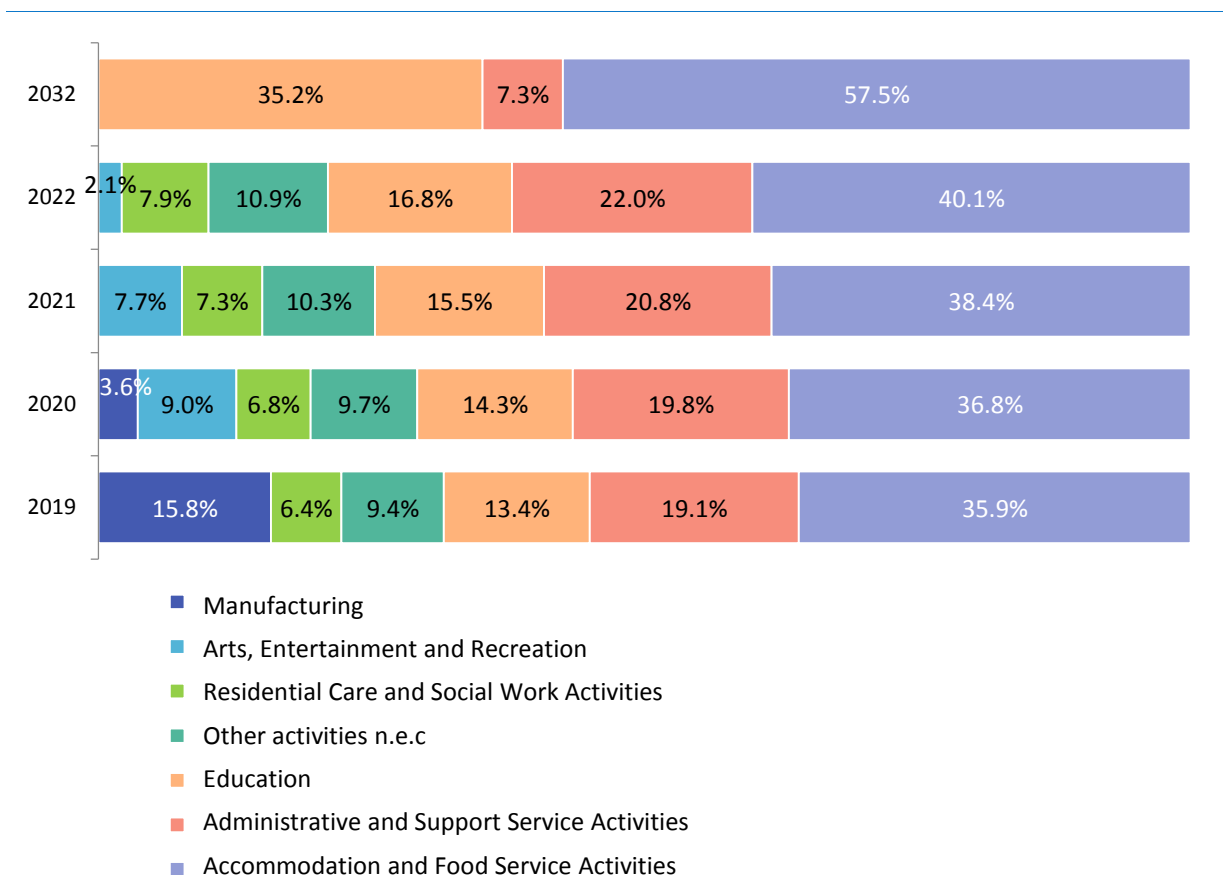
The largest deficits of upper secondary graduates will be observed in the following activities: *Accommodation and Food Service Activities*, which in 2022 will be short of 67.0 thousand, and in 2032 – of 54.1 thousand employees with upper secondary education; *Administrative and Support Service Activities*, where the problem will affect a total of 36.8 thousand occupations, although in the long term it will start to diminish; *Education*, in which in 2022 shortages will amount to 28.1 thousand employees with upper secondary education, and in 2032 the problem will have affected 33.1 thousand occupations. Other economic activities that will experience similar problems in the medium- and/or in the long term will be *Manufacturing*, *Residential Care and Social Work Activities*, and *Arts, Entertainment and Recreation*.

Table 20: **Mismatches by economic activity: shortage of upper secondary graduates, people thousands**

	2018	2019	2020	2021	2022	2032
Manufacturing	-25.3	-30.5	-6.8	0.0	0.0	0.0
Accommodation and Food Service Activities	-69.2	-69.1	-69.0	-68.0	-67.0	-54.1
Administrative and Support Service Activities	-36.6	-36.9	-37.1	-37.0	-36.8	-6.9
Education	-24.7	-25.7	-26.7	-27.4	-28.1	-33.1
Residential Care and Social Work Activities	-12.0	-12.4	-12.8	-13.0	-13.2	0.0
Arts, Entertainment and Recreation	0.0	0.0	-16.9	-13.6	-3.6	0.0
Other Activities n.e.c.	-17.8	-18.0	-18.3	-18.3	-18.3	0.0

Source: own calculations

Graph 35: **Share of shortages of upper secondary graduates in total structural deficit, %**



Source: own calculations

The presence of imbalances between the demand and the supply of a particular educational attainment level is the cause of structural mismatches in employment and of the existence of *underemployment*<sup>64</sup> and *overemployment*<sup>65</sup> in the labour market. To a certain extent, these occur in every single labour market; however, if they are significant, this is indicative of structural problems preventing the effective functioning of the labour market, the production process, and the development of the economy.

The labour market forecasts for Bulgaria point to existence of significant overemployment among the population with Lower secondary or lower educational attainment levels and underemployment among tertiary education graduates. In 2014 an assessment of the structural mismatches in employment in the Bulgarian labour market was done for the first time, and it found significant structural deficits of human resources with upper secondary education and structural surpluses of tertiary education graduates in the medium- and in the long term. At the time, the forecasts anticipated that the underemployment of tertiary education graduates would persist due to their being redirected to occupations traditionally held by upper secondary graduates, currently affected by staff shortages. The changes to the educational structure of employment occurring in the period 2010-2014<sup>66</sup> were significant, and current imbalances in the labour market suggest a further aggravation of the situation. In this relatively short period some very big changes occurred. The estimates done with the help of the forecasting model indicate that a total of 149.4 thousand occupations, which in 2010 were taken by employees with upper secondary education, had already been given to tertiary education graduates in 2014. The biggest percentage changes can be seen in *Information and Communication* (with a 10.0% increase in the share of employees with tertiary education) and in *Human Health and Social Work Activities* (with a 9.6% share increase). In absolute terms the most pronounced changes were in *Human Health and Social Work Activities* (where the number of tertiary education graduates in occupations requiring upper secondary education totalled 56.5 thousand) and in *Public Administration* (with 28.7 thousand such cases). The causes of this situation are as follows:

- Shortage of human resources with adequate qualifications;
- Succession of generations in the labour market and demographic processes associated with continuous improvement of the educational structure of the population;
- Statutory changes of the qualification requirements for certain occupations;
- Improved qualifications of employees in certain occupations (completion of tertiary education);
- Expansion of business activities and emerging needs of highly-skilled (management) staff;
- Processes related with the digitalisation of the economy etc.

These observations are indicative of current and ongoing changes in occupational profiles in the labour market. Occupations traditionally held by upper secondary graduates have already been or are likely to be given to jobseekers with tertiary education. If the Bulgarian economy continues to lag behind technological development, this structural change will seemingly indicate an overcoming of structural deficits. In effect, however, in the absence of technological development, underemployment problems for tertiary education graduates will persist, but will become increasingly difficult to

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<sup>64</sup> In its broader sense, *underemployment* refers to the utilisation of employee qualifications, the length of working hours of engagement, and the job description for the position held. In our case the following working definition has been adopted for the forecasting model: employee engagement in occupations that do not fully utilise their knowledge and skills; this is the case where an employee is overqualified for the occupation held, and his/her experience and knowledge surpass what is necessary to successfully carry out the commitments arising from this occupation.

<sup>65</sup> The broad definition of *overemployment* similarly refers to qualifications, length of working hours, and content and scope of the tasks performed. The working definition adopted for the model is as follows: engagement in an occupation requiring higher qualifications than the one currently held by the employee.

<sup>66</sup> The analyses of the educational structure of employment are based on the only in-depth and comprehensive labour market survey – Eurostat's four-yearly *Structure of Earnings Survey*.

identify, and so the number of underemployed will be underestimated.<sup>67</sup> The underlying causes for this can be seen in the ongoing modification of job descriptions and in the changing attitudes of employers, workers, educational institutions and students. All these processes are the result (and to a certain extent also the cause) of the current “inflation” of tertiary education in the global and domestic labour markets.

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<sup>67</sup> During simulations taking into account these processes in the Bulgarian labour market, the estimated underemployment of workers with tertiary education in 2018 was found to affect a total of 157.0 thousand persons, and in 2022 this number is expected to reach 170.5 thousand.

## CHAPTER 6

# REGIONAL IMBALANCES

### 6.1 Regional variations in labour market indicators

In periods of low labour demand, the variations in coefficients of regional employment rates fall, while those in coefficients of regional unemployment rates rise.

The measuring toolkit for variations in the condition of regional labour markets includes the *coefficients of variation of regional employment and unemployment rates*. The latter two have different dynamics in periods of improved and of deteriorating labour market conditions. In years of falling labour demand, the coefficient of variation of regional employment rates shows a downward trend, and in years of employment recovery regional employment variations start to grow. Variations of regional unemployment rates have the opposite tendency – in years of falling labour demand, the variation between regional unemployment rates decreases, and in years of high labour demand it goes up.

Table 21: **Coefficient of variation and range of variation of employment rate by province in the period 2008–2016**

Indicator	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coefficient of variation, %	9.4%	10.0%	10.8%	8.4%	8.2%	8.7%	8.5%	9.4%	9.1%
Range of variation – difference between maximum and minimum value, p.p.	24.2 Sofia-City – 73.9%; Razgrad – 49.7%	24.5 Sofia-City – 73.3%; Razgrad – 48.8%	24.3 Sofia-City – 70.6%; Kardzhali – 46.3%	17.2 Sofia-City – 67.2%; Vidin – 50.0%	16.2 Sofia-City – 66.9%; Razgrad – 50.7%	19.3 Sofia-City – 67.5%; Silistra - 48.2%	19.2 Sofia-City – 69.2%; Silistra - 50.0%	22.5 Sofia-City – 71.7%; Silistra - 49.2%	22.5 Sofia-City – 72.5%; Vratsa - 49.2%

Source: NSI, own calculations

The spectrum of *the coefficient of variation of the employment rate* for the population aged 15-64 in the period 2008-2016 was relatively small – between 9% and 11%. The regions with the lowest employment rates traditionally included the provinces of Sliven, Razgrad, Silistra and others, whereas those with the highest employment rates were Sofia-City, Sofia-Province, Stara Zagora etc. Although the highest coefficient of regional variation was registered in 2010, immediately after the country hit the bottom of the economic crisis, the lowest values were captured in the period of slow economic

recovery (2011-2014), when employment continued to decline as a result of the optimisation of production processes. In the course of accelerated economic growth and employment recovery at the beginning of 2010 the variation of regional employment rates again tended to increase.

In regions with lower unemployment the recovery of the labour market is faster than in those with persistently high unemployment. In the latter, increasing labour demand should be coupled with active labour market measures targeting long-term unemployed.

The coefficient of variation of unemployment rate by province in the period 2008-2016 ranged between 35% and 80%. Unlike employment rates, regional unemployment rates varied to a much greater extent from the national average, which was also the reason for the bigger regional variations. It should also be considered that aggregates of the regional numbers of unemployed are relatively small, and LFS estimates of regional unemployment rates are not always statistically significant. Nevertheless, the fact that the coefficient of variation of regional unemployment rates grew in years of increasing demand and decreasing average unemployment rate means that the reintegration of unemployed into the labour market was done at highly variable rates in the different regions. In provinces with lower than the national average unemployment rate the recovery of labour demand was relatively faster than in provinces with traditionally high unemployment; hence, the variations between them increased in years of economic growth. This indicates that in addition to a qualification dimension, structural (long-term) unemployment also has a regional one. There are regions with relatively higher concentrations of population with minimum chances of finding employment in the labour market, where increased labour demand is not sufficient for any rapid decrease in current unemployment, and therefore active labour market measures should be given extra priority there (including for promotion of territorial mobility among unemployed).

Table 22: **Coefficient of variation and range of variation of unemployment rate by province in the period 2008–2016**

Indicator	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coefficient of variation, %	78.2%	75.9%	54.8%	49.3%	40.6%	34.2%	42.2%	55.3%	54.3%
Range of variation – difference between maximum and minimum value, p.p.	15.2 Shumen - 16.7%; Kardzhali - 1.5%	20.4 Shumen - 23.1%; Kardzhali - 2.7%	23.9 Shumen - 28,8%; Kardzhali - 4.9%	21.7 Shumen - 26.8%; Kardzhali - 5.1%	20.2 Shumen - 26.6%; Sofia – 6.4%	19.0 Shumen - 26.0%; Kardzhali - 7.0%	17.5 Silistra - 22.4%; Kardzhali - 4.9%	19.5 Silistra - 21.8%; Kardzhali - 2.3%	15.5 Shumen - 17.2%; Kardzhali - 1.7%

Source: NSI, own calculations

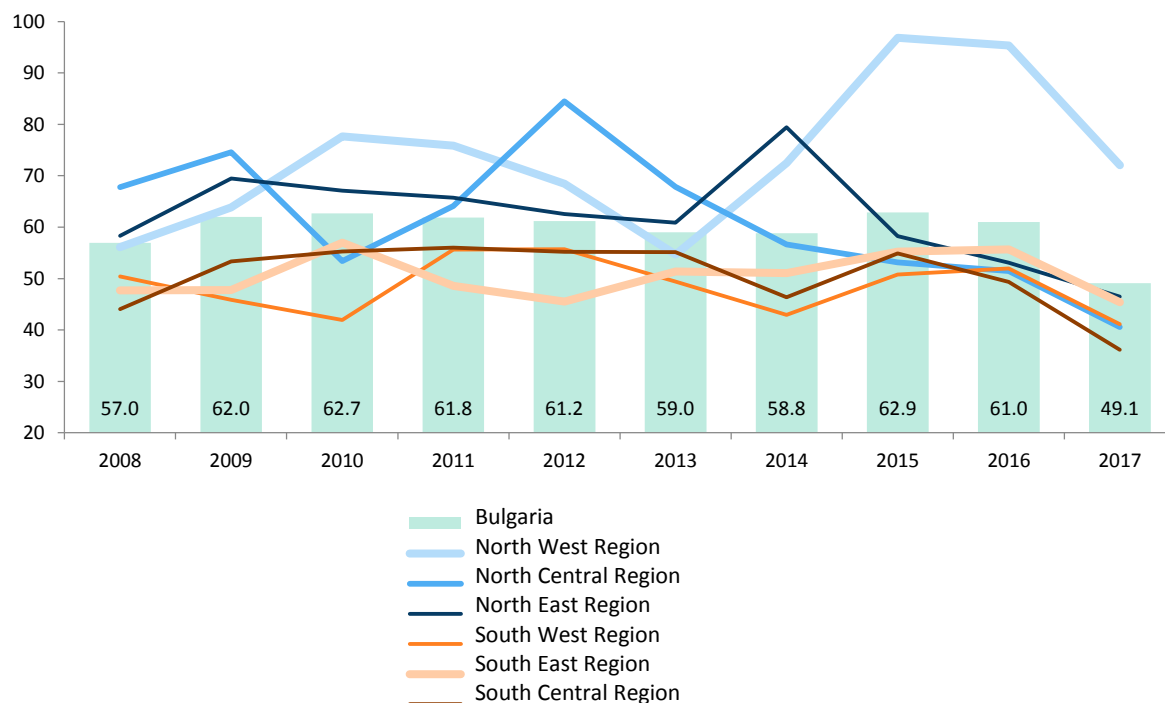
## 6.2 Regional variance

In the period 2008–2017 the total coefficient of variance<sup>68</sup> of regional employment fluctuated around the national average of 60%. The lowest reported value, to the amount of 36.15%, was for South East

<sup>68</sup> The coefficient of total variance is calculated by the formula  $SMI\ e\text{-}ad = \sum IP_i / Pt * (e_i - et)I$  for each  $i = 1, 2, 3$ ; where  $P_i$  is the share of labour force with  $i$  educational attainment level in the total labour force in the country  $Pt$ , and  $e_i$  is the regional employment rate for  $i$  educational attainment level in the total employment rate in the country  $et$ . The educational attainment levels referred to are: **basic**, Lower secondary or lower; Secondary; and tertiary education. The calculations refer to the age group 25-64, and are based on Eurostat data. The coefficient is the sum total of the weighted absolute deviations from the total employment rate in the country.

Region in 2017, when employment rates grew significantly compared with the previous period. The highest value (around 96%) was reported in 2015–2016 for North West Region, where there was a significant drop in employment of low-skilled labour over the previous period, in contrast to high-skilled labour.

Graph 36: Coefficient of total variance of regional employment in the period 2008–2017



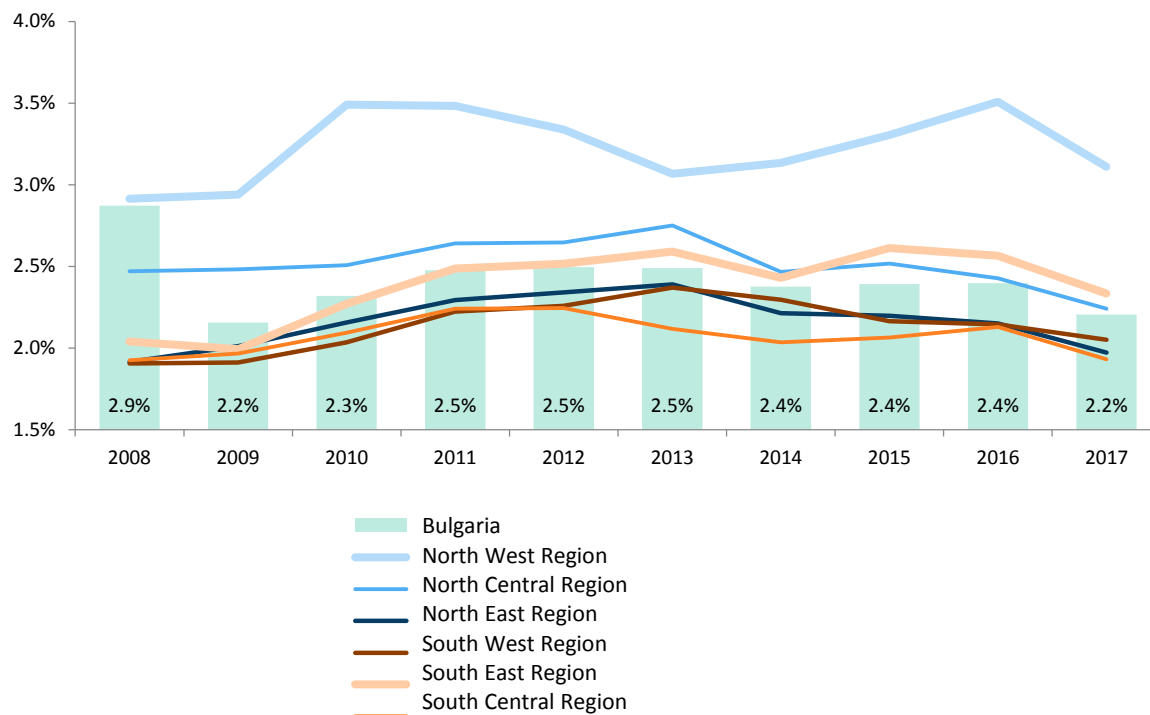
Source: Eurostat, own calculations

At the beginning of the period the variance of regional employment rates was lower in only four of the six regions, while towards the end the deviations in almost all regions, except for North West, were below the national average. The regions where the employment rate was lower than the national average during most of the period were the northern regions. South West was the only region to have a higher than the national average employment rate all through 2008–2017. The values for the other two southern regions were close to the national average, but only South Central, and only in 2017, managed to attain a matching rate.

The coefficient of relative variance of employment<sup>69</sup> during 2008–2017 fluctuated around the national average rate of 2.4%, with only two regions – North West and North Central – having a higher than the country average deviation at the start of the period. Starting in 2011 to the end of the period, South West Region had a higher than the country average variance rate.

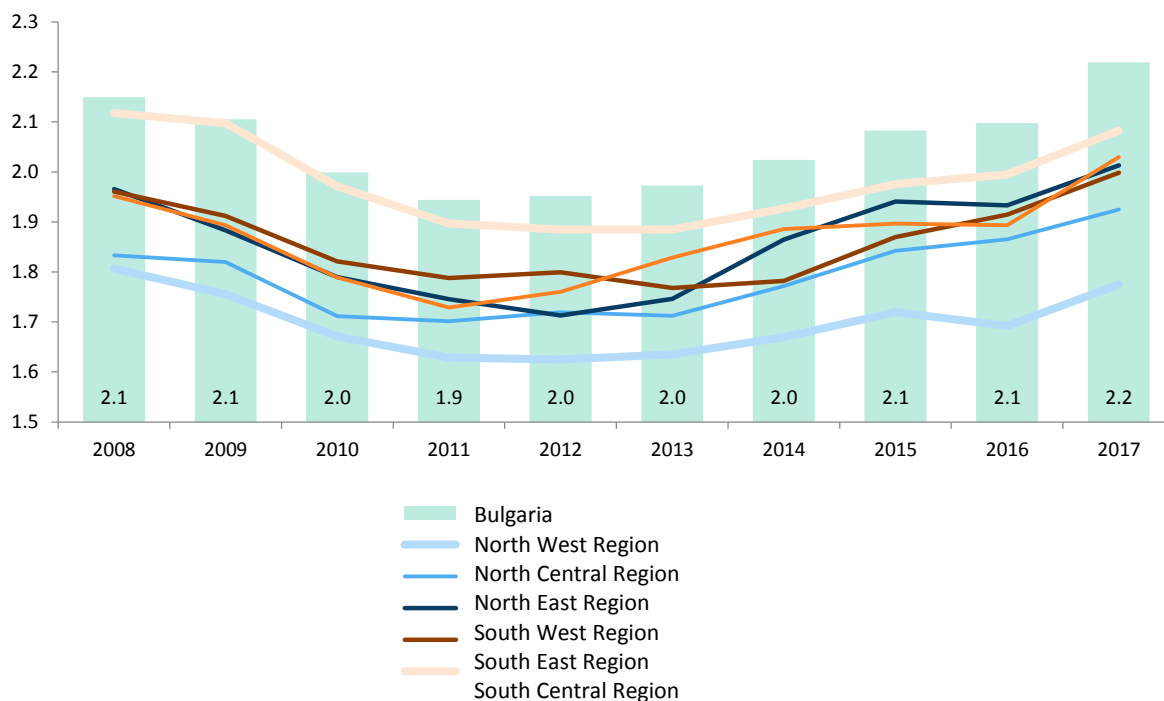
<sup>69</sup> The coefficient of relative variance is calculated by the formula  $SMI\ e-rd = 1/et * |Pi/Pt * (ei - et)|$  for each  $i = 1, 2, 3$ ; where  $Pi$  is the share of labour force with  $i$  educational attainment level in the total labour force in the country  $Pt$ , and  $ei$  is the regional employment rate for  $i$  educational attainment level in the total employment rate in the country  $et$ . The educational attainment levels referred to are: basic, Lower secondary or lower; Secondary; and Tertiary education. The calculations refer to the age group 25-64, and are based on Eurostat data. The coefficient is represented as absolute variance to total employment rate ratio.

Graph 37: Coefficient of relative variance of regional employment in the period 2008–2017



Source: Eurostat, own calculations

Graph 38: Coefficient of standard deviation of regional employment in the period 2008–2017



Source: Eurostat, own calculations

The lowest reported variance value, to the amount of 1.91%, was for South East Region in 2008–2009, when regional employment rates for the population with primary education increased significantly compared to the previous period. By contrast, the highest variance value – 3.51% – was reported in 2016 for North West Region, and was the result of a more pronounced drop in employment of the least qualified population compared to the previous period.

The coefficient of standard deviation<sup>70</sup> of employment in the period 2008–2017 fluctuated around the average regional employment rate in the country, amounting to 2.05%. Regional dynamics, however, were rather diverse. The lowest variance rate (1.62%) was reported in 2012 for North West Region, at a time when the employment rate for the low-skilled population increased, in contrast to tertiary education graduates. The highest rate of 2.12% was reported in 2008 for South West Region, where the employment rate for all categories increased significantly.

At the beginning of the period there was only one region – South West – with a deviation rate approaching the national average. At the same time, starting in 2012 to the end of the period, the coefficient of standard deviation for all regions was below the national average.

### 6.3 Projected medium-term and long-term regional imbalances

Regional labour market needs for any particular education attainment level will be based on the structure of occupations in terms of qualification requirements. Regionally, structural deficits of specific educational levels will emerge, which will be overcome by appointing staff with a lower or a higher attainment level than the one required.

The supply of labour with Lower secondary or lower education in the regions will be adequate. However, structural deficits of jobseekers with secondary and tertiary education are to be expected.

The shortage of human resources with secondary education will also be manifested at province level, but it will be gradually overcome, and, in general, regional structural deficits of staff with this educational level will tend to diminish.

In the medium term, the estimated size of this deficit for 2022 is 21.6 thousand, while in 2030 a balance is expected to be reached between the supply and demand for labour with upper secondary education.

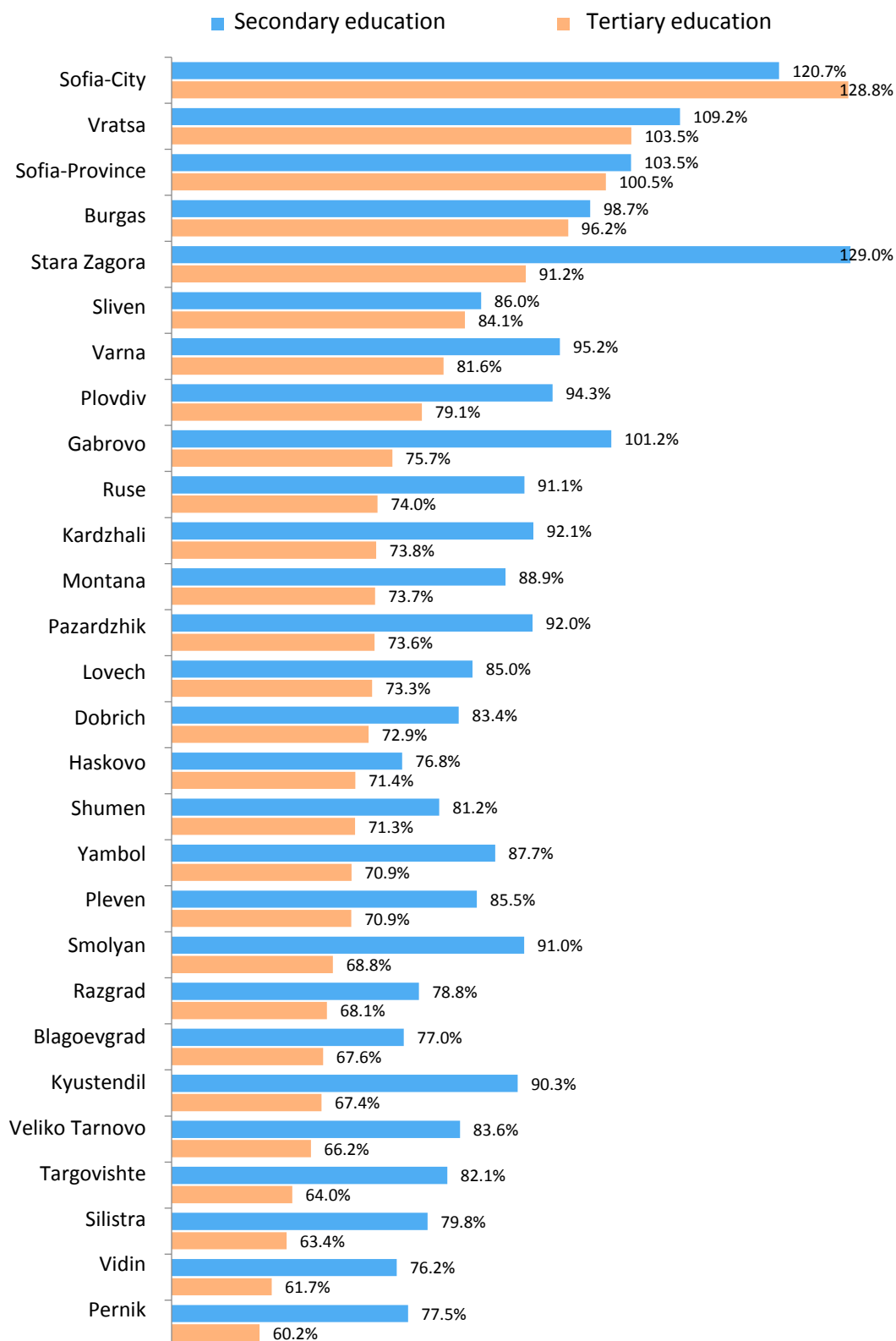
In the long term, after 2031, relatively small structural surpluses can be expected to emerge, as part of the employed human resources with secondary education will begin work in occupations with different qualification requirements.

Regional asymmetry will also be observed in the supply and demand for labour with tertiary education. The forecasts point to an aggravation of the problem in the medium term, where in 2022 the structural deficit of staff with tertiary education in certain regions is expected to total 185.0 thousand. In the long term, this shortage will begin to diminish regionally, and its estimated size for 2032 is 161.3 thousand. In effect, this will mean that despite the overall improvement in the educational structure of the labour force and the growing share of higher education graduates in employment, in some regions these structural changes will not be felt. Among others, this will be due to relatively low pay rates, lack of investment appeal, socio-economic underdevelopment, negative demographic processes etc.

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<sup>70</sup> The coefficient of weighted standard deviation is calculated by the formula  $SMI\ e-wsd = \sqrt{\sum P_i/P_t * (e_i - e_t)^2}$  for each  $i = 1, 2, 3$ ; where  $P_i$  is the share of labour force with  $i$  educational attainment level in the total workforce in the country  $P_t$ , and  $e_i$  is the regional employment rate for  $i$  educational attainment level in the total employment rate in the country  $e_t$ . The educational attainment levels referred to are: **basic**, Lower secondary or lower; Secondary; and Tertiary education. The calculations refer to the age group 25-64, and are based on Eurostat data.

Graph 39: **Relative pay rates for employees with upper secondary and tertiary education, % of the national average wage for employees with the corresponding attainment level**



Source: own calculations

The expected imbalances will only occur in certain regions, and will not result in overcoming the long-term structural deficit of upper secondary graduates, nor in reducing the structural surplus of labour with tertiary education in the total economy.

Labour market mobility and migration processes make it difficult to pinpoint specific regions where these structural deficits will be observed; however, they are expected to be most common in the regions with the lowest pay rates.

As regards employees with completed upper secondary education, the lowest relative pay rates can be found in the provinces of Vidin, Haskovo and Blagoevgrad (amounting to 76-77% of the national average wage for employees with upper secondary education).

Furthermore, there is a well-pronounced mismatch in regional compensation levels for employees with tertiary education, with Pernik, Vidin, Silistra and Targovishte provinces ranking as the ones with the lowest earnings (amounting to 60-64% of the national average wage for employees with tertiary education).

Table 23: **Mismatch between persons in employment by educational attainment level and the need for such persons expected to emerge at regional level**

	2018	2019	2020	2021	2022	2032
Lower secondary or lower education	143.8	148.8	143.4	127.9	117.2	47.4
Secondary education	-28.9	-37.7	-34.6	-28.1	-21.7	7.4
Tertiary education	-114.8	-166.5	-176.2	-178.3	-185.0	-161.3

*Key: A negative difference (mismatch) indicates a structural deficit of an educational attainment level that will be filled (offset) by persons having a different attainment level than the one sought. A positive difference (mismatch) indicates a structural surplus of an educational attainment level that will be reallocated where there are deficits.*

*Source: own calculations*

## CHAPTER 7

# COMPARISON OF THE CURRENT FORECASTS WITH THE FORECASTS PREPARED BY THE EUROPEAN CENTRE FOR THE DEVELOPMENT OF VOCATIONAL TRAINING (CEDEFOP)

### 7.1 Comparison of forecasted results

Overall, the medium-term and the long-term forecasts for the dynamics and the structure of employment prepared for this report are not much different from CEDEFOP's forecasts for Bulgaria. Some variation can be seen in terms of the expected employment dynamics in some sectors.

The latest published forecasts of the European Centre for the Development of Vocational Education (CEDEFOP) date back to 2018 and refer to the period 2016-2030.<sup>71</sup> Based on these, the EU-28 labour market is expected to experience an increase in skill polarisation. On the one hand, growth can be expected in both employment in high-skill occupations (managers, associate professionals etc.) and in less skilled jobs (security, cleaning, care etc.). On the other hand, job losses are projected in medium-skill occupations (workers in agriculture, workers with special skills, clerks etc.) The factors which CEDEFOP specifies as leading to these changes are related to the continuing sectoral structural changes in EU economies and to technological and other changes that influence the patterns of skill demand within sectors. The same factors were considered for the current update of the forecasting model for Bulgaria, and they were identified as the main reason for the projected structural changes in employment.

CEDEFOP's projections for the EU-28 labour market suggest a 3.7% increase in the working age population and a moderate employment growth, while at the same time, Bulgaria is expected to undergo a sharp decrease in the size of the working age population (by 10.1%) and the labour force (-10.2% or down by 338.3 thousand). This projected fall in employment is the result of negative demographic processes and outward migration. The forecasts further envisage a rapid growth in the number of jobseekers with tertiary education and an improvement in the educational structure of the labour force in the country, together with an increase in the number of tertiary education graduates at the expense of those with upper secondary and lower education, whose numbers are likely to drop.

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<sup>71</sup> See CEDEFOP (2018): Skills forecast: trends and challenges to 2030, *Cedefop Reference series 106*.

These projections are fully consistent with the forecasts prepared with MLSP's forecasting model for Bulgaria.

CEDEFOP envisages large employment increases in the services sector and in some manufacturing sectors. Employment in new member states<sup>72</sup> will increase in most service sectors. Employment increases in *Wholesale and Retail Trade* will be more muted due to long-term declining population trends and corresponding consumer activity in the EU. The forecasts for Bulgaria indicate high employment increases in some industries in *Manufacturing, Computer Programming, Information Services, Real Estate Services, Legal, Accounting and Consulting Services, R&D, Advertising and Market Research; other professional activities* and *Arts, Entertainment and Recreation*. Overall, these projections are consistent with the results generated by the updated model for Bulgaria, except for CEDEFOP's projected ICT employment growth. The application of the model for Bulgaria does not identify any reason to anticipate significant employment growth in ICT given the lack of expectation of significant domestic and foreign investment in the sector. If such is to be realised or an intention to this effect is to be declared, it will be considered for the next update of the model for Bulgaria.

Another important CEDEFOP finding refers to the growing role of ICT in all sectors of the economy. This change will lead to a gradual replacement of routine and/or physical tasks with activities requiring social and/or intellectual work. The demand for high-skilled staff in the EU will continue to grow rapidly, and the proportion of occupations with little or no qualification requirements will become even smaller. These projections refer to the EU-28 and not necessarily to Bulgaria. The findings of the medium-term and long-term projections made with the application of MLSP's approach suggest that Bulgaria is lagging behind such processes, and before 2032 no significant increase in the share of high-technology employment is to be expected, the reason being that in recent years the national economy has not only failed to overcome its technological underdevelopment with regard to the European economy, but has even lagged further behind.

As regards structural mismatches in the labour market, according to the European Skills and Jobs Survey (ESJS), one in every four employees with tertiary education in the EU-28 is engaged at a position with a lower qualification level than the one currently held.<sup>73</sup> At the same time, the greatest difficulty for employers in the EU is finding suitably qualified staff to fill vacant positions. Bulgaria has been listed among the countries most affected by this problem. There are a number of underlying factors for this, one particular being employers' inability to offer competitive remuneration for vacant positions. These projections are consistent with the updated medium-term and long-term forecasts for the Bulgarian labour market. Both approaches confirm the ongoing process of underemployment of tertiary education graduates, which is expected to continue in the long run.

## 7.2 Comparison of applied methodologies

The comparison of the two methodologies made below is based on information available from CEDEFOP's publications.<sup>74</sup> It should be noted that some details relating to this information are not publicly accessible as it is commercial property of Cambridge Econometrics, the developer of the E3ME macroeconomic model.<sup>75</sup>

From a methodological perspective, both CEDEFOP's modelling framework and the model used to generate the forecasts for the Bulgarian economy are modular-based. Generally speaking, the mod-

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<sup>72</sup> Reference is made to accession countries during the fifth and sixth enlargement of the EU.

<sup>73</sup> See CEDEFOP (2018): Insights into skill shortages and skill mismatch. Learning from Cedefop's European skills and jobs survey, Cedefop Reference series 108.

<sup>74</sup> CEDEFOP (2012c).

<sup>75</sup> <https://www.camecon.com/how/e3me-model/>.

ules represent distinct structural units within the overall modelling framework in which certain types of calculations are performed. The results of these calculations are either transitional values, which are subsequently fed onto one or more other modules, or final outputs, applied directly by the users of the forecasts.

Similarities between the two approaches can also be found in the structure and the content of the source information on labour supply. More specifically, both approaches aim to calculate the stock and the flow of human resources by educational attainment level (following ISCED's three-level model) and economic activity. As a result, both generate estimates of the size of the population and of the labour force in the different educational attainment levels.

Another similarity as regards labour supply is the inclusion of employment projection by occupation and educational attainment level. As a result, needs forecasts are generated for human resources with a particular profession and human resources with a particular educational attainment level.

The main difference between the two methodologies is the presence of an overall comprehensive model of the economic system at macroeconomic level, which is the case with CEDEFOP's E3ME model. The forecasts use the results generated by its component related to labour market indicators. In particular, these are projections for the labour force by age and sex (associated with labour supply), employment (associated with labour demand), and, as a result of the two, unemployment. In the model for Bulgaria, a dedicated labour market forecasting module was designed to generate medium-term and long-term labour supply and labour demand forecasts. It is based on a presentation of the supply side of the economy via production technology (a production function), using externally fed indicators for demographic development, inflation and physical capital.

Another significant difference is that the CEDEFOP approach is more reliant on econometric assessments of behavioural dependencies and trends, which are subsequently used to generate forecasts. In this respect, CEDEFOP can count on the built-in advantage (which in the case of Bulgaria individually is not present) arising from the fact that its modelling framework treats all member states simultaneously and separately, because of which the lengths of the data rows generated are long enough to guarantee more robust parameter estimates. The Bulgarian model, as required and appropriate, combines econometric assessments with calibration of macroeconomic production function, dependencies derived from microeconomic fundamentals (optimal behaviour of economic agents), direct projections based on available statistical information, and specified convergence objectives.

As regards the output variables generated by the models, in the Bulgarian approach, unlike CEDEFOP's, replacement demand is not estimated. On the one hand, this is by reason of data availability and characteristics, and, on the other, of the fact that reaching retirement age is less frequently associated with exiting the labour force. This can be explained by the ageing and migration processes in the country, which, in the presence of relatively stable labour demand, necessitate the retention of this population into the labour force.

A final major difference is that in recent years CEDEFOP's assessment of the mismatch between skills demand and supply in the labour market has been survey-based, using the European Skills and Jobs Survey.<sup>76</sup> In the Bulgarian case, mismatches are assessed using a specialised module combining employment forecasts at the macroeconomic level with employers' needs. The latter are derived on the basis of the structure of employment by educational attainment level. Moreover, the calculation of mismatches uses the results of the solution of the problem for optimal behaviour of the labour force.

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<sup>76</sup> CEDEFOP (2018a).

# PART 3

## SUMMARY OF FINDINGS AND CONCLUSIONS

## CHAPTER 8

# GENERAL TRENDS

### 8.1 Expected medium-term dynamics

Overall, the labour market dynamics in the past ten years has followed the cycle of economic development. After a lengthy period of employment decline between 2009 and 2013, which was the result of slow and unstable recovery from the impact of the global financial and economic crisis, labour demand began to rise in 2014, due to steady economic growth. This in turn facilitated a drop in unemployment rate, which in 2017 almost recovered its pre-crisis level. In the period from 2018 to 2022 the working age population is expected to shrink from 4,563.7 thousand to 4,381.7 thousand. In percentage terms, the cumulative decrease will amount to 4.0%, a rather significant value given the relatively short duration of the horizon. This should also be taken into account when considering the growth potential of the economy. Projected employment in the medium term will rise from 3,080.4 thousand in 2018 to 3,151.2 thousand in 2022 (up by 2.3%).

The estimated number of employed females for 2022 is 1.52 million, and of males – 1.44 million. In that year the highest number of employed males will be engaged in Manufacturing (318.6 thousand), Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles (225.2 thousand), Construction (206.7 thousand), and Transportation and Storage (155.3 thousand). As regards female employment in the same year, the highest numbers can be expected in Manufacturing (312.9 thousand), Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles (273.2 thousand), Public Administration (157.8 thousand), Education (157.0 thousand), and Human Health (138.9 thousand).

Detailed mid-term employment forecasts by age group show that in 2022:

- Employment in the age group 15-24 will amount to 171.3 thousand.
- Employment in the age group 25-34 will amount to 627.4 thousand.
- Employment in the age group 35-44 will amount to 795.7 thousand.
- Employment in the age group 45-54 will amount to 744.5 thousand.
- Employment in the age group 55-64 will amount to 537.8 thousand.
- Employment in the age group 64 and over will amount to 79.9 thousand.

In absolute terms, the biggest positive changes in employment will be in Manufacturing (33.6 thousand) and in the public-sector dominated activities of Education (23.7 thousand), Public Administration (16.5 thousand), and Human Health and Social Work Activities (16.0 thousand). Employment declines can be expected in Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles (25.7 thousand), Accommodation and Food Service Activities (5.3 thousand), Mining and Quarrying (4.2 thousand), and Electricity, Gas, Steam and Air Conditioning Supply (1.3 thousand). The highest percentage growths will be seen in Real Estate Operations (39.4%), Education (13.8%), and Human Health and Social Work Activities (10.0%), and the deepest percentage declines – in Mining and Quarrying (13.8%), Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles (4.9%), and Electricity, Gas, Steam and Air Conditioning Supply (3.5%).

In the medium term, 2022, labour with Lower secondary or lower education will be most in demand in the provinces of Sofia-City, with an estimated total of 28.8 thousand, Plovdiv – with 19.1 thousand, Burgas – with 13.8 thousand, Stara Zagora – with 12.2 thousand, and Varna – with 11.8 thousand. The need for human resources with completed upper secondary education will be most pronounced in Sofia-City, where in 2022 demand is expected to reach 445.6 thousand, Plovdiv – 178.0 thousand, Varna – 113.7 thousand, Burgas – 94.5 thousand, and Stara Zagora – 88.8 thousand. Business demand for tertiary education graduates in the same year will be highest in Sofia Province, where it is expected to amount to 468.0 thousand, Plovdiv – 107.9 thousand, Varna – 84.0 thousand, Burgas – 42.6 thousand, and Stara Zagora – 38.1 thousand.

In the period 2018–2022 the following occupational dynamics can be expected:

- Increase in the number of employed Specialists by 7.2%, with an estimated total of 548.3 thousand in 2022, corresponding to the largest share compared to all other groups;
- Slight decrease in the number of Services and Sales Workers (down by 1%), with a total of 543.5 thousand employed, and therefore ranking as the second most common occupational group;
- Expected 3.0% increase in Elementary Occupations, with an estimated total of 386.1 thousand employed at the end of the mid-term forecasting period;
- Increase in the number of Plant and Machine Operators and Assemblers by 3.2%, with an estimated total of 366.2 thousand in 2022;
- 3.6% growth in the employment of Technicians and Associate Professionals, as well as Craft and Related Trades Workers, with estimated totals of 301.4 thousand and 338.9 thousand respectively at the end of the period;
- Increase in the number of employed Clerical Support Workers by 2.7%, with an estimated total of 283.7 thousand in 2022;
- Growth in the number of employed Managers, amounting to 182.1 thousand (4.1%).

## 8.2 Long-term forecasts for the development of the labour market

In the timeframe of the forecasting period the number of the working age population will follow the dynamics of the total population in the country. Between 2018 and 2032 the working age population is expected to decrease by 606.0 thousand (13.3%), totalling 4,034.2 thousand in 2032. Starting in 2022 until the end of the forecasting period employment will decline in line with negative demographic processes. In 2032 employed population will total 2,965.7 thousand, having dropped by an estimated 4.3% in 2018–2032. The employment rate of the population will rise steadily throughout the period, from 67.5% to 73.5%.

The structure of employment by educational attainment level will see a steep decrease in the number of employed with Lower secondary or lower education, from 337.9 thousand in 2018 to 226.0 thousand in 2032. For upper secondary graduates the decline in employment in the same period is expected to be relatively small, from 1,764.9 thousand to 1,736.9 thousand. The long-term change in the number of employed tertiary education graduates will be positive, as their number will grow from 977.6 thousand in 2018 to 1,002.9 thousand in 2032.

The forecasts show that the following changes can be expected in the employment rate in the period 2018–2032:

- The employment rate for the population with Lower secondary or lower education will decrease gradually, from 27.3% to 23.5%;
- The employment rate for upper secondary graduates will increase significantly, from 79.3% to 88.6%;
- The employment rate for tertiary education graduates will increase, from 88.7% to 90.1%.

Female employment will be slightly higher than male employment, where the share of employed females will rise steadily, from 51.1% in 2018 to 52.0% in 2032, and that of employed males will drop from 48.9% to 48%.

The dynamics of employment structure by age group will not be balanced, as the forecasts indicate that there will be a reduction in the share of younger employed against a growing role of older people in employment. Most employed, aged 35-54, accounted for 52.2% in 2018, and in 2032 their share is expected to total 51.7%. The share of employed aged 15-34 will drop from 27.6% in 2018 to 25.7% in 2032, and that of employed aged 55 or over will rise from 20.2% in 2018 to 22.6% in 2032.

In the long term, 2023–2032, as a result of negative demographic processes, overall employment decline and gradual convergence of the economy, the key estimated changes will be as follows:

- Economic activities expected to experience employment reductions: Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles, in which the number of employed is expected to fall by 106.9 thousand (down by 21.9%); Accommodation and Food Service Activities, in which the number of employed will be reduced by 27.9 thousand (down by 17.8%); Mining and Quarrying, with an expected fall in employment amounting to 11.7 thousand (down by 47.3%);
- Economic activities expected to experience employment boost: Education, where the number of employed is expected to grow by 30.7 thousand (up by 15.3%); Human Health, in which employment numbers will go up by 12.8 thousand (up by 9.1%); Public Administration and Defence; Compulsory Social Security, with an expected employment growth of 11.0 thousand (up by 4.6%); Manufacturing, in which employment will increase by 7.1 thousand (up by 1.1%).

Regional employment forecasts are consistent with the overall employment dynamics. In the medium term some employment growth is expected, but in the long term employment is expected to shrink as a result of negative demographic processes. The highest numbers of employed will continue to be in the provinces of Sofia-City, where in 2032 a total of 871.7 thousand will be employed, and Plovdiv and Varna, with 282.4 thousand and 194.5 thousand employed respectively in the same year. Burgas and Stara Zagora will also make significant contributions to employment. The lowest employment rates will be observed in Silistra, with a total of 20.1 employed in 2032, and Vidin, where the total in the same year will be 22.4 thousand. Other provinces with expected low employment totals will be Razgrad, Lovech, Montana and Targovishte.

In 2032 the occupations with the highest number of employed will be Shop Salespersons (162.9 thousand), Administration Professionals (121.0 thousand), Heavy Truck and Bus Drivers (105.6 thousand), Manufacturing Labourers (92.6 thousand), and Mining and Construction Labourers (73.7 thousand). The biggest long-term changes will be as follows:

- Decrease in the number of employed Shop Salespersons (down by 39.4 thousand), Waiters and Bartenders (down by 10.7 thousand), and Other Sales Workers (down by 6.4 thousand). The biggest percentage changes will be in Mining and Mineral Processing Plant Operators (down by 21.3%), as well as in sales-related occupations;
- Increase in the number of employed Secondary Education Teachers (up by 6.9 thousand), Primary School and Early Childhood Teachers (up by 5.9 thousand), Nursing and Midwifery Associate Professionals (up by 4.3 thousand). The biggest percentage changes in employment will be in the teaching occupations.

## CHAPTER 9

# EMPLOYMENT IN KEY ECONOMIC SECTORS: TOP 7 ECONOMIC ACTIVITIES BY NUMBER OF EMPLOYEES AND THE ICT SECTOR

In the medium and in the long term the two leading economic activities with the highest number of employed will be *Manufacturing* and *Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles*. The forecasts show that the total of employed in these activities will continue to exceed 1 million. In case of gradual convergence to the European economy, the role of Manufacturing will grow despite the expected employment decrease, and in the period 2018-2032 the absolute change in employment in the sector will total 43.4 thousand, and the percentage change will be 7.3%. This development scenario will mean that there will be a significant shrinking in *Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles*, and employment reduction in the sector will amount to 143.8 thousand (down by 27.4%), as a result of both overall employment decline and the restructuring of the economy. *Construction* will continue to have a strong impact on the labour market, and its expected employment growth will amount to 7.6%. In 2022 the sector is expected to employ 246.2 thousand people, and in 2032 this number will already total 250.6 thousand.

The current structure of employment by economic activity in Bulgaria is characterised by lower than average EU shares of public-sector dominated activities: *Public Administration, Education, and Human Health and Social Work Activities*. They are expected to increase their roles in the medium and in the long term. The highest growth is anticipated for *Education*, with a projected increase of 13.8% (23.7 thousand) in 2018-2022. It will be followed by *Human Health and Social Work Activities*, which is expected to grow by 10.0% (16.0 thousand) in the same period.

As regards *Information and Communication*, which is of key significance to economic development, the forecasts show that it will retain its role in the labour market, and will enjoy a slight increase in the share of employed in total employment. In the years to follow there will be some dynamism in the sector, and in 2018–2022 the number of employed is expected to rise by 3.5%. The projected long-term overall employment decline will not affect the sector, which will retain its employment rate, and in 2032 the number of employed in it will total 91.5 thousand. If the technological and investment development of the economy is to retain its rate of the past three years, the sector will have limited growth potential.

A relative balance between male and female employment will be seen in *Manufacturing, Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles* and *Information and Communication*. Activities dominated by male employment will be *Construction* and *Transportation and Storage*, and

those dominated by female employment will be *Education* and *Human Health and Social Work Activities*. In 2032 male employment will be most common in *Manufacturing* and *Construction*, and least common in *Human Health and Social Work Activities* and *Education*. As for females, they will enjoy larger employment shares in *Manufacturing* and *Wholesale and Retail Trade*, and lower – in *Information and Communication* and *Construction*.

The medium-term and long-term forecasts highlight two sectors that will be characterised by ageing human resources – *Education* and *Human Health and Social Work Activities*. In 2022 the number of employed aged over 50 in *Education* is expected to be 102.0 thousand (52.0% of employed), and in 2032 – 120.2 thousand. In *Human Health* the projected number of employees over 50 for 2022 is 91.9 thousand (52.3% of employed in the sector), and for 2032 – 101.7 thousand. Relatively low employment age will be seen in *Information and Communication*, where in 2022 a total of 72.9% of employed will be below 40, and in *Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles*, with a total of 53.5% of employed below 40 in 2022.

The estimated needs of skilled labour in the key economic activities indicate that:

- In 2022 the highest number of employed with Lower secondary or lower education will be needed in *Manufacturing* (62.3 thousand), *Construction* and *Wholesale and Retail Trade* (25.6 thousand), and *Repair of Motor Vehicles and Motorcycles* (14.3 thousand). In absolute terms, the largest increases will be in the first two activities, whereas *Wholesale and Retail Trade* is expected to experience shrinking in demand for labour with Lower secondary or lower education.
- Upper secondary graduates will be most in demand in the labour market. In 2022 nearly 1.5 million of them will be needed in the key industries. This will be mostly due to *Manufacturing*, in which demand in that year will total 474.0 thousand, followed by *Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles* (376.9 thousand), *Construction* (173.3 thousand), and *Transportation and Storage* (169.0 thousand). Similar to the processes relating to the demand for the lower skilled category, here too the biggest absolute growth will be in *Manufacturing* and *Construction*, and the biggest absolute drop in *Wholesale and Retail Trade*, where the expected decrease in the period 2018–2032 will total 89.3 thousand.
- The number of tertiary education graduates in demand in the key sectors in 2022 is expected to be 704.7 thousand. The most jobs requiring such qualifications will be in *Public Administration* (152.5 thousand) and *Education* (131.8 thousand). These will also be the sectors with the most pronounced absolute changes in demand for such staff during the whole reference period (2018-2032). At the same time, the biggest drops will be experienced in *Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles* (30.9 thousand).

The occupations expected to be most in demand will be as follows:

- In *Manufacturing* nearly one-third of all jobs will be for *Manufacturing Labourers* (whose number in 2022 will amount to 53.9 thousand, and in 2032 to 54.8 thousand), *Textile, Fur and Leather Products Machine Operators* (whose number in 2022 will amount to 53.5 thousand, and in 2032 to 54.4 thousand), and *Garment and Related Trades Workers* (whose number in 2022 will amount to 51.3 thousand, and in 2032 to 52.1 thousand).
- In *Construction* nearly one-third of all jobs will be for *Mining and Construction Labourers* (whose number in 2022 will amount to 57.0 thousand, and in 2032 to 58.1 thousand) and *Building Frame and Related Trades Workers* (whose number in 2022 will amount to 18.9 thousand, and in 2032 to 19.2 thousand). Another occupation with a key role for the industry will be *Heavy Truck and Bus Drivers* (whose number in 2022 will amount to 14.8 thousand, and at the end of the reference long-term period – to 15.1 thousand).

- In 2022 over one-third of employees in *Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles* will be *Shop Salespersons*, and their number will be 179.2 thousand (representing 36.0% of employment in the sector). The forecasts point to an estimated reduction in this occupation in the labour market, where in 2032 its total will drop to 136.7 thousand. Two more significant occupations will be *Other Sales Workers* (whose number in 2022 will amount to 28.8 thousand, and in 2032 to 22.0 thousand) and *Material Recording and Transport Clerks* (whose number in 2022 will amount to 21.9 thousand, and in 2032 to 16.7 thousand). Whereas for the above two sectors the forecasts indicate a steady demand and a slight increase in the number of employed, the expectations here are for a drop in employment, which will affect all occupations in the sector. In the medium term the leading sales occupations will be of relatively greater importance, but it will decrease in the long term.
- In *Transportation and Storage* nearly one-third of employed will be *Heavy Truck and Bus Drivers* (whose number in 2022 will amount to 70.5 thousand, and in 2032 to 67.6 thousand). The other two significant occupations will be *Material Recording and Transport Clerks* (whose number in 2022 will amount to 11.7 thousand, and in 2032 to 11.2 thousand) and *Physical and Engineering Science Technicians* (whose number in 2022 will amount to 9.6 thousand, and in 2032 to 9.2 thousand).
- The most sought-after occupation in *Information and Communication* will be *Software and Applications Developers and Analysts*, which in 2022 will provide employment to 20.0 thousand, and in 2032 to 19.4 thousand, accounting for 21.2% of employed in the sector (each fifth person in the sector will be employed as a *Developer*). Other significant occupations for this economic activity will be *Database and Network Professional* (whose number in 2022 will amount to 5.7 thousand, and in 2032 to 5.5 thousand) and *Telecommunications and Broadcasting Technicians* (whose number in 2022 will amount to 5.6 thousand, and in 2032 to 5.4 thousand).
- In *Public Administration* nearly one-third of employed will be *Administration Professionals* (whose number in 2022 will amount to 73.7 thousand, and in 2032 to 77.8 thousand). Each fifth employee will be a *Government Regulatory Associate Professional* (in 2022 the number of *Associate Professionals* will amount to 48.2 thousand, and in 2032 to 50.9 thousand). The third most important occupation here will be *Business Services and Administration Managers* (in 2022 the number of *Managers* will amount to 16.7 thousand, and in 2032 to 17.7 thousand, or 7.1% of employed in the sector).
- In *Education* teachers will be most in demand, as jobs for *Secondary Education Teachers* will total 44.2 thousand in 2022 and 52.0 thousand in 2032 (22.5% of employed in the sector), and those for *Primary School and Early Childhood Teachers* will total 37.7 thousand in 2022 and 44.4 thousand in 2032 (19.2% of employed). Another important occupation for the sector, expected to engage every tenth employee, will be *Other Teaching Professionals* (whose number in 2022 will amount to 20.0 thousand, and in 2032 to 23.6 thousand).
- In *Human Health and Social Work Activities* in 2022 a total of 46.0 thousand (one-fourth of all employed in the sector) will be *Nursing and Midwifery Professionals*, and in 2032 their number will reach 50.9 thousand. The second most important occupation in the sector will be *Personal Care Workers in Health Services* (with a share of 18.0% and a total of 31.6 thousand in 2022 and 35.0 thousand in 2032). Demand for *Medical Doctors* will total 24.4 thousand in 2022 and 27.0 thousand in 2032, and will account for 13.9% of employed healthcare workers.

## CHAPTER 10

# CAUSES AND CONSEQUENCES

### 10.1 Basic forecasting assumptions and risks

The main assumptions underpinning the model are related to the trajectory of total factor productivity, the dynamics of physical capital, the degree of inter-industry mobility, the convergence process and the demographic dynamics.

The total employment forecasts and its breakdown by educational attainment level are estimated by modelling the overall production potential of the economy with the help of exogenous trajectories for total factor productivity and physical capital within the timeframe of the forecasting horizon. Using the production function specifically designed for the model, these production factors are combined, and an estimated real GDP trajectory is calculated. This approach creates a potential risk of inadequate consistence of the real production estimates generated by the model with the outputs of other forecasting tools modelling demand-side GDP. To minimise this risk, real GDP scores are compared with the projections of other institutions, such as the Ministry of Finance, and, where needed, the assumptions about total factor productivity and physical capital are adjusted to avoid any major deviation.

The assumption for the trajectory of total labour productivity is formed by taking into account two types of considerations. First, the historical development of the technologisation of the economy in the past twenty years shows a weak dynamics of restructuring of employment towards higher-technology industries, which is the rationale behind the assumed moderate pace of technological change underpinning the update of the model. In the event that measures are taken at government level and large-scale policies are implemented to overcome the gap in technological development between EU-28 and Bulgaria, there is a risk that the constructed trajectory might be diverted from the assumption. In this case, the exogenous model trajectory will have to be updated. This would have a positive effect on demand rates for low- and high-skilled labour and a negative effect on demand for medium-skilled labour, in line with labour market processes in the EU. Second, in addition to technological progress, overall factor productivity is also influenced by other features of economic development, such as degree of utilisation of available production capacity. This complexity of total factor productivity means that significant deviations of the GDP estimated by the model from current estimates of other institutions could indicate a need to adjust the assumption about its dynamics. The extent to which this represents a risk for the forecasts, unlike a standard deviation due to the different structures of the models used by different institutions, should be assessed on a case-by-case basis.

The trajectory of physical capital in the economy for the forecasting period is also a key assumption of the base model, in view of which a series of verifications is carried out for its construction to ensure its logic and minimise the risk of weak links with the overall development of the economy. Such verifications are done on real annual investment growth rate, used to construct the row of capital values, as well as on the investment and capital to GDP ratio. Additional logical verification is carried out to link capital assumptions to total factor productivity.

Forecasting labour market dynamics inevitably reflects the convergence process of the Bulgarian to the European economy, in accordance with the specified objectives, which are highly likely to be achieved (determined on the basis of statistical analysis in accordance with the methodology of the model), assuming that the functioning of the identified economic mechanisms in the future will remain similar to one so far. Achieving the convergence objective for the development of the publicly-dominated sectors of *Public Administration, Education and Human Health* is also related to policy making, policy and reform implementation, and formulation of measures. Achieving the convergence objective for private sector development is related to the socio-economic and political development of European economies. In case of adoption of other strategic policies (different from those reinforcing the role of *Education and Human Health*) and/or unfavourable developments in the external environment, there is a risk that the long-term forecasts generated by the model may not be accurate, as the development trajectory would deviate from the specified convergence objective.

Forecasting labour supply is based on official NSI demographic estimates, reflecting birth, death and migration processes. The development of alternative scenarios (in terms of extreme developments – a pessimistic and an optimistic scenario, and a probable “base” scenario) is subject to more detailed demographic analysis, and, if such are to be specified, they could be considered for subsequent updates and applications of the model.

The needs for human resources with a particular educational attainment level in different economic activities are based on the structure of occupations in terms of qualification requirements. These needs at the macroeconomic level are contrasted with the labour supply resulting from demographic and socio-economic processes; as well as at the level of employment, determined by technological development, economic convergence processes and the dynamics of physical capital. In this way structural mismatches in employment are identified and estimated. They, however, are not an indicator of unemployment or of cessation of production in a given sector, but rather of a mismatch between the available and the required human capital in individual economic activities. The labour market operates in such a way that once vacancies are filled with staff having the particular qualifications required, any mismatch that may subsequently occur will be compensated for by a natural shift of human resources to occupations requiring lower or higher qualifications.

The projected attractiveness of economic activities in terms of pay rate per educational attainment level has been calculated on the basis of the convergence objective underpinning the model (current structure and pay rate in Eastern European member states). The level of labour market mobility also affects employees’ choices of economic activity in which they are occupied. The forecasts have been prepared in consideration of the current limited mobility factor, and, as a matter of fact, none of the economic activities can be expected to be fully depopulated. After all, the projected structural deficits are not expected to affect all economic activities, but just those with relatively low pay rates and therefore least popular with jobseekers. To a certain extent, the reduction of structural deficits in the long term will be due to an overall shrinking of employment, as well as to an expected shrinking of some sectors (a result of the convergence process for the Bulgarian economy).

## 10.2 Underlying factors for structural mismatches

The existence of imbalances between the demand and the supply of particular qualifications is the cause of structural mismatches in employment and for *underemployment* and *overemployment* in the labour market. To a certain extent, these occur in every single labour market; however, if they are significant, this is indicative of structural problems that can prevent the effective functioning of the labour market, the production process, and economic development. Some of the underlying factors for the existence of structural mismatches are:

- Rapid change in the educational structure of the population, in particular the working age population, seen in Bulgaria and in European member states in recent years, which has led to oversupply of labour with tertiary education;
- The restructuring of the Bulgarian economy during the transition period;
- Digitalisation and advance of ICT in most economic activities in the European and the Bulgarian economy;
- Low adaptability of educational curricula to new labour market requirements, resulting in insufficiently developed skills sets able to meet employers' current needs;
- Uncompetitive pay rates for skilled labour and redirection of jobseekers to labour markets and/or positions with higher pay rates.

However, it is also possible that some instances of established structural imbalances may not refer to a factual mismatch between skills supply and demand. As a matter of fact, there may be hidden competencies and skills that cannot be captured through standard surveys and statistical indicators. A person not holding any formal qualifications may have built up the necessary skills set through *on-the-job training* or *non-formal training*, and may, in effect, possess the required knowledge and skills to successfully carry out his/her professional obligations. This process could itself be a factor for potential identification of mismatches. Establishing such overestimations of structural deficits could be done through further surveys with employees and employers.

## 10.3 Policy consequences and challenges

Despite the fact that structural mismatches, underemployment and overemployment are to a certain degree common to every single labour market, when they become significant, that can indicate serious structural problems hindering the efficient functioning of the labour market, the production process and economic development.

Macroeconomic, social and demographic processes in the Bulgarian economy are the underlying causes of the persistent shortage of human resources with upper secondary education. In effect, the jobs that are going to be affected by this structural deficit will be taken by jobseekers with either tertiary or Lower secondary or lower education. This is the reason for the expected underemployment of part of employed tertiary education graduates and the overemployment of part of employed staff with Lower secondary or lower education.

A key conclusion drawn from the forecasts is that the main advantage of obtaining a university degree is reflected in the high employment rate for tertiary education graduates, i.e. the degree could be seen as a "ticket" for work. This is fully confirmed by European labour market trends. The degree itself however, cannot guarantee that the jobs secured by tertiary education graduates will necessarily require university education. The recently emerging tendency for underemployment of part of employed tertiary education graduates will persist, following, albeit with some delay, the processes in the European labour market.

At the same time, the economic development of the European economy in recent years has shown a change in labour market trends in terms of an ever-increasing demand for tertiary education graduates – a process which is on the one hand a result of digitalisation and the advance of new technologies in all areas of the economy, and, on the other, an indication of a shift in attitudes in the labour market, as many young people have already (for various reasons) completed tertiary education, so obtaining a university degree is becoming more of a norm.

If the Bulgarian economy manages to get over the processes related to its technological development, it will be possible to solve the problem with the underemployment of tertiary education graduates in the long term. Overcoming technological underdevelopment, however, is a challenge for the government and business, as, in effect, in recent years the gap between Bulgaria and the other European member states has not only failed to be bridged, but has deepened even more. Practically, we can expect that a growing number of university graduates will not be able (because of lack of jobs and/or of competitive knowledge and skills) or willing (because of uncompetitive pay) to work in positions requiring tertiary education.

Another milestone is the identified structural deficit of human resources with upper secondary education. It, however, will not affect all economic activities in the same way. Meeting the demand for a particular qualification level is conditional on the motivation and the ability of jobseekers to start work. Motivation and choice are in turn affected by the attractiveness of economic activities in terms of pay rate, the degree of labour market mobility, and other factors affecting jobseekers' choices. The projected structural deficits are not expected to have the same strong impacts on all economic activities, but only on those with relatively lower pay rates and therefore least popular with jobseekers, i.e. *Accommodation and Food Service Activities, Administrative and Support Service Activities, Manufacturing, Residential Care and Social Work Activities, and Arts, Entertainment and Recreation*. The policy challenge related to addressing the problem with the structural deficit of human resources with upper secondary (mostly vocational) education lies in the formulation of adequate, timely and effective measures for development of the required human resources, and/or full absorption of potential labour supply, and/or adequate earnings policy, and/or effective demographic policy, and/or attraction of human resources from third countries.

Next, the forecasts indicate a growing regional asymmetry in regional labour market developments, as well as existence of a substantial deficit not only of upper secondary but also, in some regions, of tertiary education graduates, which is due to relatively low pay, lack of investment attractiveness, socio-economic underdevelopment, negative demographic processes etc. Labour market mobility and migration processes make it impossible to pinpoint the exact regions where these structural deficits will be experienced, but the expectations are that they will occur in regions with lower pay rates. In this case too timely and adequate measures will be needed to overcome these regional imbalances.

Last but not least, another need for policy action is related to the formulation of measures to “rejuvenate” employment in certain economic activities in which the dominant share of employed is expected to be over 50.

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# ANNEXES

## ANNEX 1

# EMPLOYMENT AND BUSINESS DYNAMICS IN SELECTED KEY SECTORS IN THE PERIOD 2008–2017

The forecasts identify sectors of key importance to the labour market in the medium and in the long term. Employment decline and employment growth in these sectors will be the result of their ongoing business processes in recent years. Therefore, this section looks at employment dynamics and business indicators for the sectors with the highest employment totals<sup>77</sup> (Manufacturing, Trade, Construction, Transport). In view of the key role of Agriculture, Forestry and Fishing in recent years, it has also been included in the analysis below. Another addition is the ITC sector<sup>78</sup>, which in recent years has shown a high growth in employment and has played a role in boosting technological intensity. The added value generated in the ICT sector is substantial, and the development of its employment growth potential will have a positive impact on the development of the national economy. For short these sectors are called key sectors in this analysis.

## Manufacturing

Manufacturing industry<sup>79</sup> is one of the main sectors of the Bulgarian economy, which has a significant impact on both the general economic development and the employment dynamics in the country. A significant part of the industrial production in the country is intended for export, therefore the external demand and the economic cycle of the main trading partners are among the main factors determining the business activity in the sector. The latter implies a high degree of flexibility of economic activities in adapting their labour costs to meet negative external shocks or increased demand for manufactured goods abroad or in the country.

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<sup>77</sup> The employment structure used for the identification of the sectors is based on LFS data for 2016.

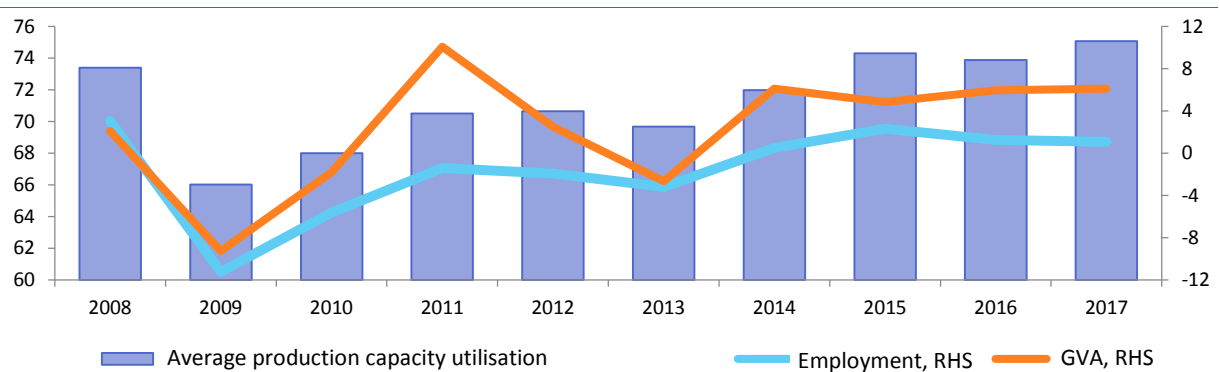
<sup>78</sup> This analysis has adopted a narrow definition of the ICT sector, namely sector J Information and Communication (NACE 2008).

<sup>79</sup> This section only considers the manufacturing industry and its sub-activities under NACE 2008.

A key factor for employment recovery and labour productivity growth in industry in 2008-2017 was the external demand.

In the period 2008-2017, industrial employment dynamics broadly followed the rate of change of economic activity in the industry, which went through several phases of decline and boom. Industry is among the economic sectors most affected by the global financial and economic crisis. With the decline in external demand and the contraction in capital flows to the country, the gross value added in the industry showed a real decrease by 9.2% in 2009. In addition, employment decreased by 11.2%. In 2010, however, Bulgaria's main trading partners started to recover their demand, which led to a two-digit increase in the volume of exported goods in 2010 and 2011, respectively of 22.9% and 19.9%<sup>80</sup>. The enhanced activity of the export-oriented activities of the sector helped for the increase of the newly created value added in industry by 10.1% in 2011, before the growth of industrial production slowed down again and started declining in the period 2012-2013, influenced by the new cyclical decline of the EU-28 economy. Thus, the unsustainable pace of economic dynamics in industry during the post-crisis recovery did not allow the negative trend in industrial employment to be completely overcome. It had a decrease of 1.4% in 2011, which went even further in the next two years to 3.2% in 2013. Since 2014, the industry has returned to a sustainable growth path and value added has increased between 4.8% and 6.1% in real terms. This, in turn, led to an increase in employment with an average annual rate of 1.3%. By the end of 2017, however, the number of employees in the industry still remained by 17.5% below its 2008 level, although GVA in the sector exceeded its pre-crisis level back in 2012 and in 2017 it was already 22.5% higher. The reason for this is the decline in the capacity utilisation and the availability of spare production capacity, which restored its pre-crisis levels only in 2015, and then began the more substantial recovery of jobs that were lost in the previous years.

Graph 40: **Dynamics of the real GVA and of the employment, and average production capacity utilisation, %**



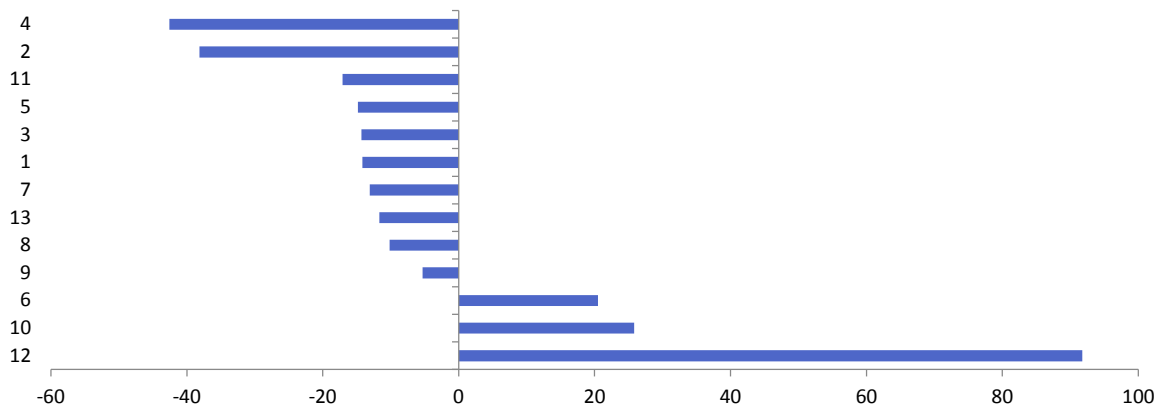
Source: Eurostat, NSI

Leading factor for the increased production activity over the period 2008-2017 was the non-domestic turnover which increased by 63.8% in real terms. At the same time the domestic turnover declined by 16.8%, as the domestic demand was recovering slowly in the years up to 2013. Regardless of the increased industrial production for export, only three of the export-oriented activities saw an increase in employment over the entire ten-year period, namely in the *manufacture of motor vehicles, manufacture of electrical equipment and manufacture of basic pharmaceutical products and pharmaceutical preparations* which formed on average approximately 7.8% of the total employment in the industry. All other activities experienced a decrease in the number of employed, ranging from

<sup>80</sup> According to national accounts data (ESA 2010).

5.3% in the *manufacture of computer, electronic and optical products* to 42.6% in the *manufacture of coke and refined petroleum products*.

Graph 41: **Employment dynamics in the industrial sub-activities in 2017, compared to 2008**



Key: 1- manufacture of food products, beverages and tobacco products; 2- manufacture of textiles, apparel, leather and related products; 3- manufacture of wood and paper products, and printing; 4- manufacture of coke, and refined petroleum products; 5- manufacture of chemicals and chemical products; 6- manufacture of basic pharmaceutical products and pharmaceutical preparations; 7- manufacture of rubber and plastic products and other non-metallic mineral products; 8- manufacture of basic metals and fabricated metal products; 9- manufacture of computer, electronic and optical products; 10- manufacture of electrical equipment; 11- manufacture of machinery and equipment; 12- manufacture of motor vehicles; 13- other manufacture n.e.c.

Source: Eurostat

Export-oriented industries are subject to strong competitive pressure on the part of foreign markets. This was the leading factor that led to a substantial increase in labour productivity in them of almost 50% compared to 2008, along with the process of gradually increasing the capacity utilization.

Table24: **Real Turnover, Employment and Labour Productivity Indices, 2008=100**

	Turnover, total	Non-domestic turnover	Domestic turnover	Employed	Labour productivity*
Manufacturing	115.5	163.8	83.2	82.5	148.4
Manufacture of food products, beverages and tobacco products	111.4	227.4	89.3	85.8	137.2
Manufacture of textiles, apparel, leather and related products	71.9	76.2	61.8	61.8	163.9
Manufacture of wood and paper products, and printing	95.0	149.3	79.7	85.7	132.7
Manufacture of coke, and refined petroleum products	...	...	...	57.4	1282.0
Manufacture of chemicals and chemical products	143.0	158.9	127.0	85.2	144.7
Manufacture of basic pharmaceutical products and pharmaceutical preparations	133.4	80.6	206.7	120.5	113.6
Manufacture of rubber and plastic products and other non-metallic mineral products	110.6	198.9	73.6	86.9	129.1
Manufacture of basic metals and fabricated metal products	133.2	160.4	68.7	89.8	127.8
Manufacture of computer, electronic and optical products	195.1	299.1	86.2	94.7	157.5
Manufacture of electrical equipment	146.5	172.4	112.1	125.8	83.8
Manufacture of machinery and equipment	108.7	141.5	73.7	82.9	104.9
Manufacture of motor vehicles	125.9	174.0	41.8	191.7	53.6
Manufacture n.e.c	99.0	128.2	77.9	88.3	150.6

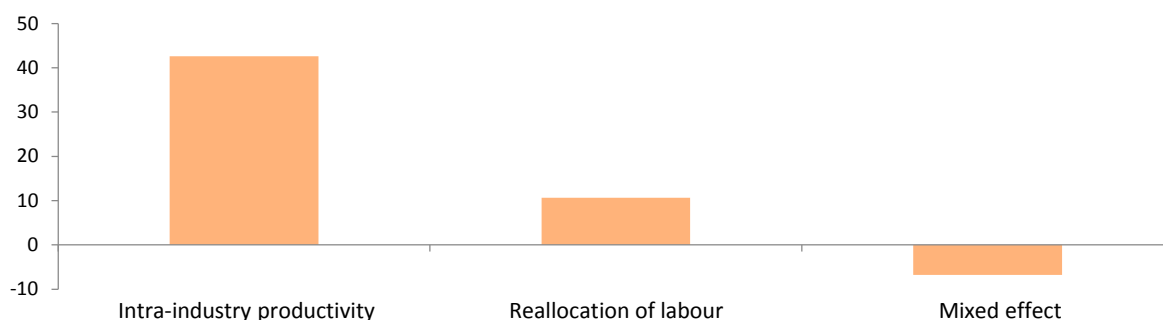
\* Calculated with GVA at 2010 prices.

Source: Eurostat, own calculations

Comparison of the dynamics of turnover, employment and labour productivity outlined several groups of industries. The first group includes activities for which the main driver of growth is the external demand and which saw an increase in labour productivity, but not in the number of employees. Such economic activities are the *manufacture of computer, electronic and optical products, manufacture of basic metals and fabricated metal products, manufacture of machinery and equipment, manufacture of rubber and plastic products and other non-metallic mineral products*. With the lead contribution of the revenue from non-domestic turnover, supported by an increase in labour productivity, were also characterized some activities whose production is realized in a larger volume on the domestic market, such as *manufacture of food products; beverages and tobacco products* as well as economic activities such as *manufacture of chemicals and chemical products*, which have seen a gradual reorientation of manufacturing output from the domestic to the non-domestic market over the last ten years. The second group consists of export-oriented activities, where employment growth has been observed, but not in all cases accompanied by growth in labour productivity. In the *manufacture of electrical equipment* and the *manufacture of motor vehicles*, the increase in employment was accompanied by a decrease in productivity, with the first activity being among the few industrial activities where there was a real growth in the turnover on the domestic market as well. The latter was also valid for the *manufacture of basic pharmaceutical products and pharmaceutical preparations* whose economic activity was fully driven by the domestic market, with an increase in both employment and labour productivity.

The third group consist of the activities characterized by a decline in both turnover and employment. It includes the economic activities *manufacture n.e.c., manufacture of wood and paper products, and printing* and *manufacture of textiles, apparel, leather and related products*. While the first two are predominantly aimed at the domestic market, *Manufacture of textiles, apparel, leather and related products* is the second economic activity, along with the *manufacture of basic pharmaceutical products and pharmaceutical preparations*, with a decline in the non-domestic turnover. The main reason for this is the strong competition on the global market by economies with lower production costs, including labour costs. *Manufacture of textiles, apparel, leather and related products* is the industrial sub-activity with the lowest level of labour productivity. It is among the economic activities with the most significant relative share decrease in the total industrial employment.

Graph 42: **Decomposition of labour productivity growth in manufacturing in 2017 compared to 2008, according to the contribution of factors, p.p.**



Source: Eurostat, own calculations

The real labour productivity growth was decomposed under three groups of factors<sup>81</sup>. The first one takes into account the contributions of intra-industry productivity. The second one refers to the effect of the reallocation of labour from lower to higher productive activities. The third group refers to the mixed effect of the change in labour productivity and of the share of employment. Decomposi-

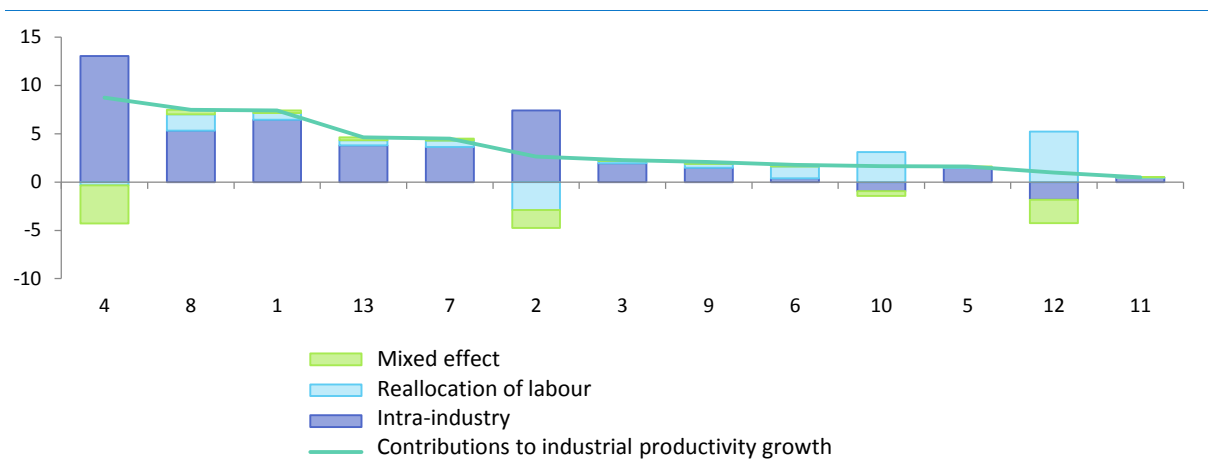
<sup>81</sup> See footnote 18.

tion shows that the main driver for the growth of the value added per employee in industry was the increase in productivity in the industries themselves. Positive but significantly lesser influence is observed from the restructuring of employment to industries with higher added value; the mixed effect of the change in labour productivity and of the share of total employment in industry is negative.

The assessments of labour shortages in industry have been considerably rising since 2015 as a factor limiting activity.

At the level of industry sub-activities, in most of the activities the highest was the contribution of the internal productivity linked to the internal characteristics of the respective economic activity, with a positive impact also from the reallocation of employment, as well as a low positive impact of the mixed effect of productivity growth and of employment share. Such economic activities are *the manufacture of basic metals and fabricated metal products, the manufacture of food products; beverages and tobacco products, manufacture n.e.c., manufacture of rubber and plastic products and other non-metallic mineral products, manufacture of wood and paper products, and printing, manufacture of computer, electronic and optical products, manufacture of chemicals and chemical products, manufacture of machinery and equipment*. The activities such as *manufacture of motor vehicles, the manufacture of electrical equipment and the manufacture of basic pharmaceutical products and pharmaceutical preparations* were characterised with a different allocation of contributions, as the leading role here had the reallocation of employment which compensated the negative contributions of internal productivity and of the mixed effect in the first two activities, as well as the low positive contributions of these two factors in the third economic activity. The *manufacture of coke and refined petroleum products*, as well as the *manufacture of textiles, apparel, leather and related products* are also some kind of exceptions since they have been entirely dominated by the internal productivity in the economic activity that has managed to compensate for the negative impact of reallocation of labour and of the mixed effect.

Graph 43: **Decomposition of the contribution of labour productivity growth factors in manufacturing in 2017 compared to 2008, by economic activity, p.p.**

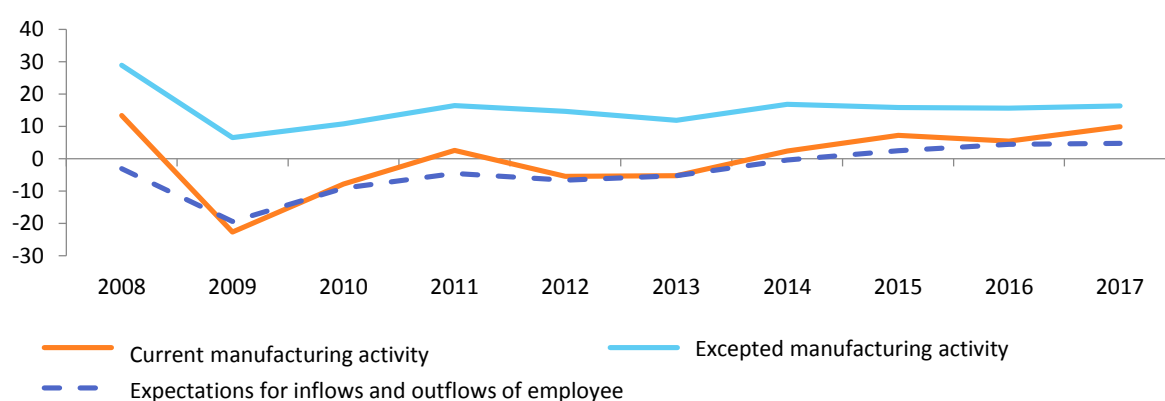


Key: 1- manufacture of food products, beverages and tobacco products; 2- manufacture of textiles, apparel, leather and related products; 3- manufacture of wood and paper products, and printing; 4- manufacture of coke, and refined petroleum products; 5- manufacture of chemicals and chemical products; 6- manufacture of basic pharmaceutical products and pharmaceutical preparations; 7- manufacture of rubber and plastic products and other non-metallic mineral products; 8- manufacture of basic metals and fabricated metal products; 9- manufacture of computer, electronic and optical products; 10- manufacture of electrical equipment; 11- manufacture of machinery and equipment; 12- manufacture of motor vehicles; 13- other manufacture n.e.c.

Source: Eurostat, own calculations

The positive development of industrial employment in recent years has been confirmed by entrepreneurs' assessments of business activity in the industry. With the improved production activity and rising expectations for the business environment in industry, the balance of employment assessments is characterised by positive values since 2015, showing increased employers' optimism with respect to staff recruitment. These trends, however, were realized in the context of a significant increase in the assessments of labour shortages in the industry. While at the start of the global financial and economic crisis, the main factors that hampered business activity were the insufficient demand and the uncertain economic environment, after 2014 their weight was significantly reduced, at the expense of an increase in the significance of labour shortages. It should be noted that as early as 2016 the share of employers who indicated that labour shortages were among the main factors limiting their work exceeded its 2008 level. This will also limit the possibilities for further increase of industrial employment, and will require more and more investments for enhancing the labour productivity.

Graph 44: Selected indicators from the industry's business climate, balance



Source: NSI

Table 25: Main obstacles for industrial businesses to operate , % of respondents

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
<b>Insufficient domestic demand</b>	27.3	37.5	41.7	39.6	43.1	45.7	35.0	26.3	25.8	22.9
<b>Insufficient external demand</b>	16.5	31.0	30.8	27.9	30.4	31.1	22.5	19.8	19.7	16.8
<b>Shortage of labour</b>	19.5	11.1	6.5	7.5	8.7	8.6	11.2	15.8	21.7	27.1
<b>Financial problems</b>		16.8	22.8	24.0	19.9	22.0	21.8	16.6	14.1	11.3
<b>Uncertain economic environment</b>	26.5	51.9	57.9	56.3	55.6	55.9	56.2	55.2	50.7	47.6

Source: NSI

Another factor limiting the growth of industrial employment over the ten-year period considered was the slow recovery of investment activity in the industry, with calculated correlation between the change in employment and the gross fixed capital formation in real terms amounting to 0.54. The dynamics of investments in fixed capital showed a strong volatility in terms of both declines and growth rates recorded in individual years. In 2017, real gross fixed capital formation in industry was 5% below its 2008 level, which was associated with a significant lag in investment in machinery and equipment which was 25.5% less than in 2008. Investments in machinery and equipment have a leading share in total investments in all industrial sub-activities, but in most of them the volume of

investments was below the 2008 amount. Only four of the industrial activities were characterised by growth in the productive investments – *manufacture of wood and paper products, and printing, manufacture of chemicals and chemical products, manufacture of computer, electronic and optical products, and manufacture of machinery and equipment*, but even in these activities the growth in employment in recent years failed to offset declines experienced immediately after the crisis.

The growth of compensations per employee exceeds the real increase in labour productivity in all industries.

It is notable that in the period 2008-2017, the profitability, expressed as the ratio between the gross operating surplus and the value added in industry, was marked by an increase, mainly contributed by the economic activities: *manufacture of chemicals and chemical products, manufacture of basic metals and fabricated metal products, manufacture of computer, electronic and optical products, manufacture of motor vehicles and, to a lesser extent, the manufacture of wood and paper products, and printing and the manufacture of textiles, apparel, leather and related products*. Only in *manufacture of wood and paper products, and printing, and in manufacture of chemicals and chemical products*, however, there was an increase in the share of investments in value added, although in the second economic activity they dropped as a share of the profit. Increase in the share of investments in value added and operating surplus also registered the *manufacture of machinery and equipment*, but a decrease in profitability was recorded in this case. All this showed that the increased profit margin in a large part of the industrial activities compared to 2008 does not contribute to an increase in the investment activity, and there are probably other factors that make an influence in the opposite direction.

The dynamics of labour costs over the period considered generally followed the economic cycle in industry. As the crisis started in 2009, the industries responded immediately and the majority of them made a reduction in the compensation for employees. With a growth of that indicator, but significantly slower compared to the one observed up to 2008, remained only *manufacture of food products, beverages and tobacco products, the manufacture of coke, and refined petroleum products* (but this is a specific economic activity and was characterised by declines in 2010-2013) and *the manufacture of rubber and plastic products and other non-metallic mineral products*, which managed to reduce the compensation for the employed a year later. This was a result of the undertaken significant reduction in employment, and in some economic activities also a reduction in wages, incl. *manufacture of basic metals and fabricated metal products* and in *manufacture of machinery and equipment*. While some industries continued to reduce compensations also in 2010 (*manufacture of wood and paper products, and printing, manufacture of basic metals and fabricated metal products, and manufacture n.e.c.*), most of the industrial sub-activities increased the compensations, which was linked to an increase in income. The rate of increase in compensation per employee in 2010 accelerated in most industries and even reached double digits. Wage growth remained high in the following years, with a downward trend in the period until 2013 in the majority of industries, and a further acceleration in the years after 2014, which corresponded to the cycle of industrial economic dynamics. Thus, by 2013, the increase in compensations was mainly driven by a rise in incomes, while after 2014 the increased labour demand contributed as well. It should be noted that, although income growth from year to year varied per economic activities, the growth rate of compensation per employee for the whole period from 2008 to 2017 did not differ significantly per economic activities. It stood at 8.2% in total for the industry, with a distinct higher growth in *manufacture of coke, and refined petroleum products* (11.5%), *manufacture of electrical equipment* (9.9%) and *manufacture n.e.c.* (9.9%) and relatively lower than the average – in the *manufacture of motor vehicles* (5.6%) and *manufacture of wood and paper products, and printing* (6.4%).

Table 26: Investment and profitability indexes in industry, %

	Investments/GVA			Investments/GOS			GOS/GVA		
	2008	2017	Difference p.p.	2008	2017	Difference p.p.	2008	2017	Difference p.p.
Total	41.5	27.6	-13.9	147.8	89.6	-58.2	28.1	30.8	2.7
Manufacture of food products, beverages and tobacco products	43.0	21.6	-21.4	134.6	72.8	-61.8	31.9	29.6	-2.3
Manufacture of textiles, apparel, leather and related products	17.4	12.5	-4.8	102.3	61.6	-40.7	17.0	20.4	3.4
Manufacture of wood and paper products, and printing	43.1	55.8	12.7	171.4	219.6	48.3	25.1	25.4	0.2
Manufacture of chemicals and chemical products	52.7	62.1	9.4	167.5	133.9	-33.6	31.5	46.4	14.9
Manufacture of basic pharmaceutical products and pharmaceutical preparations	96.1	53.0	-43.0	229.4	206.2	-23.2	41.9	25.7	-16.2
Manufacture of rubber and plastic products and other non-metallic mineral products	50.3	30.3	-19.9	132.0	125.1	-7.0	38.1	24.2	-13.8
Manufacture of basic metals and fabricated metal products	41.9	22.0	-19.9	170.1	51.3	-118.8	24.6	42.9	18.3
Manufacture of computer, electronic and optical products	40.1	27.8	-12.3	129.1	68.5	-60.6	31.1	40.6	9.5
Manufacture of electrical equipment	48.3	33.6	-14.7	164.1	158.5	-5.6	29.4	21.2	-8.3
Manufacture of machinery and equipment	21.4	23.2	1.8	61.5	110.5	49.0	34.8	21.0	-13.8
Manufacture of motor vehicles	80.6	28.0	-52.6	553.3	106.8	-446.5	14.6	26.2	11.6
Manufacture n.e.c.	23.2	15.9	-7.2	69.9	54.9	-15.0	33.2	29.0	-4.1

Source: Eurostat, own calculations

As a result of the positive dynamics of compensations in the period since 2010, the share of labour in value added in industry in 2017 has restored its 2008 level. About half of the activities saw an increase over the pre-crisis period, with the share reaching value around the industry average and exceeded the average in the *manufacture of electrical equipment*, *manufacture of machinery and equipment*, and *manufacture n.e.c.* Among the economic activities that reported a decrease in the share of labour in the value added, it remained high and exceeded the average for the industry in *manufacture of textiles, apparel, leather and related products* and *manufacture of motor vehicles*.

Table 27: **Average growth of GVA, compensations of employees, compensations per employee, employees in the period 2008-2017 and share of compensations in GVA, %**

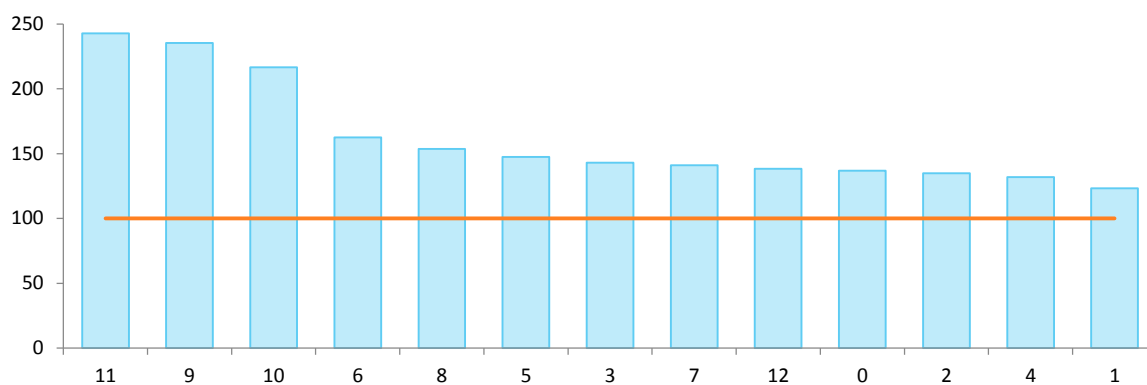
	GVA	Compensations of employees	Compensation per employee	Employees	Share of compensations in GVA	
					2008	2017
Manufacturing	5.7	6.5	8.2	-1.6	51.0	51.0
Manufacture of food products, beverages and tobacco products	4.4	5.0	7.3	-2.1	46.4	51.3
Manufacture of textiles, apparel, leather and related products	3.0	3.2	7.8	-3.9	71.2	70.8
Manufacture of wood and paper products, and printing	6.0	5.9	6.4	-0.4	47.4	50.4
Manufacture of coke, and refined petroleum products	-20.1	-0.7	11.5	-9.1	80.2	16.0
Manufacture of chemicals and chemical products	9.2	5.9	7.9	-1.9	42.7	32.8
Manufacture of basic pharmaceutical products and pharmaceutical preparations	5.2	9.0	7.8	1.2	41.8	50.5
Manufacture of rubber and plastic products and other non-metallic mineral products	3.3	8.1	9.0	-0.7	36.9	48.0
Manufacture of basic metals and fabricated metal products	7.2	7.7	8.3	-0.7	48.8	42.9
Manufacture of computer, electronic and optical products	9.0	9.4	7.9	1.9	53.9	46.0
Manufacture of electrical equipment	12.8	12.8	9.9	2.7	53.5	59.8
Manufacture of machinery and equipment	5.8	7.1	8.3	-1.0	50.8	60.8
Manufacture of motor vehicles	13.4	12.4	5.6	6.8	70.9	61.9
Manufacture n.e.c.	7.0	8.4	9.9	-1.5	53.2	59.6

Source: Eurostat, own calculations

For the whole period considered, the nominal ULC increased, because the accumulated increase in compensation per employee exceeded the real increase in labour productivity in all industries<sup>82</sup>. A clearly higher growth of the indicator compared to other activities was recorded in *manufacture of motor vehicles, manufacture of electrical equipment and the manufacture of machinery and equipment*, and with a lower than the average for the industry increase of the nominal ULC were characterised only three economic activities – *manufacture of food products, beverages and tobacco products, manufacture of textiles, apparel, leather and related products, and manufacture of chemicals and chemical products*. Despite the positive dynamics of the indicator observed in all economic activities, income growth did not lead to a loss of competitive positions in the industry, given the increase in exports during the period considered and the country's gaining export shares on foreign markets. However, the achieved high share of compensation of employees in the value added in some economic activities could be a limiting factor for competitiveness, given the strong competition on the foreign market as well as in case of a possible new cyclical decline in demand for production for exports, resulting in a need to re-optimize the labour costs.

<sup>82</sup> The economic activity *manufacture of coke and refined petroleum products* has been excluded from the calculations due to specificities that distinguish it from the other industrial activities.

Graph 45: Index of nominal ULC in industry per sub-activities in 2017, 2008=100



Key: 0- manufacturing, total; 1- manufacture of food products, beverages and tobacco products; 2- manufacture of textiles, apparel, leather and related products; 3- manufacture of wood and paper products, and printing; 4- manufacture of coke, and refined petroleum products; 5- manufacture of chemicals and chemical products; 6- manufacture of basic pharmaceutical products and pharmaceutical preparations; 7- manufacture of rubber and plastic products and other non-metallic mineral products; 8- manufacture of basic metals and fabricated metal products; 9- manufacture of computer, electronic and optical products; 10- manufacture of electrical equipment; 11- manufacture of machinery and equipment; 12- manufacture of motor vehicles; 13- other manufacture n.e.c.

Source: Eurostat, own calculations

## Trade

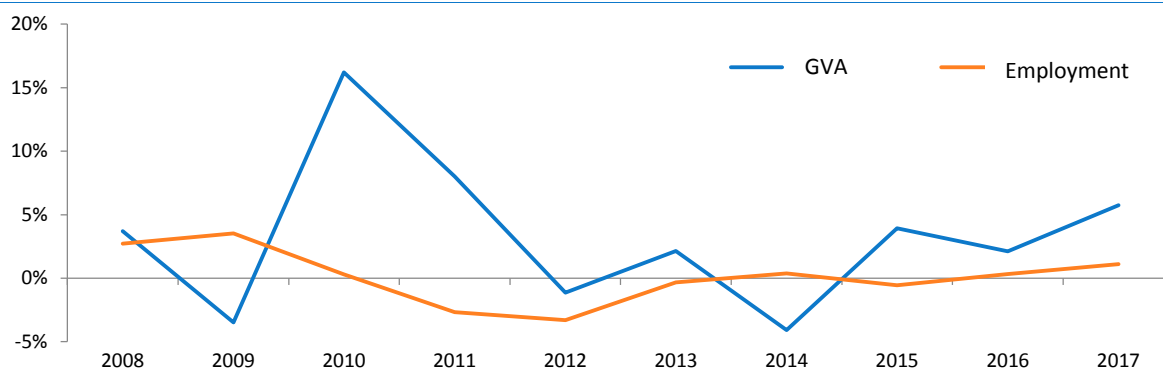
Even if with a roughly two-year lag, retail trade was also affected by the economic crisis in the country, in terms of a decreased domestic demand. Initially, the crisis had an impact on the micro and small-sized companies, and in 2012–2015 the drop in the employment in the sector was mostly due to its decline in the major companies.

The main economic activities in the trade sector are the *retail* and *wholesale* trade. The number of the persons employed in the trade sector accounts for roughly 15% of the total employment in the country over the past ten years and the sector has a significant impact on its general dynamics. The sector's importance was enhanced by the widespread availability of the trade companies. Along with the state administration, they operate in almost all populated areas in the country. Apart from this, the share of the self-employed in the trade companies was relatively high, hence the sector's relatively high significance for family employment.

The trade sector's response to the economic crisis of 2008 and 2009 was relatively delayed. This lag was particularly evident in the case of *retail trade* where the generated real GVA decreased as late as 2011 and 2012, which was about a two-year lag compared to the companies engaged in the other economic activities. The number of trade companies peaked in 2009 (12.7%), which had to do with the very high investment activity during that and the previous years, which also led to a fast increase in the new retail spaces. *The wholesale trade* as well as the *sale of cars and motor vehicles* reacted almost immediately to the economic shock and saw a decrease as early as 2009 but their gradual recovery was evident the very next year.

In the course of the next few years, the three main activities of the sector showed relatively diverse dynamics. *Retail trade* and *the trade of motor vehicles and motorcycles* managed to stabilise and after 2012 achieved a permanent GVA growth; there were also years of high GVA growth rate in terms of constant prices. Unlike those, *wholesale trade* proved extremely volatile and had successive periods of downturns followed by years of growth, with the growth rates fluctuating within a very wide range.

Graph 46: **GVA and employment growth rates (total for the industry), %**



Source: Eurostat, own calculations

In 2010–2013, employment in the trade sector registered a downward trend. In the next four years, it was generally fluctuating around the level achieved, even though the sector registered positive GVA growth rates. Trade in motor vehicles and motor cycles, employing about 10% of the persons employed in the sector, saw a sharp drop in employment in 2009 but recovered the very next year and has been maintaining a relatively stable level since then.

Employment dynamics in the wholesale trade, employing 32-33% of the total number of the persons employed in the sector, managed to recover to its 2008-2010 levels. Restructuring was witnessed here as well, with some of the major companies leaving the market while others replaced them (both new and already existing ones at the market), which determined the employment recovery observed in the past two years.

Retail trade, employing about 56-58% of the total employment in the trade sector, witnessed a generally permanent downward employment trend since 2010. If however, in 2010 and 2011, this could be associated with the rapid decrease in the number of the micro and small-size companies in the sector, in 2012-2015 it was related rather to the restructuring of the sector and to some of the major companies leaving the market.

The difficulties faced in the process of employment recovery in retail trade after 2010 had to do both with the companies' main activity and its dynamics, and with the existing market conditions at that time. Retail trade depends to a great extent on domestic demand dynamics, and till 2015 its real growth remained relatively low. In addition, after 2010, banks tightened significantly their lending conditions for new loans, including for working capital loans, which resulted in serious deterioration of trade companies' access to funding.

Access to financing improved again after 2013. This, along with the strengthened domestic demand, contributed to an improved business environment in the sector. However, the number of employed remained almost static during the period 2014–2017. Trade companies were faced with new difficulties and challenges, with the most serious one being the strengthened competition in the industry, which was due, to a great extent, to the competition of the major trading companies operating in the market.

Generally, trading companies are not faced with significant problems in recruiting the right and qualified workforce. However, in the past few years, entrepreneurs in the sector come to consider this problem a possible obstacle to expanding their business. The demographic processes in the country and the prospects for decreasing workforce are likely to affect the trading companies as well even though the issue with the shortage of labour force is not that acute in the sector compared to other economic activities.

Generally, trading companies are not faced with significant problems in recruiting the right and qualified workforce. However, in the past few years, this proves to be a growing impediment to expanding the business.

Table 28: **Business environment and turnover indices for retail trade for the period 2008–2017**

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Retail trade turnover indices by comparable prices (2015 = 100)	Index	87.3	80.6	73.8	74.3	78.2	81.2	89.5	100.0	106.1	110.0
Sales volumes for the last three months; retail trade; total for the country	balance	24.13	-20.3	-8.5	-4.8	-8.5	6.3	7.74	12.64	20.41	21.08
Expected orders to providers for the next three months; retail trade; total for the country	balance	29.54	0.1	9.87	18.8	18.3	17.61	20.1	18.38	25.63	24.35
Expected sales for the next three months; retail trade; total for the country	balance	30.38	1.04	10.9	23.9	22.5	20.83	22.41	21.84	28.02	28.49
Competitiveness in the industry; total for the country	%	41.83	35.39	29.8	28.6	51.1	44.73	51.15	50.93	52.58	55.30
Financial problems; total for the country	%	8.625	18.82	30.8	34.5	24.8	19.73	16	14.09	13.1	11.18
Economic insecurity; total for the country	%	30.16	51.63	55.5	68.7	61.6	63.43	63.89	57.65	48.31	45.08
Labour force shortage; total for the country	%	6.9	3.317	2.26	2.46	3.27	2.667	4.05	7.325	12.85	17.72

Source: NSI, own calculations

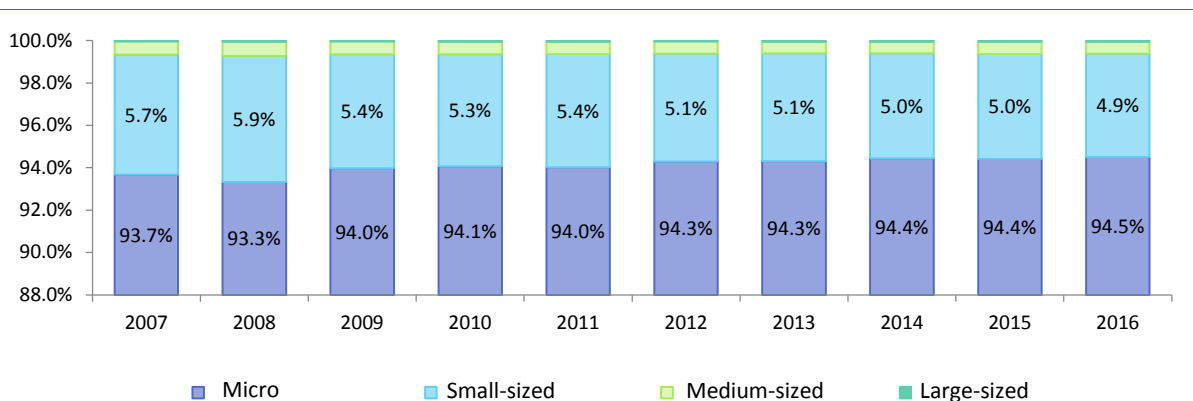
The share of self-employed workers in the trade sector accounts for about 23% of total employment in the sector and their relative share is close to the average for the country. Considered by economic activities, the share of the self-employed in the total activity was higher in the *trade in motor vehicles and motorcycles* as well as in *retail trade*. However, during the last few years, the share of the self-employed in the *retail trade* has decreased (from 29.5% in 2008 down to 25.7% in 2017) mostly due to the expanding presence of the major retail chains in the industry, which has the greatest impact on the dynamics of small family-run businesses.

Graph 47: **Employment structure in trade sector for the period 2008–2017, %**



Source: Eurostat, own calculations

**Graph 48: Employment structure in the trade sector by enterprise size for the period 2008–2017, %**



Source: Eurostat, own calculations

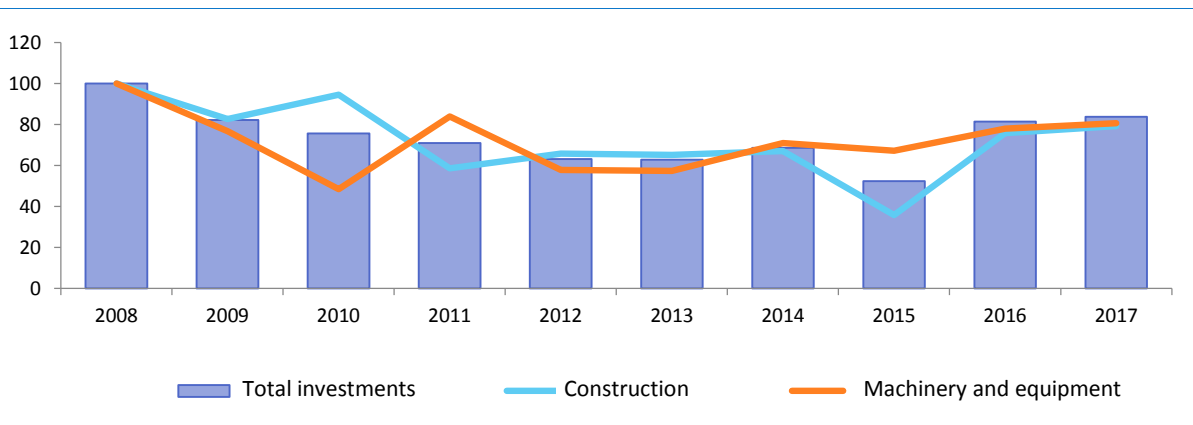
The structure of trading companies is dominated by micro and small-sized companies employing up to 50 persons. Micro companies account for 94.1% on average of the companies operating in the sector during the period 2008-2017, and the companies employing between 10 and 50 persons account for about 4.8% on average of all companies in the sector. Thus micro and small-sized companies, employing up to 50 people account for nearly 99% of all companies in the sector.

Even though medium and large-sized companies, employing over 50 people, account for about 1% of all trading companies, they play a significant role in terms of employment dynamics and company revenues in the sector. Together they generate about 1/4 of the employment in the sector and about 40% of the revenues of trading companies.

Throughout the whole period under consideration, the investments made in the sector failed to reach the levels registered prior to the economic crisis. In 2013 they hit their lowest level for the whole period (62.7% of the investments made in 2008) and then a gradual upward trend was witnessed in trading companies' investment activities. Despite this, even in 2017 investments made in the sector did not exceed the 2008 level (83.7%). This investment activity aligned with the investment activity of the whole economy.

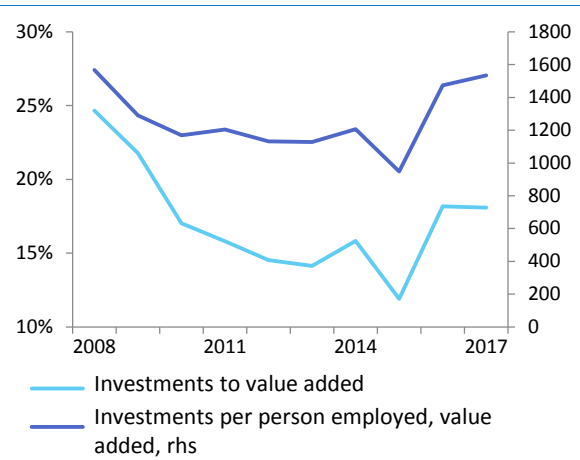
The bulk of the investments in trade were made in construction – mostly construction of buildings and other facilities. During the last few years, a relatively high growth of investments was observed in machinery and equipment, which is a major prerequisite for increased labour productivity in the sector.

**Graph 49: Gross fixed capital formation index in trade by constant prices for 2010, 2008=100**



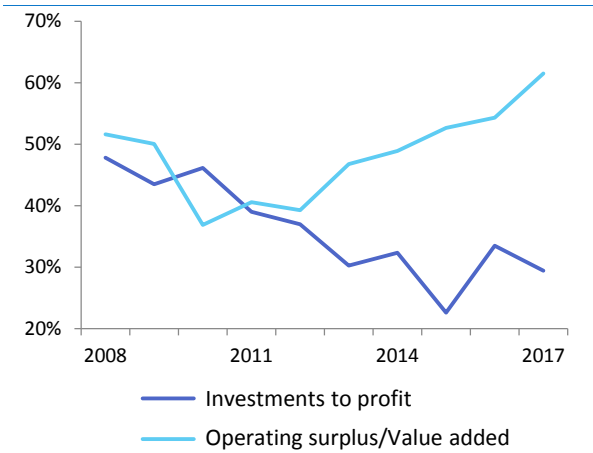
Source: Eurostat, own calculations

**Graph 50: Investments to value added and Investments per person employed for the period 2008-2017**



Source: Eurostat, own calculations

**Graph 51: Investment to operating surplus and operating surplus to value added for the period 2008-2017**



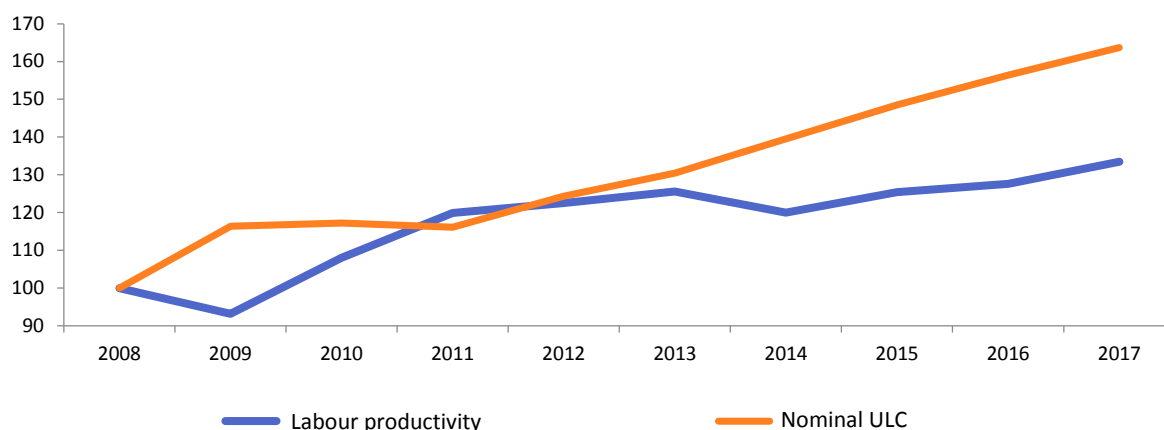
Source: Eurostat, own calculations

The decrease in the funds invested during the period under consideration resulted also in a decrease in the values of the indices of *investments per person employed* and *investments to newly generated value added* in the retail sector for the period 2008-2015. However, during the last two years, the investments per person employed increased and almost reached the 2008 level. This was due to the higher investments made by the entrepreneurs, determined by the continued increase of the operating surplus of trading companies and of their profitability as well as to companies' improved access to loan resources and the relatively cheap investment loans.

An upward labour productivity trend was observed in the trade sector during the better part of the 2008-2017 period. The most significant increase was registered in the *trade in motor vehicles and motorcycles* (in 2017 it rose by over 2.5 times compared to 2008). Retail trade also saw a significant labour productivity increase, and in 2017 it was about 40% higher than the one registered in 2008. The improved labour productivity in the *retail trade sector* had to do with market restructuring, aggregation of businesses and a constant process of some of the major retail chains closing their business and being replaced by other, more highly productive players. Labour productivity in the *wholesale trade sector* alone registered a relatively low growth rate during the 2008-2017 period (around 10%). The restructuring taking place in the sector over the past few years (both in *retail* and *wholesale trade*) gives reasons to expect a relatively high labour productivity growth rate in the coming years, and that the potential trade growth could be achieved with a relatively permanent and even decreasing employment, with the labour force who were made redundant being reallocated to sectors with a higher share of newly added value and where there is even greater labour force shortage.

Over the period 2008-2017, the nominal unit labour cost (NULC) in the trade sector increased by 6.3% on the average. Throughout most of the period under consideration, wage growth outpaces labour productivity growth. It should be taken into account that the relative wages in the sector are relatively low and are therefore more strongly affected by legal framework changes concerning the minimum wage and the minimum insurable income thresholds in comparison with other economic activities.

Graph 52: Nominal ULC and labour productivity at 2008=100 base



Source: Eurostat, own calculations

## Construction

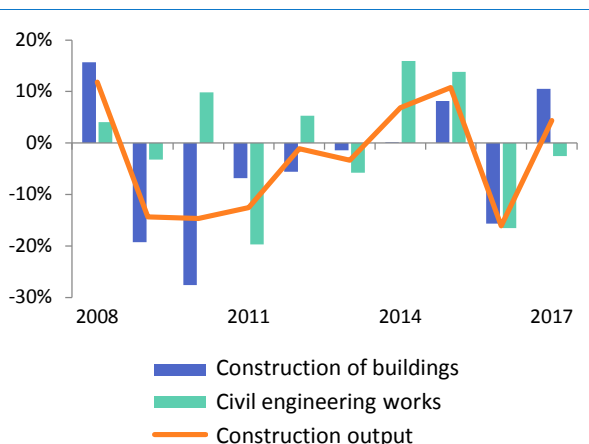
Construction is the industry most severely affected by the economic and financial crisis in 2008-2009. During the economic boom period, construction was the most dynamic industry of the economy, registering annual GVA growth of 15% to 17% (in real terms), exceeding considerably the average annual growth rates for the entire economy.

The downward trend in construction became evident with a one-year lag compared to that in the economy due to the relatively longer production cycle of the activities run in the sector. Construction continued to grow in 2009 even if at a slower rate, while economy registered a decrease in GVA during that same year. As early as the next 2010, a period of continued and significant downturn in construction activity began. In 2010 construction registered a GVA decrease of 18% and the downward trend continued in the next two years, though at a much slower rate. There was a considerable decrease in demand for new properties, drastic decrease in investments in other industries due to the reduced construction of production facilities, hotels, hospitals, etc. The construction boom in 2006-2008 involved also an intensified investment process in buildings and facilities. Commercial banks reduced significantly loan financing of construction activities since during the period 2010-2012 these projects were driving the process of non-performing loans accumulation in the financial system.

First signs of recovery were observed in 2013 (construction GVA growth of 1.3%) but the industry's development remained volatile and from 2013 to 2017 periods of decline alternated with periods of growth. Construction is the only economic sector in Bulgaria, which in 2017 has not yet regained its pre-crisis level. GVA of the construction sector for 2017 was about 1/4 (26.9%) lower than its 2009 peak.

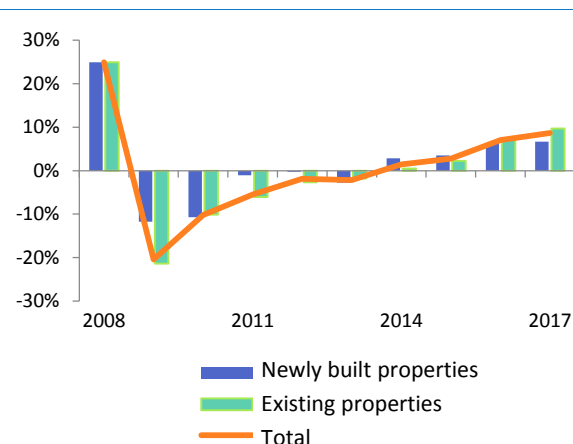
Another unfavourable factor, along with the decreased demand for construction output, were the falling house prices. The adverse price trend became evident from the crisis onset in 2009, when house prices dropped by 20.4% on annual basis. The house price decline did not go beyond the 2009–2010 period, unlike other EU countries, such as Greece, Spain, Portugal, etc. where the price decline was even sharper and over a longer period of time. 2011 saw a gradual process of price increase, reaching the 2010 level in 2014. In 2017, house prices have not yet reached the pre-crisis levels of 2008, however, the increasing demand for new housing properties and hence the increased volume of housing loans in the country are factors contributing to both the recovery of residential construction activities and to increase in house prices.

Graph 53: Construction output indices by constant prices of 2015, % on annual basis<sup>83</sup>



Source: NSI, own calculations

Graph 54: House prices indices by constant prices of 2010 r., % on annual basis<sup>84</sup>



Source: NSI, own calculations

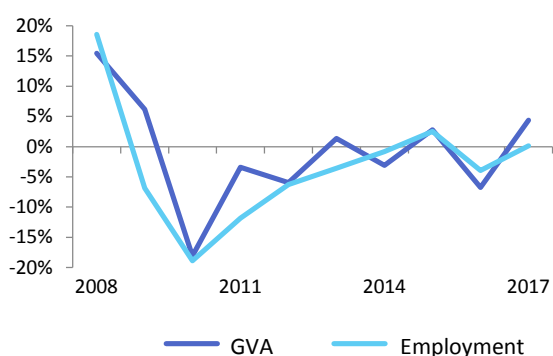
Civil engineering works was a factor, which occasionally was able to compensate to an extent the decrease in the residential building activities and construction of buildings; it involved activities related to certain government programmes (such as National Energy Efficiency Programme, etc.) as well as activities funded under European programmes. In 2014–2015, as a result of the investments made in civil engineering works, mostly under European projects, for the first time after the crisis, construction output registered positive changes on an annual basis. Generally, the Euro funds allocated for this kind of activities can be accounted for under three major programmes: *Transport, Environment, Regional Development*. During this period, 1/3 of the total amount of the funds absorbed were paid under OP *Transport*, which amounts to about 1 bln. BGN, spent mainly on the development of railway and road infrastructure. Over half of the funds planned under OP *Environment*, amounting to 3.5 bln. BGN, have been invested in 2014–2015, with the resource being absorbed mainly under priority axes: *Improvement and development of water supply and wastewater infrastructure in major populated areas, etc.* and *Improvement and development of waste treatment infrastructure*. The third OP focused on improving the quality of infrastructure is *Regional Development*. The funds paid under the OP for the period 2014–2015 amount to 1.2 bln. BGN, in other words 42% of the total investments under the programme are made in 2014–2015. The resource is absorbed mainly under two priority axes: *Sustainable and Integrated Urban Development* and *Regional and Local Accessibility*.

In the beginning of the new programming period in 2016 and due to the smaller amounts of funds absorbed under European programmes, a new decline in civil engineering works is registered.

<sup>83</sup> Average unadjusted monthly data for Indices of construction production - <http://www.nsi.bg/bg/content/895/%D0%B8%D0%BD%D0%B4%D0%B5%D0%BA%D1%81%D0%B8-%D0%BD%D0%B0-%D1%81%D1%82%D1%80%D0%BE%D0%B8%D1%82%D0%B5%D0%BB%D0%BD%D0%B0%D1%82%D0%B0-%D0%BF%D1%80%D0%BE%D0%B4%D1%83%D0%BA%D1%86%D0%B8%D1%8F>

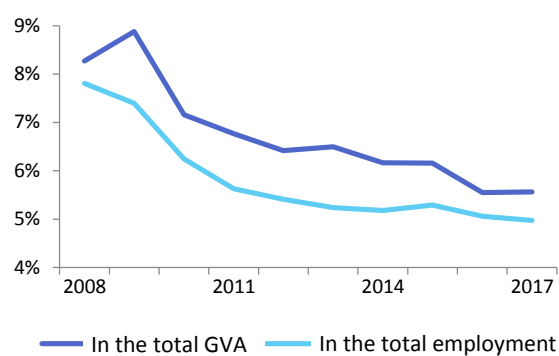
<sup>84</sup> Average quarterly data for Indices of housing prices, national level <http://www.nsi.bg/bg/content/13026/%D0%B8%D0%BD%D0%B4%D0%B5%D0%BA%D1%81%D0%B8-%D0%BD%D0%B0-%D1%86%D0%B5%D0%BD%D0%B8%D1%82%D0%B5-%D0%BD%D0%B0-%D0%B6%D0%B8%D0%BB%D0%B8%D1%89%D0%B0-%D0%B8%D1%86%D0%B6-%D0%BD%D0%B0%D1%86%D0%B8%D0%BE%D0%BD%D0%B0%D0%BB%D0%BD%D0%BE-%D0%BD%D0%B8%D0%B2%D0%BE>

Graph 55: Real GVA and employment growth rate in the construction sector, %



Source: Eurostat, own calculations

Graph 56: Share of employment and GVA of construction sector in the total for the economy, %



Source: Eurostat, own calculations

Since 2013 a gradual recovery of employment in the construction sector is observed. Initially, this is mostly due to the projects financed under European programmes (2014-2015) and subsequently to the recovery of the construction of residential buildings (2017).

Employment dynamics in the construction sector aligned strictly with the changes in the production activities of the companies operating in the sector. Throughout the entire 2008-2012 period, employment in the sector decreases as a result of the seriously reduced demand of construction output. In 2013, the employment decline in the construction sector was discontinued and over the next few years it fluctuated around the level achieved. The end of the first programming period for the projects financed with European funding (2014–2015) can be pointed out as one of the reasons for putting an end to the decrease in employment and at a later stage for the recovery of residential construction (2017).

Table 29: Structure and changes of the employment in the individual construction subsectors for the period 2008-2016; construction output index – %

	2008	2009	2010	2011	2012	2013	2014	2015	2016
<b>Employment, structure</b>									
Construction of buildings	55.2%	49.5%	44.4%	43.1%	41.3%	40.7%	39.6%	38.6%	40.3%
Civil engineering works	17.5%	21.2%	25.8%	26.3%	27.1%	27.5%	28.9%	29.5%	26.1%
Specialised construction activities	27.3%	29.3%	29.8%	30.6%	31.5%	31.7%	31.5%	31.9%	33.6%
<b>Employment, annual change</b>									
Construction of buildings	11.8%	-17.9%	-30.9%	-14.3%	-10.6%	-4.7%	-1.6%	-2.5%	1.1%
Civil engineering works	50.9%	10.9%	-6.3%	-10.0%	-3.9%	-1.8%	6.1%	2.1%	-14.2%
Specialised construction activities	9.1%	-2.0%	-21.7%	-9.1%	-4.2%	-2.6%	0.4%	1.4%	2.1%
<b>Construction output index, annual change<sup>85</sup></b>	<b>11.9%</b>	<b>-14.3%</b>	<b>-14.6%</b>	<b>-12.5%</b>	<b>-1.1%</b>	<b>-3.3%</b>	<b>6.8%</b>	<b>10.8%</b>	<b>-16.1%</b>

Source: Eurostat, own calculations

<sup>85</sup> Average monthly seasonally unadjusted data for *Index of construction production* at 2015 base, NSI - <http://www.nsi.bg/bg/content/895/%D0%B8%D0%BD%D0%B4%D0%B5%D0%BA%D1%81%D0%B8-%D0%BD%D0%B0-%D1%81%D1%82%D1%80%D0%BE%D0%B8%D1%82%D0%B5%D0%BB%D0%BD%D0%B0%D1%82%D0%B0-%D0%BF%D1%80%D0%BE%D0%B4%D1%83%D0%BA%D1%86%D0%B8%D1%8F>

As for the sector's employment structure, construction of residential buildings is of the greatest significance for the industry; in 2008 it employs more than half of the people working in the sector. Subsequently, the share of the persons employed in residential buildings construction gradually decreases and in 2017 it accounts for about 40%. The other two main construction activities employ roughly equal number of people (about 30% of the total employment for the sector), though over the past few years a slight upward employment trend is registered in *specialised construction activities*, mainly due to the nature of the programmes implemented with funds allocated from national and European budgets.

The average share of the persons employed in the total construction employment accounts for 85.6% for the period 2008–2017. In 2017, the share of micro and small-sized enterprises in the construction sector stands at 97.5%. The number of persons employed in those companies accounts for 60% of the total employment in the sector for the same period. It should be noted, however, that the economic crisis had a different impact on the activity and employment dynamics of construction companies depending on the number of their employed staff. In 2017, the number of micro enterprises (employing up to 10 people) remained practically the same as in 2008 (a drop of less than 2%), while during the period under consideration there is a more intense downward trend among the bigger construction companies, consistent with their size, in terms of them declining in number. The negative trend is most evident among the largest companies, which in practice experience an almost three-fold decrease in number over the period 2008–2017.

The large construction companies responded almost immediately to the decline in their activity by reducing the labour resources they used. Unlike them, the micro companies (the majority of them being family companies) keep their employment levels almost unchanged despite the difficulties that the industry experiences during the period 2009–2013.

A similar phenomenon was observed with relation to employment dynamics based on company size. During the period 2008–2017, employment in micro companies decreases by roughly 17%; small-sized companies (employing between 10 and 49 persons) register a decline of one third (37%); the medium-sized ones (employing between 50 and 249 persons) – reduction of workforce by half, and with the biggest companies – more than three-fold decline (over 66%). In practice, micro companies, most of them being a family business, often providing employment to the owner and the members of their family, manage to survive despite the long years of difficulties and decreased demand, while the large companies respond to the changed economic environment almost immediately and employment decrease occurs almost simultaneously with the decrease in the number of orders received.

Even though employment in the construction sector still manages to keep the levels achieved in the last few years, there are already first signs evident that here just like in the other economic activities, the problem with the shortage of sufficiently qualified staff is about to become acute. The staff shortage challenge proved to have become relatively more serious during the construction boom period in the country (2006–2008), when about 20-25% of the construction entrepreneurs identified the difficulties they experienced in recruiting the right workforce as a potential challenge for increasing the production activity. During this period, the challenge was faced by a high number of entrepreneurs not only during the summer months (typically, the peak of construction activities) but also throughout the whole calendar year.

Table 30: **Number of enterprises and persons employed in construction by enterprise size (2008=100)**

	Number of enterprises					Persons employed				
	Total	Micro	Small-sized	Medium-sized	Large-sized	Total	Micro	Small-sized	Medium-sized	Large-sized
2008	100	100	100	100	100	100	100	100	100	100
2009	107	113	90	84	84	89	107	90	84	81
2010	98	68	106	92	69	67	61	62	60	58
2011	90	60	99	83	61	60	55	54	56	51
2012	88	57	97	79	59	57	52	53	44	43
2013	87	55	95	77	56	53	52	51	48	45
2014	88	56	97	76	56	54	53	52	52	46
2015	90	56	99	78	59	57	51	50	49	43
2016	91	54	100	82	59	56	50	49	35	32
2017	90	55	98	83	63	60	51	49	37	33

Source: NSI, own calculations

In 2017, the share of construction entrepreneurs experiencing difficulties in recruiting the workforce they need, exceeded the numbers registered at the height of the construction boom of 2007-2008 and the trend is likely to continue.

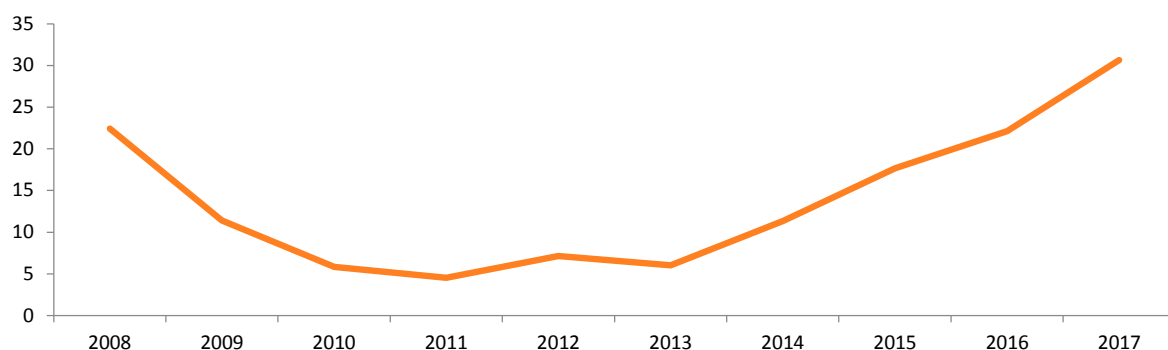
As could be expected, with the onset of the crisis in the construction sector, the challenge faced by entrepreneurs in their activity, lost its significance and during the period 2010–2015 it constituted no major obstacle to the development of activity. However, since the second half of 2015 the share of entrepreneurs experiencing difficulties in recruiting staff started gradually growing again and towards the end of 2017 their share even exceeded the index values of 2008 and 2009, the industry's best years for the current century. If in 2007 and 2008 an average of 22.4% of the construction entrepreneurs annually report difficulties in hiring staff, in 2017 the average annual value of the index has already reached 30.6%, with an upward trend expected in the coming years, should the recovery in the construction sector continue. Even though construction activities are still below the 2008 level, the staffing issue in the sector is further exacerbated of the demographic and migration processes that are underway in the country. The labour force declines as a result of the general decrease in the working-age population. In addition, many of the potential employees of the sector take advantage of the easier access to the labour market in the EU countries, and most often the construction sector in these countries is namely among the industries offering employment opportunities to the Bulgarian workers.

Throughout the whole period under consideration, investments in construction remained below their 2008 level<sup>86</sup>, with their lowest being registered in 2014 when they were as little as 42.1% of the 2008 investments. A gradual investment growth was observed in the next few years but even in 2017 their level reached 57.3% of the level in the beginning of the period.

Investments made in the construction sector are dominated by the funds invested in buildings and other facilities. Investments in machinery and equipment proved strongly volatile, reaching a peak of 77.3% of the pre-crisis levels in 2015. However, at a later stage they dropped down again and towards the end of the period they were over 60% less than the 2008 level. The recovery of the activity of the major companies in the industry as well as the limited opportunities for increase of the labour force used, created preconditions for recovery of the investment activity in the construction sector in the coming years.

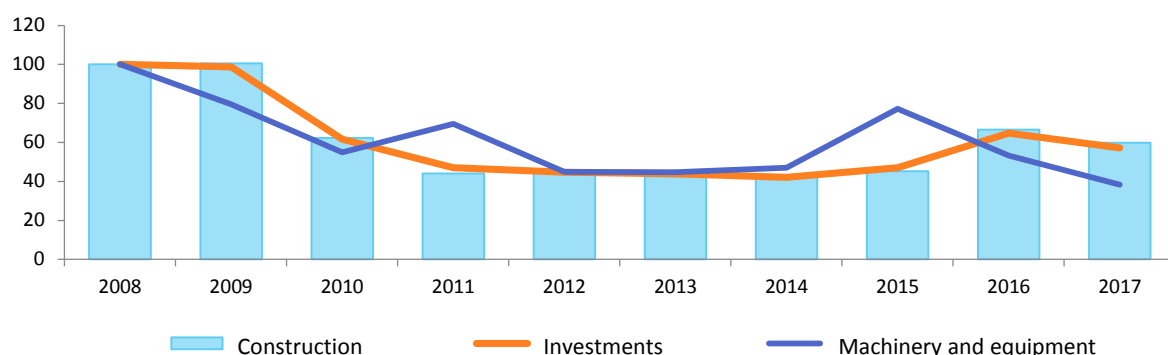
<sup>86</sup> Based on constant 2010 prices

Graph 57: Labour force shortage in construction sector (%)



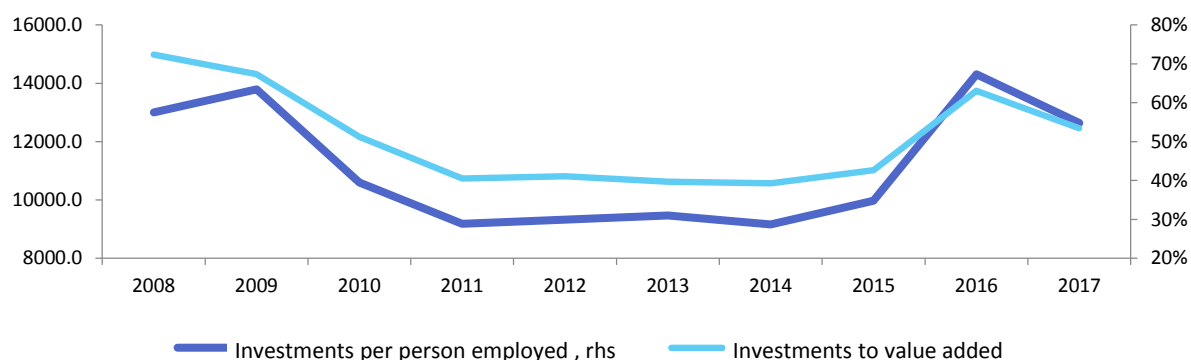
Source: NSI

Graph 58: Gross fixed capital formation index in the construction sector based on constant 2010 prices, 2008=100



Source: Eurostat, own calculations

Graph 59: Investments to value added and investments per person employed for the period 2008–2017



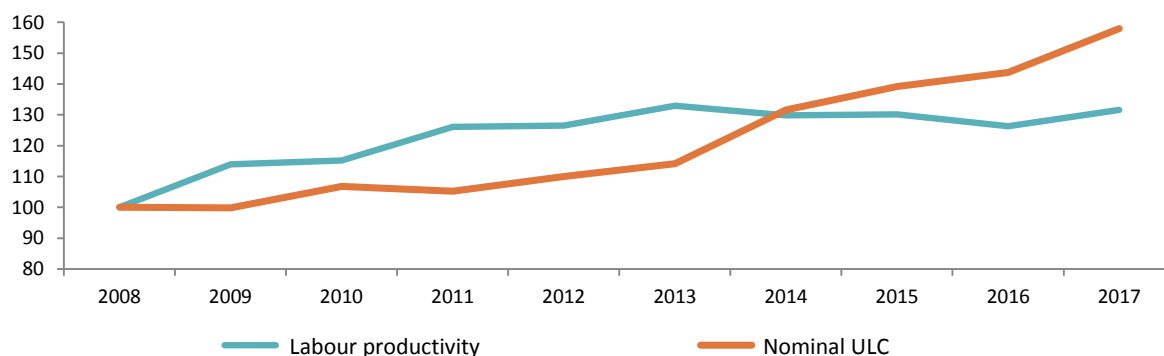
Source: Eurostat, own calculations

In 2017, the investments per person employed in the construction sector almost reached their 2008 level. Some growth of investments in the construction sector was observed in 2016 and 2017, while at the same time employment remained almost unchanged, which determined also the increase of the investment per person employed index in the last two years of the period under consideration. This in turn is a prerequisite for a future increase of labour productivity in the sector, which is likely to be a major factor contributing to growth in an environment of limited labour supply.

Even though construction has not regained yet its pre-crisis GVA and employment levels, the industry registers high growth of labour productivity.

Labour productivity in the construction sector<sup>87</sup> showed a stable upward trend during the period 2008–2017. In 2017 it was 31.6% higher compared to 2008, which exceeded the labour productivity growth rate of the entire economy for the same period. It is during the period 2014-2016 alone that labour productivity in the construction sector slowed down on an annual basis. This was due to a significant employment reduction in the sector, which exceeded the decline of GVA created in the construction sector during the period under consideration.

Graph 60: **Nominal ULC and labour productivity at base 2008=100**



Source: Eurostat, own calculations

The nominal unit labour costs (NULC) change as a result of the labour productivity dynamics and the compensation of a person employed in the construction sector. Generally, the trend observed involved an almost constant growth of nominal ULC during the whole period, with their average annual growth for the whole period being 6.6%.

A major reason for this dynamics was the increase of the compensations per person employed, which increased in nominal terms in 2017 by 108% as compared to 2008. This increase was determined mainly by legal framework changes concerning the minimum insurable income thresholds, minimum wage as well as by the increase of the average wage in an environment of a decreasing labour supply in the economy and in particular of appropriately qualified workforce for the construction activities.

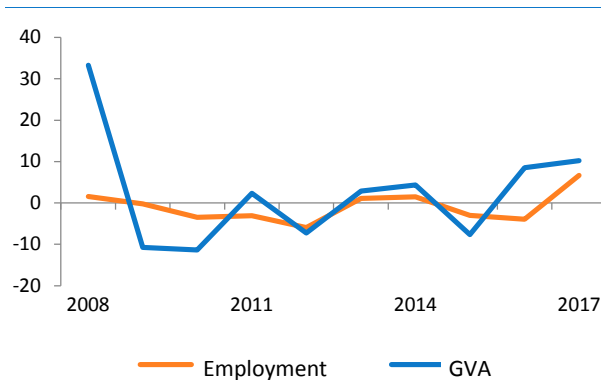
## Agriculture

Agriculture<sup>88</sup> is one of the sectors of the economy characterised by high volatility of the economic activity and of labour demand and employment respectively. It generates a relatively small value added share to the economy but it is extremely labour intense and therefore has a high relative share of the total employment. Due to its high volatility and substantial weight in the total employment, agriculture is one of the main sectors having a significant impact on employment dynamics on a national scale.

<sup>87</sup> At base 2008 = 100

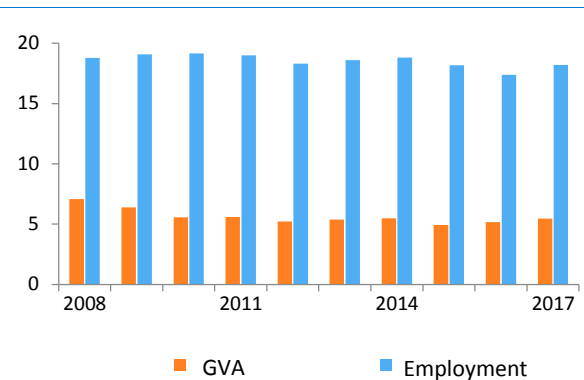
<sup>88</sup> The main group defined in the Statistical classification of economic activities A 64 of CEA-2008 is the agricultural sector, comprising agriculture, hunting, forestry and fishing. The current analysis will focus on agriculture alone since this sector generates about 90% of the value added and about 97% of the employment in the agricultural sector in the period 2008-2017. Agriculture in turn comprises crop and animal production, hunting and related service activities.

Graph 61: Real GVA and employment growth in agriculture, %



Source: NSI, Eurostat

Graph 62: Share of agriculture in GVA (2010 prices) and employment in the total economy, %



Source: NSI, Eurostat

During the period 2008–2017, the changes in agriculture employment as a whole were consistent with the rate of changes of the newly generated income in the sector. The gross value added (GVA) in real terms alternated periods of high growth of over 33% in 2008, followed by years of sharp decline of about 11% in 2009–2010. After 2011 GVA growth rates fluctuated within a more limited range, with the sector’s dynamics remaining volatile.

The interdependence between the changes of GVA and of employment in the sector was particularly evident in the years from 2009 to 2015, when the periods of GVA growth and decline were accompanied by periods of growing and decreasing employment.

Agriculture sector generates a relatively small value added share to the economy but is highly labour intensive and therefore has a high relative share in the total employment. It has a significant impact on employment dynamics on a national scale.

In 2012, the sector saw the sharpest decrease in the number of employed persons (of 5.9%), which coincided with the biggest annual GVA decline post 2010. In the next two years, the number of the employed in agriculture increased and this was one of the main factors contributing to the gradual stabilisation of the total employment in the country in the post-economic crisis period. Over the last two years, the sector’s economic dynamics was again among the strongest ones by economic activity, with a real growth of the newly generated income of 8.5% and 10.2%, while the number of the employed registered an increase of 6.7% in 2017.

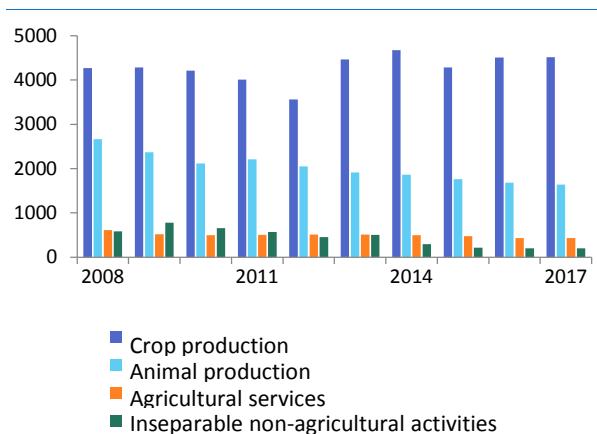
Generally, the changes in the value added and the employment in agriculture were consistent with the profile of agricultural activity development in the entire economy during the ten-year period under consideration but the industry’s considerably more volatile nature was determined by its dependence on climate and season-related factors and explains the nature of the demand of agricultural products as depending on the current situation. In 2017, the value added in real terms was 11% lower compared to 2008, which fully corresponded to the 10.5%-decline in the number of persons employed, registered for the same period.

The decrease in the newly generated income and the employment in agriculture over the last ten years was the result of the identical dynamics in the volume of the gross agricultural output<sup>89</sup>. The negative development was determined most of all by the decrease registered in animal breeding,

<sup>89</sup> Based on data from the economic accounts for the agriculture, which are satellite accounts of the national ones.

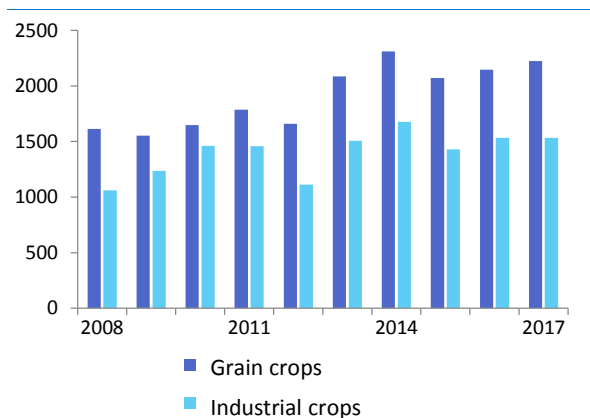
with a downward trend observed throughout the whole period under consideration, with the exception of 2011. Crop production showed a downward trend during the period up to 2012, which was however, compensated as early as 2013. Regardless of the unstable dynamics during the next few years, the final crop output registered a 5.8% increase in real terms from 2008 to 2017. The positive development had to do with the real growth of grain production as a structuring sector of Bulgarian agriculture – by 37.7% as well as with the increased volume of industrial crops production by 44.7%.

Graph 63: Agriculture production (2010 prices), mln BGN



Source: Eurostat

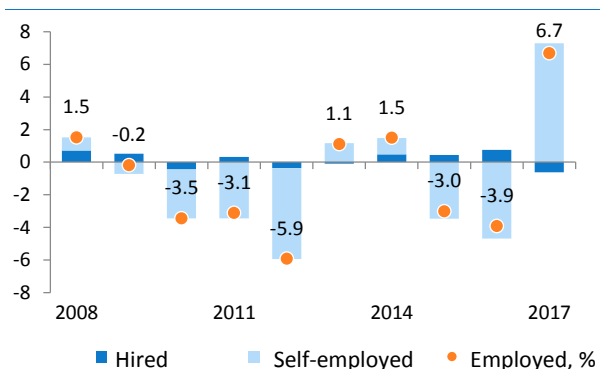
Graph 64: Production of grain and industrial crops (2010 prices), mln BGN



Source: Eurostat

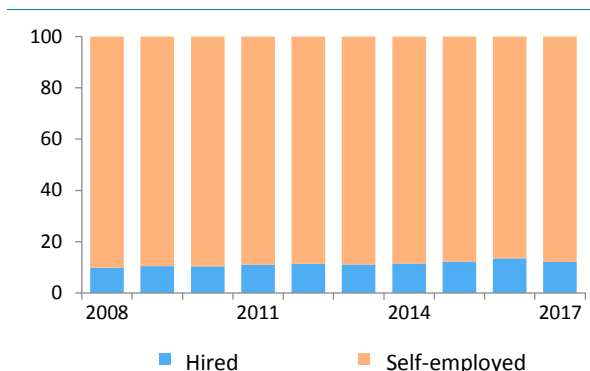
The employment structure of the industry is dominated by self-employed persons, who represent an average of about 89% of the total employment in the agriculture. This is determined by the structure of the farms.

Graph 65: Contribution to employment dynamics in agriculture, p.p.



Source: Eurostat

Graph 66: Employment structure in agriculture, %



Source: Eurostat

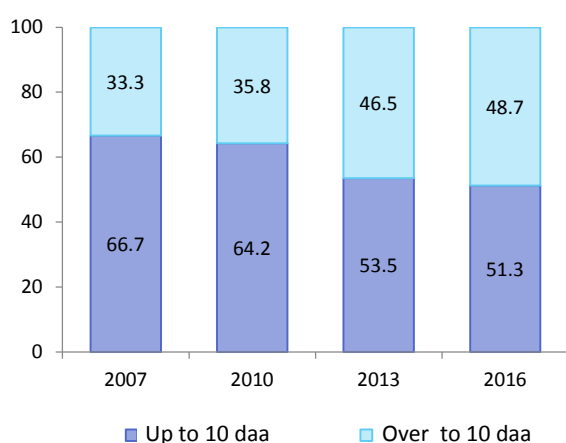
The heavy interdependence between the output and employment in agriculture is determined by the high labour intensity as a factor of production, it depends also on the industry's employment structure. It is dominated by self-employed persons, who represent an average of about 89% of the total employment in the agriculture and determine the high share of the industry in the total number of the persons employed in the economy of about 18.6% on the average during the 2008–2017 period. Though the share of the self-employed during the 10-year period under consideration generally followed a downward trend, with a growing share of the hired labour resource, the self-employed re-

mained a significant factor influencing the dynamics of the total employment in agriculture. Thus in 2017, the self-employed share in agriculture accounted for 88%, which is a 2 p.p. decrease compared to 2008, while the hired persons' share increased to 12%.

The high share of self-employed in agriculture has to do with farms' structure. Based on data from the censuses and regular studies of farms' structure conducted in 3-year periods, a conclusion can be drawn that the workforce is concentrated mostly in small farms<sup>90</sup>, which rely heavily on family labour. This structure determines also the high labour intensity for increased agriculture output since small farms have more limited resources available to them to invest in equipment, new technologies and modernisation of the production process.

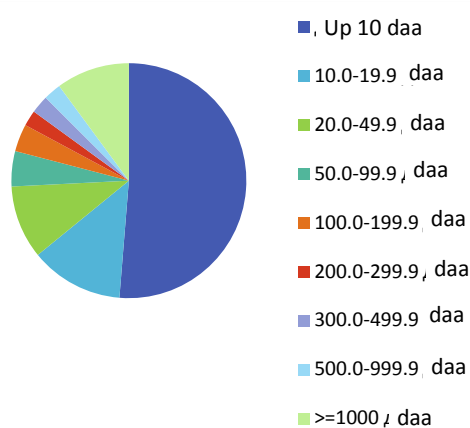
During the period 2007-2016<sup>91</sup>, the distribution of workforce based on the size of the utilised agricultural area(UAA) shows that small farms of UAA of up to 10 decares (1 ha) dominate in terms of share they take up. This share declines gradually while the share of farms bigger than 10 decares is on the increase, which indicates processes of farms' aggregation. Even though it is significantly lower in comparison to 2007, in 2016 the workforce share in the small farms continued to take up over 50% in the general workforce structure, with 1 to 3-decare farms still dominating the small farms structure, followed by 5 and 10-decare farms. The only difference between the small farms structure in 2016 and in 2007 is that in 2016 the workforce share in farms of 3-5 decare UAA exceeded the share of workforce in farms of 0.1 and 1 decare UAA. This is another indicator of an ongoing aggregation of small farms.

Graph 67: Workforce structure depending on UAA size, %



Source: MAF

Graph 68: Workforce structure depending on UAA size, %, 2016



Source: MAF

The concentration of workforce in small farms was confirmed also by the data available on its distribution based on farms' legal status and UAA size. In 2007 the workforce share in farms owned by physical persons amounted to 95%, gradually decreasing to 86.7% in 2016. Taking into account the UAA size as well, the workforce share in small farms was about 70% in 2007, decreasing to 57.8% in 2016. In comparison, the workforce share in small farms owned by legal persons, was a mere 10.5% in 2007, registering a decline down to 8.6% in 2016. At the same time, the opposite trend was observed with farms that are over 10 decares in size, belonging to legal persons, where workforce share increased from 89.5% in 2007 to 91.4% in 2016.

<sup>90</sup> One of the criteria for a small farm is the utilised agriculture area (UAA). According to this criteria, a small farm is considered a farm having from 0 to 10 decares of UAA.

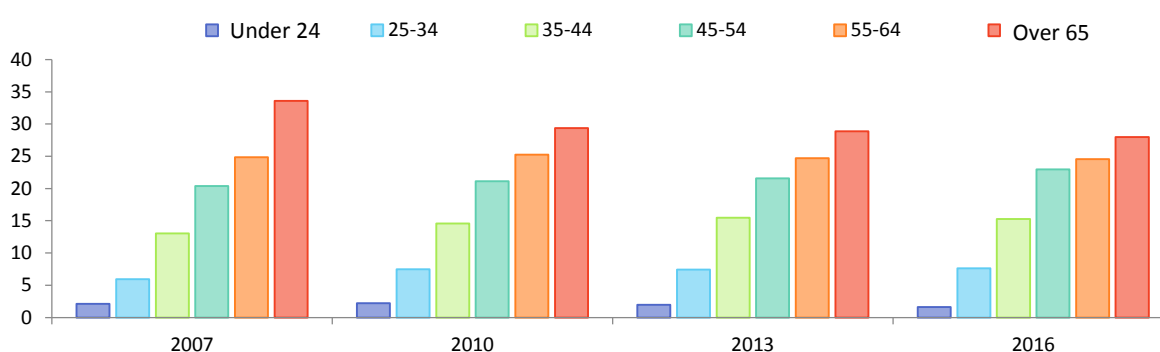
<sup>91</sup> The latest study of farms' structure covers 2016 data.

About 85% of the persons employed in agriculture are family workforce i.e. the holders themselves, their spouses and closest relatives. For about 2/3 of them this is their only or main employment.

Workforce distribution in accordance with the family tie with the farm holder is indicative of agriculture employment. The majority of the people engaged in farming are family members, with their share accounting for 94.5% in 2007. Even though family labour registered a gradual decline over the years, its share in 2016 still stood at over 85% of the total agricultural employment. The family labour structure is dominated by the holders themselves, followed by spouses, who jointly account for about 84% on the average, with the remaining share taken up by other family labour – most likely represented by the rest of the household members or other close relatives. For about 63% of the family labour this is their sole or main employment and for the other 37% – it is a source of additional employment

Another important characteristic in terms of evaluation of agriculture workforce potential is age structure. Throughout the whole period monitored, the age distribution of the persons employed is shifted to the elderly age groups, with the biggest share taken up by higher age group workers. The persons aged over 65 have the highest share, which however, registers a declining trend and in 2016 it is 5.6 p.p. lower compared to 2007. The share of people aged 55-64 is relatively stable and thus the two age groups of elderly labour (over 55) account for more than half of the sector's workforce. It should be noted that there is a favourable change of gradual increase in the share of persons belonging to the middle-age groups between 45 and 54 and 35-44 as well as those belonging to the younger age groups between 25 and 34. To a great extent, the trends observed by age groups are determined also by the negative demographic developments but also lead to a more even age distribution of farm employment, which creates also higher potential for generation of value added to the industry and increased labour productivity.

Graph 69: **Workforce structure by age groups, %**



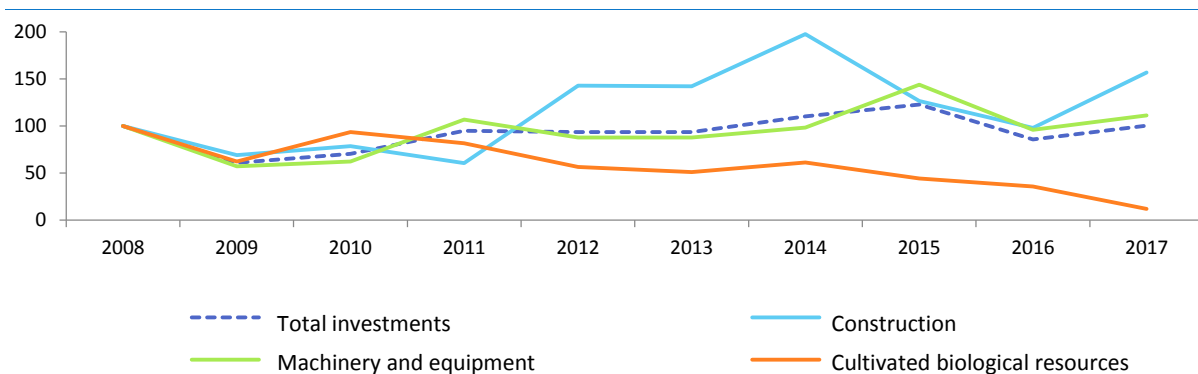
Source: MAF

Investment activity of the producers in the industry is very volatile. Gross fixed capital formation manages to recover its pre-crisis levels as late as 2014-2015, which probably reflects also the accelerated absorption of EU funds at the end of the programming period.

Regardless of the slow workforce transformation observed, from small farms relying mostly on family labour and for whom this is the main source of employment, to bigger farms hiring workforce, employment structure contributes to more limited opportunities for investment in the industry. Accord-

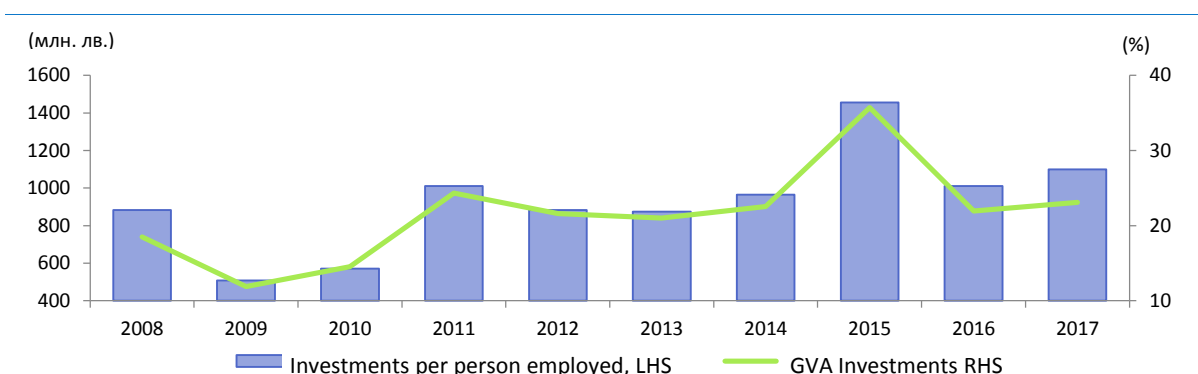
ing to the national accounts data, the dynamics of gross fixed capital formation shows strong volatility in the period 2008–2017 and manages to recover its post-crisis declines as late as 2014–2015. The latter probably reflects also the more accelerated absorption of EU funds at the end of the programming period 2007–2013, which is then followed by new decline in investment activity. Investments dynamics, depending on their type, shows that the total growth is being limited by the decrease in cultivated biological resources. At the same time, investments in construction (mostly buildings) had the most significant contribution to the recovery of investment activity, with a growth of 56.8% registered in 2017 compared to 2008. The growth rate of investments in machinery and equipment accounted for 11.4%, influenced most of all by the strong growth during two of the years covered by the ten year-period under consideration, namely 2011 and 2015. In practice, investments in machinery and equipment are of major significance for labour productivity increase and creation of jobs. The calculated ratios *investments made in machinery and equipment to value added per person employed in agriculture*, also indicate increased investments in fixed assets, with the share of investments in value added is 4.6 p.p. higher and the investments per person employed have increased by 24.4% in 2017 compared to 2008.

Graph 70: **Gross fixed capital formation index (2010 prices) in agriculture, 2008=100**



Source: Eurostat

Graph 71: **Ratio of investments made in machinery and equipment (2010 prices) to GVA (2010 prices) and persons employed in agriculture**

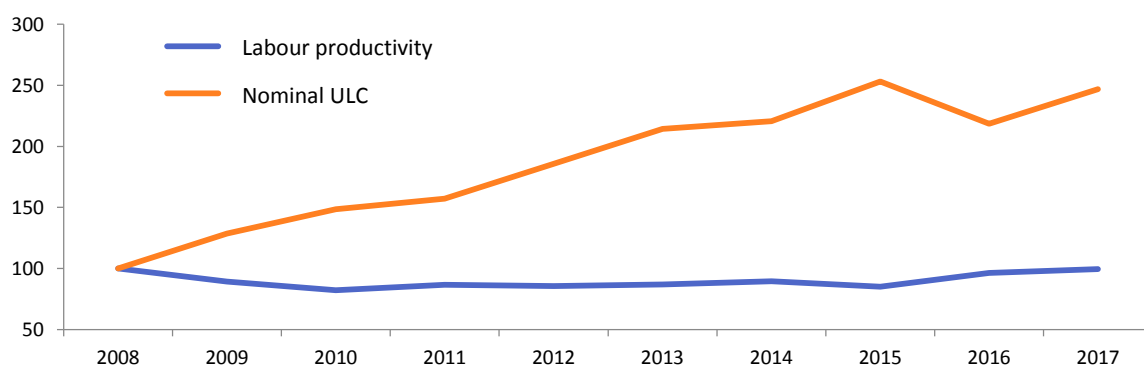


Source: Eurostat

Regardless of the increased investment activity, the technological level of labour productivity in agriculture remains low. Adhering to the profile of GVA and employment development, labour productivity in agriculture shows unstable and volatile dynamics, alternating periods of decline and increase. For the whole period since 2008, the industry shows accumulated decline in labour productivity, with the level of the indicator in 2017 being 0.5% lower compared to 2008.

Unlike labour productivity, in the case of a compensation of a person employed, which measures the level of income earned in the industry, a constant growth is observed, with the only exception of 2016 when a decline was registered on an annual basis. It should be noted that the compensation per person employed indicator concerns only hired workforce since the income from labour by self-employed is considered a mixed income and is presented along with the gross operating surplus of the Income Account of the National Accounts and therefore cannot be distinguished from the profit. For the entire period from 2008 to 2017, the average growth of the compensation per person employed in agriculture accounted for 12%, while the average growth rate for the economy was 8.6%. Most of the time, agriculture was showing a faster rate of income growth compared to the average increase for the country but at the same time, the increase was also higher than the nominal growth of the value added in the sector. For this reason the share of labour in the value added, measured through the compensations of the employed, increased almost twice compared to 2008 and reached 25.1% in 2017.

Graph 72: **Labour Productivity Index and Nominal Unit Labour Cost (NULC) Index, 2008=100**



Source: Eurostat

These developments were related to the increase in the number of the employed in the sector – from around 10% in 2008 they reached 12% of the total employment in agriculture in 2017. On the other hand, given the relatively low levels of income from labour in the industry, labour costs register an upward trend in an environment of growing average income in the economy, increases in the minimum monthly wage and annual update of the minimum insurable income of the persons employed in agriculture. Compared to labour productivity dynamics, however, which is characterised by accumulated decline, the labour cost growth in the sector led to a significant increase in the nominal unit labour cost, which indicates an unfavourable development in terms of cost competitiveness in agriculture.

## Transport

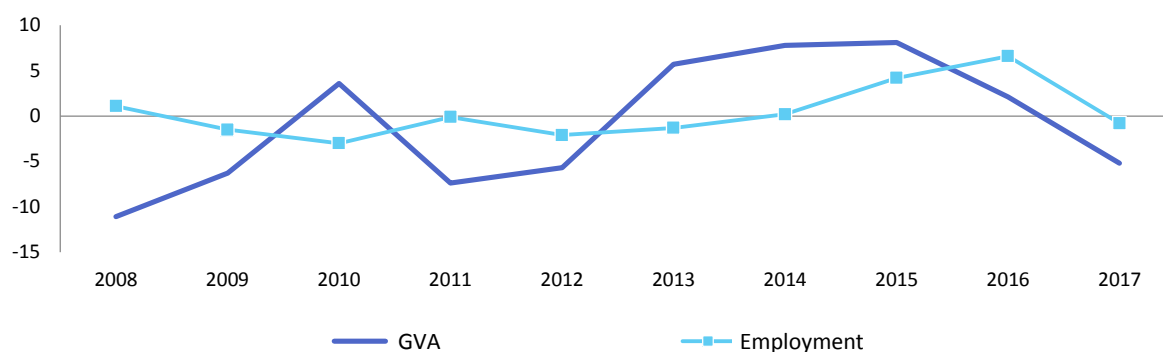
*Transport, storage and communication* economic activity involves all types of transport services (*land, air and water transport*), *goods storage services and support services for transportation*, as well as *postal and courier service*.

Employment in the general group accounts for about 5% of the total employment in the economy (based on SNA data), with a gradual growth of this share during the period 2008-2017, reaching about 6% of the total employment in the last two years of the period. The persons employed under an employment contract form the major part of the employment in the sector (between 73 and 76% of the total employment in the sector), this share being very close to the value of the indicator for the entire economy. Employment in some of the activities (*air transport*, and up until 2014 – *water transport as well*) is entirely formed by persons employed under an employment contract.

Even though the share of small-sized companies (employing up to 50 persons) in *transport, storage and communications* is similar to the one applying to the entire economy, (a little less than 99%), the share of the persons employed in the small-sized companies in the sector is below their share in small-sized companies in the entire economy. If small-sized companies employ about 50-54% of all persons employed in the economy during the period 2008-2017, *transport* employs about 40% till 2011 and then a gradual increase is registered to about 46-47% in 2015 and 2017. The relatively lower weight of the employment in the small-sized companies in the sector is due to the nature of some of the activities in the sector (*air transport, water transport, postal and courier services*), where a number of big companies operate. The decreased employment in the large-sized companies during the 2012-2016 period, was one of the factors, which had an impact on employment dynamics in the sector, especially from 2010 to 2014.

To a great extent, employment dynamics in *transport* was being determined by the employment dynamics in *land transport* activity. The latter accounts for about two thirds of the employment in the whole sector, with the share increasing in the past few years (2015–2017) and exceeding 70%. *Storage services* are the other type of activities having relatively higher shares in the total employment in the sector (about 20% in the beginning of the period under consideration and about 17% in 2016 and 2017), along with *postal and courier services* (about 10% of the employment in the sector). Employment in *air and water transport* is extremely volatile but represents a relatively small share in the total employment in the sector (about 3% in total) and therefore has a limited influence on the general employment dynamics in the industry.

Graph 73: **GVA and employment growth rate in transport (%)**



Source: Eurostat

A major factor for employment dynamics in the sector is the general dynamics of transport services demand and they in turn are directly dependent on the dynamics of the entire economy. The volume of goods transported is directly linked to the dynamics of commodity turnover both domestically and for export purposes; and passenger transport is directly dependent on the growth of the population's purchasing power and hence their consumption levels, including of transport services. However, it should be pointed out that the link between the sector's growth (measured in terms of GVA change) and its employment growth (measured in terms of changes in the number of the persons employed in the respective activities) becomes evident with about a one-year lag. In other words, the decline in the GVA generated in the transport sector affects its employment dynamics, normally, in the coming year; the opposite also applies – the recovery of transport services demand has an impact on employment, again with a one-year lag. Similar lag in the GVA-employment link was particularly evident in *land transport* activity.

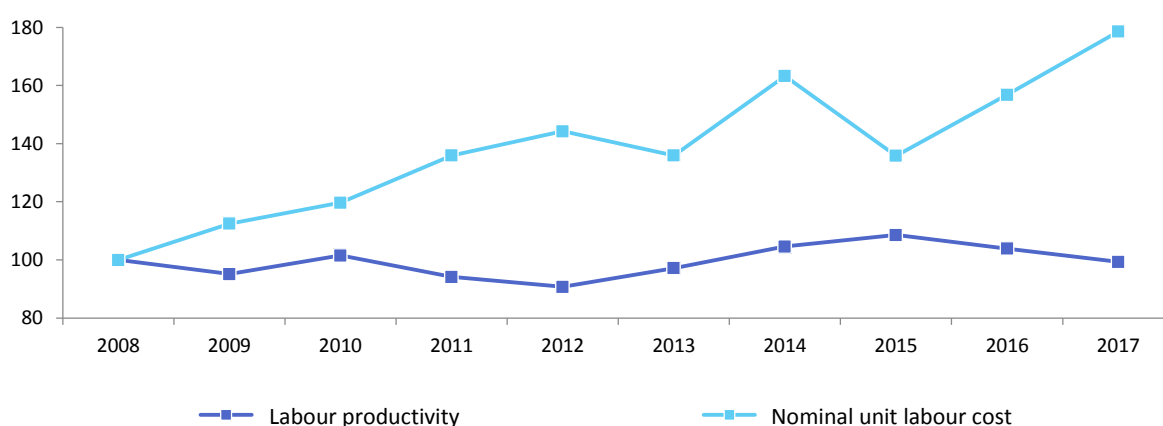
Apart from the domestic production activity, another factor influencing transport dynamics and employment is the dynamics of international fuel prices. Trade companies responded to the increase by reducing their profits first and maintained a relatively stable employment.

Another factor influencing the dynamics of transport services are the changes in the international fuel prices. This was particularly evident with *land transport* but affected *air transport* as well. During the period 2011 – first half of 2012, crude oil prices at the international markets were rising fast and were the main factor contributing to inflation. In 2011 all transport services registered decline in their real GVA, and with *land transport services* the downward trend continued in 2012 as well. During the period 2013-2016, when a significant decline in crude oil prices was observed, transport services (and most of all *land transport services*) registered a constant GVA growth. It should be noted, however, that the dynamics of crude oil prices at the international markets had a direct impact on GVA dynamics but not so directly on employment dynamics in the sector. In practice, employment in land transport remained relatively stable during the period 2010-2014 and it was as late as 2015 and 2016 that it saw high annual growths. The reason for this was that over the years of sharp rise in fuel prices, transport companies did not respond by a large scale shrinking of profit margins but maintained a relatively stable employment and labour compensations.

The higher petrol prices at the international markets were among the main factors influencing the activity and employment dynamics of the *air and water transport* companies but there were additional factors as well. In the case of *air transport*, the increased competition of foreign companies operating at the Bulgarian market proved to be a significant factor, especially in the low-cost carriers' segment. During the period 2012-2014, a sharp decline was observed in the *water transport* employment, which went down by almost 50% over a three-year period due to the restructuring of major companies.

The recovery of transport companies' activity led to recovery of the number of persons employed in *land transport* during the period 2014-2017 and employment exceeded the pre-crisis level. The entrepreneurs in the sector expect that the demand for labour force possessing the right qualifications, will continue growing, their estimate being that there will be a staffing shortage (mostly heavy duty lorry drivers) of about 3 thousand people or about 2% of the employed in the land transport sector in 2017.<sup>92</sup>

Graph 74: Labour productivity and nominal unit labour cost index 2008=100



Source: Eurostat

<sup>92</sup> Data from a sociological survey presented by the Union of International Carriers in Bulgaria on 19 November 2018.

During the period 2008-2017, labour productivity in *transport, storage and communications* sector<sup>93</sup> was extremely volatile and did not show a particular trend in its dynamics. Labour productivity in the main activity in the sector – *land transport* – remained relatively stable during the period 2008-2010, with the decrease in the number of the persons employed being consistent with the GVA decline. Over the next two years, labour productivity decreased by about 15% due to the further GVA decline. This was a period of relatively quick rise in fuel prices, which resulted in *land transport* shrinking their activity but also in a significant drop in the profitability of the sector. The second half of 2014 saw a process of quick drop in the crude oil and fuel prices and this had an immediate impact on the labour productivity growth by 15% on an annual basis, followed by stabilisation of the value of the indicator around the level reached. During this period, employment growth as a whole was following GVA dynamics.

Labour productivity dynamics in *water and air transport* was fluctuating in a very wide range, with periods of double-digit growths and declines. In the case of *water transport*, this was related to the restructuring of the activity and the sharp changes both in the GVA generated and the number of the employed. With *air transport*, the main factors influencing the improvement or deterioration of labour productivity were the increased competition on the part of foreign (low-cost air carriers) companies and the dynamics of fuel prices. The impact of the latter on air transport productivity was felt even stronger than in *land transport* due to the lower profitability and extremely high price competition among the companies in the industry.

*Warehousing and support activities for transportation* was the only activity in the sector, which registered a relatively well defined upward labour productivity trend over the period analysed. *Postal and courier activities* had the lowest productivity in the sector and during the first half of the period analysed it registered a relatively constant decline. It is as late as since 2013 that labour productivity of the activity saw a gradual increase but even in 2017 it remained below its 2008 level and about 16% lower than the average one for the whole transport sector.

At the same time, throughout the whole period analysed, an almost constant increase of nominal unit labour costs was observed in all economic activities in the transport sector. It is in *land transport*, in 2011–2013, that the value of the indicator showed stable dynamics. This was the period when *land transport* registered a relatively high GVA decline as well as decrease in companies' profits mostly due to the still weak growth of the economy as a whole and the high operational expenditure ensuing from the high fuel prices.

## Information and Communication Technologies

ICT employment engages professionals and highly qualified staff.

The people employed in the *information technologies and information services* (ICT) account for an average of about 2% of the employed in the economy over the period 2008-2017. This sector is in the focus of attention not so much because of its relative share in the employment of the Bulgarian economy. The two factors which make it significant for employment dynamics are its potential for future development as well as the fact that the people working in the sector are highly educated and qualified and are engaged in activities referred to as “professions of the future”, which are at the forefront of technological development. These activities are the main impetus for technological development and total factor productivity growth. Assessments conducted at European level show that employment in this activity includes mostly professionals and highly qualified staff.

<sup>93</sup> Calculated as GVA based on 2010 prices per person employed.

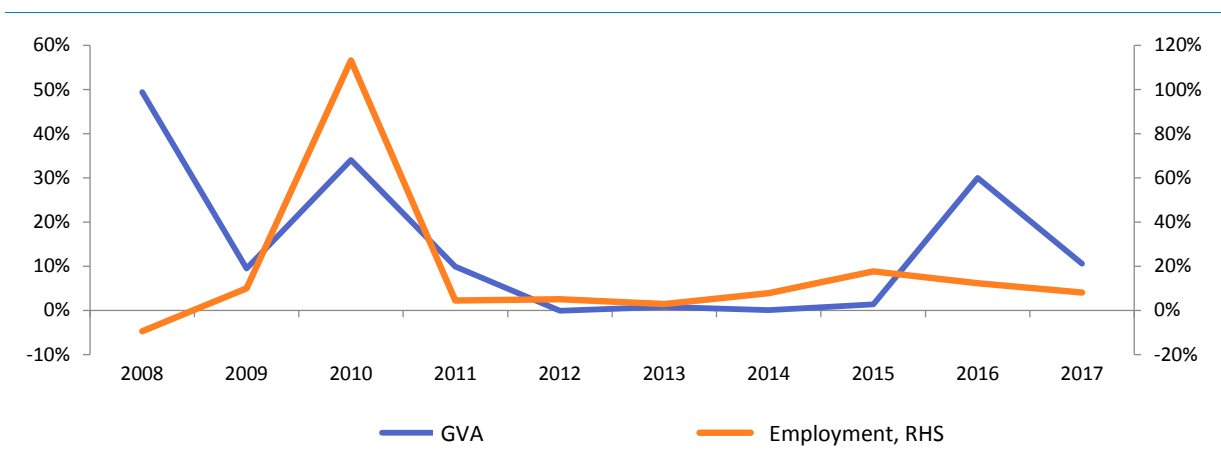
In accordance with NACE 2008, ICT includes activities related to *publishing activities, motion picture and radio programmes production, sound recording and music publishing activities, radio and television programming and broadcasting activities, telecommunications, information technology activities and other information service activities*. This analysis will focus mostly on the development of labour market in the field of *information technology activities and other information service activities*.

The 2008 and 2009 crisis had an impact on ICT GVA alone, registering a decline, while the number of the employed stabilised around the level achieved. Already in 2010, the number of the persons employed in the sector doubled and for the whole period 2008-2017 it saw a four-fold increase.

An extremely high growth rate was observed in *information technology activities and other information service activities* over the last ten years. In 2008, the number of the employed amounted to 13.5 thousand people and in 2017, their number increased four times, already reaching 55.1 thousand. Unlike other sectors of the economy, the 2008-2009 crisis did not result in a decline in ICT but only slowed down the sector’s growth. If during the pre-crisis years (2006–2007) the annual growth rate of ICT GVA was ranging between 25 and 50%, in 2008 it slowed down to 9.5% but the very next year it went up to a two-digit level. During the period 2008–2009, ICT employment stabilised around the level reached but in 2010 already, employment in the sector doubled compared to the previous year.

During the period 2012–2015, a certain standstill of ICT activities in Bulgaria was observed. This period is characterised by a minimum GVA growth in the ICT sector (and even a minimum decline during one of the years specified). As a result, employment dynamics in the sector did not suffer any significant impact either. In 2016 and 2017, however, ICT GVA started growing again at an accelerated rate (the 2016 GVA growth rate in the ICT sector was 30.0% and for 2017 – 10.5%). This was accompanied by a new leap of employment numbers, which almost doubled over a three-year period (2015–2017) – from 38.6 to 55.1 thousand people.

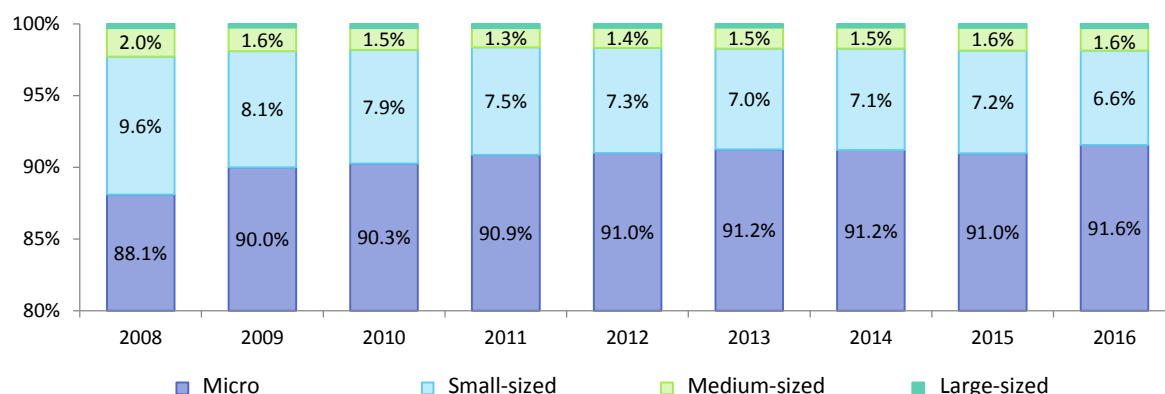
Graph 75: **GVA growth and employment rate, %**



Source: Eurostat, own calculations

The medium and large-sized companies have a relatively high importance for the dynamics of the total employment in the sector compared to other economic activities. The share of medium and large-sized companies in the total number of persons employed in ICT in 2008 was about 59% (the companies employing over 250 people alone account for 34.5%) and in 2017 this share grew to 62% (40.3% – the share of the large-sized companies alone).

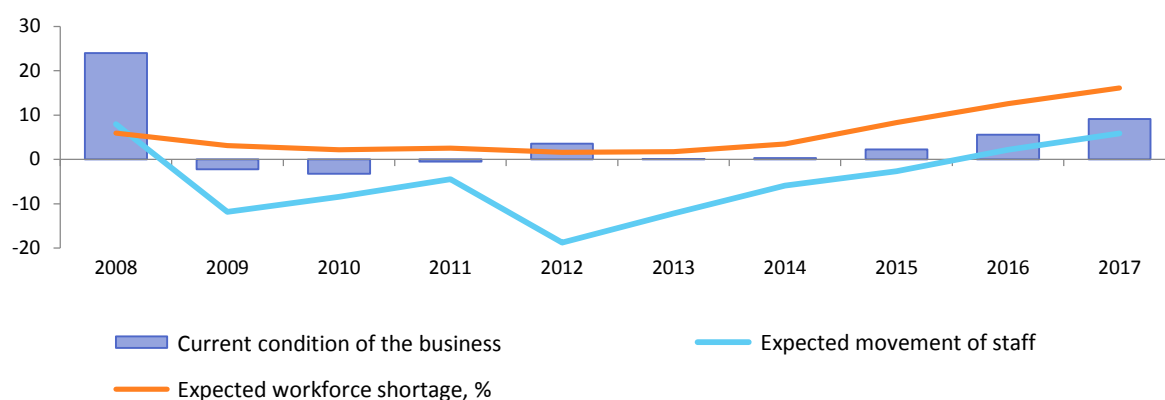
Graph 76: Employment structure in the ICT sector by company size for the period 2008-2016, %



Source: Eurostat, own calculations

The peculiarity of labour demand in this sector is that it includes mostly highly qualified persons, holding IT, mathematics or engineering degrees and is normally oriented to young people, aged below 35 (average age). According to a projection of the European Centre for Development of Vocational Training, up to 2020 the demand for IT specialists at EU level will outpace the demand for other types of employment in the economy. The global staffing shortage in all EU countries and the flexible employment options available increase the competition among employers and present a serious challenge to them in hiring the staff with the right qualifications. The business environment indices for the ICT sector services show that the qualified staff shortage issue can be expected to deteriorate in the future.

Graph 77: Selected indicators of business environment in the services sector – total for the country, balance

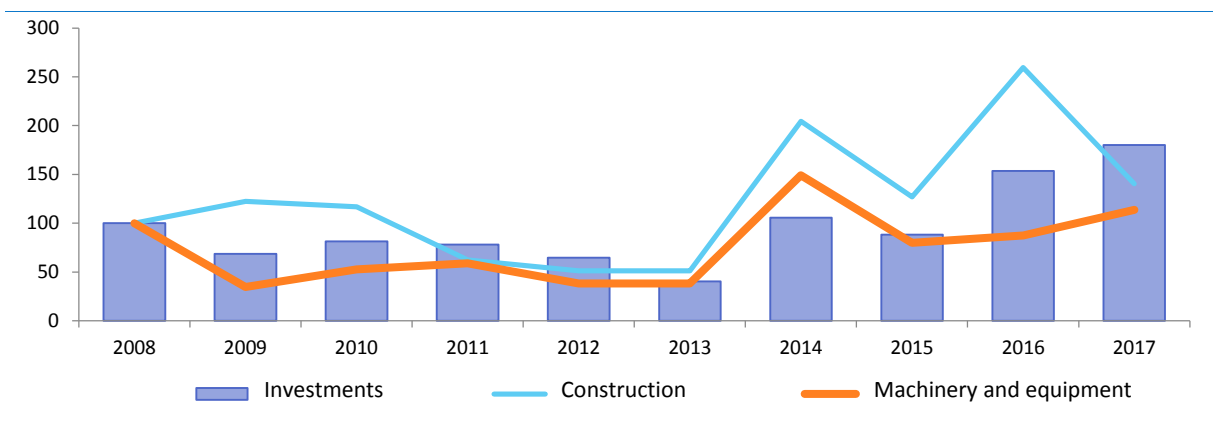


Source: NSI

During the period under consideration, investments in the sector increased compared to the registered ones in the years prior to the economic crisis, mostly in 2016-2017. In 2012 they were at their lowest for the whole period (64.7% of the investments made in 2008), which was followed by a gradual growth of the investments made in the ICT sector. Investment activity in the sector responded with a certain delay to the dynamics of the total investments in the economy. Part of the investments in the sector are made by the banking and telecommunications sector as well as by the large companies. The high volume of investments in the shared services centres, the acquisition of local companies by foreign investors, as well as the expectations of continued investments in the sector are a prerequisite for the future growth of the ICT sector.

Most of the money invested in the sector are utilised for the purchase of machinery and equipment, which, having hit the bottom in 2009 as a result of the crisis, gradually recovered and is among the factors for production growth in the sector.

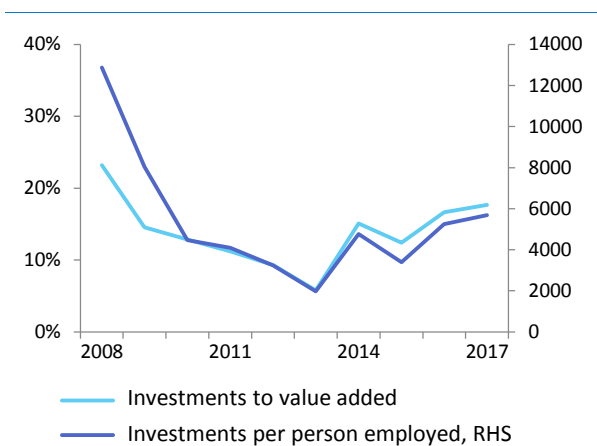
Graph 78: **Gross fixed capital formation index in ICT by constant 2010 prices, 2008=100**



Source: Eurostat, own calculations

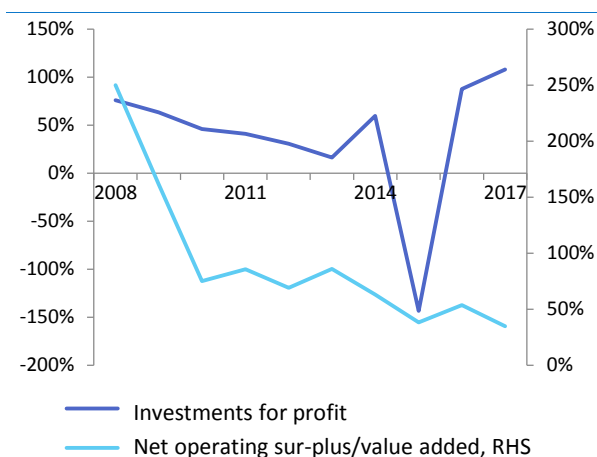
Investment dynamics in the sector predetermined also the decline in the indicators of investments per person employed and investments to value added for the period 2008-2015. Then they register an increase as a result of the growth of investments and value added. Investments increase is the result of the relatively higher volume of free funds in the form of operating surplus during the period, as well as of the easier access to loan financing.

Graph 79: **Investments to value added and investments per person employed for the period 2008-2017**



Source: Eurostat, own calculations

Graph 80: **Investments to operating surplus and operating surplus to value added for the period 2008-2017**

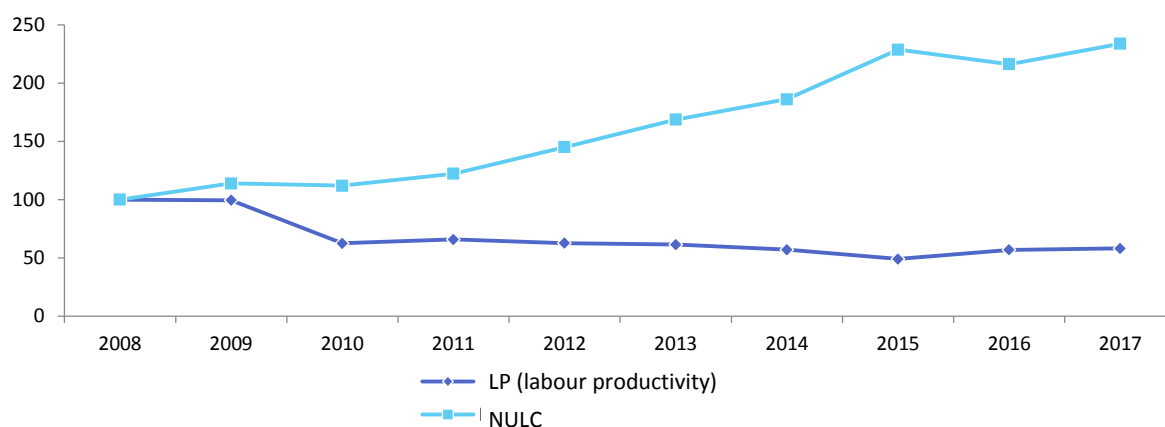


Source: Eurostat, own calculations

Labour productivity dynamics in the ICT sector was relatively unstable. The indicator reached its peak in 2008 and 2009, when it was over 60% higher compared to the previous years, however, in 2010 already it bounced back to its 2006–2007 level. This decline was determined by the sharp increase in employment in the sector (more than double), which was not accompanied by the respective GVA growth. It is likely that new companies entered the market (Bulgarian or international ones), which

initially registered lower labour productivity compared to the productivity of the already well established companies at the market. The period 2010-2015 saw a gradual decrease of ICT labour productivity, which coincided with the period of minimum growth in the sector both in terms of GVA and employment dynamics. In 2016, ICT was back on the upward growth trend and labour productivity regained its 2007–2008 levels (constant prices).

Graph 81: **Nominal ULC and labour productivity in ICT sector at 2008 = 100 base**



Source: Eurostat, own calculations

At the same time, the nominal unit labour costs (NULC) in the ICT sector were constantly growing, with the average annual growth rate for the whole period being 13.1%. Throughout the whole period under consideration, the wage growth was outpacing that of labour productivity. NULC dynamics was determined mainly by the growth of the compensation per person employed, the average annual growth rate for the period being 35%, while the one in the economy was 8.6%.

The global ICT staff shortage in all EU countries and the flexible employment options available increase the competition among employers significantly and lead to a fast increase in the average salary in the sector, which is the highest relative salary in Bulgaria.

The average salaries in the ICT sector are the highest in the country. According to 2016 data, the average salary for the whole sector (not only *information activities and services* but also *telecommunications, production of artistic products, etc.*) was 150% higher than the average for the country and apart from this, its rate over the last ten years was outpacing that of the rest of the economic activities. On the one hand, this was determined by the higher labour productivity in the ICT sector compared to the average for the economy. In 2017, it was over 50% higher than the productivity for the total economy, and during the previous years (especially 2008-2009), this gap was significantly bigger. On the other hand, the high growth rate of the salaries in the ICT sector is determined also by the high competition, which employers are faced with when hiring qualified staff. Bulgarian and foreign entrepreneurs compete for ICT professionals (the nature of the work allows that Bulgarian professionals are employed for remote work by international companies); there is also completion among entrepreneurs from the ICT sector and the other sectors of the economy, where computer services are becoming increasingly widespread and there is a demand for professionals with the relevant qualification.

## ANNEX 2

# TECHNICAL NOTES

## Methodology framework of the forecasting model for labour market developments

### General description of the main modules

According to the MLSP ToR, the preparation of the current medium- and long-term forecasts implies the improvement of the macroeconomic forecasting model for labour market developments in Bulgaria through the development of a new medium-term forecasting module.<sup>94</sup> The initial version of this macroeconomic model consist of six main interconnected modules that form the basis of this update:

- Module for forecasting employment by educational attainment level at macroeconomic level, containing:
  - A detailed scheme for estimation of potential labour supply by age and educational attainment level, implemented in a structure with overlapping generations taking into account the decisions of economic agents in terms of their education;
  - An aggregate production function modelling the labour demand using production technology with constant elasticity of substitution.
- Module for forecasting the structure of employment by economic activity:
  - The estimates of the dynamics of employment by economic activity are based on the assumption that at the end of the forecast horizon a given structure of distribution of employment by industry is achieved through gradual (linear) convergence.
- Module for forecasting employment by educational attainment level at sectoral level and identifying of structural imbalances in the labour market, containing:
  - Estimates of labour demand by economic activity and educational attainment level, reflecting the structural characteristics at microeconomic level regarding the needs of businesses.

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<sup>94</sup> For further information see the model documents: Vassilev, A., Ganev, K., Dimidtrov, L., Simeonova-Ganeva, R., Mihnev, P., Kalibatseva, G., Uzuznova, E. (2014) A forecasting model for labour market developments and future needs for knowledge and skills in Bulgaria in the medium and long-term, eds. Simeonova-Ganeva, R. and K. Ganev, Ministry of Labour and Social Policy, SMART: Noema & Sigma Hat & Foundation Business for Education, Sofia.

- Forecasts for filling of jobs (placement of labour supply on job positions) by educational attainment level and economic activity. They are based on the assumption for a minimum saturation threshold of the needs for qualified labour by educational attainment level in all economic activities and a priority orientation of the individuals supplying labour towards more profitable industries. In preparing the forecast for employment dynamics by industry, it is assumed that at the end of the forecast period, a given pay structure for employees by educational attainment level and economic activity is reached, towards which the current structure converges linearly.
  - Mismatch between supply and demand of skilled labour by economic activity. In sectors with relatively unattractive remuneration this mismatch may determine structural deficit of skilled labour. Likewise, in the presence of labour supply with a given skills level for which there is no counter demand, a structural surplus is identified. In the case of structural deficit, the relevant vacancies are filled by lower or higher qualified persons. In the case of structural surplus, i.e. in the case of persons unable to find employment corresponding to their qualifications, one of the options for these persons is to turn to jobs requiring lower qualifications. In such cases there is an underemployment of the persons concerned. The second option suggests that persons target jobs that require higher qualifications than the qualification they have. This results in overemployment of the respective persons.
- Module for estimating the duration of registration as an unemployed by educational attainment level, sex, age and region;
  - Module for forecasting employment by occupation;
  - Module for forecasting employment by sex.

Within the current update, the model frame was complemented also by two additional modules:

- Module for forecasting employment by age group;
- Medium-term forecasting module, combining all key for the MLSP cross-sections between educational attainment levels, economic activities, sex, age groups, regions and occupations.

The calculations in the above modules are based on diverse information, which can be classified generally in two categories – internal and external to the model. External information includes exogenously set values of development parameters such as demographic dynamics and forecast trajectories of the deviation from potential output and of the capital in the economy. Internal information includes the results of endogenous calculations, e.g. for expected return on education or employment dynamics by industry that can be used as input information for some of the other modules.

Depending on the requirements and specificity of the individual modules, different modelling approaches have been applied. For example, some are based on a more formalised theoretical framework – for example, implementing an overlapping generations scheme with continuous replacement of cohorts participating in the labour market. In other, the empirical basis is considerably stronger, basically relying on the information that can be derived from the available statistics – this category includes, for example, modules for generating forecasts for the employees by occupation, sex and age.

The organisation of computational procedures in the original model<sup>95</sup> allows for parallel forecasting in the medium- and long-term horizon, using a uniform theoretical and methodological framework. In the original version of the model, the medium-term forecasts refer to 120 occupations, 35 economic activities, 28 provinces, 4 educational attainment levels, sex, individual (integer figure) age.

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<sup>95</sup> For more information, *Ibid.*

Long-term forecasts have a higher aggregation level and cover 9 classes of occupations, 18 economic activities, 28 provinces and 4 educational attainment levels.

### **Demographic and macroeconomic forecasts used. Updating and upgrading the model**

As a basis for the current update, the final version of the model, implemented under Contract No PД04-25/28.02.2013 by SMART (Noema, Sigma Hat, Foundation Business for Education) was used.

The level of detail of the forecasts is consistent with the publicly available data published by the NSI and Eurostat, as well as with the statistical information additionally requested and provided by NSI, NRA, NSSI and NEA.

The statistical data provided by the NSI includes anonymised data from the Structure of Earnings Survey carried out in 2002, 2006, 2010 and 2014. This survey allows for full connection of the data on employees' completed education, labour income, sex, age with the parameters of the employment contract. The information is structured into two data sets, the first one including detailed data by economic activity (NACE, A31 and NACE 2008, A38) and occupation of the employees (3-digit code of the NCOP 2011) and the second – provincial information (28 provinces). The information provided by the NRA refers to aggregated data on registered employment contracts by economic activity, occupation and province for the period 2000-2017. Data from NSSI covers the same period and include information on the insurable earnings of: employment contracts by province, economic activity and occupation; and civil contracts and self-employment by province. The NEA information refers to all registered unemployed by sex, educational attainment level, age and province for the period 2010-2017

The educational attainment levels included in the analysis are consistent with ISCED and are (structured) as follows: tertiary (ISCED 5A, 5B and 6), upper secondary (ISCED 3 and 4), Lower secondary or lower education (ISCED 0, 1 and 2).

The regional coverage of the forecasts is NUTS 3 (28 provinces).

The medium-term forecasting module is in line with the economic activities at A21 level of NACE 2008 and covers 18 economic activities. The occupations included here are at the 1-digit code of the NCOP 2011 (a total of 9 major groups of occupations).

The remaining forecasting modules underpinning the long-term forecasts are at A38 level and include 35 economic activities and 120 occupations from NCOP 2011.

The forecast scenarios used are based on NSI's official demographic projections, namely: a baseline demographic scenario, an optimistic demographic scenario, and a pessimistic demographic scenario.

The official forecasts for the macroeconomic development of the economy of the respective institutions: MoF, BNB and EC have been taken into account when updating the model and preparing the current forecasts.

The forecast period covers 2018-2032, and it is provisionally divided into a medium-term plan (2018-2022) and a long-term plan (2023-2032). The reference period for the structure of the labour market in the medium and long-term projections was 2014, as this is the year referred to in the latest published data of the Structure of Earnings Survey. Labour market information for the period 2000-2017 was used to derive correlations with historical data as well as to verify and validate the interim and final results of the model.

The changes in the model concerning the module for forecasting employment by educational attainment level at macroeconomic level can be categorised into three groups:

- Update of the model's programme code from Python version 2 to Python version 3, including using higher versions of additional libraries such as Numpy, Scipy, and Pandas. This group of changes is related to the announcement of the end of maintenance for Python 2 in 2020. The

implications are that using the model under Python 2 involves the use of obsolete and poorly supported technological solutions, and in the worst case scenario – risks related to the security of the information systems. Because of these considerations, the parts of the module produced with Python have been redesigned and brought into Python 3-compliant formats. Further modifications were made during this process, allowing for the use of up-to-date versions of more powerful modules such as Numpy and Pandas, as well as modifications enabling the model to be used under versions of Linux operating system. The model has been tested and updated with the WinPython 2018-4 distribution (available for Windows operating system) and the Anaconda version from December 2018 on Ubuntu 18.04.

- Update the data used in the module for forecasting the labour market by educational attainment level with the information available in December 2018. This includes NSI data on population by age, demographic projections (including different scenarios for future demographic developments), quarterly and annual labour force surveys, and on the GDP and its components by final consumption expenditure method. Eurostat data was also used for the number of persons holding or completing different educational attainment levels and for the employment rates by educational attainment level. During the database update used by the module, a series of modifications and additions have been implemented that automate parts of the update process, thus allowing for control and easy reproduction of the results. These modifications were made using a combination of R and Python programming language codes that process raw data and feed into the database used by the module.
- Re-estimate the statistical correlations used and re-calibrate the correction components within the module with new data. First, the updated data is used to feed into the exponential smoothing procedures to produce new estimates of the expected trajectories of the percentage of persons with a given degree of educational attainment level by age group. Second, the regression links of the employment rates by educational attainment level were re-estimated as a function of age group and the cyclical position of the economy. Updated vectors from the estimates were fed into the module code and automatically applied for preparing forecasts by educational attainment level. Third, model correction components were re-calibrated with the latest available data. The correction components provided for expert corrections by the model end-users were not changed from their baseline zero values, which is consistent with the approach adopted in the previous version of the module.

The updates of the module for forecasting the structure of employment by economic activity were reduced to identifying a long-term convergence objective for the Bulgarian economy. In the originally developed model, the forecast for employment dynamics by industry was based on the assumption that at the end of the forecasting horizon a given structure of the sectoral distribution of employees shall be reached. In line with the methodology used so far, the choice of convergence objective was done through cluster analysis of labour market data for EU Member States. The results of this analysis confirmed that the initially identified economies of Hungary, Estonia and Slovakia continue to remain the most appropriate for the convergence objective, as throughout the 2000-2017 period they were the closest to the socio-economic development and structure of the Bulgarian labour market. The updated convergence objective constitutes a synthetic economy with the characteristics of these three economies, while the specific objective in this case is the arithmetic mean industrial structure for the period 2013-2017 of Hungary, Estonia and Slovakia.

The updating of the module for forecasting employment by educational attainment level at sectoral level and the identification of structural imbalances include:

- Drawing up the structures of employment and earnings by educational attainment level, province/region and economic activity on the basis of the most up-to-date available data provided by the NSI, NRA and NSSI. Updated structures are reflected in all relevant equations

of this and the other modules. The main data set used in the originally developed model and here, is the data from the latest Structure of Earnings Survey in 2014.

- Updating the convergence objective at the level of remuneration by educational attainment level and economic activity. For convergence objective in the long-term horizon, the arithmetic mean wages in the other Eastern European Member States in 2014 were adopted (based on the most up-to-date data from Structure of Earnings Survey (SES), published by Eurostat). Meeting this objective implies a moderate annual percentage increase in nominal earnings for most of the educational attainment levels and economic activities.

When updating the modules for forecasting employment by sex, age group and occupation, the latest available data on the employment structure published by NSI, NRA and NSSI covering the 2014-2017 period was taken into account.

The updating of the module for forecasting the duration of registration as an unemployed took into account the data for the registered unemployed of the NEA in the period 2013-2017.

The upgrading of the model in accordance with the new information needs of the MLSP included also the development of a new module for forecasting supply and demand by age group. The methodological framework of this module follows the frameworks of the modules for forecasting employment by sex and occupation. The preparation of projections for future employment by economic activity and age group in the long-term horizon used the NSI's Structure of Earnings Survey in 2014. The distribution of the employed by age group was based on the forecasts of the total labour demand by economic activity and reflects the mechanisms of convergence of the Bulgarian economy towards the chosen objective set out in the model.

#### **Adopted assumptions and hypotheses. Risks and possible alternative scenarios**

The key assumptions in the model are related to the total factor productivity, physical capital dynamics, convergence process and demographic dynamics.

According to the model methodology, technological development is reflected through an externally set trajectory of the total factor productivity of the economy, which is one of the factors determining the labour demand at macroeconomic level. In addition, technological development is implicitly reflected in the employment structure by economic activity and occupation. Historical developments in the technologisation of economy over the past twenty years indicate weak dynamics during employment restructuring towards high-technology sectors, which justifies the assumption adopted in the model update for a moderate pace of technology change. In the event where measures are taken at government level and large-scale policies are implemented to overcome the problem with the delay in the technological developments compared to the EU-28 average, there is a risk that the actual trajectory will be diverted from the assumption, and respectively the externally set trajectory in the model should be updated. This would have a positive impact on the demand level for low- and highly-skilled labour and negative on the demand for medium-skilled labour force in line with the labour market processes observed in the EU. In addition, the total factor productivity is also influenced by other features of economic development, apart from technological progress, such as the degree of utilisation of available production capacity. This complex nature of the total factor productivity means that significant deviations of the GDP estimated by the model, from the current estimates of other institutions may indicate the need to adjust the assumption of its dynamics.

An important assumption for the model is the adopted trajectory of the physical capital in economy. It is one of the factors determining the dynamics of the real GDP and, accordingly, the demand for labour in the economy. In the event of inconsistency of the assumption of physical capital development with the other assumptions of the model there is a risk for not sufficiently realistic forecast. This risk is managed and limited by the use of appropriate consistency checks, for example, in relation to key ratios in the model.

According to the methodology, the mechanisms of forecasting the macroeconomic development of the economy by the respective institutions: MoF, BNB and EC, have been taken into account in the development of the model, as well as the most recent forecasts for the macroeconomic dynamics published at the time of the forecasting. The information from these forecasts is taken into account by means of assumptions about the dynamics of the total factor productivity and of the physical capital in the economy, that take part in determining the actual production. The macroeconomic forecasts are updated on a regular basis, and the next update of the model will take into account the new expectations of economic growth, which may lead to changes in the forecasted employment.

The forecasting of labour market dynamics inevitably reflects the process of convergence of Bulgarian economy to the European one, in accordance with the identified objectives, which are highly likely to be achieved (determined on the basis of statistical analysis according to the model methodology). The convergence process is explicitly reflected in the model through the dynamics of the employment structure by economic activity, as well as through the increase in nominal wages by economic activity and educational attainment level. The achievement of the convergence objective with respect to the development of the publicly dominated sectors of *public administration*, *education* and *human health* is also related to policy decision making, implementation of reforms and policies, and design of measures. The achievement of the convergence objective regarding the development of the private sector is linked to the socio-economic and political development of the European economies. There is a risk for the long-term forecasts to be inaccurate due to a divergence of the development trajectory from the convergence objective in the case of adoption of other strategic policies (other than those reinforcing the role of the *education* and *health* sectors) and/or unfavourable development of the external environment.

Labour supply forecasts are based on the official demographic projections of NSI that reflect birth rates, death rates, and migration processes. Employment expectations by economic activity, occupation, age group, sex, and educational attainment level are sensitive to any significant deviations in the future demographic dynamics from the predictions valid as at the end of 2018. Currently, positive or negative demographic shocks are not modelled endogenously. Development of alternative scenarios (with regards to extreme developments – pessimistic and optimistic scenarios, and a development of a probable “central” scenario) is subject to more detailed demographic analysis, and in the event these are specified, they can be taken into account in subsequent updates and applications of the model.

#### **Additional module for medium-term forecasting**

According to the ToR, the new medium-term forecasting module should provide a tool for structuring forecasts by economic activity (according to Aggregate Nomenclature A21, excluding letter-coded sectors A, T and U, classes of occupations and educational attainment levels (tertiary, upper secondary, and Lower secondary or lower education). At the same time, a general requirement for the overall modelling framework is provision of long-term employment and labour demand forecasts by sex, age group, 3 educational attainment levels, 28 provinces, economic activities according to the NSI aggregate nomenclature A38, and 120 occupational groups.

Following the latter requirement, the original modelling framework was modified to allow generating forecasts according to the set parameters. Due to the performed update of all the modules, all required long-term forecasts are also provided. The results are presented in spreadsheets, detailed at the level of 120 occupations, 35 economic activities, 28 provinces, 3 educational attainment levels and 6 age groups.

By its very nature, the additional medium-term forecasting module is based on the results of the long-term forecasting module, and one of the goals it achieves is to aggregate the forecast information according to the specific parameters set for it. Another main goal, respectively developed functionality of this module, is the calculation of the medium-term structural mismatches in the labour market.

The medium-term forecasting module is produced in a separate Excel document. Using the capabilities of this software application, including automation of operations with the help of VBA functionalities, detailed long-term forecasts are aggregated at the level of 9 classes of occupations, 18 economic activities, 28 provinces, 3 educational attainment levels, and 6 age groups.

Due to the fact that the medium- and long-term forecasts are based on a uniform methodology and consistent statistical classifications, the two types of forecasts are fully consistent with each other.

The medium-term forecasting module follows the general framework of the model and adheres to the same sequence of steps. In particular, it is based on basic macroeconomic behavioural correlations and identities.

The first step in the procedure is to generate the medium-term forecasts for aggregate labour demand (employment) and supply (labour force) by educational attainment level. With respect to employment forecasts, they build on the assumption that the production level determines the demand. For the purpose of generating demand forecasts, a macroeconomic neoclassical production function is used. The production factors in this function are *labour* (the labour force used in the production process), *capital* (fixed assets used in the production process), *human capital* (education and skills of the labour force) and *technologies* (total factor productivity). For the production of labour supply forecasts, the observed demographic processes and NSI official demographic projections are taken into account, as well as a forecast of the dynamics of the educational structure of the population. From a methodological point of view, the latter have been implemented through an overlapping generations scheme. Modelling the labour supply and demand by educational attainment level is organised in two separate blocks.

The second step is generating employment forecasts by economic activity at A21 level. For this purpose, first, a convergence objective with regards to the employment structure shall be set. The objective is identified on the basis of statistical information for the other Member States using a cluster analysis. In this model update, the baseline period for calculating the target values is 2013-2017. Accordingly, due to the presence of a new forecast period extending to 2022 in the medium-term and in the long-term – up to 2032, the convergence objective is set for the end of the longer term. Consequently, the employment structure in all intermediate years is calculated based on the application of linear interpolation. This structure is used to generate employment by sectors based on the aggregate labour demand forecast.

The *Agriculture, Forestry and Fishing sector* is not covered by standard labour market surveys, hence there is an objective limitation on the possibility of producing detailed forecasts on the employment in the sector. Therefore, the sector was not included in the MLSP ToR. The latter also applies to sectors of *Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use*, and *Activities of extra-territorial organisations and bodies*. That is why the forecasts for sectors A, T and U are subtracted from the aggregate labour demand at A21 level, thus resulting in the aggregate labour demand at A18 level.

The reduced aggregate labour demand at A18 level is assumed to follow the structure of labour demand by educational attainment level at A21 level.

The third step consists in calculating the needs for human resources by educational attainment level, by the sectors at A18 level. For this purpose, the employment forecasts by economic activity generated in step 2 and the available data from the Structure of Earnings Survey by educational attainment level in each of the sectors is used.

The fourth step involves calculating the differences between the employed by educational attainment level at the macro level and the needs for human resources by educational attainment level in the different sectors. Depending on the signs (+ or -) of these differences, structural deficits or structural surpluses are identified.

In the fifth step, a convergence objective for 2032 for labour income by educational attainment level and by sector at A18 level is set first. Then, the labour income values for the interim periods are calculated using linear interpolation. Finally, a ranking of the sectors at A18 level by the size of earnings is done for each educational attainment level.

Step six involves calculating the minimum filling of available jobs by sector at A18 for each educational attainment level. An assumption for a minimum saturation rate of 50% was adopted.

The seventh step is to allocate the residual labour supply (after the minimum filling of jobs) by sector at A18 level for each educational attainment level. It is assumed that this supply targets with priority the sector with the highest pay. After filling the available jobs, the supply targets the sector with the next highest pay. The procedure continues until the residual supply or available vacancies are exhausted.

The eighth step is to identify structural mismatches in the labour market in terms of the demanded and supplied skills (educational attainment level). In particular, it helps to identify the sectors where structural mismatches are projected to occur.

The ninth step involves calculating employment by 28 provinces for each educational attainment level. The aggregate demand forecast from step one and statistics on employment by educational attainment level and by province from the Structure of Earnings Survey are used. One result of this step is also the identification of structural regional deficits on the labour market.

Step ten includes the calculation of employment by sex for the sectors in A18 classification. The employment results by sector from step two and statistical information from the Structure of Earnings Survey are used.

The eleventh step generates employment forecasts by nine classes of occupations for the A18 sectors. The calculations are based on the results of step two concerning sectoral employment and data from the Structure of Earnings Survey on employment by occupation and economic activity.

Step twelve includes the calculation of employment forecasts by age group. Data from the Structure of Earnings Survey and the results from step two for the employment in the medium-term is used.

The medium-term forecasting module also provides for the possibility of producing alternative forecasts for supply and demand by economic activity, occupation, educational attainment level, province, age group and sex with alternative taking into account the dynamics in the employment structure by economic activity, and the dynamics of pay level by educational attainment level and economic activity.

From a technical point of view, the following tools have been used in implementing the above steps:

- Econometric estimation: time series analysis, cross section, individual data, panel data analysis;
- Model calibration (using statistical techniques and adapting the coefficients used in economic literature and practice) regarding key parameters in the cases of not surveyed components of supply and demand curves and lack of sufficient data;
- Solving a model (system of equations) balancing the labour supply and demand and based on the results of the econometric analysis and calibration (using numerical methods, etc.);
- Sensitivity analysis using statistical methods established in practice.

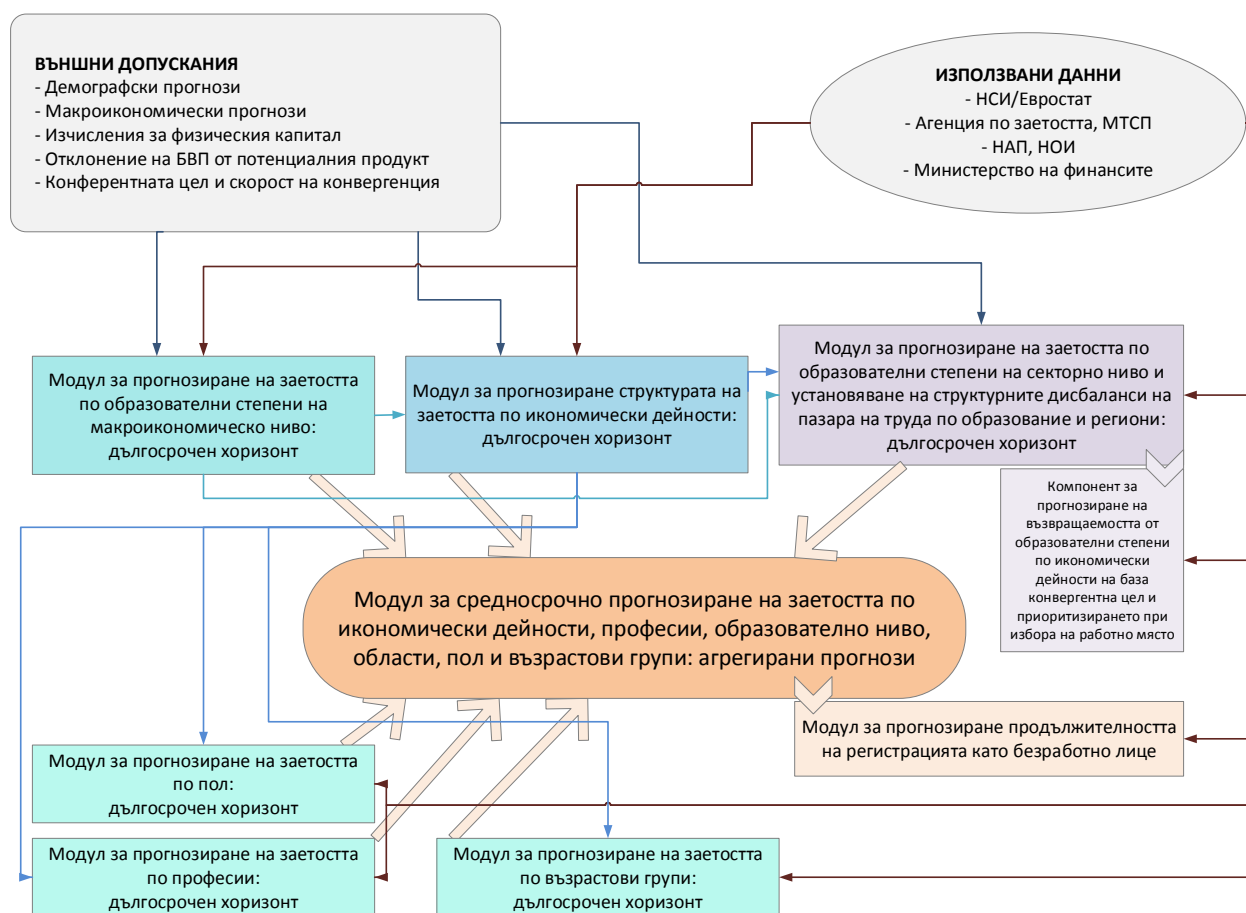
The module has been developed in two main stages. In the first stage, interim estimates of the individual correlations in the model were made with the help of specialised software packages for mathematical modelling, statistical and econometric analysis – Python, R, EViews, PSPP. In the second stage, the final implementation of the module in Excel spreadsheets was carried out, using automa-

tion in the calculations through VBA, while all interim estimates of the rates in the model were included in functional links between the variables.

Setting alternative structures of employment and earnings was not a problem in itself also in the original version of the model, but has been linked to some technical difficulties. These technical difficulties were result of the lack of built-in functionalities that automatically distribute the generated employment forecasts by economic activity by educational attainment level, by province, occupation, age group and sex. In practice, making alternative forecasts was possible, but it would have required time and effort to apply the current methodology step-by-step. In the developed module, such functionalities (with the help of VBA) and relations are built in, that allow easy and efficient calculation of alternative forecasts.

Thus, the additionally built-in functionalities in the medium-term forecasting module make it possible to monitor the labour market development and to analyse the possible educational and regional imbalances for the alternative scenarios for employment and earnings by sector.

### SCHEMATIC PRESENTATION OF THE MODEL



## Methodological notes

### Working definitions of the basic terms

<b>Unemployed</b>	Persons aged 15-64 who are unemployed but actively seek work.
<b>Employment</b>	Employed, aged 15-64. The employed may be hired (working on the basis of an employment or a civil contract), self-employed, employers (managing their own enterprises) and unpaid family workers. Employed persons can occupy posts that correspond to their qualifications or that require higher or lower qualifications than the ones they have.
<b>Employment by economic activity</b>	Number of the actually employed persons by economic activity for a given period of time. This does not include the vacant posts or any potential vacancies.
<b>ICT sector</b>	In this analysis a narrow definition of the ICT sector is used: sector J – Information and communication activities (Classification of economic activities, NACE 2008).
<b>Prioritisation quota in relation to the choice of job</b>	The proportion of the jobs that will be “filled”, based on the attractiveness of the remuneration. The mechanism of the model that correlates labour demand to labour supply includes prioritising when the choosing a job by those who supply labour. The assumption has been made that a part of those who supply labour will make a rational choice, when choosing an occupation and a job. The main factor that determines their attitude to the sector to be employed in is the level of remuneration and the rate of return on their qualification in this particular sector. They direct their job seeking efforts to economic activities offering higher pay according to their expectations concerning the rate of return on the educational attainment level they have acquired. When making the decisions where to work some of the people who supply labour first try to find jobs in the sectors where they expect to get the highest rate of return on their skills. If they can't find employment in their preferred industry, they try the next one offering the next lower rate of return on the education, etc. Thus, the industry offering the lowest rate of return will be the least desired by the job seekers and could be affected by structural deficits, underemployment or overemployment.
<b>Employment rate</b>	The employment rate is the relative share of the employed of the total population of the same age.
<b>Persons not in the labour force</b>	Persons aged 15-64 who are neither employed, nor unemployed.
<b>Minimum saturation</b>	The model is based on the assumption that there is a minimum saturation threshold for the needs of human resources with a given educational attainment level by economic activity. The existence of a level of minimum saturation of jobs intended for human resources having particular skills will not permit the complete “depopulation” or “denuding” of one or more industries of staff, i.e. it will not allow an extreme development of the labour market whereby all enterprises in a given industry will not employ a single person with the sought qualification. The assumption of a minimum saturation of the jobs corresponds to the observed labour market dynamics characterised by certain lack of mobility. In practice, at the industry level some of the unattractively paid jobs are always filled. Minimum saturation is used as an assumption at the economic activity level and is not valid at the level of the individual enterprise.
<b>Underemployment</b>	Hiring of employees in positions that do not use fully their skills and knowledge; when people who supply labour hold positions, for which they are overqualified, and they have experience and education level that exceed what is needed for carrying out successfully the work duties related to these positions.
<b>Potential labour supply</b>	The economically active population, the working age population. Within the model used this group is defined as the population aged 15-64.
<b>Labour supply</b>	The labour force
<b>Labour force</b>	The economically active population who furnish the supply of labour for the production of goods and services. The labour force comprises of the employed and unemployed.
<b>Overemployment</b>	Hiring of employees in positions for which higher qualifications than those they possess are required.
<b>Sector, industry and economic activity.</b>	According to the NACE 2008 classification the economic activities at the level of the letter codes in the classification (from A to U) are categorised as sectors, while each subsequent disaggregation (which in the analysis goes down only to the 2-nd digit) is usually called economic activity or industry as interchangeable terms.
<b>Structural deficit/shortage</b>	A negative difference between the employed by educational attainment level and the needs for such persons by the enterprises. Structural deficit concerns the mismatch between the number of employed having certain educational attainment level on the labour market and the actual need for such persons by the enterprises. Structural deficit for a given educational attainment level is compensated for (balanced) by persons having qualifications that are different than those in demand. For example, the structural deficit for persons with secondary education is compensated for by employed with higher or lower secondary or lower education.
<b>Structural surplus</b>	A positive difference between employed by educational attainment level and the needs for such persons by the enterprises. Structural surplus concerns the mismatch between the number of employed having certain educational attainment level on the labour market and the actual need for such persons by the enterprises. Structural surplus for a given educational attainment level does not measure unemployment. It shows what part of the employed with a given educational attainment level are being redistributed by way of the labour market mechanisms to areas with structural deficits. In the event of the prepared forecasts the structural surplus of persons with higher education meets the needs for employees with secondary education, in relation to whom there is a structural deficit.
<b>Labour demand</b>	The number of the actual work positions during a given period of time, for which human resources are needed, and for which such resources were actively sought, irrespective of the type of the labour relationship or the duration of the working time. This does not include the vacant posts, for which the employers actually do not seek to recruit human resources, nor any potential work positions that employers might create under a more favourable market situation in the future.

## **The economic interpretation of the forecasts**

The detailed forecasts produced are relevant to the supply and demand of skilled labour, employment by sector, occupation, province, sex and age group, and structural imbalances in the labour market. They are based on the assumptions about the demographic and economic development of Bulgaria.

Demographic problems are among the biggest challenges the Bulgarian labour market faces. Aging and shrinking of population will continue to have more and more tangible impact on labour supply and employment. For the economic interpretation of forecasts for a particular economic activity, occupation or a province, it is important to carefully assess to what extent the expected changes will be primarily due to the negative demographic processes, and to what extent to the restructuring of the economy and the improvements in the technologies used. Reduction in employment would be mainly due to demographic processes if forecasts do not show a tangible change in employment in a given industry, and there are no indications of current or expected technological developments. In the event of a projected employment growth in a given economic activity, occupation or province, despite overall shrinking of the employment, the underlying causes should be sought in bringing the employment structure closer to that of the selected EU Member States and/or in the technological development.

A key point in the preparation of the forecasts is taking into consideration the official forecast for economic growth published by the Ministry of Finance. By the end of 2018, when the first results were produced applying the model, there were optimistic expectations concerning the economic growth in 2019 and in the subsequent years. By early 2019, growth forecasts over the medium term were reduced, and they will be reflected in the model when it is next applied in the spring of 2019. Therefore, forecasts for 2019 and 2020 are heightened to some extent. When interpreting the results of the model, it should be taken into account that its goal is to track the dynamics over a longer horizon, and the focus of the analysis of the forecast should be set on the trends over the entire forecast horizon – horizons 2022 and 2032.

The dynamics of the estimated employment is determined also by the identified convergence objective. Although the selected economies to which the Bulgarian economy will get closer over the next 15 years are not among the leading in the EU, in some respects this convergence objective seems ambitious in terms of the needed catching-up growth rates. Therefore, considering policy scenarios where EU-28 or better developed European economies are set as a convergence objective would not be realistic.

When interpreting the structural imbalances in the labour market, it should be taken into consideration that they do not measure the unemployment rate or the rate of vacancies not filled up. Structural imbalances show to what extent vacancies will be filled by persons with a lower or higher than the required qualification.

The dynamics of the educational structure of the population changes and will continue to change the perceptions in the labour market. We may say that higher education today has taken the place of yesterday's secondary education. In this context, the economic interpretation of the dynamics of the jobs educational structure must take into account the technologisation – happening or not. The increase in the share of employees with higher education compared to previous periods, in the absence of indications of technological development of the industry, is most probably explained by:

- Shortage of human resources with relevant qualifications and/or
- Generational change in the labour market and the demographic processes related to the continuous improvement of the educational structure of the population and/or
- Formal change in qualification requirements for occupying certain posts and/or

- Upgrading the qualification of the employees already occupying certain posts (completion of the already started but not completed higher education).

In the absence of technological development, the problems with the underemployment of higher education graduates will continue, but will become even more difficult to be measured. In such cases, imbalances should be interpreted with caution as regards establishing whether the reduction of underemployment is ostensible or factual. If there are indications that it is ostensible, measuring the underemployment share could be based on additional surveys among employees and employers similar to the *European Skills and Jobs Survey* (ESJS).

## The Forecast User Guide

The development of these labour market forecasts is consistent with the standard principle to consider only approved economic policy measures. In the case of development of long-term forecasts, such information is practically absent, especially towards the end of the forecast period. As a consequence of the compliance with this practice, the forecasts presented have a built-in element of inertia, in so far as they project in the future only established correlations and characteristics of economic policy from past periods. Accordingly, the results of the forecasting model represent a basic scenario for future development of the labour market and provide a baseline against which to design alternative policies concerning the labour market and human capital formation.

The forecasts prepared indicate the direction of development of labour supply and demand in the absence of a significant change in the external and internal environment. The projections include the main structural breakdowns of employment, namely: by educational attainment level, by sex, by age group, by region, by economic activity. In addition, the results of the application of the model meet the information needs for the expected structural imbalances in the labour market.

Traditional EU education and employment policies based on centralised planning increasingly strengthen their focus on regional asymmetries and structural imbalances in the labour market and are gradually focusing more and more on measures to overcome the mismatch between the needs and the supply of skills. As a result, the role of anticipating supply and demand of labour and skills has greatly increased and currently plays a major role in the process of formulating measures and undertaking more targeted policy actions on the part of the various institutions involved with the labour market and the formation of human capital. Active labour market measures and education policies should have a favourable impact on the process of reducing labour market mismatches.

The results of forecasting the development of the Bulgarian labour market enable policy-makers from various relevant institutions to identify the problematic and the most risky segments of the labour market, make an informed decision and identify adequate strategic goals to gradually overcome the expected structural imbalances.

In the absence of such policies, the forecasted negative processes will become reality. The negative effects of possible passive behaviour with regard to taking timely measures and the forecasts coming true may have a wider dimensions than those set out in the model – the available and used statistical information does not reflect the professional and scientific direction of the educational attainment levels, the quality of the education received, and the increasing functional illiteracy among young people, the limited inter-sectoral mobility of certain occupations, the high level of mobility on the European labour market, and the limited opportunity to “import” human resources with certain skills (e.g. doctors and teachers).

The forecasts outline the challenges and risks in the labour market and provide an information base to serve for prioritizing problems and hence – policies. For example, specific policies could be designed to reduce the structural deficit problem: for each economic activity and/or province where it is expected. Similarly, measures could be implemented for reducing the age of the labour force in

economic activities where the expected predominant share of the employed is in the age group of over 50.

An adequate and reasoned design of such policies requires that there is in place a specialized analysis framework and adequate tools that are specific to the different policy areas and which should allow a logically robust and evidence-based study of the various alternatives. Such an approach would make it possible to make a realistic and supported by quantified estimates assessment of the potential impact of implementing one or other set of policy measures. These forecasts offer a common reference point on the basis of which each of the institutions concerned could develop the analytical framework necessary for its operation.

The estimates prepared can be useful to a wide range of users – government institutions, non-governmental organisations, employers' organisations and individual employers, educational institutions, civic organisations, students and job seekers, etc. The results of the medium- and long-term forecasts of labour supply and demand are a useful tool for policy purposes<sup>96</sup>:

- For economic growth:
  - To take into account the forecasts in the process of developing strategic documents resulting from the country's commitments as an EU Member State. These documents include the development of policies that address the challenges to the socio-economic development, incl. in the preparation of the macroeconomic forecast for Bulgaria.
- For overcoming demographic problems and addressing regional socio-economic inequalities, incl. development of strategic documents for rural development;
- For human capital formation:
  - To adapt education and training programmes in accordance with the labour market needs;
  - To determine the direction of the trainings provided to upgrade and acquire professional qualification;
  - To develop career guidance programmes;
  - To develop lifelong learning policies;
  - To adapt the planned admissions in vocational high schools and classes, as well as to ensure the link between education, training and lifelong learning;
  - To plan the admissions in higher education schools;
  - To design measures for the development of higher education;
- For raising the level of economic activity of Bulgarian population and attracting human resources from other countries:
  - To design measures and programmes for the inclusion of vulnerable groups into the labour market, incl. drafting of the National Action Plan for Employment;
  - To draft amendments in the legal framework regulating the access of foreign nationals to the labour market, especially those having occupations for which a significant shortage in the labour market has been established.

The forecasts prepared could be used by employers and employers' organisations in the process of:

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<sup>96</sup> The listed areas and specific policies for which the forecasts might be useful are indicative and do not constitute a comprehensive list.

- Identification of sectoral risks with regard to the shortage of human resources;
- Analysing the factors determining the positive and negative trends in the labour market;
- Drafting of business plans and development strategies;
- Designing measures to promote the economic activity of human resources who are temporarily or permanently excluded from the labour market, incl. implementation of flexible employment forms. For example, with regard to the inclusion in the labour force of inactive parents of young children, disabled people who could be capable to work when provided with appropriate working conditions, etc.
- Other.

Other users who could make meaningful use of the forecasts are educational institutions, training organisations and businesses whose activities are related to the *education* sector:

- In the process of adapting the syllabi, curricula, and training materials to the medium- and long-term labour market needs;
- When providing career guidance services to trainees;
- When identifying the risks of staff shortages in the education sector (lecturers, teachers, specialists, administration, etc.) and developing strategies for human resource development;
- To effectively cooperate with business organisations and improve the practical training of students/trainees in accordance with the labour market needs;
- Other.

Last but not least, users for whom the forecasts would be useful are students and job seekers. Deciding what kind of education students should pursue and where to study requires a high level of awareness of market demand, the skills required to practice an occupation and the level of pay.

In the transition years in Bulgaria the lack of forecasts concerning the labour market development, and of information about the employment opportunities predetermined the irrational choice of where and what schoolchildren and students would study and created inadequate perceptions of the integrity and profile of the different occupations.

For example, in recent decades, in the Bulgarian universities there has been an outflow from mathematics and physics due to the mistaken perception that there is no demand for the respective occupations and that they are not of high profile – a perception that does not correspond to the global and European trends in recent decades, nor to the needs of the Bulgarian labour market. At the same time, students targeted specialties that were perceived to be modern and prestigious on the basis of subjective, in many cases, misleading information.<sup>97</sup> The availability of detailed labour market forecasts can effectively support the choice of career and career development. This would also increase the level of satisfaction and motivation of human resources to study and work.

In addition, forecasts may be taken into account by the job-seekers when deciding on:

- Sectors and economic activities focus on;
- Upgrading their skills;
- The most suitable career development and opportunities for successful employment;
- Taking on or avoiding risks in the labour market that are relevant for the successful employment of individuals;

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<sup>97</sup> The imbalance in the number of graduates of different majors and students in the various educational fields is among the main reasons for the current underemployment of higher education graduates.

- Career reorientation and change of occupation;
- Starting own business;
- Other.

The forecasts presented in Annex 3 include medium-term forecasts for the period 2018–2022 and long-term forecasts for the period 2023–2032, and the information is organized as follows:

Aggregate labour demand and supply: 2018-2032 r.	Medium-term forecasts: 2018-2022	Long-term forecasts: 2023-2032
<ul style="list-style-type: none"> <li>•Population (15-64) by educational attainment (3 levels - primary and lower, secondary and tertiary education)</li> <li>•Employment (15-64) by educational attainment (3 levels - primary and lower, secondary and tertiary education)</li> </ul>	<ul style="list-style-type: none"> <li>•Employment by economic activities (A18)</li> <li>•Demand for labour force with primary and lower education by economic activities (A18)</li> <li>•Demand for labour force with secondary education by economic activities (A18)</li> <li>•Demand for labour force with tertiary education by economic activities (A18)</li> <li>•Employment by provinces (28 administrative districts)</li> <li>•Employment by occupation (9 occupational classes)</li> <li>•Employment by sex and economic activities (A18)</li> <li>•Employment by age groups (6 age groups)</li> <li>•Labour market imbalances by educational attainment and economic activities (A18)</li> </ul>	<ul style="list-style-type: none"> <li>•Employment by economic activities (A38)</li> <li>•Demand for labour force with primary and lower education by economic activities (A38)</li> <li>•Demand for labour force with secondary education by economic activities (A38)</li> <li>•Demand for labour force with tertiary education by economic activities (A38)</li> <li>•Employment by provinces (28 administrative districts)</li> <li>•Employment by occupation (120 groups of occupations)</li> <li>•Employment by sex</li> <li>•Employment by age groups (6 age groups)</li> <li>•Labour market imbalances by educational attainment</li> </ul>

## ANNEX 3

## DETAILED FORECASTS

## Aggregate labour demand and supply

	Population (15-64) by educational attainment level, thousand				Share of population with the respective educational attainment level			
	Lower secondary or lower education	Secondary	Tertiary	Total	Lower secondary or lower education	Secondary	Tertiary	Total
2018	1236.3	2225.9	1101.6	4563.7	27.1%	48.8%	24.1%	100.0%
2019	1320.1	2095.1	1099.6	4514.8	29.2%	46.4%	24.4%	100.0%
2020	1265.3	2106.4	1097.1	4468.7	28.3%	47.1%	24.6%	100.0%
2021	1219.8	2103.7	1096.3	4419.8	27.6%	47.6%	24.8%	100.0%
2022	1188.6	2098.0	1095.2	4381.7	27.1%	47.9%	25.0%	100.0%
2023	1162.8	2086.0	1094.8	4343.6	26.8%	48.0%	25.2%	100.0%
2024	1141.1	2069.3	1095.1	4305.5	26.5%	48.1%	25.4%	100.0%
2025	1122.8	2048.7	1095.9	4267.4	26.3%	48.0%	25.7%	100.0%
2026	1107.3	2025.1	1097.0	4229.3	26.2%	47.9%	25.9%	100.0%
2027	1089.5	2005.4	1102.3	4197.1	26.0%	47.8%	26.3%	100.0%
2028	1073.4	1983.1	1108.5	4165.0	25.8%	47.6%	26.6%	100.0%
2029	1042.5	1975.2	1115.1	4132.8	25.2%	47.8%	27.0%	100.0%
2030	1011.2	1967.5	1121.9	4100.6	24.7%	48.0%	27.4%	100.0%
2031	983.3	1956.3	1128.8	4068.4	24.2%	48.1%	27.7%	100.0%
2032	960.6	1961.1	1112.5	4034.2	23.8%	48.6%	27.6%	100.0%

	Employment (15-64) by educational attainment level, thousand				Employment rate			
	Lower secondary or lower education	Secondary	Tertiary	Total	Lower secondary or lower education	Secondary	Tertiary	Total
2018	337.9	1764.9	977.6	3080.4	27.3%	79.3%	88.7%	67.5%
2019	345.3	1777.9	995.5	3118.6	26.2%	84.9%	90.5%	69.1%
2020	341.3	1802.6	1011.3	3155.2	27.0%	85.6%	92.2%	70.6%
2021	324.4	1809.3	1021.0	3154.7	26.6%	86.0%	93.1%	71.4%
2022	312.5	1814.2	1024.6	3151.2	26.3%	86.5%	93.6%	71.9%
2023	302.8	1814.0	1022.8	3139.6	26.0%	87.0%	93.4%	72.3%
2024	294.7	1809.0	1021.6	3125.4	25.8%	87.4%	93.3%	72.6%
2025	288.0	1800.1	1019.3	3107.4	25.6%	87.9%	93.0%	72.8%
2026	282.5	1789.9	1017.2	3089.6	25.5%	88.4%	92.7%	73.1%
2027	278.3	1774.8	1014.1	3067.2	25.5%	88.5%	92.0%	73.1%
2028	271.1	1759.0	1011.6	3041.8	25.3%	88.7%	91.3%	73.0%
2029	258.0	1752.6	1011.0	3021.7	24.8%	88.7%	90.7%	73.1%
2030	245.5	1747.9	1005.9	2999.3	24.3%	88.8%	89.7%	73.1%
2031	234.3	1739.7	1002.3	2976.3	23.8%	88.9%	88.8%	73.2%
2032	226.0	1736.9	1002.9	2965.7	23.5%	88.6%	90.1%	73.5%

## Medium-term forecasts: 2018 – 2022

### Employment by economic activities

	2018	2019	2020	2021	2022
Agriculture, forestry and fishing	204262	200774	197041	190917	184626
Mining and quarrying	30281	29447	28568	27340	26087
Manufacturing	597802	610140	622288	627166	631461
Production and distribution of electricity, gas and steam	39047	38975	38870	38301	37697
Water supply; sewerage, waste management and remediation activities	33301	33532	33741	33551	33330
Construction	232818	237688	242485	244450	246188
Trade; repair of motor vehicles and motorcycles	524070	521232	517907	508376	498389
Transport, storage and postal activities	208602	211591	214483	214854	215027
Hotels and restaurants	165388	165194	164862	162563	160118
Production and distribution of information and cultural products; telecommunications	91192	92599	93965	94228	94404
Financial and insurance activities	63039	63604	64132	63902	63613
Real estate activities	12015	13266	14537	15649	16746

	2018	2019	2020	2021	2022
Professional activities and scientific research	107767	109413	111012	111307	111499
Administrative and support service activities	103327	104179	104968	104516	103969
Public administration	219923	225481	230992	233818	236424
Education	172328	179347	186392	191299	196023
Human health and social work activities	159596	164629	169652	172713	175611
Culture, sport, entertainment activities	48542	49777	51002	51634	52218
Other activities	56292	57046	57773	57820	57814

### Demand for labour force with Lower secondary or lower education by economic activity

	2018	2019	2020	2021	2022
Mining and quarrying	3246	3157	3063	2931	2797
Manufacturing	58940	60156	61354	61835	62259
Production and distribution of electricity, gas and steam	1090	1088	1085	1069	1052
Water supply; sewerage, waste management and remediation activities	9058	9120	9177	9126	9066
Construction	24173	24679	25177	25381	25561
Trade; repair of motor vehicles and motorcycles	15058	14976	14880	14607	14320
Transport, storage and postal activities	8565	8688	8807	8822	8829
Hotels and restaurants	6639	6631	6618	6525	6427
Production and distribution of information and cultural products; tele-communications	275	279	283	284	285
Financial and insurance activities	130	131	132	132	131
Real estate activities	737	813	891	959	1026
Professional activities and scientific research	1247	1266	1285	1288	1291
Administrative and support service activities	10871	10961	11044	10996	10939
Public administration	3544	3633	3722	3768	3810
Education	6989	7273	7559	7758	7950
Human health and social work activities	8354	8618	8881	9041	9193
Culture, sport, entertainment activities	897	920	942	954	965
Other activities	1771	1795	1817	1819	1819
Total	161583	164185	166718	167295	167717

### Demand for labour force with secondary education by economic activity

	2018	2019	2020	2021	2022
Mining and quarrying	22973	22340	21674	20742	19792
Manufacturing	448755	458016	467135	470797	474021
Production and distribution of electricity, gas and steam	27025	26975	26903	26509	26091
Water supply; sewerage, waste management and remediation activities	19613	19748	19872	19760	19630
Construction	163902	167330	170708	172091	173314
Trade; repair of motor vehicles and motorcycles	396308	394162	391647	384440	376888

	2018	2019	2020	2021	2022
Transport, storage and postal activities	163971	166320	168593	168885	169021
Hotels and restaurants	138424	138262	137984	136060	134013
Production and distribution of information and cultural products; tele-communications	31052	31531	31996	32085	32145
Financial and insurance activities	20337	20520	20690	20616	20523
Real estate activities	6550	7232	7925	8531	9129
Professional activities and scientific research	37243	37812	38364	38466	38533
Administrative and support service activities	73106	73709	74267	73947	73560
Public administration	74536	76420	78288	79246	80129
Education	49454	51468	53490	54898	56254
Human health and social work activities	86243	88963	91677	93331	94897
Culture, sport, entertainment activities	32230	33050	33863	34283	34670
Other activities	35616	36094	36553	36583	36579
Total	1827339	1849952	1871629	1871271	1869190

### Demand for labour force with tertiary education by economic activity

	2018	2019	2020	2021	2022
Mining and quarrying	4061	3949	3832	3667	3499
Manufacturing	90108	91968	93799	94534	95181
Production and distribution of electricity, gas and steam	10931	10911	10882	10723	10554
Water supply; sewerage, waste management and remediation activities	4631	4663	4692	4665	4635
Construction	44743	45679	46600	46978	47312
Trade; repair of motor vehicles and motorcycles	112705	112094	111379	109330	107182
Transport, storage and postal activities	36066	36583	37083	37147	37177
Hotels and restaurants	20325	20301	20261	19978	19677
Production and distribution of information and cultural products; tele-communications	59866	60789	61686	61858	61974
Financial and insurance activities	42572	42954	43310	43155	42960
Real estate activities	4729	5221	5721	6159	6590
Professional activities and scientific research	69277	70335	71363	71552	71676
Administrative and support service activities	19350	19510	19657	19573	19470
Public administration	141842	145427	148982	150804	152485
Education	115885	120605	125343	128643	131820
Human health and social work activities	64999	67049	69095	70341	71522
Culture, sport, entertainment activities	15415	15808	16197	16397	16583
Other activities	18905	19158	19402	19418	19416
Total	876410	893003	909282	914922	919712

## Employment by provinces

	2018	2019	2020	2021	2022
Burgas	150434.8	152629.7	154755.5	155063.1	155227.5
Blagoevgrad	119059.6	120796.8	122479.2	122722.7	122852.8
Dobrich	47755.49	48452.29	49127.12	49224.76	49276.95
Gabrovo	45711.45	46378.42	47024.36	47117.82	47167.78
Haskovo	76145.4	77256.42	78332.42	78488.11	78571.33
Yambol	37671.87	38221.54	38753.87	38830.9	38872.07
Kyustendil	41772.12	42381.62	42971.89	43057.3	43102.95
Kardzhali	48025.86	48726.6	49405.24	49503.44	49555.92
Lovech	34648.16	35153.71	35643.32	35714.16	35752.03
Montana	35680.34	36200.94	36705.14	36778.09	36817.09
Pazardzhik	67307.15	68289.22	69240.33	69377.95	69451.51
Plovdiv	284624.1	288777	292799	293380.9	293692
Pernik	39459.23	40034.97	40592.57	40673.25	40716.37
Pleven	75709.61	76814.28	77884.13	78038.92	78121.67
Razgrad	31609.49	32070.7	32517.37	32582	32616.54
Ruse	86144.87	87401.8	88619.1	88795.24	88889.39
Sofia (province)	75298.92	76397.6	77461.63	77615.59	77697.89
Shumen	47871.31	48569.8	49246.26	49344.14	49396.46
Silistra	20229.67	20524.84	20810.7	20852.06	20874.17
Sliven	45829.44	46498.13	47145.74	47239.45	47289.53
Smolyan	47772.37	48469.41	49144.47	49242.15	49294.36
Sofia (capital city)	878756.6	891578.4	903996	905792.7	906753.2
Stara Zagora	133085.7	135027.6	136908.2	137180.3	137325.8
Targovishte	36149.66	36677.11	37187.94	37261.85	37301.36
Varna	196052.8	198913.4	201683.8	202084.6	202298.9
Vidin	22614.4	22944.37	23263.93	23310.17	23334.88
Vratsa	49861.56	50589.08	51293.67	51395.61	51450.11
Veliko Tarnovo	90049.55	91363.45	92635.93	92820.05	92918.47

## Employment by occupation

		2018	2019	2020	2021	2022
1	Managers	175009	177945	180810	181555	182132
2	Professionals	511285	523882	536365	542605	548338
3	Technicians and associate professionals	290822	295384	299819	300735	301374
4	Clerical support workers	276125	279844	283428	283678	283668
5	Personal services workers in trade and security	548918	551265	553228	548625	543523
6	Skilled agricultural, forestry and fishery workers	6308	6372	6433	6418	6397
7	Craft and related trades workers	327092	332203	337172	338184	338882
8	Machine operators and assemblers	354924	360089	365092	365805	366180
9	Elementary occupations	374850	380154	385282	385882	386125

## Employment by sex

<b>Number of male employees by economic activity</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
Mining and quarrying	25040.72	24350.67	23624.32	22608.26	21572.68
Manufacturing	301572.7	307796.8	313925	316386	318552.5
Production and distribution of electricity, gas and steam	30855.6	30798.76	30715.82	30266.18	29789.23
Water supply; sewerage, waste management and remediation activities	22040.36	22192.96	22331.46	22205.64	22059.54
Construction	195494.8	199583.8	203611.9	205262.1	206721.2
Trade; repair of motor vehicles and motorcycles	236805.3	235522.9	234020.3	229713.8	225201.1
Transport, storage and postal activities	150672.4	152831.4	154920.1	155188.3	155313.2
Hotels and restaurants	58995.75	58926.34	58807.96	57987.95	57115.59
Production and distribution of information and cultural products; telecommunications	53156.86	53976.58	54772.87	54926.16	55028.68
Financial and insurance activities	19295.99	19468.92	19630.43	19560.06	19471.76
Real estate transactions	6271.586	6924.615	7587.938	8168.576	8740.956
Professional activities and scientific research	45514.89	46210.24	46885.4	47010.07	47091.29
Administrative and support work activities	71402.84	71991.5	72536.66	72224.4	71846.03
Public administration	73144.29	74992.81	76826.03	77765.62	78632.42
Education	34314.89	35712.46	37115.31	38092.42	39033.22
Human health and social work activities	33393.51	34446.61	35497.63	36138.1	36744.49
Culture, sport and entertainment	21356.78	21900.21	22439.25	22717.33	22974.14
Other activities	20459.94	20734.07	20998.22	21015.39	21013.18
<b>Total</b>	<b>1399789</b>	<b>1418362</b>	<b>1436247</b>	<b>1437236</b>	<b>1436901</b>
<b>Number of female employees by economic activity</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
Mining and quarrying	5240.427	5096.015	4944.007	4731.371	4514.648
Manufacturing	296229.6	302343.5	308363.1	310780.4	312908.6
Production and distribution of electricity, gas and steam	8191.075	8175.986	8153.969	8034.603	7907.991
Water supply; sewerage, waste management and remediation activities	11260.67	11338.64	11409.4	11345.12	11270.47
Construction	37323.38	38104.05	38873.09	39188.14	39466.71
Trade; repair of motor vehicles and motorcycles	287265	285709.3	283886.5	278662.3	273188.1
Transport, storage and postal activities	57929.79	58759.86	59562.93	59666.04	59714.07
Hotels and restaurants	106392.6	106267.5	106054	104575.2	103002
Production and distribution of information and cultural products; telecommunications	38035.62	38622.16	39191.93	39301.62	39374.97
Financial and insurance activities	43743.27	44135.31	44501.44	44341.9	44141.73
Real estate transactions	5743.5	6341.542	6949.012	7480.758	8004.942
Professional activities and scientific research	62251.93	63202.99	64126.42	64296.93	64408.02
Administrative and support work activities	31924.49	32187.68	32431.43	32291.81	32122.64
Public administration	146778.3	150487.7	154166.4	156051.9	157791.3
Education	138013.2	143634.2	149276.4	153206.3	156990.1
Human health and social work activities	126202.7	130182.6	134154.7	136575.2	138866.9
Culture, sport and entertainment	27184.87	27876.6	28562.75	28916.72	29243.61
Other activities	35831.91	36312.01	36774.62	36804.68	36800.82
<b>Total</b>	<b>1465542</b>	<b>1488778</b>	<b>1511382</b>	<b>1516251</b>	<b>1519718</b>

## Employment by age groups

Age groups	2018	2019	2020	2021	2022
15-24	171482	172582	173570	172503	171279
25-34	618076	624538	630655	629333	627433
35-44	776912	786779	796254	796357	795727
45-54	720151	731008	741542	743368	744507
55-64	515206	524255	533103	535706	537812
65+	63504	67977	72504	76220	79861

## Labour market imbalances

Mismatch between employees by educational attainment level and demand for such in the private and public sector	2018	2019	2020	2021	2022
Lower secondary or lower education	152746	157667	152143	136426	125444
Secondary education	-185681	-192658	-187648	-177383	-167043
Tertiary education	32935	34991	35506	40957	41599

*Key: A negative difference (mismatch) indicates a structural deficit of an educational attainment level that will be filled (offset) by persons having a different level than the one sought. A positive difference (mismatch) indicates a structural surplus of an educational attainment level that will be reallocated where there are deficits.*

Structural deficits of secondary education personnel	2018	2019	2020	2021	2022	2023	2024
Mining and quarrying	0	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0	0
Production and distribution of electricity, gas and steam	0	0	0	0	0	0	0
Water supply; sewerage, waste management and remediation activities	0	0	0	0	0	0	0
Construction	0	0	0	0	0	0	0
Trade; repair of motor vehicles and motorcycles	0	0	0	0	0	0	0
Transport, storage and postal activities	0	0	0	0	0	0	0
Hotels and restaurants	-69212	-69131	-68992	-68030	-67007	-65814	-64574
Production and distribution of information and cultural products; telecommunications	0	0	0	0	0	0	0
Financial and insurance activities	0	0	0	0	0	0	0
Real estate transactions	-3275	0	0	0	0	0	0
Professional activities and scientific research	0	0	0	0	0	0	0
Administrative and support service activities	-36553	-36854	-37133	-36974	-36780	-36492	-36174
Public administration	0	0	0	0	0	0	0
Education	-24727	-25734	-26745	-27449	-28127	-28729	-29300
Human health and social work activities	-17991	-26367	-36501	-26639	-16840	-7327	-942
Culture, sport, entertainment	-16115	-16525	0	0	0	0	0
Other activities	-17808	-18047	-18277	-18292	-18290	-18240	-18175
Total structural deficits	-185681	-192658	-187648	-177383	-167043	-156602	-149166

## Long-term forecasts: 2023 – 2032

### Employment by economic activities

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Agriculture, forestry and fishing	177885	171046	164063	157164	150103	142988	136211	129413	122676	116516
Mining and quarrying	24773	23449	22108	20784	19443	18102	16810	15522	14249	13047
Manufacture of food products, beverages and tobacco products	114458	114830	115055	115281	115319	115231	115332	115333	115298	115735
Manufacture of textiles, leather and related products	157034	157545	157854	158164	158216	158095	158234	158235	158188	158786
Manufacture of wood, paper and paper products; printing	41006	41140	41221	41301	41315	41284	41320	41320	41308	41464
Manufacture of coke and refined petroleum products	2437	2445	2450	2455	2456	2454	2456	2456	2455	2465
Manufacture of chemical products	15710	15761	15792	15822	15828	15816	15830	15830	15825	15885
Manufacture of medicinal substances and products	9883	9915	9935	9954	9957	9950	9958	9959	9956	9993
Manufacture of rubber, plastics and mineral products	58831	59023	59139	59255	59274	59229	59281	59282	59264	59488
Manufacture of basic metals and fabricated metal products, except machinery	79948	80208	80366	80523	80550	80488	80559	80560	80535	80840
Manufacture of computer, electronic and optical products	10072	10105	10124	10144	10148	10140	10149	10149	10146	10184
Manufacture of electrical equipment	25196	25278	25327	25377	25385	25366	25388	25388	25381	25477
Manufacture of general and special-purpose machinery	37581	37704	37778	37852	37864	37835	37869	37869	37858	38001
Manufacture of vehicles	28890	28984	29041	29098	29108	29085	29111	29111	29102	29213
Other manufacturing; repair and installation of machinery and equipment	53048	53221	53325	53430	53447	53407	53454	53454	53438	53640
Production and distribution of electricity, gas and steam	36999	36274	35511	34758	33959	33135	32378	31603	30831	30192
Activities related to water supply; sewerage, waste management and remediation activities	33024	32691	32322	31957	31546	31107	30725	30322	29916	29636
Construction	247278	248145	248693	249241	249383	249251	249528	249587	249568	250568
Trade; repair of motor vehicles and motorcycles	487156	475593	463554	451665	439206	426463	414603	402555	390563	380299
Transport, storage and postal services	214641	214072	213241	212426	211280	209923	208928	207768	206561	206211
Hotels and restaurants	157268	154305	151180	148095	144813	141423	138315	135132	131954	129351
Publishing activity, motion picture, radio and television programmes	17411	17383	17333	17285	17210	17117	17053	16976	16894	16883
Telecommunications	23953	23915	23847	23781	23677	23549	23461	23355	23243	23227

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Information technology activities and services	52970	52885	52735	52587	52358	52075	51882	51646	51398	51363
Financial and insurance activities	63161	62658	62081	61513	60854	60139	59532	58883	58225	57812
Real estate activities	17794	18818	19807	20786	21719	22614	23533	24419	25283	26242
Legal, accounting, consulting and engineering activities	64203	64092	63901	63714	63428	63077	62834	62541	62232	62181
Scientific research and development activities	16483	16454	16405	16358	16284	16194	16132	16056	15977	15964
Advertising and veterinary activity; other professional activities	30715	30661	30570	30481	30344	30176	30059	29919	29772	29747
Administrative and support service activities	103154	102256	101240	100238	99089	97849	96788	95658	94516	93772
Public administration; compulsory social security	238403	240161	241599	243028	244049	244789	245917	246819	247630	249443
Education	200216	204202	207890	211543	214809	217791	221084	224142	227084	230921
Human health services	139406	141171	142741	144297	145602	146729	148078	149281	150420	152160
Medical and social care services with accommodation and social work activities without accommodation	38634	39123	39558	39989	40351	40663	41037	41371	41686	42168
Culture, sport, entertainment	52663	53059	53385	53708	53941	54112	54369	54575	54762	55169
Other activities, not elsewhere classified	57658	57453	57178	56909	56551	56137	55822	55462	55091	54949

### Demand for labour force with Lower secondary or lower education by economic activity

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Mining and quarrying	2656	2514	2370	2228	2084.48	1940.7	1802.217	1664.127	1527.594	1398.823
Manufacture of food products, beverages and tobacco products	12852	12893	12919	12944	12948.3	12938.41	12949.77	12949.9	12946	12994.98
Manufacture of textile, apparel, shoes and other processed leather products; leather processing	19315	19378	19416	19454	19460.66	19445.81	19462.88	19463.07	19457.21	19530.83
Manufacture of wood, paper and paperboard and products of those (except furniture); printing	4297	4311	4319	4327	4328.878	4325.574	4329.371	4329.413	4328.11	4344.486
Manufacture of coke and refined petroleum products	12	12	12	12	12.34043	12.33102	12.34184	12.34196	12.33825	12.38493
Manufacture of chemical products	1178	1182	1185	1187	1187.325	1186.419	1187.461	1187.472	1187.115	1191.606
Manufacture of medicinal substances and products	146	146	147	147	146.903	146.7909	146.9197	146.9212	146.8769	147.4327
Manufacture of rubber, plastics and other non-metallic mineral products	5409	5427	5437	5448	5449.833	5445.674	5450.454	5450.507	5448.867	5469.482
Manufacture of basic metals and metal products, except machinery and equipment	5399	5417	5427	5438	5439.767	5435.615	5440.386	5440.439	5438.802	5459.38
Manufacture of computer and communication equipment, electronic and optical products	162	162	163	163	162.9354	162.8111	162.954	162.9556	162.9065	163.5229

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Manufacture of electrical equipment	918	921	922	924	924.603	923.8974	924.7083	924.7173	924.4391	927.9367
Manufacture of general and special-purpose machinery	2444	2452	2457	2462	2462.484	2460.604	2462.764	2462.788	2462.047	2471.362
Manufacture of vehicles	6598	6620	6633	6646	6648.017	6642.943	6648.774	6648.839	6646.838	6671.987
Other manufacturing; repair and installation of machinery and equipment	3787	3799	3807	3814	3815.384	3812.472	3815.819	3815.856	3814.708	3829.141
Production and distribution of electricity, gas and steam	1033	1013	991	970	947.9726	924.9808	903.8381	882.2178	860.6484	842.8327
Water supply; sewerage, waste management and remediation activities	8982	8892	8791	8692	8580.31	8460.87	8356.996	8247.427	8136.942	8060.902
Construction	25675	25765	25821	25878	25893.16	25879.49	25908.22	25914.39	25912.43	26016.24
Trade; repair of motor vehicles and motorcycles	13997	13665	13319	12977	12619.25	12253.1	11912.36	11566.19	11221.64	10926.73
Transport, storage and communications	8813	8790	8756	8722	8675.463	8619.726	8578.869	8531.247	8481.691	8467.305
Hotels and restaurants	6313	6194	6068	5944	5812.726	5676.682	5551.91	5424.134	5296.592	5192.094
Publishing activity, production of audio-visual products, broadcasting activity	74	74	74	73	73.06354	72.66893	72.39864	72.07022	71.72436	71.67509
Telecommunications	148	148	147	147	146.1227	145.3335	144.7929	144.1361	143.4444	143.3459
Information technology activities and services	61	61	61	61	60.67707	60.34936	60.12489	59.85215	59.56492	59.524
Financial and insurance activities	130	129	128	127	125.3064	123.8334	122.5841	121.2474	119.8932	119.0434
Real estate transactions	1091	1153	1214	1274	1331.358	1386.218	1442.525	1496.811	1549.818	1608.556
Legal, accounting, management, architecture and engineering activities, technical testing and analysis; management consultancy activities	583	582	580	578	575.7656	572.5793	570.3738	567.7114	564.9127	564.4508
Scientific research and development activities	340	339	338	337	335.4112	333.5551	332.2703	330.7193	329.0889	328.8198
Advertising and veterinary activity; other professional activities	367	367	365	364	362.724	360.7167	359.3272	357.65	355.8868	355.5958
Administrative and support work activities	10853	10758	10651	10546	10425.08	10294.67	10182.99	10064.15	9943.979	9865.732
Public administration; compulsory social security	3842	3870	3893	3916	3932.621	3944.541	3962.715	3977.247	3990.325	4019.543
Education	8120	8281	8431	8579	8711.447	8832.383	8965.923	9089.932	9209.257	9364.831
Human health services	5713	5785	5849	5913	5966.455	6012.61	6067.883	6117.196	6163.869	6235.175
Medical and social care services with accommodation and social work activities without accommodation	3607	3653	3693	3734	3767.47	3796.615	3831.516	3862.655	3892.126	3937.151
Culture, sport and entertainment	973	980	986	992	996.4913	999.6476	1004.387	1008.201	1011.645	1019.179
Other activities, not elsewhere classified	1814	1807	1799	1790	1779.026	1766.017	1756.079	1744.779	1733.107	1728.639
Total	167700	167539	167171	166812	166189.8	165396.6	164884.9	164239.3	163552.4	163540.7

## Demand for labour force with secondary education by economic activity

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Mining and quarrying	18795	17790	16773	15768	14750.69	13733.24	12753.27	11776.09	10809.92	9898.687
Manufacture of food products, beverages and tobacco products	86071	86352	86521	86690	86719.03	86652.84	86728.9	86729.74	86703.65	87031.69
Manufacture of textile, apparel, shoes and other processed leather products; leather processing	127587	128002	128253	128505	128547	128448.9	128561.6	128562.9	128524.2	129010.5
Manufacture of wood, paper and paperboard and products of those (except furniture); printing	30073	30171	30230	30290	30299.68	30276.55	30303.13	30303.42	30294.3	30408.92
Manufacture of coke and refined petroleum products	1138	1142	1144	1146	1146.426	1145.551	1146.557	1146.568	1146.223	1150.56
Manufacture of chemical products	10223	10256	10276	10296	10299.62	10291.76	10300.79	10300.89	10297.79	10336.75
Manufacture of medicinal substances and products	5595	5613	5624	5635	5636.631	5632.329	5637.273	5637.328	5635.631	5656.954
Manufacture of rubber, plastics and other non-metallic mineral products	44443	44588	44675	44763	44777.51	44743.33	44782.61	44783.04	44769.57	44938.95
Manufacture of basic metals and metal products, except machinery and equipment	61550	61751	61872	61993	62013.59	61966.26	62020.65	62021.26	62002.59	62237.18
Manufacture of computer and communication equipment, electronic and optical products	6008	6028	6039	6051	6053.298	6048.678	6053.987	6054.046	6052.225	6075.123
Manufacture of electrical equipment	17460	17516	17551	17585	17590.91	17577.49	17592.92	17593.09	17587.79	17654.34
Manufacture of general and special-purpose machinery	26739	26826	26879	26932	26940.43	26919.87	26943.5	26943.76	26935.66	27037.57
Manufacture of vehicles	19435	19498	19536	19575	19581.16	19566.22	19583.39	19583.58	19577.69	19651.76
Other manufacturing; repair and installation of machinery and equipment	39677	39806	39884	39963	39975.75	39945.24	39980.3	39980.69	39968.66	40119.88
Production and distribution of electricity, gas and steam	25608	25106	24578	24057	23503.82	22933.77	22409.56	21873.51	21338.73	20897.01
Water supply; sewerage, waste management and remediation activities	19449	19254	19036	18821	18578.88	18320.25	18095.33	17858.09	17618.85	17454.21
Construction	174082	174692	175078	175464	175563.5	175470.9	175665.7	175707.5	175694.2	176398
Trade; repair of motor vehicles and motorcycles	368393	359649	350545	341554	332132.9	322496.1	313528	304417.1	295348.4	287586.6
Transport, storage and communication	168718	168271	167617	166976	166076.1	165009.1	164227	163315.4	162366.7	162091.3
Hotels and restaurants	131628	129148	126533	123951	121203.2	118366.5	115764.8	113100.5	110441.1	108262.2
Publishing activity, production of audio-visual products, broadcasting activity	5714	5705	5689	5673	5648.183	5617.678	5596.783	5571.395	5544.658	5540.849
Telecommunications	12827	12807	12770	12735	12679.24	12610.76	12563.85	12506.86	12446.84	12438.29
Information technology activities and services	13581	13560	13521	13483	13424.49	13351.99	13302.32	13241.98	13178.44	13169.38
Financial and insurance activities	20377	20214	20028	19845	19632.41	19401.63	19205.89	18996.47	18784.29	18651.15

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Real estate transactions	9700	10258	10798	11332	11840.26	12328.15	12828.9	13311.7	13783.1	14305.49
Legal, accounting, management, architecture and engineering activities, technical testing and analysis; management consultancy activities	19308	19275	19217	19161	19075.11	18969.55	18896.48	18808.28	18715.56	18700.26
Scientific research and development activities	5750	5740	5723	5706	5680.398	5648.963	5627.204	5600.937	5573.325	5568.769
Advertising and veterinary activity; other professional activities	13439	13416	13376	13337	13276.85	13203.38	13152.52	13091.12	13026.59	13015.94
Administrative and support activities	72983	72348	71629	70920	70107.17	69230.21	68479.13	67679.99	66871.84	66345.64
Public administration; compulsory social security	80800	81395	81883	82367	82713.41	82964.12	83346.37	83652.01	83927.09	84541.62
Education	57457	58601	59659	60708	61645.01	62500.79	63445.76	64323.29	65167.68	66268.56
Human health services	69343	70221	71002	71776	72424.81	72985.08	73656.01	74254.6	74821.15	75686.71
Medical and social care services with accommodation and social work activities without accommodation	26866	27206	27509	27809	28060.45	28277.52	28537.47	28769.39	28988.89	29324.25
Culture, sport and entertainment	34966	35229	35445	35660	35814.69	35928.13	36098.46	36235.55	36359.32	36630.1
Other activities, not elsewhere classified	36481	36351	36177	36007	35780.28	35518.63	35318.77	35091.5	34856.75	34766.88
Total	1862263	1853784	1843071	1832532	1819193	1804081	1792135	1778824	1765159	1758852

### Demand for labour force with tertiary education by economic activity

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Mining and quarrying	3323	3145	2965	2787	2607.653	2427.786	2254.546	2081.798	1910.997	1749.907
Manufacture of food products, beverages and tobacco products	15535	15585	15616	15646	15651.52	15639.57	15653.3	15653.45	15648.74	15707.95
Manufacture of textile, apparel, shoes and other processed leather products; leather processing	10132	10165	10185	10205	10208.02	10200.23	10209.18	10209.28	10206.21	10244.83
Manufacture of wood, paper and paperboard and products of those (except furniture); printing	6637	6658	6671	6684	6686.493	6681.39	6687.255	6687.32	6685.308	6710.602
Manufacture of coke and refined petroleum products	1287	1291	1294	1297	1296.98	1295.99	1297.127	1297.14	1296.75	1301.656
Manufacture of chemical products	4308	4322	4331	4339	4340.773	4337.46	4341.267	4341.31	4340.003	4356.424
Manufacture of medicinal substances and products	4143	4156	4164	4172	4173.773	4170.588	4174.249	4174.289	4173.033	4188.822
Manufacture of rubber, plastics and other non-metallic mineral products	8979	9009	9026	9044	9046.846	9039.942	9047.876	9047.964	9045.242	9079.465
Manufacture of basic metals and metal products, except machinery and equipment	12999	13041	13066	13092	13096.42	13086.43	13097.91	13098.04	13094.1	13143.64
Manufacture of computer and communication equipment, electronic and optical products	3902	3915	3922	3930	3931.435	3928.434	3931.882	3931.92	3930.737	3945.609

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Manufacture of electrical equipment	6818	6841	6854	6867	6869.714	6864.471	6870.496	6870.563	6868.496	6894.483
Manufacture of general and special-purpose machinery	8398	8425	8442	8459	8461.316	8454.858	8462.279	8462.362	8459.815	8491.823
Manufacture of vehicles	2857	2866	2872	2877	2878.421	2876.224	2878.749	2878.777	2877.911	2888.799
Other manufacturing; repair and installation of machinery and equipment	9584	9615	9634	9653	9656.342	9648.972	9657.441	9657.535	9654.629	9691.157
Production and distribution of electricity, gas and steam	10358	10155	9942	9731	9507.029	9276.449	9064.413	8847.588	8631.272	8452.602
Water supply; sewerage, waste management and remediation activities	4592	4546	4494	4444	4386.593	4325.53	4272.426	4216.41	4159.926	4121.051
Construction	47522	47688	47793	47899	47926.09	47900.8	47953.97	47965.39	47961.76	48153.9
Trade; repair of motor vehicles and motorcycles	104766	102279	99690	97133	94454.13	91713.54	89163.13	86572.11	83993.11	81785.76
Transport, storage and communications	37110	37012	36868	36727	36528.89	36294.21	36122.17	35921.66	35713	35652.42
Hotels and restaurants	19327	18963	18579	18200	17796.59	17380.07	16998.06	16606.86	16216.37	15896.43
Publishing activity, production of audio-visual products, broadcasting activity	11622	11604	11571	11539	11488.31	11426.26	11383.77	11332.13	11277.74	11270
Telecommunications	10978	10961	10929	10899	10851.47	10792.86	10752.72	10703.94	10652.57	10645.25
Information technology activities and services	39327	39264	39152	39043	38872.95	38663	38519.19	38344.46	38160.45	38134.23
Financial and insurance activities	42654	42315	41925	41542	41096.23	40613.12	40203.4	39765.02	39320.87	39042.17
Real estate transactions	7003	7406	7795	8181	8547.808	8900.033	9261.54	9610.08	9950.402	10327.52
Legal, accounting, management, architecture and engineering activities, technical testing and analysis; management consultancy activities	44312	44235	44103	43975	43776.9	43534.64	43366.95	43164.52	42951.72	42916.61
Scientific research and development activities	10394	10376	10345	10315	10268.19	10211.37	10172.03	10124.55	10074.64	10066.4
Advertising and veterinary activity; other professional activities	16908	16879	16829	16779	16704.02	16611.58	16547.59	16470.35	16389.15	16375.75
Administrative and support work activities	19318	19150	18959	18772	18556.4	18324.28	18125.48	17913.96	17700.05	17560.78
Public administration; compulsory social security	153762	154895	155823	156745	157403.2	157880.4	158607.8	159189.4	159712.9	160882.3
Education	134639	137320	139800	142256	144452.9	146458.2	148672.6	150728.9	152707.5	155287.3
Human health services	64351	65165	65890	66609	67211.08	67731.01	68353.65	68909.15	69434.91	70238.16
Medical and social care services with accommodation and social work activities without accommodation	8160	8264	8356	8447	8523.13	8589.063	8668.021	8738.464	8805.137	8906.998
Culture, sport and entertainment	16724	16850	16953	17056	17130.08	17184.34	17265.81	17331.38	17390.58	17520.09
Other activities, not elsewhere classified	19363	19295	19202	19112	18991.72	18852.84	18746.75	18626.12	18501.52	18453.82
Total	922093	923655	924044	924455	923379.4	921315.9	920785	919474.2	917897.6	920084.7

## Employment by provinces

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Burgas	154988	154616	154055	153504	152715	151772	151090	150288	149452	149235
Blagoevgrad	122663	122369	121925	121489	120864	120118	119578	118944	118282	118110
Dobrich	49201	49083	48905	48730	48479	48180	47963	47709	47443	47375
Gabrovo	47095	46982	46812	46644	46404	46118	45910	45667	45413	45347
Haskovo	78450	78262	77978	77699	77300	76822	76477	76071	75648	75538
Yambol	38812	38719	38578	38441	38243	38007	37836	37635	37426	37371
Kyustendil	43036	42933	42777	42624	42405	42143	41954	41731	41499	41439
Kardzhali	49479	49361	49182	49006	48754	48453	48235	47979	47712	47643
Lovech	35697	35611	35482	35355	35173	34956	34799	34614	34422	34372
Montana	36760	36672	36539	36408	36221	35997	35836	35646	35447	35396
Pazardzhik	69344	69178	68927	68681	68327	67905	67600	67242	66867	66770
Plovdiv	293239	292536	291474	290432	288938	287153	285863	284346	282764	282354
Pernik	40654	40556	40409	40264	40057	39810	39631	39421	39201	39145
Pleven	78001	77814	77532	77254	76857	76382	76039	75636	75215	75106
Razgrad	32566	32488	32370	32254	32089	31890	31747	31579	31403	31357
Ruse	88752	88539	88218	87903	87451	86910	86520	86061	85582	85458
Sofia (province)	77578	77392	77111	76835	76440	75968	75627	75225	74807	74698
Shumen	49320	49202	49023	48848	48597	48297	48080	47825	47559	47489
Silistra	20842	20792	20716	20642	20536	20409	20318	20210	20097	20068
Sliven	47217	47103	46932	46765	46524	46237	46029	45785	45530	45464
Smolyan	49218	49100	48922	48747	48496	48197	47980	47726	47460	47391
Sofia (capital city)	905354	903183	899904	896688	892076	886566	882582	877900	873015	871748
Stara Zagora	137114	136785	136288	135801	135103	134268	133665	132956	132216	132024
Targovishte	37244	37155	37020	36887	36698	36471	36307	36114	35913	35861
Varna	201987	201502	200771	200053	199024	197795	196906	195862	194772	194489
Vidin	23299	23243	23159	23076	22957	22815	22713	22592	22467	22434
Vratsa	51371	51248	51061	50879	50617	50305	50079	49813	49536	49464
Veliko Tarnovo	92775	92553	92217	91887	91414	90850	90442	89962	89461	89331
Total	2952056	2944978	2934287	2923799	2908762	2890794	2877805	2862537	2846609	2842478

## Employment by occupations

No		2023	2032
1	Shop Salespersons	202219	162860
2	Administration Professionals	119216	120985
3	Heavy Truck and Bus Drivers	111309	105609
4	Manufacturing Labourers	93675	92570
5	Mining and Construction Labourers	74791	73721
6	Other Elementary Workers	72159	67442
7	Protective Services Workers	65029	60683
8	Material Recording and Transport Clerks	64927	59791
9	Textile, Fur and Leather Products Machine Operators	56735	57042
10	Waiters and Bartenders	66221	55484
11	Garment and Related Trades Workers	54592	54721
12	Government Regulatory Associate Professionals	52480	54591
13	Domestic, hotel and office cleaners and helpers	53980	54069
14	Nursing and Midwifery Professionals	48409	52751
15	General Office Clerks	54137	52554
16	Finance Professionals	54075	52510
17	Secondary Education Teachers (5ht -12 <sup>th</sup> grade)	45169	52092
18	Physical and Engineering Science Technicians	52204	50694
19	Blacksmiths, Toolmakers and Related Trades Workers	46404	46530
20	Car, Van and Motorcycle Drivers	47885	44901
21	Primary School and Early Childhood Teachers (1st-4 <sup>th</sup> grade)	38635	44539
22	Business Services and Administration Managers	44739	44466
23	Personal Care Workers in Health Services	39915	42815
24	Machinery Mechanics and Repairers	45670	40873
25	Administrative and Specialised Secretaries	41161	40567
26	Other Clerical Support Workers	35738	35666
27	Teller, Money Collectors and Related Clerks	36667	35513
28	Cooks	39346	35135
29	Numerical Clerks	35716	33763

No		2023	2032
30	Managing Directors and Chief Executives	33154	31727
31	Manufacturing, Mining, Construction and Distribution Managers	33046	31721
32	Sheet and structural metal workers, moulders and welders, and related workers	31388	30870
33	Electrical Equipment Installers and Repairers	32667	30560
34	Assemblers	30514	30408
35	Mobile Plant Operators	32329	30226
36	Building Frame and Related Trades Workers	28672	28846
37	Other Sales Workers	34876	28454
38	Medical Doctors	25685	27822
39	Professional Services Managers	25552	27318
40	Other Teaching Professionals	23780	26928
41	Other Stationary Plant and Machine Operators	26484	26590
42	Engineering Professionals (excluding Electrotechnology)	24929	24261
43	Software and Applications Developers and Analysts	25067	24168
44	Client Information Workers	25089	23159
45	Business Services Agents	24075	23021
46	Financial and Mathematical Associate Professionals	23052	21892
47	Sales and Purchasing Agents and Brokers	24250	21473
48	Legal Professionals	19425	19805
49	Social and Religious Professionals	19046	19407
50	Other Craft and Related Workers	19459	19019
51	Mining, Manufacturing and Construction Supervisors	19170	18932
52	Food Preparation Assistants	21481	18677
53	Building Finishers and Related Trades Workers	18716	18050
54	Street and Related Services Workers	18204	17721
55	Food Processing and Related Trades Workers	18083	17542
56	Cashiers and Ticket Clerks	20084	17287
57	Transport and Storage Labourers	20337	17227
58	Secretaries (general)	17388	17176
59	Legislators and Senior Officials	16228	16866
60	Other Personal Services Workers	18028	16662

No		2023	2032
61	Child Care Workers and Teachers' Aides	14598	16485
62	University and Higher Education Teachers	13166	15186
63	Rubber, plastic and paper products machine operators	14306	14151
64	Sales, Marketing and Development Managers	13507	12464
65	Other Health Professionals	12567	12188
66	Keyboard Operators	13259	12169
67	Process Control Technicians	13785	12124
68	Medical and Pharmaceutical Technicians	12098	12011
69	Hairdressers, Beauticians and Related Workers	12587	11859
70	Database and Network Professionals	12022	11602
71	Electrotechnology Engineers	11863	11340
72	Information and Communications Technology Operations and User Support Technicians	11936	11268
73	Vehicle, Window, Laundry and Other Hand Cleaning Workers	11861	11236
74	Wood Treaters, Cabinet-makers and Related Trades Workers	11205	11057
75	Street and Market Salespersons	12990	10842
76	Creative and Performing Artists	9798	9970
77	Printing Trades Workers	9961	9867
78	Locomotive Engine Drivers and Related Workers	10322	9482
79	Architects, Planners, Surveyors and Designers	9259	9038
80	Wood Processing and Papermaking Plant Operators	8399	8287
81	Refuse Workers	8784	8006
82	Vocational Education Teachers	6960	8003
83	Handicraft Workers	7999	7851
84	Mining and Mineral Processing Plant Operators	9626	7576
85	Agricultural, Forestry and Fishery Labourers	8183	7471
86	Telecommunications and Broadcasting Technicians	7634	7446
87	Authors, Journalists and Linguists	7201	7001
88	Sales, Marketing and Public relations Professionals	7477	6994
89	Electronics and Telecommunications Installers and Repairers	7277	6855
90	Food and Related Products Machine Operators	6828	6818
91	Chemical and photographic products plant and machine operators	6578	6566

No		2023	2032
92	Travel Attendants, Conductors and Guides	6691	6428
93	Painters, building structure cleaners and related trades workers	6620	6369
94	Librarians, Archivists and Curators	6156	6313
95	Retail and Wholesale Trade Managers	7104	5722
96	Artistic, Cultural and Culinary Associate Professionals	5228	4942
97	Paramedical Practitioners	3969	4312
98	Building and Housekeeping Supervisors	4448	4170
99	Ship and Aircraft Controllers and Technicians	4156	4000
100	Life Science Professionals	3959	3860
101	Metal Processing and Finishing Plant Operators	3340	3378
102	Sports and Fitness Workers	3250	3377
103	Market Gardeners and Crop Growers	3552	3258
104	Other Health Associate Professionals	3206	2996
105	Physical and Earth Science Professionals	2961	2857
106	Other Services Managers	2724	2792
107	Information and Communications Technology Services Managers	2805	2708
108	Hotel and Restaurant Managers	3132	2697
109	Legal, Social and Religious Associate Professionals	1867	1860
110	Street Vendors (excluding Food)	1902	1516
111	Forestry and Related Workers	1483	1334
112	Life Science Technicians and Related Associate Professionals	1370	1272
113	Veterinarians	1153	1012
114	Animal Producers	1002	985
115	Ships' Deck Crews and Related Workers	950	892
116	Mathematicians, Actuaries and Statisticians	669	657
117	Fishery Workers, Hunters and Trappers	309	299
118	Veterinary Technicians and Assistants	284	253
119	Production Managers in Agriculture, Forestry and Fisheries	243	231
120	Traditional and Complementary Medicine Associate Professionals	16	13
121	Mixed Crop and Animal Producers	12	12

## Employment by sex

Number of employees by sex	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Male	1432836	1427565	1420561	1413676	1404616	1394168	1386147	1377054	1367670	1363972
Female	1519220	1517414	1513726	1510123	1504146	1496626	1491658	1485483	1478940	1478506
Share of the persons employed by sex	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Male	48.54%	48.47%	48.41%	48.35%	48.29%	48.23%	48.17%	48.11%	48.05%	47.99%
Female	51.46%	51.53%	51.59%	51.65%	51.71%	51.77%	51.83%	51.89%	51.95%	52.01%

## Employment by age groups

Age groups	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
15-24	169615	167819	165831	163870	161672	159332	157287	155135	152968	151450
25-34	623913	619882	615117	610423	604812	598629	593515	587964	582314	579104
35-44	793033	789675	785364	781123	775686	769489	764638	759202	753611	751159
45-54	743707	742270	739919	737615	734159	729959	727010	723481	719780	719059
55-64	538511	538738	538289	537860	536575	534726	533776	532383	530846	531492
65+	83278	86594	89768	92908	95858	98659	101579	104371	107089	110214

## Labour market imbalances

Mismatch between employees by educational attainment level and demand for such personnel	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Lower secondary or lower education	116998	110196	104790	100536	97686	92242	80875	70068	60565	53047
Secondary education	-156602	-149166	-143235	-138684	-136052	-132350	-122989	-110619	-101261	-94181
Tertiary education	39603	38970	38444	38148	38366	40109	42114	40551	40696	41134

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