Development of a macroeconomic skills forecasting model for Georgia

Analysis of the labour market for the next 5 years



MINISTRY OF ECONOMY AND SUSTAINABLE DEVELOPMENT OF GEORGIA



LABOUR MARKET

Plan the future



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1 Foreword

This report represents the product of collaboration between Cambridge Econometrics and the Ministry of Economy and Sustainable Development of Georgia (MOESD). The main focus of cooperation was to develop a macroeconomic skills forecast model for Georgia with a 5-year outlook, which is part of the budget support program signed by the Georgian Government and the European Commission. Specifically, Indicator 1.5 (Availability of national skills anticipation with a 5-year outlook) aims to develop a macroeconomic forecasting model with a 5-year perspective that covers the following parameters for full achievement:

- (a) macroeconomic projection;
- (b) employment changes in the whole economy;
- (c) replacement needs;
- (d) demographic trends for labour supply.

To implement the above-mentioned indicator, MOESD requested expert support from the EU Technical Assistance Program. Initially, the primary goal was to explore institutions with relevant experience in macroeconomic studies and skills anticipation. The market inquiry covered domestic and foreign companies, and ultimately, Cambridge Econometrics, an international consulting company, was selected and contracted (under sub-contract by GOPA) for the study.

Cambridge Econometrics was responsible for developing the model in close consultation with Georgian partners, which, in addition to the Ministry, included the National Bank and the National Statistics Office of Georgia. National partners played a key role in providing input data and checking and validating the underlying assumptions applied in the model. The Ministry of Economy and Sustainable Development of Georgia steered the process from the Georgian side by consolidating the feedback of national partners and enriching the report with context-related information.

As a result of the fruitful cooperation between international and national partners, the first-ever skills forecasting report is now available for Georgia. Accordingly, the program was implemented in a timely manner, and the current report presents the findings and analysis of the macroeconomic forecasting model with a 5-year outlook. The team at the Ministry of Economy and Sustainable Development has taken over the operation of the model and will continue producing future forecasts for the benefit of better employment and education policy making.

The development of the Skills Forecasting model for Georgia was made possible with the financial support of the EU Skills4Jobs program.

2 **Executive Summary**

This report presents a first assessment of the future skills issues facing the Georgia's economy in the next five years. The analysis has been developed in a new skills forecasting model for Georgia, than links forecasted output by sector to employment by sector, occupations and qualifications. The model also provides a forecast of labour supply by qualifications.

The projections are consistent with the macroeconomic forecast produced by National Bank of Georgia in October 2022 and with the population forecast produced by United Nations World Population Prospects 2022.

The process of preparing the analysis has highlighted key areas where there is a lack of data to inform assumptions about future trends. In a number of these cases the projections make the simplifying assumption that current characteristics continue in the future.

The key points from these initial baseline projections to 2027 are:

- Output in all sectors is expected to growth. Manufacturing, Wholesale and retail trade and Construction remain the most important sectors in the economy.
- The largest increase in employment is expected in Public administration and defence, Education, and Transport and storage. The largest decline in employment is expected in Agriculture. Strong growth is expected in small sectors such as Mining and quarrying and Activities of households as employers.
- New jobs will be created in the next five years in all occupations, except Skills agricultural workers and Crafts and related trades workers. The former occupation is driven by the decline in employment in Agricultural sector as productivity is expected to increase faster than output in this sector. Professionals occupation will experience the largest increase in new jobs over the forecast period.
- Replacement needs are expected to increase over time given the ageing of workers in some occupations and emigration.
- Replacement and expansion demand are expected to account for 70% and 30% of job openings, respectively.
- The proportion of men in the labour force is higher than women in 2022 across all age groups, and is projected to remain by 2027 among most age groups.
- The supply of high qualified workers is expected to remain stable, while the demand is expected to increase. The supply of medium qualified workers is expected to decline, while the demand is expected to increase only marginally.

3 Introduction

This report summarises the overall macroeconomic employment forecast for Georgia, and the implications for employment by sector, occupation and qualifications, and labour force trends. The first year of the forecast is 2022.

This specific commission should be seen as being the start of a longer process for the Ministry, providing them with an initial framework that works with the information currently available. In time, individual modules can be enhanced in scope or sophistication as new data become available, or the needs of policy makers develop.

Overview of the
modelThe overarching objective of this modelling framework is to provide a forecast
of skills demand and supply using the specific national data available to answer
the needs of Georgian policy makers. The model has three main components
(see Figure 1.1):

- four skills demand modules: modules 1-4
- a skills **supply** module; and
- a demand for replacement needs module.



Figure 3.1 Modelling framework

Note(s): Module 2 was not made operational in the end due to concerns of data quality. Source(s): Cambridge Econometrics.

Skills demand The first module produces estimates of employment by sector for the next 5 years, obtained from a forecast of sectoral output and productivity ¹.

Modules 3 and 4 further disaggregates the employment by sector into employment by occupation and qualifications². The labour demand by occupation is determined by the labour demand in each sector and assumption

¹ Further details on the assumptions for these and other inputs are provided in subsequent chapters.

² See Table A.6 in Appendix A for the gualification levels used in the modelling framework.

on the changes of the occupational structure of the sectors. The labour demand by qualifications is driven by labour demand in each occupation and assumption on the expected changes in the qualification structure of occupations.

- *Skills supply* The skills supply component is based on external population projection by age and gender. Module 5 produces estimates of labour force by age, gender and qualification. The estimates of labour supply by age and gender are derived by multiplying population projections by age and gender with assumptions in the change in participation rates by age and gender. The labour supply by qualification is driven by the changes in the age distribution of labour supply and assumptions on the changes in the qualification distribution of each group.
- ReplacementThe replacement need module produces estimates of replacement demand,
which measures the net outflow of workers from occupations (see Section 6.3
for more details).

Structure of the report is structured as follows. Chapter 4 presents the external assumptions that were used in the modelling framework. Chapter 4.3 presents the overall employment forecast for the next 5 years in Georgia. Chapters 5.3 and 6 analyse the employment forecast by sectors and by occupations, respectively. Finally, Chapter 7 analysis the gap between the demand and supply of skills.

4 External assumptions

4.1 Introduction

This chapter outlines the main macroeconomic assumptions underlying the employment and labour supply projections for Georgia. They cover:

- (a) Population projections,
- (b) GDP projections, both short and medium-term.

The forecast horizon is 2022-27. These assumptions are discussed in further detail below.

4.2 **Population assumptions**

External population projections are a key input for the labour force projections. Historical data for population by gender and age (i.e. 2016 - 2022) are taken from Geostat³. Population projection to 2027 are based on the medium fertility variant from United Nations (UN) World Population Prospects 2022⁴. These two sources are combined by applying growth rates from the UN projections to the latest historical figures from Geostat⁵.

Declining working age population Figure 4.1 shows the changes in population by age group and gender in Georgia in the periods 2016-22 and 2022-27 (full set of results can be found in Table A.1. of the Appendix A). Over the forecast period, the population of working age (15-64) in Georgia is expected to decline by 12,000 people. This overall decline is mainly due to the expected decline in those aged 25-34 and 55-64, which is not compensated by the expected increase in 15-24 and 35-44 age groups. Overall, the male working age population declines faster than female population over the forecast period.

³ Population as of 1 January by 5-year age group and sex

https://www.geostat.ge/en/modules/categories/316/population-and-demography

⁴ Data taken from <u>https://population.un.org/wpp/Download/Standard/Population/</u> (download date: 01/10/2022).

⁵ Geostat does not publish population projections and it was agreed that the UN population projections for Georgia (which are updated every two years) are a credible source for this project. The UN projections may not be wholly consistent with the latest data from Geostat, hence the two series are combined in the manner described.



Figure 4.1: Changes in population by age and gender, 000s

Notes(s): For the projections, the growth rates are based on the 2022 Revision of World Population Prospects – medium fertility variant. They were used to extend the Geostat historical data up to 2027.

Source(s): Cambridge Econometrics based on Geostat and United Nations 2022 Revision of World Population Prospects.

4.3 Macroeconomic assumptions

Economic growth

The macroeconomic context for the analysis is given by the projections for GDP
 and components of expenditure produced by the National Bank of Georgia in
 October 2022⁶ and IMF projections for the 2024-2027.

Figure 4.2 summarises the growth of GDP and its components over the projection period. GDP grew by just under 10½% in 2021, driven by an increase in final consumption and a surge in exports, whereas investment declined. In the period 2022-23, GDP growth is expected to be moderate, with all components providing a positive contribution to growth. From 2024 onward, GDP growth is expected to remain stable at around 5% each year, with each main component of expenditure expected to grow at a similar rate.

⁶ From: <u>https://nbg.gov.ge/en/publications/monetary-policy-reports</u>



Figure 4.2: Real GDP and components annual growth rate, 2021-27

Source(s): For the short-term (2022-23):National Bank of Georgia, Monetary Policy Report published in October 2022. For the medium term (2024-27): IMF Data Mapper, October 2022⁷.

Output by sector growth

Projections of output by sector, consistent with the macroeconomic context, are developed by applying an Input-Output (IO) methodology⁸ to the growth in GDP components.

Estimate of sector growth Figure 4.3 shows the expected evolution of gross output by sector based on their contribution to final demand. The increasing height of the bar over 2022-27 shows that total gross output is expected to grow by 30%. The size of each colour band shows the importance of an individual sector in the total economy. For example, it is possible to see that the biggest sectors are: *Agriculture* (A), *Manufacturing* (C), *Construction* (F), *Wholesale and retail trade* (G) and *Transport* (H). Together, these five sectors account for almost 60% of gross output.

⁷ See <u>https://www.imf.org/en/Countries/GEO#countrydata</u>

⁸ The methodology entails allocating the growth in GDP components the output of different sectors based on the distribution of final demand derived based on the Input-Output table.



Figure 4.3 Projected gross output by sector, current prices (m GEL2021), 2022-27



Source(s): Cambridge Econometrics.

As shown in Table 4.1, Mining and guarrying (B), Transportation and storage (H) and Arts, entertainment and recreation (R) are expected to experience the strongest growth (over 32% growth over 2022-27). Manufacturing (C) is expected to make the largest contribution to growth of the economy (+6,740 m GEL2021) due to its relative size and the expectation that growth in the sector will outpace that in the economy as a whole. Construction (F) is expected to see little further growth to 2027 but will continue to be one of the most important sectors of the economy in terms of its size.

Public administration and defence; compulsory social security (O), Education (P) and Human health and social work activities (Q), have among the lowest output growth in relative terms.

	Economic activity (NACE Rev2)	Growth (%), 2022- 27	Annual Growth (%), 2022- 27
А	Agriculture, forestry and fishing	30.4	5.5
В	Mining and quarrying	35.2	6.2
С	Manufacturing	30.7	5.5
D	Electricity, gas, steam and air conditioning supply	29.9	5.4
E	Water supply; sewerage, waste management and remediation activities	30.1	5.4
F	Construction	26.6	4.8
G	Wholesale and retail trade; repair of motor vehicles and motorcycles	30.7	5.5

Table 4.1 Expected growth in gross output by sector (%)

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Н	Transportation and storage	32.5	5.8
1	Accommodation and food service activities	31.5	5.6
J	Information and communication	30.0	5.4
K	Financial and insurance activities	29.7	5.3
L	Real estate activities	29.0	5.2
М	Professional, scientific and technical activities	29.9	5.4
Ν	Administrative and support service activities	29.3	5.3
0	Public administration and defence; compulsory social security	28.4	5.1
Ρ	Education	28.5	5.1
Q	Human health and social work activities	28.4	5.1
R	Arts, entertainment and recreation	32.4	5.8
S	Other service activities	29.4	5.3
Т	Activities of households as employers	28.4	5.1
U	Activities of extraterritorial organisations and bodies	0.0	0
Couroola	N. Combridge Econometrice		

Source(s): Cambridge Econometrics.

5 Employment outlook

5.1 Introduction

This chapter presents the baseline results of employment (Section 5.2) and its distribution of sector (Section 4.3).

The employment forecast is constructed based on the relationship between output and productivity. The key steps of constructing the employment forecast for the next 5 years are to develop assumptions for:

- output by sector (see Section 4.3).
- productivity⁹.

Productivity assumptions There is little historical data on productivity by sector with which to estimate trends in productivity to guide forward-looking assumptions. In this context, assumptions for future productivity growth by sector used in the employment projections have relied heavily on consultation with the MoESD stakeholders. Table 5.1 shows the assumptions adopted in the projection¹⁰.

For example, it is assumed that productivity in Agriculture will increase by 5% pa in 2022 and 2023 and then quicken to 7% pa in 2027. As a result, productivity in 2027 will be 45% higher than in 2021. Output in the sector would need to see equivalent growth if employment were to remain at its 2021 level. Other sectors such as Construction are expected to have a growth rate of 5% per annum. Most of the Business services (e.g. real estate) will have a negative growth (less output per worker) in 2022-23 as a result of adjustment impacts to the Covid pandemic and other factors but then to recover strongly over 2024-27.

Sector code	Sector label	2022	2023	2024	2025	2026	2027
А	Agriculture	5	5	7	7	7	7
В	Mining and quarrying	3	3	2	2	2	2
С	Manufacturing	6	6	7	7	6	6
D	Electricity and gas	2	2	1	1	1	1
Е	Water supply	2	2	1	1	1	1
F	Construction	5	5	5	5	5	5
G	Wholesale and retail	4	4	5	5	5	5
Н	Transport	3	3	2	2	2	2
1	Accommodation	5	5	3	3	3	3
J	ICT	3	3	2	2	2	2
K	Finance	3	3	3	3	3	3
L	Real estate	-2	-2	5	3	3	3
М	Professional services	-2	-2	5	3	3	3

Table 5.1: Assumptions of productivity yearly percentage growth rate (%)

⁹ Productivity is calculated here as real gross output divided by employment, i.e. m GEL/person.

¹⁰ It is straightforward to use the Skills forecasting model that has been developed to assess the impact of alternative productivity assumptions on employment needs.

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Ν	Admin and support	-2	-2	5	3	3	3
0	Public admin	2	2	2	2	2	2
Р	Education	1	1	3	3	4	4
Q	Health	2	2	3	3	3	4
R	Arts and entertainment	-2	-2	5	3	3	3
S	Other services	-2	-2	5	3	3	3
Т	Households as employers	0	0	0	0	0	0
U	Extraterritorial organisations	0	0	0	0	0	0

Source(s): Cambridge Econometrics and Adjusted in Consultation with MoESD stakeholders.

5.2 Overall employment results

Figure 5.1 summarises the change in levels and the annual percentage growth rate of employment over 2020-27. Across the forecast period (2022-27), employment in Georgia is forecast to grow at an average of 1.3% per annum, compared to the decline of 2% between 2020-21. Total employment declined by around 24,000 workers in 2021, and is expected to increase by 52,000 and 36,000 workers in 2022 and 2023 respectively. Afterward, employment is expected to increase by around 10,000 workers per year.

Figure 5.1: Employment change in levels and annual growth rate, 2022-27



Source(s): Cambridge Econometrics.

Employment in Georgia is forecast to increase from 1.27 m people in 2022 to 1.36m in 2027(6.9% over 2022-27).

5.3 Sectoral employment trends

Figure 5.2 shows the level of employment across 21 broad NACE Rev 2 sectors in 2022 and 2027. Most sectors are expected to see employment increase over the period, with the most striking exception being agriculture expected to decline by over 11,000 workers.



Figure 5.2: Employment levels by sector in Georgia, 2022 and 2027



Table 5.2 shows the employment expansion demand by sectors, i.e. number of new jobs/ lost jobs over the forecast, in both absolute and relative terms. The largest absolute increase in employment is expected in *Public administration and defence* (O), *Transport and storage* (H), and *Education* (P). The largest decline in employment is expected in *Agriculture* (A). Strong percentage growth is expected in small sectors such as *Mining and quarrying* (B) and *Activities of households as employers* (T).

The employment forecast by sector is driven by two main assumptions: the growth in output; and the increase/decrease in productivity. The employment projections for *Agriculture* (A) and *Manufacturing* (C) are mainly driven by the strong growth in labour productivity in these sectors (see Table 5.1). The output growth in these sectors is not expected to grow faster than the increase in productivity.

In real estate, renting and business activities sectors, productivity is expected to decline in the short term (to 2023) and then increase again until 2027. Employment will continue to increase alongside the growth in productivity.

	Economic activity (NACE Rev2)	Expansion demand (levels)	Growth (%)
А	Agriculture, forestry and fishing	-11,459	-4.8
В	Mining and quarrying	2,336	21.6
С	Manufacturing	-4,249	-4.3

Table 5.2: Employment by sector, 2022-27

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D	Electricity, gas, steam and air conditioning supply	2,988	20.5
Е	Water supply; sewerage, waste management and remediation activities	3,464	20.7
F	Construction	-63	-0.1
G	Wholesale and retail trade; repair of motor vehicles and motorcycles	8,128	4.3
Н	Transportation and storage	14,084	17.2
ļ	Accommodation and food service activities	3,898	11.2
J	Information and communication	2,819	15.0
K	Financial and insurance activities	3,678	11.9
L	Real estate activities	812	14.6
Μ	Professional, scientific and technical activities	3,623	15.3
Ν	Administrative and support service activities	3,152	14.9
0	Public administration and defence; compulsory social security	16,819	17.7
Ρ	Education	16,223	10.7
Q	Human health and social work activities	7,824	11.5
R	Arts, entertainment and recreation	5,667	17.6
S	Other service activities	3,585	15.0
Т	Activities of households as employers	3,838	28.4
U	Activities of extraterritorial organisations and bodies	0	0.0
	Total	87,170	6.9

Source(s): Cambridge Econometrics.

6 Job openings by occupational group

6.1 Introduction

This section presents the implications for employment by occupation. Two drivers of change are considered: expansion demand (that from changing size and structure of the economy); replacement demand (the need to replace people who may be leaving current jobs).

6.2 Assumptions for occupational structure of sectors

The previous sections outlined the development of employment by sectors derived from the projected path of output and productivity. To further disaggregate employment by occupation requires information on the occupational structure of sectors and assumptions for how structure of sectors will develop through the forecast.

Consistent data on the shares of occupations within sectors are only available for 2020 and 2021¹¹. Such a small sample does not allow for a reliable estimation of a trend. Therefore, the assumptions for changes in sectoral employment by occupation also draw on an examination of trends in countries similar to Georgia but with more data available (e.g. Bulgaria and Romania) and with expert judgement. The occupations considered are the nine ISCO 1-digit occupations¹².

Table A.2 in the Appendix shows the assumed changes in percentage point in the shares of 1-digit ISCO occupations within sectors over the period 2021-27. The occupational structure of some sectors is kept unchanged where there is considered a lack of evidence on possible future trends. In other sectors, it was possible to detect a clear tendency for certain occupations to expand/decline, as for example is the case for professionals in ICT, which are clearly expected to increase their shares¹³.

6.3 Expansion and replacement demand

Expansion demand

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Applying the assumed shares of occupations in sectors to the projected employment by sector provides projections of the overall number of jobs by occupation in the economy. The yearly absolute changes in the number of jobs by occupations are called 'expansion demand'. For example, the total number of *Managers* is expected to increase from over 79,000 in 2022 to almost 84,000 in 2027. The difference of almost 6,000 represents a positive expansion demand. Similarly, changes in the economy result in the number of *Skilled*

¹¹ The classification used in the LFS changed meaning data for earlier years are not directly comparable with the data since 2020.

https://www.ilo.org/public/english/bureau/stat/isco/#:~:text=ISCO%20%2D%20International%20Standard%2 0Classification%20of%20Occupations&text=The%20International%20Standard%20Classification%20of,of% 20economic%20and%20social%20classifications.

¹³ Alternative assumptions for occupational change, including no change, can be assessed using the Skills forecasting model.

Agricultural, Forestry and Fishery Workers being expected to decline by 10,000 people over 2022-27, which represents a negative expansion demand. Figure 6.1 shows yearly expansion demand by 1-digit occupation over the period 2022-27¹⁴. Each bar shows the annual absolute difference in employment within occupations. For example, the red bar shows employment in 2022 minus employment in 2021. For all occupations, expansion demand is strongest at the beginning of the projection period and then weakens, turning negative for *Skilled Agricultural, Forestry and Fishery Workers* and *Crafts and related trades workers*.



Figure 6.1: Number of jobs arising from expansion demand by occupation, 2022-27

Replacement demand

Replacement demand measures the net flow of workers from an occupation. Such outflows can occur for example because of older workers retiring, workers changing occupation, or workers entering into unemployment/exiting the labour force. All or part of these workers may need to be replaced, in which case replacement demand will create further job opportunities on top of those provided by expansion demand. In general terms, replacement demand can be seen as job openings arising because of people leaving the workforce or their occupation. The replacement demand rates are derived from LFS data for the years 2020 and 2021 using information on the age, gender, and occupational structure of employment, and are applied to employment figures in each year (see Table A.3 in the Appendix). Figure 6.2 shows the projected replacement demand by occupation. The bars represents the levels of replacement demand each year, i.e. the job openings arising due to replacement needs. There is a replacement demand need in each occupation and that demand will increase over time the number of job openings on top of the needs derived from economic growth. The greatest replacement demand is among Professionals (between

Note(s):Armed forces and Non response are also computed but not shown.Source(s):Cambridge Econometrics.

¹⁴ See Figure 5.1 for expansion demand in total employment.

6,000 and 7,000 more job openings each year on top of the new jobs) and *Service and sales workers*. It is smallest among *Managers* and *Skilled Agricultural, Forestry and Fishery Workers,* with around 1,000 more jobs opening per year.



Figure 6.2: Number of jobs arising from replacement demand by occupation, 2022-27

6.4 Job openings

Total job openings available in an occupation in a given year are obtained as the sum of expansion demand and replacement demand. Figure 6.3 shows projected job openings by occupation. The size of the bar represent the sum of expansion and replacement demand for an occupation in each year. As shown in Figure 6.1 and Figure 6.2, most occupations are expected to see positive expansion and replacement demand, and as a result, the number of job openings are also positive. In *Skilled Agricultural, Forestry and Fishery Workers* however, the loss of jobs due to expansion demand more than offsets the number of jobs arising from replacement demand, meaning that the workers leaving the occupation will not be replaced, and that therefore the employment levels in that occupation are expected to decline.

Note(s): Armed forces and Non response are also computed but not shown. Source(s): Cambridge Econometrics.



Figure 6.3: Job openings by occupation, 2022-27



Figure 6.4 summarises the total number of job openings over the projection period. It is possible to see that in most occupations replacement demand represents the bulk of job openings. Overall, replacement demand and expansion demand are expected to account for 70% and 30% of job openings respectively. *Professionals* is the occupation where expansion demand accounts for the largest share of job openings (45%). As mentioned before, *Skilled Agricultural, Forestry and Fishery Workers* is expected to shrink, hence no job openings are expected in that occupation. The occupations with largest number of job openings coming from new jobs are *Professionals* and *Service and sales workers*, accounting for 25% and 21%, respectively, of total job openings.



Figure 6.4: Job openings by broad occupational group, 2022-27

Source(s): Cambridge Econometrics.

7 Demand and supply of skills

7.1 Introduction

This chapter presents the projected path of labour supply by age and gender, and by qualification and compares labour demand by qualification with labour supply, to assess the likelihood of mismatches between the demand and supply of skills.

7.2 Labour supply

Projections of labour supply are obtained by multiplying population projections (see Section 4.2) with assumed participation rates. The participation rates are derived from the LFS microdata. Following consultations with MoESD experts, it was decided the projection should not include any change in participation rates (by age/gender) for the period 2022-27 so that the change in labour supply being projected was the result of demographic changes only. Tables A.1 and A.4 in the Appendix show the baseline assumptions for population and participation rates, respectively.

Figure 7.1 shows total labour force changes in levels and in percentage annual growth rate. The total labour force is expected to decline by around 66,000 people (2.5%) over 2022-27.





The baseline labour force trends by age group are summarised in Figure 7.2. The bars show labour force by age band in each year. The largest proportion of the labour force is aged 35 to 44; with labour force within this age band expected to grow by about 0.8% on average per annum (reaching 377,000 people in 2027). Those aged 25-34 are expected to be the second largest group in the labour force in 2022 (around 325,000 people), and to decline substantially by 2027 at an average rate per annum of -4% (reaching 270,000 people). The

Source(s): Cambridge Econometrics.

largest increase in labour force is expected among those aged 15 to 24 and 65+, where it is expected to see around a 2% average growth per annum (reaching 147,000 and 120,000, respectively, in 2027).



Figure 7.2: Labour force projection by age group

The number of people in the labour force by age and gender across the projection period is presented in Figure 7.3. The proportion of men in the labour force is higher than that of women in 2022 across all age groups (i.e. the bars are higher for men than for women in each year). It is projected to remain so to 2027, with two exceptions: age groups 45-54 and 65+, where by 2027 the proportion of women is projected to become higher than men (due to more women in the population for this age group as shown in Figure 7.3). The gender imbalance is particularly striking among age groups 15-24, with the gender gap expected to increase by 2027.

Since the participation rates are maintained at their 2021 level for the entire forecast period in the baseline, labour force by age is entirely driven by population developments. This means that if the number of people in an age group increases in the population, the size of the labour force from that age cohort will also increase.

Source(s): Cambridge Econometrics.



















7.3 Labour supply and demand by qualification

Labour supply by qualification is obtained by applying assumptions on the share of qualifications within each age group to the figures of labour force by age. Table A.5 in the Appendix shows the assumptions about the shares of qualifications by age group¹⁵. Figures of total labour force by qualifications are obtained by summing up labour force by qualification across all age groups.

The distribution of the workforce by the three levels of qualifications is expected to remain the same for the age groups 15-34 over the forecast period. For older age groups, it is expected that the 2022 distribution of the workforce by qualification in one age group will reach in the distribution by qualification in the next age cohort by 2027. For example, the distribution by qualification of the 35-44 age group in 2027 will mirror the distribution by qualification of the 25-34 age group in 2022. If the labour supply in an age group is declining, also the workforce with that qualification level is declining proportionally.

Figure 7.4 compares the projected supply (i.e. labour force) and demand (i.e. employment) of qualifications¹⁶, and shows the future available supply (i.e. supply minus demand). The supply of high qualification is expected to remain broadly constant (between 613,000 and 614,000), while the demand is expected to increase by 60,000 people over the forecast period. As a result, the available supply of high qualifications is expected to shrink over time (from around 70,000 in 2022 to around 8,000 people in 2027). Shortages of high qualifications may materialise in the medium term if this trend were to continue.

The supply of medium qualification is expected to decline (by around 50,000 people), while the demand is expected to increase only marginally (by 23,000 workers). As a result, the available supply of medium qualification is expected to decrease (by 73,000 people), with skills shortages foreseen in the -medium-to-long term if this trend continues.

The supply of low qualification is expected to grow at a faster rate than the demand for low qualifications. The supply of low qualifications increases by 13,000 over the forecast period because the number of people in labour force aged 45-54 increases, and also the share workers with low qualifications in that age band is also expected to increase. This is the only age group where both participation rate assumption and expected the share of low qualification drive the increase. As a consequence, the available supply of low qualification is expected to increase by 9,000 people by 2027.

Overall, these projections point to a possible shortage of highly qualified workers in the medium term. In such a situation, medium-skilled workers may be used to fill high-skill roles, and low-skilled workers (whose supply is expected to increase) may be used to fill medium-skill roles, causing skills mismatches that could harm productivity.

¹⁵ Shares of qualifications by age group in 2021 are computed from the LFS.

¹⁶ Table A.7 shows the assumptions regarding changes in shares of qualifications within occupations.

Figure 7.4 Supply and demand by qualification



Notes(s): Please check Table A.6 in the Appendix for the qualification classification. Source(s): Cambridge Econometrics.

8 Conclusions and Recommendations

The working-age population is expected to decrease by 12,000 persons. Employment is expected to increase with 90,000 employed. Consequently, there is a high risk of a lack of qualified labour, particularly among Professionals and Service and Sales Trade Workers.

There is an expected skills shortage among medium-qualified labour. Therefore, it is recommended to focus and facilitate upskilling of low-skilled jobseekers to medium-qualified labour using the National Qualifications Framework (NQF), recognition of prior learning, and other active employment measures.

There is an expected increased level of long-term unemployment for lowqualified labour. Active employment measures, such as upgrading low-skilled jobseekers to medium-qualified jobseekers to enhance their employability and boost economic growth, should be taken. For example, job-rotation schemes can be implemented within occupations with a lack of qualified labour.

Appendices

Appendix A Assumptions

A.1 Population

Table A.1: Population assumptions

Age group	Gender	2021	2022	2023	2024	2025	2026	2027
15-24	Male	223,031	218,206	218,658	221,802	226,582	231,605	236,791
25-34	Male	259,394	246,131	239,423	231,848	223,448	215,009	207,463
35-44	Male	252,381	249,149	251,971	254,887	257,972	260,527	261,497
45-54	Male	226,203	223,621	223,788	224,054	224,500	225,258	226,448
55-64	Male	223,592	220,386	216,503	213,073	209,769	206,287	203,105
65+	Male	213,687	213,690	213,762	216,884	222,085	227,535	232,689
15-24	Female	197,871	196,094	196,533	199,725	204,640	209,692	214,653
25-34	Female	251,260	242,440	233,935	224,538	214,317	204,156	195,102
35-44	Female	253,775	253,815	255,637	257,391	259,179	260,413	260,015
45-54	Female	238,029	235,586	235,566	235,876	236,386	237,033	237,899
55-64	Female	269,626	265,875	262,216	257,925	253,093	247,969	243,144
65+	Female	354,846	356,619	359,199	365,243	373,775	382,628	391,194
Total		2,963,695	2,921,612	2,907,190	2,903,246	2,905,746	2,908,110	2,910,001

Note(s):

Source(s):

Population assumptions were derived by applying to the 2021 population figures from Geostat the growth rates from the UN population projections. Cambridge Econometrics based on Geostat (2022) and United Nations 2022 Revision of World Population Prospects (2022).



Figure A.1: Distribution of the population (thousands), 2016-27

Occupations A.2

Table A.2: Percentage point changes in the share of occupations within sectors in 2021-27, assumptions

	Manag ers	Profes sionals	Associ ate profes sionals	Clerks	Sales worker s	Skilled agricul ture	Crafts and related trades	Plant and machi ne operat ors	Eleme ntary occup ations
Agriculture	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mining and quarrying	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Manufacturing	0.0	0.0	0.0	0.0	0.0	-0.2	-3.1	1.1	2.2
Electricity and gas	0.0	1.7	0.0	-0.1	0.0	0.0	-0.8	0.0	-0.9
Water supply	0.0	0.0	2.5	0.0	0.0	0.0	0.0	-2.6	0.0
Construction	-1.1	-0.5	-1.3	0.0	0.0	0.0	0.0	-1.1	4.0
Wholesale and retail	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Transport	-0.6	0.2	-1.4	-1.1	-0.9	0.0	0.0	3.7	0.0
Accommodation	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	-1.8
ICT	0.0	9.0	0.0	-5.3	0.0	0.0	-3.8	0.0	0.0
Finance	-2.2	3.1	2.3	-3.2	0.0	0.0	0.0	0.0	0.0
Real estate	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Professional services	-2.5	4.3	0.0	-1.9	0.0	0.0	0.0	0.1	0.0
Admin and support	-2.0	2.1	0.0	0.0	-1.7	0.0	0.0	0.0	1.8
Public admin	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Education	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Health	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Arts and entertainment	0.0	2.4	2.0	-1.6	-2.5	0.0	0.0	0.0	-0.2
Other services	-0.5	-0.9	-0.9	0.0	3.9	0.0	-0.6	0.0	-1.0
Households as employers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Extraterritorial organisations	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Note(s):

A residual occupation called *Other*, grouping together *Armed forces* and *Non response*, is also computed but not shown. Cambridge Econometrics analysis based on LFS data.

Source(s):

A.3 Replacement demand

Table A.3: Replacement rates by occupation

	Replacement rate
Managers	1.3%
Professionals	2.6%
Technicians and Associate Professionals	4.9%
Clerical Support Workers	3.3%
Service and Sales Workers	3.2%
Skilled Agricultural, Forestry and Fishery Workers	0.5%
Craft and Related Trades Workers	2.3%
Plant and Machine Operators, and Assemblers	3.0%
Elementary Occupations	3.6%

Note(s): A residual occupation called *Other*, grouping together *Armed forces* and *Non response*, is also computed but not shown.

Source(s): Cambridge Econometrics analysis of LFS data.

A.4 Labour supply

Table A.4:	Participation	rates	assumptions
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Age group	Gender	2021	2027
15-24	Female	25%	25%
15-24	Male	39%	39%
25-34	Female	51%	51%
25-34	Male	82%	82%
35-44	Female	62%	62%
35-44	Male	83%	83%
45-54	Female	60%	60%
45-54	Male	77%	77%
55-64	Female	46%	46%
55-64	Male	67%	67%
65+	Female	14%	14%
65+	Male	28%	28%

Source(s): Cambridge Econometrics analysis based on LFS data.

Age group	Qualification	2021	2027	Difference (pp)
15-24	High	19%	19%	0
15-24	Medium	73%	72%	-1
15-24	Low	9%	9%	1
25-34	High	44%	44%	0
25-34	Medium	51%	51%	0
25-34	Low	5%	5%	0
35-44	High	46%	46%	0
35-44	Medium	47%	47%	0
35-44	Low	7%	7%	0
45-54	High	42%	46%	4
45-54	Medium	56%	47%	-9
45-54	Low	2%	7%	5
55-64	High	37%	42%	5
55-64	Medium	61%	56%	-5
55-64	Low	2%	2%	0
65+	High	40%	37%	-3
65+	Medium	56%	61%	5
65+	Low	4%	2%	-2

Table A.5: Labour force by qualification and age assumptions

Source(s): Cambridge Econometrics analysis based on LFS data.

A.5 Qualifications

Table A.6: How we allocate qualification levels to the three broad groups

Name	Definition
High	Doctor or equivalent
	Master or equivalent
	Bachelor or equivalent
	Higher professional education or equivalent
Medium	 Secondary general education (upper secondary)
	 Vocational education on the base of secondary general education (except higher professional education)
	 Vocational education without secondary general education

	 Vocational education on the base of lower secondary education with secondary general education certificate
Low	Basic general education (lower secondary)
	Primary education
	Pre-primary education
	 Has no education but can read and write
	Illiterate

Table A. 7 Percentage point changes in the share of qualifications within occupations in2021-27, assumptions

		Low	Medium	High
	Managers	0.7	-2.6	1.9
	Professionals	0.0	-1.4	1.5
	Associate professionals	2.3	-5.6	3.3
	Clerks	0.0	0.0	0.0
	Sales workers	0.0	0.0	0.0
	Skilled agriculture	0.0	0.0	0.0
	Crafts and related trades	0.0	-0.1	0.1
	Plant and machine operators	0.0	-0.1	0.0
	Elementary occupations	0.0	0.0	0.0
· / ·	A residual assumption called Other	r arouning too	nother Armod	forces and No

Note(s):

s): A residual occupation called *Other*, grouping together *Armed forces* and *Non response*, is also computed but not shown.

Source(s): Cambridge Econometrics analysis based on LFS data.