3 Adapting to the future of work in Amsterdam

This chapter analyses the main future trends, challenges, and opportunities for the labour market in Amsterdam. It focuses on seven dimensions: the consequences of the increasing digitalisation for the labour market; the automation of production processes and its effect on labour demand; job polarisation and labour market mismatches by education; the ageing society and its effect on labour supply; the rise of non-standard work; and the transition to a low-carbon economy. In doing so, the chapter benchmarks Amsterdam against selected comparable metropolitan areas across OECD countries and other regions in the Netherlands, with a particular focus on the other G4 cities (Rotterdam, The Hague and Utrecht). The analysis shows that policymakers in Amsterdam should pay close attention to challenges pertaining to self-employment, the high retirement rates among workers in occupations that require vocational education, and the high incidence of part-time work.

In Brief

Digitalisation, automation, demographic change and the green transition leave Amsterdam's policymakers with new challenges and opportunities

The increasing digitalisation, the automation of production processes, ageing societies and the transition towards net-zero carbon emissions are transforming labour markets at a rapid pace. The local net welfare and employment effects of these trends vary across places due to differences in local industrial structures and the extent to which occupations are exposed to transformative forces. If these transformative forces are not managed well, they may result in an increasing risk of job loss, skills gaps, skills mismatches, a strong polarisation into well-paying and precarious jobs, and eventually a decline in productivity growth. This chapter puts the effect of these labour market megatrends on Amsterdam into national and international perspective.

The very high level of digital skills in Amsterdam's population puts the city in a promising position to meet increasing demand for these skills. Labour demand is rising fast in Amsterdam and job requirements for open vacancies are changing. The share of online job postings listing basic digital skills such as the use of word processing software rose from 45% in January 2019 to 56% in December 2021. The Dutch population's high level of digital proficiency and the central government's *Dutch Digitalisation Strategy* puts Amsterdam in a strong position to cope with the additional demand for digital skills.

Automation risks already translate into a declining labour demand for the most exposed occupations. 38% of jobs in Amsterdam face automation risks, compared to 46% on average across the OECD. Labour demand in Amsterdam is highest for occupations such as information and communication technology professional and business and administration professionals that face relatively low automation risks. In contrast, demand is low in occupations that require mostly manual labour, with the care and the construction sectors being noteworthy exceptions.

Amsterdam's population is ageing rapidly, constraining future labour supply. Due to distinct differences in education levels between young graduates and older workers in Amsterdam, occupations that require medium levels of education will face pressure as older workers retire. Meeting the growing replacement demand in professions that require secondary vocational education will be one of the key challenges on Amsterdam's labour market in the years to come.

Removing barriers to full-time work could allow those who work part-time involuntarily to increase their working hours. More than 1 in 3 Dutch employees worked less than 30 hours a week in 2021, the highest incidence of part-time work in the OECD. In 2021, in the Netherlands and the North Holland region, 64% and 59% of all employed women worked part-time respectively, compared with 29% on average in the EU. The very low incidence of involuntary part-time work among both men and women indicates a general preference for reduced working hours. The option of part-time work played a strong role in increasing female labour force participation in the Netherlands in the past. However, the declining labour supply due to an ageing workforce requires putting in place additional incentives for employees to switch to full-time work. Additional efforts by the municipality of Amsterdam to increase the supply of childcare offers and thereby decrease net childcare costs is a promising policy lever.

Self-employment is common and on the rise in Amsterdam. In 2021, the self-employed made up 21% of total employment in the North Holland region, compared to 18% in the Netherlands and 15% on

average across the EU-27. Among these, 81% were own-account workers without any employees. Apart from the sometimes precarious forms of self-employment in the digital economy, the large share of own-account workers may impede productivity in Amsterdam in the long-term. Own-account workers often have few options to advance in their careers and participate in continuous education and training less frequently, which calls for additional adult learning targeted towards this group.

The green transition will affect North Holland's large transport sector but net employment effects remain uncertain. In the North Holland region, sectors that are likely to be negatively affected by the green transition account for 2.7% of total employment, the second highest share across all Dutch regions and above the OECD average of 2.2%. However, Amsterdam's large service sector in particular may experience new job creation, leaving large uncertainty around net employment effects.

Introduction

Across the OECD, megatrends such as the increasing digitalisation, the automation of production processes, ageing societies and the transition towards net-zero carbon emissions are transforming labour markets at a rapid pace. The local net welfare and employment effects of these trends vary across places due to differences in local industrial structures and the extent to which occupations are exposed to transformative forces (OECD, 2019[1]). However, it is clear that these trends will have a strong and lasting impact on Amsterdam's labour market, directly affecting the demand for specific skills and the way jobs are carried out. Other consequences may be indirect: for example, the rise of non-standard work, including the rising number of own-account workers, is closely linked to digitalisation and the emergence of online platforms that connect service providers.

The effects of these transformative forces are already visible and measurable. The COVID-19 pandemic has brought new attention to digitalisation and automation of processes. Companies and workers were forced to adapt to physical distancing rules. Teleworking and hybrid work have become more common, but the structural transformation accelerated by the pandemic goes beyond place-related work arrangements. Firms increasingly embrace technological change and look for innovative solutions to improve their resilience to global shocks. The way firms will operate in the future will therefore demand higher levels of digital proficiency and additional flexibility from workers.

Managing the transformation of labour markets requires local policymakers to gain a clear understanding of how the different megatrends affect the local workforce and develop appropriate policies in response. Job loss, skills gaps, skills mismatches, a strong polarisation into well-paying and precarious jobs, and eventually a decline in productivity growth are all potential negative consequences of the labour market transformation if the process is not managed well. On the other hand, well-targeted polices can help make the most of the transition and reap the benefits of new productivity-enhancing technologies. For example, if occupations most exposed to automation are identified early and affected workers can make use of re-training and up-skilling offers the occupational mobility can be enhanced and job loss can be avoided.

Against this backdrop, this chapter provides an overview of megatrends and their effect on Amsterdam. The chapter is structured as follows. It first gives an overview of trends in digital skills supply and demand in Amsterdam. It then turns to the exposure of Amsterdam to the automation of production processes. It then gives an overview of job polarisation trends and analyses educational mismatches on the Amsterdam labour market. The analysis then turns to Amsterdam's ageing society and its consequences. Finally, it sheds light on the rise of non-standard work across the Netherlands and the green transition respectively.

The demand for digital skills is rising across the Netherlands

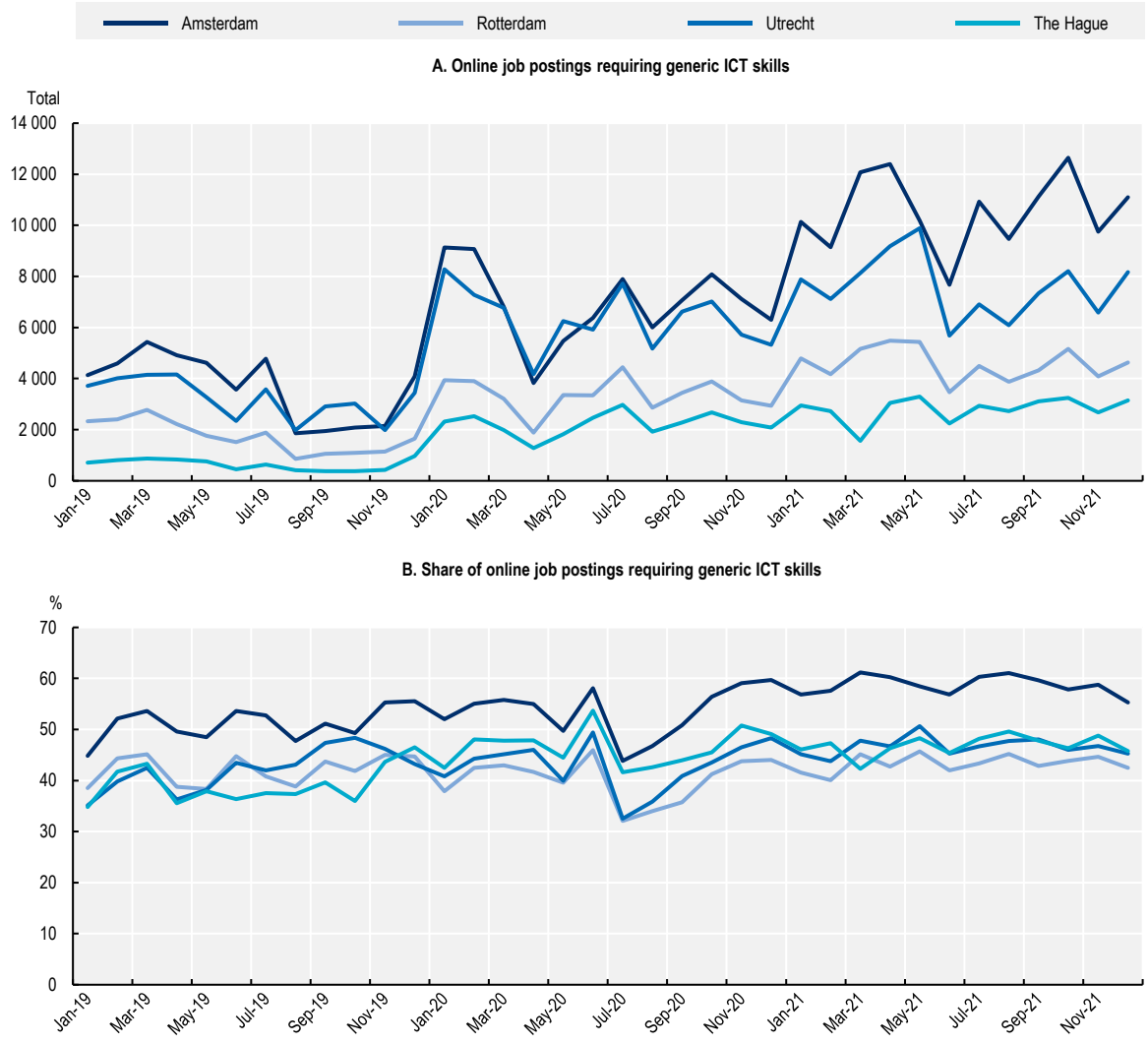
One of the major developments across OECD countries is the rising need for workers with digital skills. To succeed on the labour market, digital skills are essential for workers. They are needed to maximise opportunities, allow for efficient work in most jobs and are therefore crucial for ensuring productivity and growth. The COVID-19 pandemic is likely to interact with structural changes related to the increasing digitalisation. For example, the number of job postings requiring workers to be able to work from home has risen sharply during the pandemic, exemplifying that new jobs increasingly require basic or advanced digital skills and the ability to work in a technology-rich environment. It is therefore not surprising that digital skills are one of the major transversal skills, i.e. a skill that can be applied across a range of jobs and sectors (OECD, 2021[2]). At the same time, employers in many European countries report deficiencies in their employees' digital proficiency, prompting large-scale investments into digital education (European Commission, 2020[3]).

The demand for generic ICT skills in Amsterdam and other large Dutch cities has risen sharply over recent years. To assess the demand for digital skills in local economies, job task descriptions in online job postings can be analysed and digital skills requirements identified. Looking at the requirements of online job postings offers a timely alternative to measuring labour demand and the changing skills mix in Amsterdam's economy. For the purposes of this report, generic ICT skills refer to the performance of basic digital tasks such as the ability to use word processing software. In contrast, advanced ICT skills refer to tasks such as coding and programming. The methodology to categorise online job postings into generic and advanced ICT skills requirements is described in more detail in Box 3.1. While all G4 Dutch cities, Amsterdam, The Hague, Utrecht and Rotterdam, saw a rising demand for generic ICT skills during the COVID-19 pandemic, Figure 3.1 shows that the demand for generic ICT skills rose particularly fast in Amsterdam in both absolute (Panel A) and relative terms (Panel B). Online job postings by employers in Amsterdam that listed generic digital skills as a job requirement rose from around 4 000 in January 2019 to more than 11 000 in December 2021 (Panel A). When measured as a share of total online job postings, the percentage of online job postings requiring generic ICT skills rose from 45% to 56% over the same period, indicating that the majority of open positions in Amsterdam now require at least basic digital skills. By comparison, generic ICT skills were only required for 46%, 43% and 46% of all online job postings in The Hague, Rotterdam and Utrecht respectively in December 2021. The finding thus suggests that Amsterdam might be experiencing a faster transformation of its local economy than other places in the Netherlands.

The demand for advanced ICT skills also increased in Amsterdam, but the rise was proportionate to the general surge in job vacancies over recent years. Figure 3.2, Panel A, shows that the absolute number of online job postings requiring more advanced digital skills such as the use of coding and programming languages also rose across the G4 cities. Between January 2019 and December 2021, Amsterdam recorded an increase from around 2 300 to 5 600 online job postings that require advanced ICT skills. The other three G4 cities recorded smaller increases in absolute numbers. Panel B of Figure 3.2 shows that the rise in demand for advanced digital skills increased broadly in line with the general rise in local labour demand in all four cities. However, even in relative terms, advanced ICT skills are in high demand Amsterdam when compared to other G4 cities. In December 2021, 28% of all online job postings by Amsterdam's employers listed advanced ICT skills as a requirement, compared to 28%, 19% and 23% in The Hague, Rotterdam and Utrecht respectively.

Figure 3.1. The number of online job postings requiring basic ICT skills has risen sharply in Amsterdam over the past three years

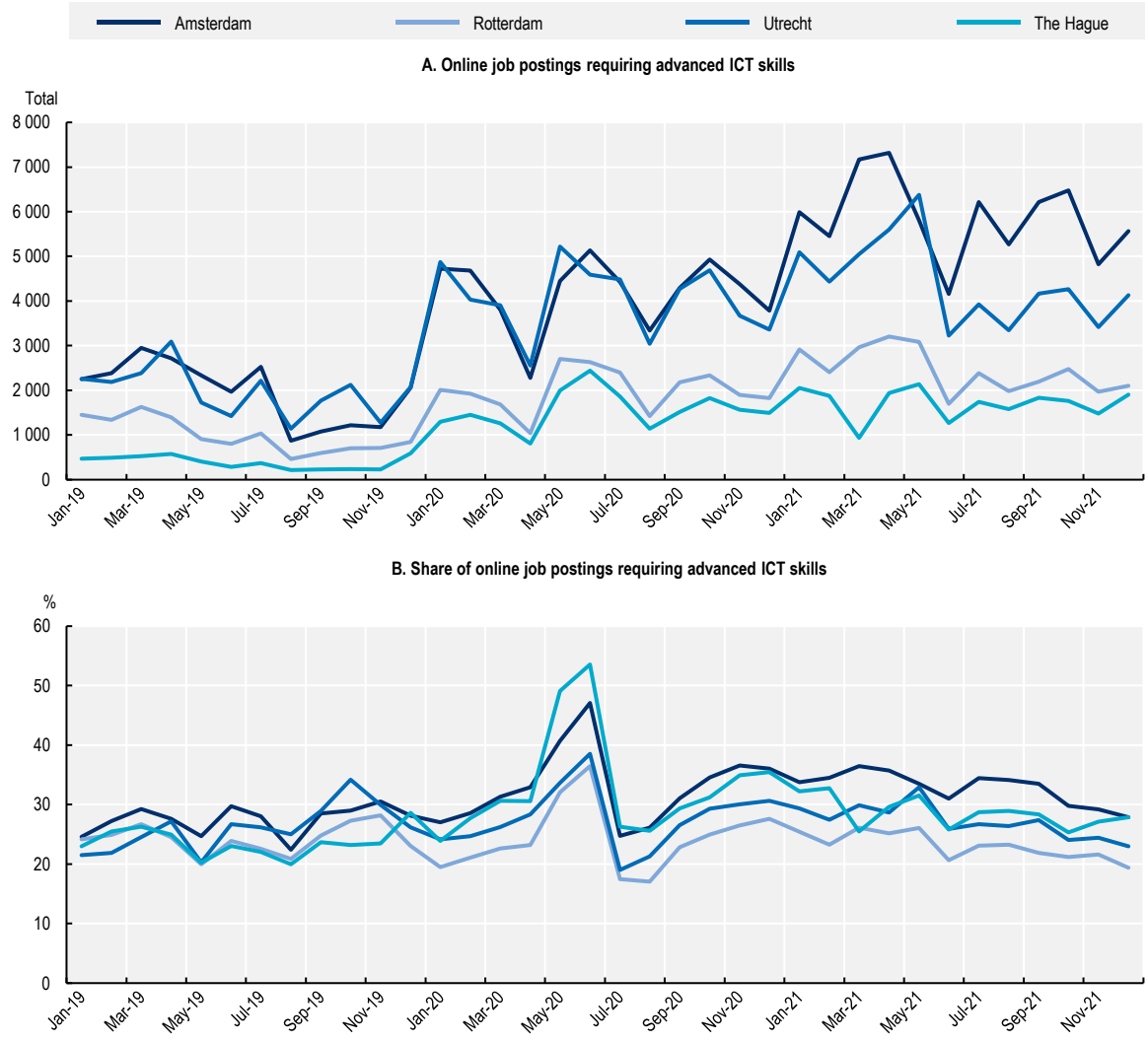
Total (Panel A) and relative (Panel B) number of online job vacancy postings indicating that the job requires at least generic ICT skills



Note: See Box 3.1 for more information the definition of generic ICT skills. Utrecht, Amsterdam, The Hague and Rotterdam refer to the TL3 region of Utrecht, Groot-Amsterdam, Agglomeratie 's-Gravenhage and Groot-Rijnmond respectively.
Source: OECD calculations based on Lightcast data.

Figure 3.2. The total number of online job postings requiring advanced ICT skills more than doubled in Amsterdam over the past three years, in line with the total number of job postings

Total and relative number of online job vacancy postings indicating that the job requires advanced ICT skills



Note: See Box 3.1 for more information on the definition of advanced ICT skills. Utrecht, Amsterdam, The Hague and Rotterdam refer to the TL3 region of Utrecht, Groot-Amsterdam, Agglomeratie 's-Gravenhage and Groot-Rijnmond respectively (see Chapter 2, Box 2.1).
Source: OECD calculations based on Lightcast data.

Box 3.1. Calculating ICT skills demand based on online job postings

The report uses online job postings data to calculate the total number and the share of job vacancies that require generic or advanced ICT skills. It makes use of Lightcast data to proxy local labour demand. Lightcast collects online job postings in many OECD countries. The data contain information on the posting's occupation, its detailed geography and other characteristics such as skills and educational requirements.

The methodology follows a three-step procedure laid out in detail in OECD (2022[4]).

- In a first step, the total number of unique monthly job postings is calculated by region.
- In a second step, the skill requirements listed in each job posting is used to calculate a dummy indicator of "generic" or "advanced" ICT skills for each job, in a procedure closely following previous OECD work on categorising these skills (Brüning and Mangeol, 2020[5]). The classification into generic and advanced skills is intuitive: Generic skills are simple ICT skills captured by key words such as "MS Excel" or "data". Advanced ICT skills are more specialised skills such as programming, coding and data analysis. These skills are captured by key words such as "algorithm" or "data mining" but also indirectly when knowledge of software such as "Python" or "Oracle" is mentioned in the posting. Jobs that require both generic and advanced ICT skills are classified as requiring advanced ICT skills, implicitly making the plausible assumption that generic skills would not suffice to carry out the job.
- In a final step, the total numbers of job postings that require generic or advanced ICT skills are summed up by region and divided by the total number of regional online job postings calculated in the first step.

One important caveat to using online job postings as a measure of labour demand is that job openings advertised online do not provide a full picture of employer demand. In general, occupations that require tertiary education tend to be overrepresented in online job postings whereas occupations that require secondary education and below may be underrepresented.

Source: Brüning and Mangeol (2020[5]), *What skills do employers seek in graduates? Using online job postings data to support policy and practice in higher education in OECD*, OECD Education Working Paper No. 231, https://doi.org/10.1787/19939019; OECD (2022[4]), *Future-Proofing Adult Learning in Berlin, Germany*, OECD Reviews on Local Job Creation, OECD Publishing Paris, https://doi.org/10.1787/fdf38f60-en.

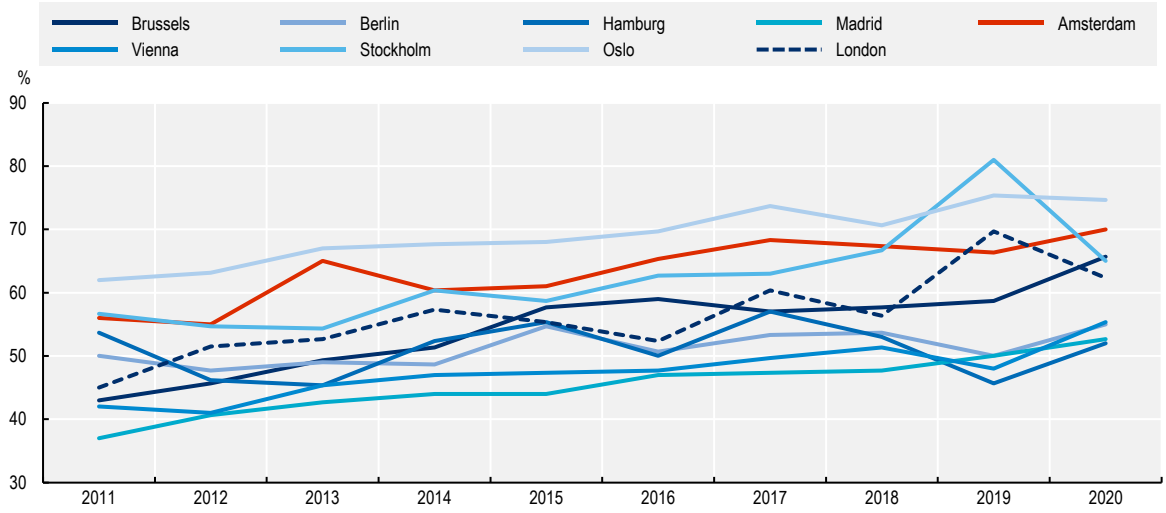
Recent survey evidence on computer, internet and software usage shows that the Dutch population ranks highest among European Union countries with respect to their digital proficiency. The EU survey on the use of information and communication technologies (ICT) in households and by individuals is the main data source that can be used to produce data on digital skills comparable across European countries. Survey respondents are asked questions on their activities in different digital domains. These domains include information and data literacy, communication and collaboration, problem solving, safety and digital content creation. Based on the complexity of activities individuals perform in each of these domains, respondents can be categorised into having basic digital skills and above basic digital skills. In the Netherlands, the share of individuals with basic or above basic digital skills stood at 79% in 2021, the highest percentage recorded across the European Union and well above the EU-27 average of 54%.[1]

Basic digital proficiency is high in Amsterdam compared to other European metropolitan areas. Comprehensive data on digital skills in Amsterdam's workforce similar to the national-level digital skills measure are missing. Ideally, an extensive survey of adult workers or firms could highlight the extent to which individuals have the necessary digital skills to succeed in the local economy. Alternative measures can provide an approximation. Figure 3.3 shows the share of internet users in Amsterdam who are able to perform basic tasks online. Between 2011 and 2020, this share rose from 56% to 70% in Amsterdam,

placing Amsterdam among the cities with the highest internet literacy in Europe in 2020, only slightly behind top performers such as Oslo.

Figure 3.3. The share of internet users able to perform basic tasks online in Amsterdam high in European comparison

Share of total internet users in Amsterdam performing basic tasks online, international comparison



Note: Performing basic tasks online calculated as the unweighted average of those who replied they used social networks, sold or bought goods online and used online banking over the past three months. The denominator are those who used the internet over the past three months, corresponding to 95% of Amsterdam's population. Year 2012 imputed as average of year 2011 and 2013 due to lack of available data. Amsterdam refers to the North Holland region. Other cities refer to their respective metropolitan area.
Source: OECD calculation based on Eurostat table isoc_r_iuse_i (Individuals who used the internet, frequency of use and activities).

The Dutch government has laid out a strategy to further advance digital skills in its population and labour force. In 2018, the Dutch government under the lead of the Dutch Ministry for Economic Affairs and Climate Policy (*Ministerie van Economische Zaken en Klimaat*) put together a comprehensive digitalisation strategy to further increase the level of digital skills in the Dutch population and its labour force. The *Dutch Digitalisation Strategy* aims to scale up digital capacities across all sectors in the economy. It also has a strong focus on segments of the population that have not yet developed digital proficiency. For example, new *Digital Government Information Points* assist those who are unable to perform administrative tasks online. A new lifelong learning action plan targets employees in SMEs to increase their participation in continuous education and training courses that can build digital and other skills needed on the labour market. The *Dutch Digitalisation Strategy* and the accompanying forward-looking *Outlook Digitalisation 2030* are described in more detail in Box 3.2.

Taken together, large parts of Amsterdam's labour force are well-prepared for the increasing digitalisation of work-related tasks, yet some labour shortages are still likely to persist in the ICT sector. The very high level of basic digital skills in the Dutch population is one of its biggest assets in international comparison. The increasing requirement for workers to possess basic digital skills to carry out tasks within the majority of occupations is therefore unlikely to present a bottleneck on Amsterdam's labour market. Additional government investment into the work force's digital proficiency will further support the upskilling needed in response to an increasing digitalisation. Municipalities could consider complementing these measures with targeted initiatives that aim to improve digital skills among the long-term unemployed and the economically inactive. In addition, as shown in chapter 2, labour demand in the

ICT sector, where the vacancy-to-jobseekers ratio is rising in Amsterdam, is likely to continue exceeding labour supply. Building the necessary advanced digital skills for work in the ICT sector should therefore remain a policy priority. The *Human Capital Agenda ICT* (HCA-ICT) that aims to link regional business communities and vocational education institutions to help education respond to local needs is a promising step (see Box 3.2).

Box 3.2. The Dutch Digitalisation Strategy and Outlook Digitalisation 2030

Dutch Digitalisation Strategy

In 2018, the Dutch State Secretary for Economic Affairs and Climate Policy, the Minister of Justice and Security, and the State Secretary for the Interior and Kingdom Relations presented the first version of the "Dutch Digitalisation Strategy". Since then, the Dutch Digitalisation Strategy has been updated annually to reflect on progress made, set new priorities and adjust the strategy accordingly.

The strategy centres on two main ideas: i) Scaling up digital capacities across all sectors of the Dutch economy; and ii) providing an institutional framework that enables digitalisation under consideration of privacy and security. Six priority areas have been identified: 1) Artificial intelligence, 2) data use and sharing, 3) inclusion, 4) connectivity, 5) resilience and 6) government.

Developing digital skills in the population and the labour force ties into all priority areas. The development of basic digital skills in the population targets those with limited digital skills. For instance, 93 "Digital Government Information Points" (*Informatiepunt Digitale Overheid*) were opened in public libraries to teach and assist those who struggle accessing digital government services. Further offers to build digital skills in vulnerable groups include the "Words count" programme (*Tel mee met Taal*) that targets functionally illiterate citizens.

The Dutch Digitalisation Strategy's main response to the need for basic digital skills in the workforce is a new lifelong learning action plan. Two priorities in the plan include the strengthening of the regional support structure to increase participation in adult learning and a focus on adult learning in small and medium-sized enterprises. For the former, a number of pilots have been launched in regional offices where the public employment service installed training and employment help desks. For the latter, the SLIM (*Stimuleringsregeling leren en ontwikkelen in mkb-ondernemingen*) subsidy scheme was introduced in 2020. It earmarks EUR 48 million in funds to promote a lifelong learning in SMEs.

Supporting the development of advanced digital skills is done through the Human Capital Agenda ICT (HCA-ICT). A key pillar of HCA-ICT is the strengthening of regional public-private partnerships. By 2021, four such partnerships between regional business communities and vocational education institutions had been formalised. Additional initiatives to increase the supply of advanced ICT professionals include the revamping of higher education curricula to include new technologies such as block chain and artificial intelligence.

Outlook Digitalisation 2030

In addition to the Dutch Digitalisation Strategy, the Dutch government also commissioned a study that looks into future technological trends that will shape society and labour markets until 2030. It is meant to complement the Dutch Digitalisation Strategy by anticipating trends in digitalisation that may play a pivotal role in the future. In relation to the labour market, these currently include autonomous artificial intelligence, digital assistance that support the work of humans and vulnerabilities of the digital transition in terms of cyber security and economic consequences of virtual warfare.

Source: Ministry of Economic Affairs and Climate Change (2021[6]), *The Dutch Digitalisation Strategy 2021; FreedomLab* (2021[7]), *Outlook Digitalisation 2030*.

Automation risks translate into relatively low labour demand in low-skill occupations

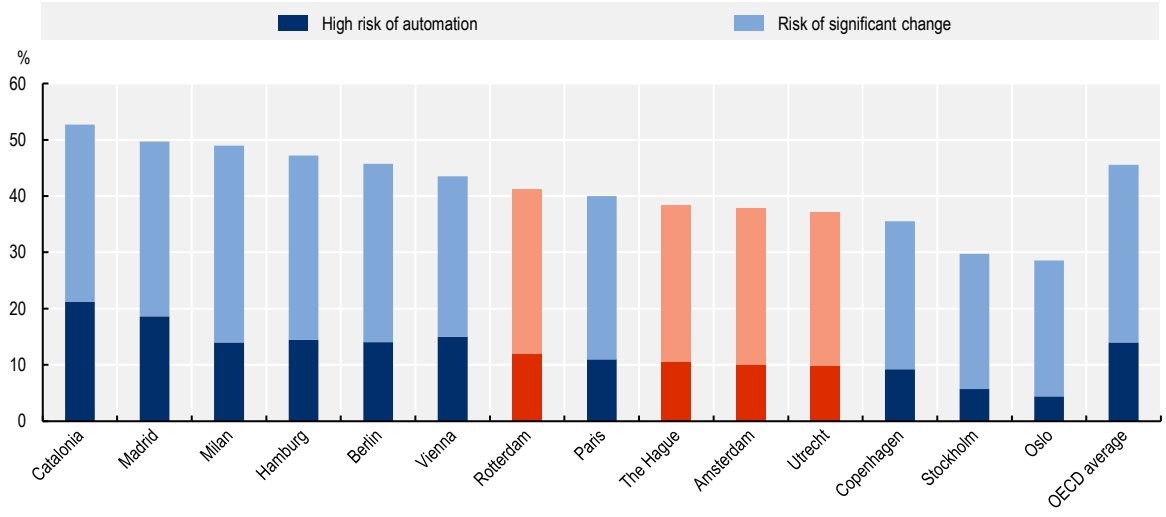
The increasing automation of production processes is causing a significant transformation of labour markets in OECD countries. The technological progress that allows for the automation of many production processes offers new opportunities and enhances productivity, thus raising aggregate prosperity and living standards across the OECD. However, absent policy measures that allow all workers to benefit from the potential of automation, the productivity-enhancing effect may come at the cost of creating winners and losers. Automating routine cognitive, routine and non-routine manual tasks tends to benefit some high-skill workers by increasing their marginal productivity but potentially replaces or strongly changes the jobs of some low-skill and middle-skill workers. Consequently, automation could aggravate existing socio-economic inequalities by widening the income gap between low-income and high-income segments of the population. In the future, the advancement of artificial intelligence (AI) may increasingly automate non-routine cognitive tasks and add more nuance to the effects of automation on labour markets: High-skill occupations such as lab technicians and engineers will be most exposed to the new wave of AI. AI will complement the work of many workers in these occupations, thereby increasing their marginal productivity and wages, and may replace the work of some who will be forced to adapt (Lane and Saint-Martin, 2021[8]). The automation estimates presented in this report are based on an expert assessment of the automatability of tasks carried out in 2013 and do not yet take future technological advancement in AI into account. Box 3.3 describes the methodology to estimate automation risk in more detail.

Across the OECD, about 46% of jobs face risks of automation. Jobs at risk of automation can be further distinguished into highly automatable jobs, i.e. jobs that face a probability of automation of over 70%, and jobs strongly affected by automation, i.e. jobs that are likely to see significant change in their tasks and the required skill sets for such tasks. Across the OECD, around 14% of jobs are highly automatable and another 32% of jobs face a significant risk of being strongly affected by automation. On average, automation tends to have smaller effects on metropolitan areas in the OECD due to their stronger focus on service-sector jobs (OECD, 2020[10]).

Amsterdam faces moderate automation risks compared to other OECD metropolitan areas. Figure 3.4 shows the share of employment at high risk of automation and the share of jobs at risk of significant change in Amsterdam compared to the other G4 cities in the Netherlands and in international comparison. In Amsterdam, 38% of all jobs faced risks of automation in 2020, 10% of all jobs were at high risk of automation, while 28% percent of all jobs in Amsterdam were likely to change significantly due to increasing automation in the same year. Amsterdam, Rotterdam, The Hague and Utrecht, compare favourably to most other OECD metropolitan areas. However, the share of jobs at risk of automation is still significantly higher than in large Scandinavian cities, such as Oslo or Stockholm, where only 29% and 30% of all jobs face risks of automation respectively.

Figure 3.4. The share of jobs at risk of automation in the big four cities is moderate compared to other OECD metropolitan areas

Percentage of jobs at significant and high risk of automation across the G4 cities in international comparison, 2020



Note: Data on The Hague, Utrecht, Rotterdam, Amsterdam and Eindhoven correspond to their respective labour market region. Other metropolitan regions shown correspond to TL2 regions. 'High risk of automation' refers to the share of workers featuring a risk of automation of 70% or above. 'Significant risk of change' reflects the share of workers with a risk of automation between 50% and 70%.
Source: OECD Calculations on EU-LFS and Census data.

Box 3.3. Estimating the share of jobs at risk of automation in OECD metropolitan areas

Frey and Osborne (2017[9]) (FO) estimate the number of occupations at high risk of automation in the United States using a two-step methodology. They conducted a workshop with a group of experts in machine learning, whom they provided with a list of 70 occupations and their corresponding O*NET task descriptions. Experts were asked "Can the tasks of this job be sufficiently specified, conditional on the availability of big data, to be performed by state-of-the-art computer-controlled equipment?". This allowed for the coding of each occupation as automatable or non-automatable. FO then used a machine learning algorithm to find out more about the links between the coding to automate and the list of O*NET variables. They were able to identify those variables (and their associated bottlenecks) with higher prediction power. High scores on these bottlenecks are likely to mean that an occupation is safe from automation. They could then compute a "probability of computerisation" for each occupation in the US, leading to the aggregate estimate that 47% of US jobs have a probability of automation of more than 70%.

Table 3.1. Automation bottlenecks

Computerisation bottleneck	O*NET variable
Perception and Manipulation	Finger dexterity Manual dexterity Cramped workspace; awkward positions
Creative intelligence	Originality Fine arts
Social intelligence	Social perceptiveness Negotiation Persuasion Assisting and caring for others

Note: Refer to Frey and Osborne (2017[9]) for further details on the definition of automation bottlenecks.
Source: Frey and Osborne (2017[9]), *The Future of Employment: How Susceptible are Jobs to Computerisation?*.

Building on this approach, Nedelkoska and Quintini (2018[11]) (NQ) calculate the risk of automation across 32 OECD countries. The approach is based on individual-level data from the OECD Survey of Adult Skills (PIAAC), providing information on the skills composition of each person's job and their skillset. While drawing on FO, this methodology presents four main differences: (i) training data in the NQ model is taken from Canada to exploit the country's large sample in PIAAC; (ii) O*NET occupational data for FO's 70 original occupations were manually recoded into the International Standard Classification of Occupations (ISCO); (iii) NQ uses a logistic regression compared to FO's Gaussian process classifier; (iv) NQ found equivalents in PIAAC to match FO's bottlenecks. PIAAC includes variables addressing the bottlenecks identified by FO, but no perfect match exists for each variable. No question in PIAAC could be identified to account for job elements related to "assisting and caring for others", related to occupations in health and social services. This implies that risks of automation based on NQ could be slightly overestimated.

Table 3.2. Automation bottlenecks correspondence

FO computerisation bottleneck	PIAAC variable
Perception and Manipulation	Finger dexterity
Creative intelligence	Problem solving (simple) Problem solving (complex)

Social intelligence	Teaching Advising Planning for others Communication Negotiation Influence Sales

Note: Refer to Nedelkoska and Quintini (2018[11]) for further details on the definition of the PIAAC variables.
Source: Nedelkoska and Quintini (2018[11]).

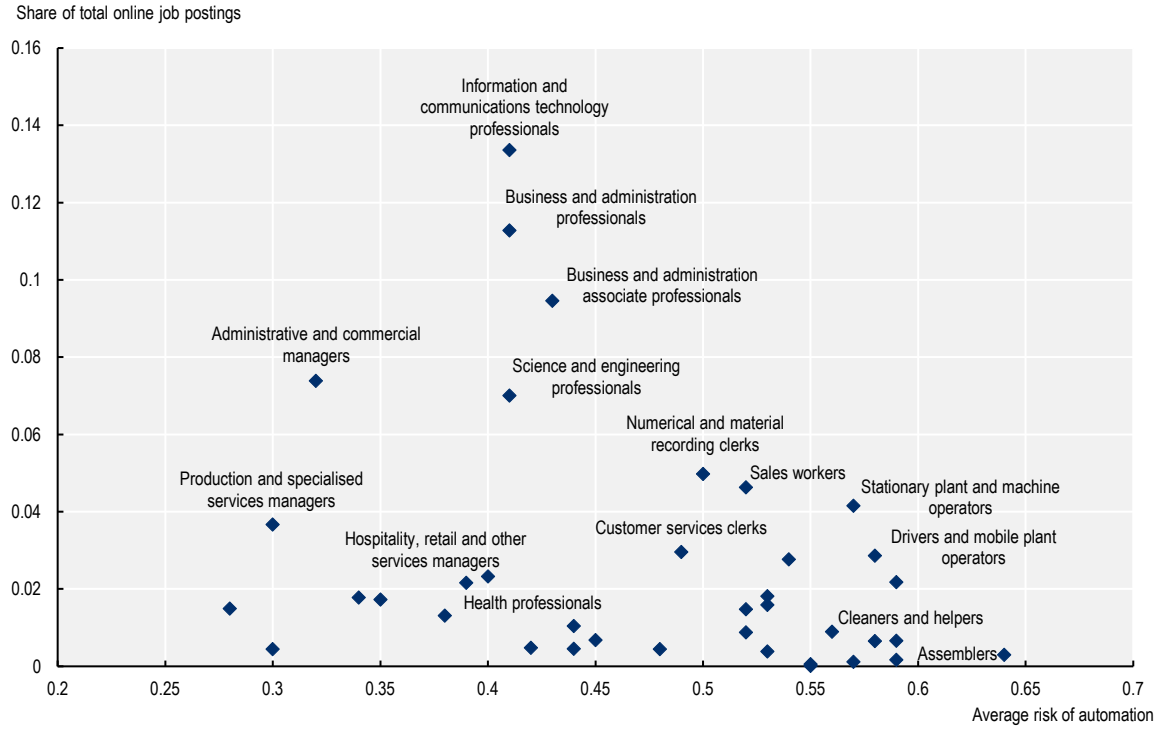
Recent studies have pointed out the difficulty in predicting the risk of automation, as different models and variables come into play. Frey and Osborne's original examination of the impact of automation on jobs was focused on machine learning and mobile robotics, but these are not the only technological developments likely to impact the future of skills. Other researchers have identified the rise of various forms of telepresence and virtual/augmented/mixed forms of reality, as well as the expansion of digital platforms as trends that will have important impacts on the future. The inherent unpredictability of technological progress means that within the growing literature, estimates of the jobs at risk of automation can vary widely, and the timeframes within which these impacts are predicted to occur are similarly broad, ranging from 10 to 50 years. Both the shape disruption will take, and its extent, are uncertain. What is certain is that workers will need to learn new skills and develop new competencies to adapt to changes are on their way (Crawford Urban and Johal, 2020[12]).

Source: Crawford Urban and Johal (2020[12]), *Understanding the Future of Skills: Trends and Global Policy*, ISBN: 9781988886787; Nedelkoska and Quintini (2018[11]), *Automation, Skills Use and Training*, OECD Social, Employment and Migration Working Papers, No. 202, https://doi.org/10.1787/2e2f4eea-en; OECD (2020[13]), *Preparing for the Future of Work in Canada*, OECD Reviews on Local Job Creation, OECD Publishing, Paris, https://doi.org/10.1787/05c1b185-en.

Labour demand in Amsterdam is highest in occupations that do not face high risks of automation. Figure 3.5 shows that there is a negative association between the share in total online job postings by occupation in Amsterdam and the average risk of automation by occupation. In 2021, the largest share of online job postings targeted ICT professionals, followed by business and administration professionals, administrative and commercial managers and science and engineering professionals. All these jobs face a probability of automation of less than 50%, meaning that they are unlikely to be affected significantly by new technology. On the other hand, demand for jobs that mostly require carrying out routine and non-routine manual tasks is relatively low. This includes demand for cleaners and helpers, and assemblers. While these labour demand patterns partly reflect the traditional sectoral composition of Amsterdam's economy and do not consider the supply side of the labour market, they give an indication of increasing difficulties for low-skill workers to find employment. One caveat applies to the analysis presented here: Some professions do not typically hire workers through online job ads. For instance, relatively few construction workers are hired through online platforms. As shown in chapter 2, the demand in the construction sector in Amsterdam exceeds the supply of workers, a mismatch that is not accurately reflected when capturing labour demand by online job vacancies.

Figure 3.5. Labour demand in Amsterdam is highest in occupations that do not face a high risk of automation

Share in total online job postings in Amsterdam by occupation in 2021 and average risk of automation



Note: Amsterdam refers to the TL3 region of Groot-Amsterdam. See Box 3.3 for details on the definition of automation risks. Occupations refer to 2-digit ISCO-08 occupations.
Source: OECD calculations based on Lightcast data and EU-LFS data.

Job polarisation characterises Dutch labour markets

The automation of production processes led to a skills-biased technological change that drives a labour market polarisation across the OECD. Even before the COVID-19 pandemic started, most OECD economies experienced dramatic shifts on their labour markets. This is particularly noticeable in large cities, which tend to be at the forefront of labour market transformations. Across OECD metropolitan areas, labour markets are increasingly polarising into high-skill jobs, which include managers, professionals and technicians and low-skill jobs, which include elementary occupations, service workers, and shop and market sales workers. In contrast, middle-skill jobs (i.e. clerks, craft and related trades workers, machine operators and assemblers) are rapidly disappearing in many places. In recent years, job polarisation has been determined primarily by a shift towards high-skill occupations in most OECD countries (OECD, 2019[1]).

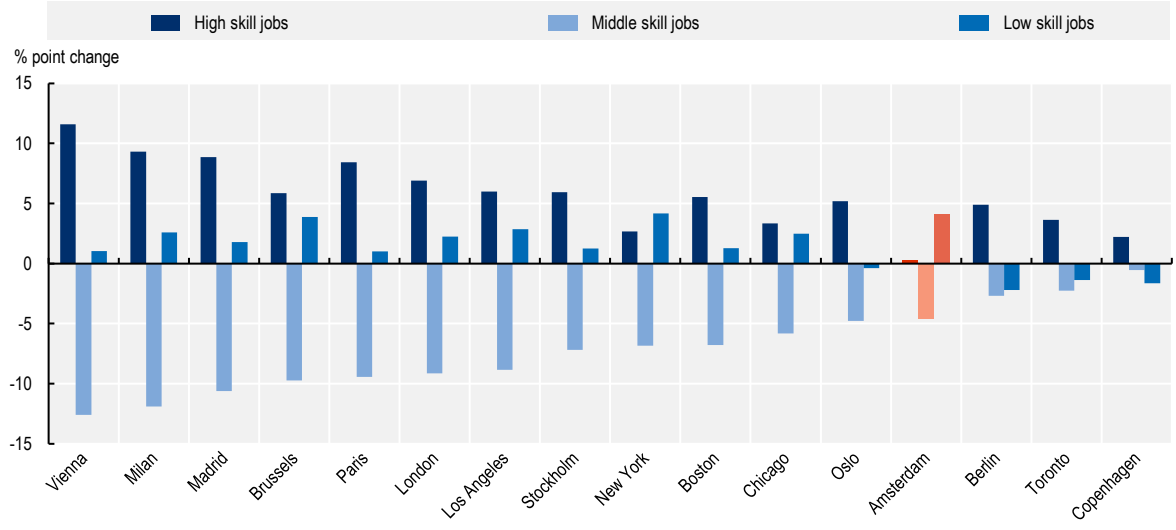
Job polarisation also creates new societal challenges by pushing some medium-educated workers into lower parts of the income distribution. Middle-skill jobs were historically associated with a middle-class lifestyle and socio-economic mobility for future generations. The shift in the skills distribution on the labour market towards higher-skill jobs and the faster growth in high-skill occupations than in middle and low-skill occupations has changed the relationship between skills and income classes. Middle-skill workers are now more likely to be in low-income classes than middle-income classes (OECD, 2019[14]). These

dynamics also affect the wage distribution across the OECD, with the divide between top and bottom earners increasingly widening.

Amsterdam's labour market has been characterised by high-skill employment for decades, but polarisation has slowed down over recent years. In 2003, 20% of all jobs in Amsterdam fell into the low-skill category, 20% were medium-skill jobs and 58% were high-skill jobs (Figure 3.7, panel A).[2] Figure 3.6 shows that until 2018, middle-skill employment in Amsterdam declined by an additional 4.6 percentage points, while high-skill and low-skill employment rose by 0.3 and 4.1 percentage points respectively. Labour markets of other OECD metropolitan areas underwent more extreme changes since 2000. For example, the share of middle-skill jobs in Vienna declined by 11.6 percentage points between 2000 and 2018. In Vienna, these middle-skill jobs were almost exclusively replaced by high-skill jobs. A similar picture emerges when trends in job polarisation in Amsterdam are compared to the other G4 cities and Eindhoven in panel B of Figure 3.7. While middle-skill jobs are increasingly disappearing across Dutch cities, this trend has been more salient in The Hague (-8.7 percentage points between 2003 and 2020), Utrecht (-8.0 percentage points) and Rotterdam (-6.9 percentage points) than in Amsterdam (-5.2 percentage points). However, these trends disguise differences in current levels of job polarisation which are still driven by the initially observed differences in polarisation. In 2020, only Utrecht's labour market was more polarised than Amsterdam's regarding its job distribution by skills categories.

Figure 3.6. Job polarisation has slowed down in Amsterdam compared to other OCED metropolitan areas

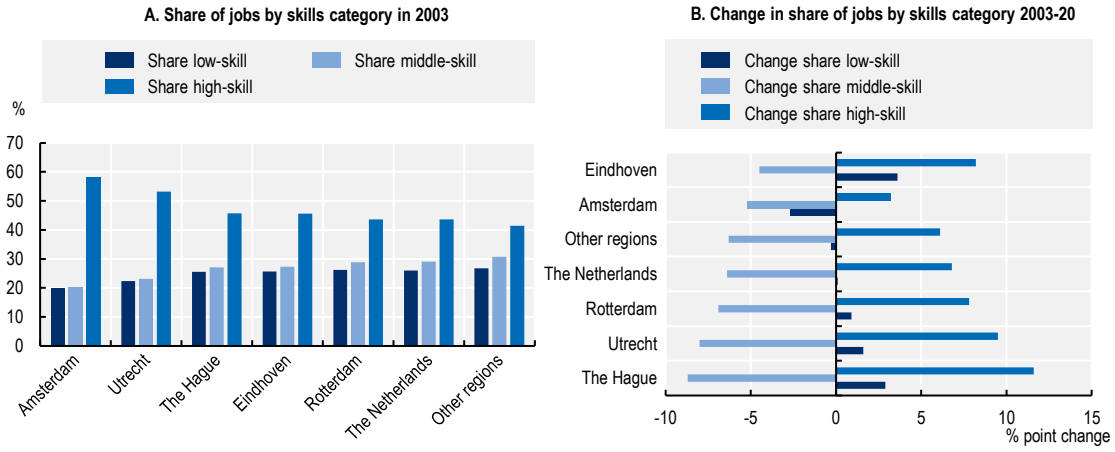
Change in the share of employment for high skill, middle skill and low skill jobs in OECD cities, 2000-18



Note: The data correspond to the TL2 regions that compose the respective metropolitan area for all cities but Amsterdam. For Amsterdam, the data corresponds to the TL3 region of Groot-Amsterdam. For Groot-Amsterdam, the baseline year is 2003 as data for 2000 was not available.
Source: OECD and Municipality of Amsterdam calculations based on EU-LFS data and the Dutch labour force survey.

Figure 3.7. Other Dutch cities experienced a sharper rise in job polarisation than Amsterdam

Level (2003) and change (2003-2020) in the share of employment for high-skill, middle-skill and low-skill jobs in Dutch cities



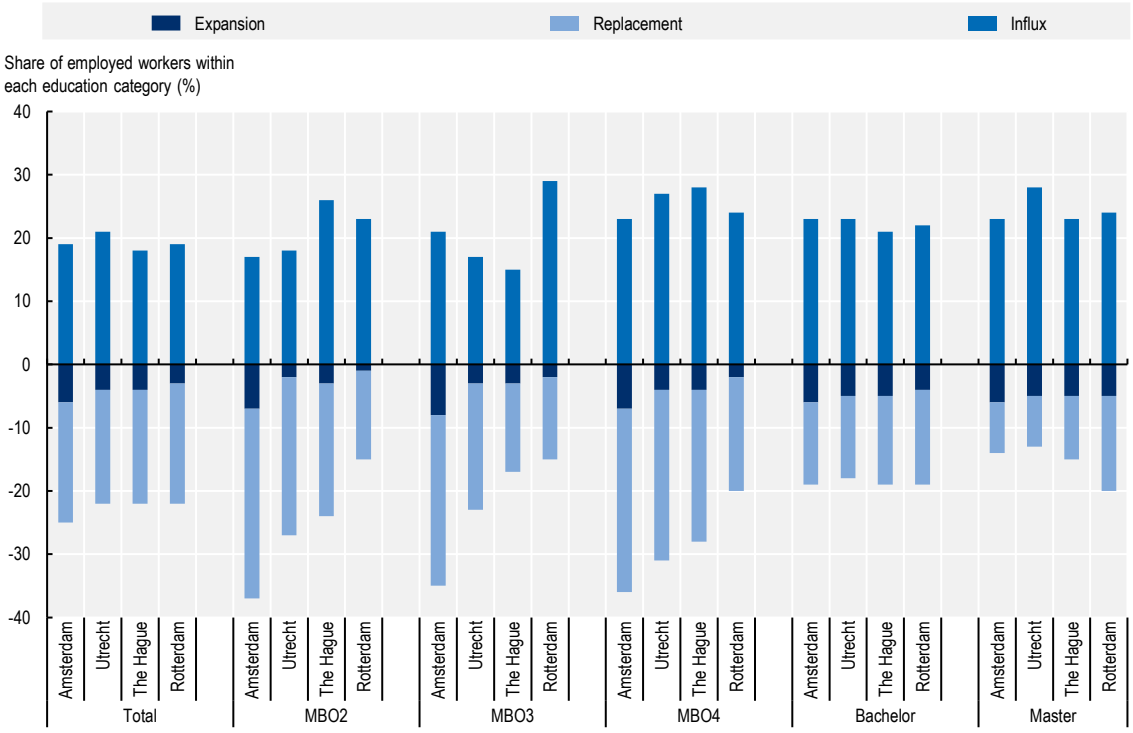
Note: Data on The Hague, Utrecht, Rotterdam, Amsterdam and Eindhoven correspond to their respective TL3 region. "Other regions" refers to all other Dutch COROP regions combined.
Source: OECD and Municipality of Amsterdam calculations based on the Dutch labour force survey.

Despite the decline in the relative number of middle-skill jobs, medium-level educated workers will be in demand in Amsterdam in the future. Labour market forecasts can be informative of future trends in labour demand and labour supply. The medium-term labour market projections by the *Researchcentrum voor Onderwijs en Arbeidsmarkt* ("Research Centre for Education and the Labour Market", ROA) forecasts labour demand and labour supply six years into the future. Its results are relied on widely by employers, graduates and policymakers in the Netherlands. The forecast contrasts projected replacement needs caused by expected outflows of workers, for instance due to retirement or occupational mobility, and additional labour demand caused by economic expansion with the projected influx of workers. The ROA forecast disaggregates these projections by different education categories, occupations, economic sectors and regions. Its main mechanics and limitations are discussed in more detail in Box 3.4. Figure 3.8 shows the projections for the G4 cities on aggregate and disaggregated by education categories. In Amsterdam, the forecast shows that the projected replacement and expansion demand outweighs the projected influx of new workers in employment in the secondary vocational education categories, MBO2, MBO3 and MBO4.[3] This trend is more salient than in the other G4 cities.

Replacement needs due to retirement are the main reason for a potential future shortage of medium-skill workers in Amsterdam. While some limitations apply to the extent to which labour market forecast can be used for manpower planning purposes (see Box 3.4), these forecasts reflect deeper trends in Amsterdam's workforce. In the North Holland region, only 29% of the local population aged 25 to 34 was educated at a medium level in 2021, compared to 37% among 55 to 64 year olds. In absolute terms, 113 000 of the 25 to 34 year olds residing in Amsterdam held degrees corresponding to a medium level of education, compared to 145 400 among 55 to 64 year olds.[4]

Figure 3.8. In Amsterdam, many medium-level educated workers will be needed over the coming years

Labour force projections until 2026 by education category in major labour market regions



Note: Expansion refers to the share of new employees needed due to growing employment. Replacement refers to the share of employees that need to be replaced due to retirement, for health reasons or education mobility. Influx is the expected share of new employees that will enter the labour market. City names refer to the respective labour market regions.
Source: Researchcentrum voor Onderwijs en Arbeidsmarkt (*Research Centre for Education and the Labour Market*).

Box 3.4. Labour market forecasting by the Research Centre for Education and the Labour Market at Maastricht University

The most frequently relied on labour market forecast in the Netherlands is developed by the *Researchcentrum voor Onderwijs en Arbeidsmarkt* ("Research Centre for Education and the Labour Market", ROA) at Maastricht University. Every year, ROA publishes its medium-term labour market forecast that provides an estimate of future labour market developments by labour market region, 21 economic sectors, 113 occupational groups, and 101 types of education six years into the future.

The forecasting model considers future developments in labour demand and labour supply and contrasts these. On the demand side of the labour market, "expansion demand" and "replacement demand" determine future needs. Expansion demand refers to expected job creation due to economic growth that translates into employment growth. Replacement demand refers to demand resulting from the outflow of workers, for instance due to retirement of occupational mobility. On the supply side of the labour market, future *influx* into the labour force consist of graduates and workers who switch between occupations or education types (if additional education is expected to be completed during the forecasting period). Labour supply also includes workers who are short-term or frictionally unemployed at the beginning of the forecasting period.

It is important to note that some caveats apply to these types of labour market forecasts. First, by design, forecasting models cannot incorporate unexpected shocks. While in addition to the baseline scenario, alternative scenarios are modelled and estimated, severe unexpected shocks such as the COVID-19 pandemic cannot be considered. Second, labour market forecasting can only be used for manpower planning purposes to a limited extend, a limitation clearly communicated by ROA. While sectoral linkages and substitution demand are modelled, labour market adjustment and responses by workers and employers cannot be fully incorporated into the forecast. In the long term, rising wages in professions that experience shortages restore the labour market equilibrium. Graduates of specific education categories are likely to move into different jobs if there is excess supply. Similarly, employers may react to labour shortages in specific occupations by hiring substitutes.

Despite these caveats, labour market forecasting models can nevertheless provide important insights into potential future bottlenecks on the labour market and inform policies related to education and occupational mobility.

Source: OECD summary based on Bakens et al. (2021[15]), *Methodiek arbeidsmarktprognoses en –indicatoren 2021-2026,* ROA Technical Report 006, Maastricht University, Research Centre for Education and the Labour Market (ROA)*;* Bakens, Fourage and Peters (2018[16]), *Labour market forecasts by education and occupation up to 2022,* ROA Technical Report 003, Maastricht University, Research Centre for Education and the Labour Market (ROA).

Educational mismatch of workers is not as widespread in Amsterdam as in other Dutch and OECD cities

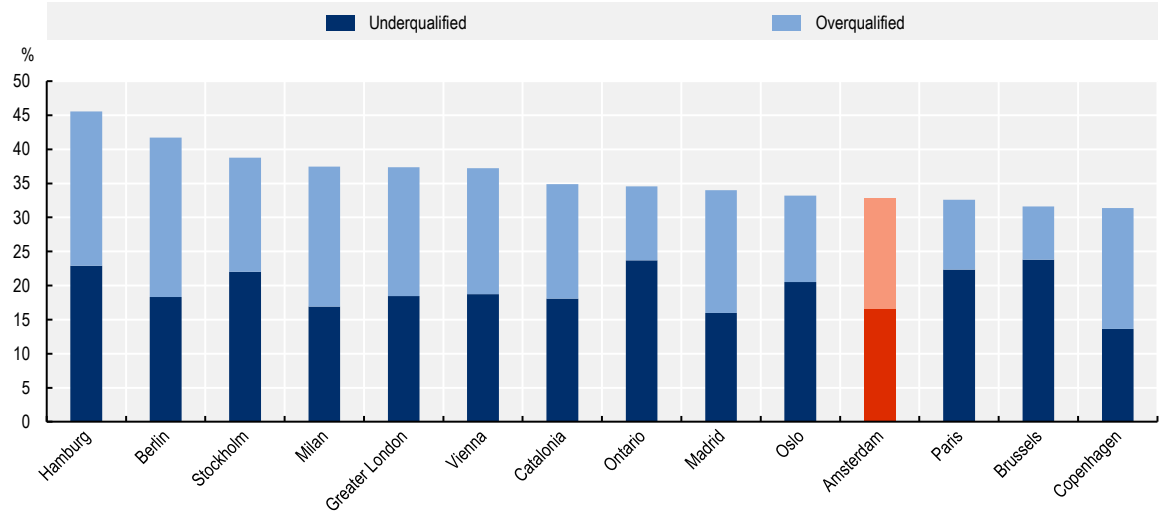
The matching of workers to jobs in which they can use their skills in the best possible way is a vital element of functioning labour markets. To the contrary, mismatches between workers' skills and the requirements of their jobs can have negative effects, ranging from lower job satisfaction, wages, and labour productivity to unused potential of human capital (OECD, 2018[17]). Mismatch by qualification is one type of such skills mismatches. It arises when workers' educational attainment is above (overqualification) or below (underqualification) the level usually required by the tasks of their job. To some extent, mismatches by education can be linked to the polarisation of local labour markets. As middle-skill jobs are disappearing

workers may be moving into occupations for which they are formally overeducated or undereducated. Such dynamism on the labour market is not necessarily a cause for concern and adult learning – that often does not lead to the attainment of a formal degree – may accelerate such occupational mobility. However, overqualification and underqualification by education can also be caused by labour shortages or structural factors, such as when migrants' degrees attained in other countries are not acknowledged, which may force them to take up low-skill employment (Ludolph, 2021[18]).

Around one-third of workers in Amsterdam were mismatched by their level of education in 2020, a relatively low share compared to other OECD metropolitan areas. Skills mismatches by formal qualification are not as widespread in Amsterdam as in other OECD metropolitan areas such as Hamburg, where they reach up to 45% as shown in Figure 3.9. 1 in 6 workers in Amsterdam have a job for which they are formally overqualified. Another 17% appear to be underqualified for their job, meaning they do not have the formal education normally expected to fill out their position. Figure 3.10 shows that a similar emerges when Amsterdam is compared to the other G4 cities and Eindhoven. For example, in Rotterdam, the mismatch by formal educational attainment reaches 37%, driven mostly by a larger share of workers that is formally underqualified for their work (23%).

Figure 3.9. Around 33% of workers in Amsterdam are mismatched by level of qualification

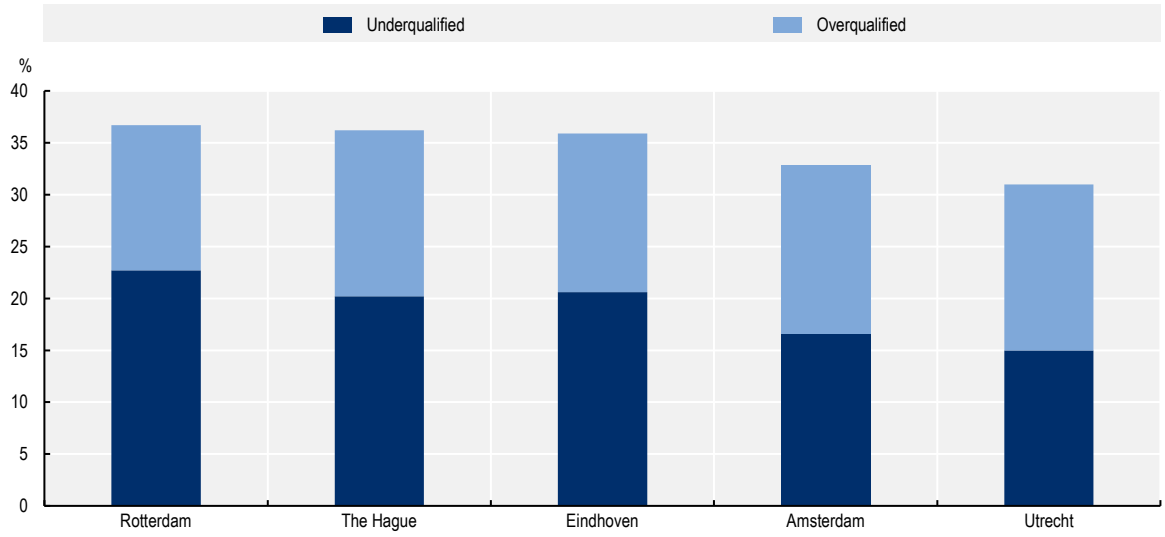
Percentage of workers across OECD metropolitans that do not match their educational attainment, 2020



Note: ISCED groups 0-2, 3, 4, 5-8. For Canada, ISCED groups 0-2, 3, 4, 5-6. ISCED groups 302, 303 and 304 are considered to be 3 according to the newest 2011 ISCED classification. Data for Greater London and Ontario is for 2018. All cities refer to their corresponding TL2 region. A person is considered underqualified if their educational attainment is below the modal education level of their respective 3-digit ISCO-08 occupation in the survey year. A person is considered overqualified if their educational attainment is above the modal education level of their respective 3-digit ISCO-08 occupation in the survey year.
Source: OECD calculations on European Labour Force Survey and Statistics Canada.

Figure 3.10. Mismatch by education is low in Amsterdam compared to other Dutch cities

Percentage of workers across Dutch cities occupying jobs that do not match their educational attainment, 2020



Note: Data on The Hague, Utrecht, Rotterdam, Amsterdam and Eindhoven correspond to their respective labour market region. Only workers aged 15 to 75 are considered.
Source: OECD and Municipality of Amsterdam calculations based the Dutch labour force survey.

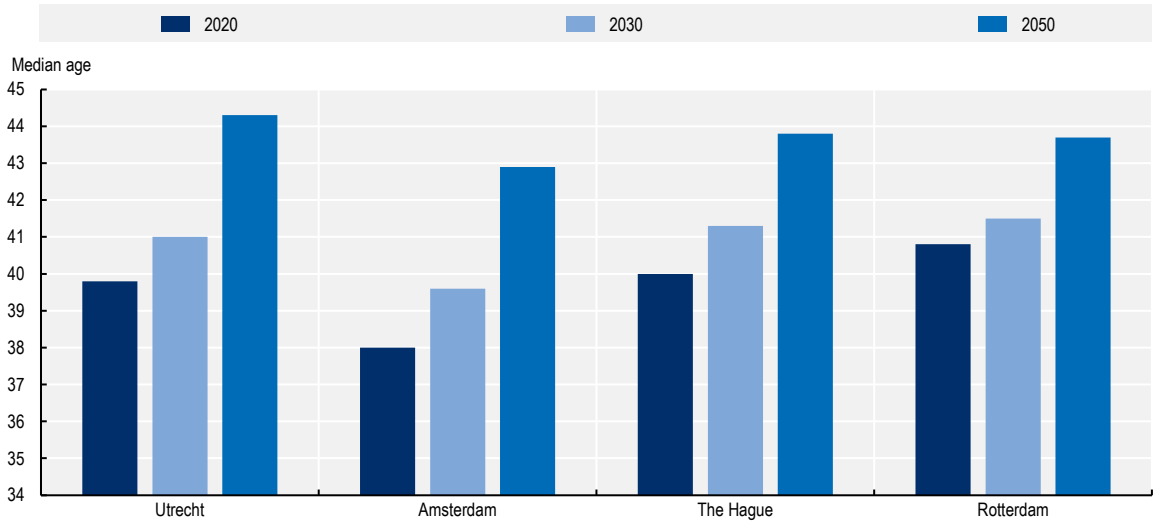
The labour force is ageing rapidly in Amsterdam and other Dutch regions

Ageing labour forces bring about new labour market challenges across the OECD. Across the OECD, the ratio of people aged 65 and over to people of working age is projected to rise from 1 in 4 in 2018 to 2 in 5 in 2050 (OECD, 2019[19]). Ensuring that older workers remain part of the labour force has therefore become a key priority across OECD countries. Acknowledging the challenges that come with retaining older workers on the labour market while ensuring a decent quality of work and life has led to an *OECD Council Recommendation on Ageing and Employment* based on three core pillars: (i) reward work and later retirement, (ii) promote employability throughout working lives and (iii) encourage employers to retain and hire older workers. Across OECD countries, much progress has been made on the first two pillars, but less so on the third. Older workers are often considered more expensive by employers and concerns related to their productivity may lead to age-related discrimination (OECD, 2019[19]). Comparing the labour force participation rate of older workers to that of prime-aged workers can therefore be informative of obstacles older workers face on the labour market.

The median age in Amsterdam is expected to rise by five years until 2050, with severe implications for the local old-age dependency ratio. Figure 3.11 shows that Amsterdam's population is ageing rapidly. The median age will rise gradually, from 38 in 2020 to 40 in 2030 and then to 43 in 2050. Figure 3.12 shows that by 2050, the ratio of individuals aged 15 to 64 to those aged 65 will be 2.75:1, up from 4.65:1 in 2020. Thus, by 2050, there will be fewer than three people of working age for every person aged above 65. The other G4 cities are on a similar ageing trajectory. Apart from the implications for the sustainability of the Dutch pension system, these changes in demographics could severely constrain labour supply, with negative consequences for employers' ability to fill vacancies and ultimately a loss in economic prosperity. It is therefore essential to retain older workers in the workforce.

Figure 3.11. The median age will rise rapidly all across the Netherlands

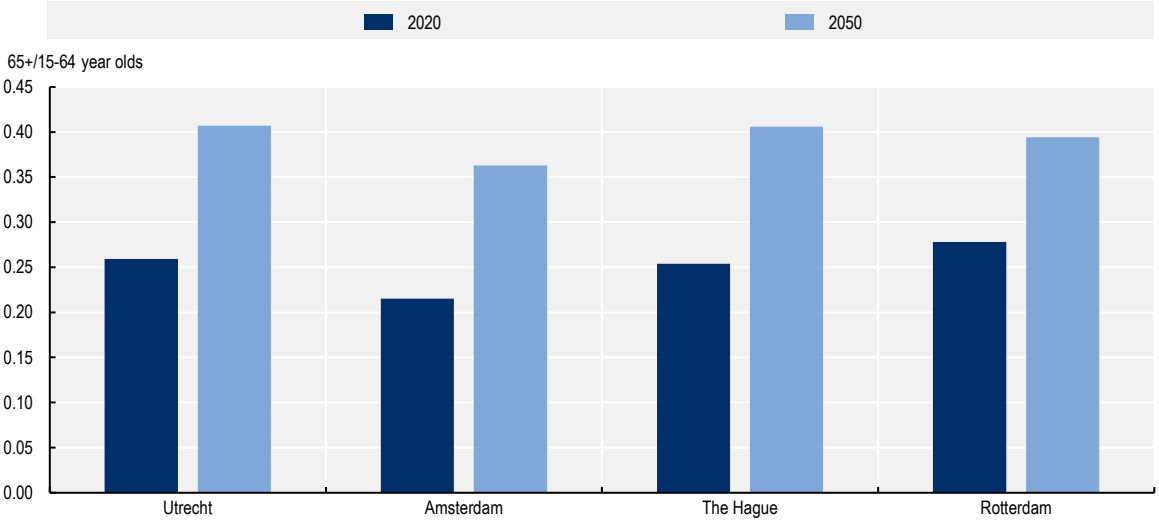
Median age by selected COROP regions, 2020, 2030 (projection) and 2050 (projection)



Note: 2030 and 2050 are projections. Utrecht, Amsterdam, The Hague and Rotterdam refer to the TL3 region of Utrecht, Groot-Amsterdam, Agglomeratie 's-Gravenhage and Groot-Rijnmond respectively.
Source: Eurostat table PROJ_19RDBI3 (Demographic balances and indicators by type of projection and NUTS 3 region).

Figure 3.12. By 2050, there will be fewer than three persons of working age for every individual aged above 65 in all of the G4 cities

Old-age dependency ratios



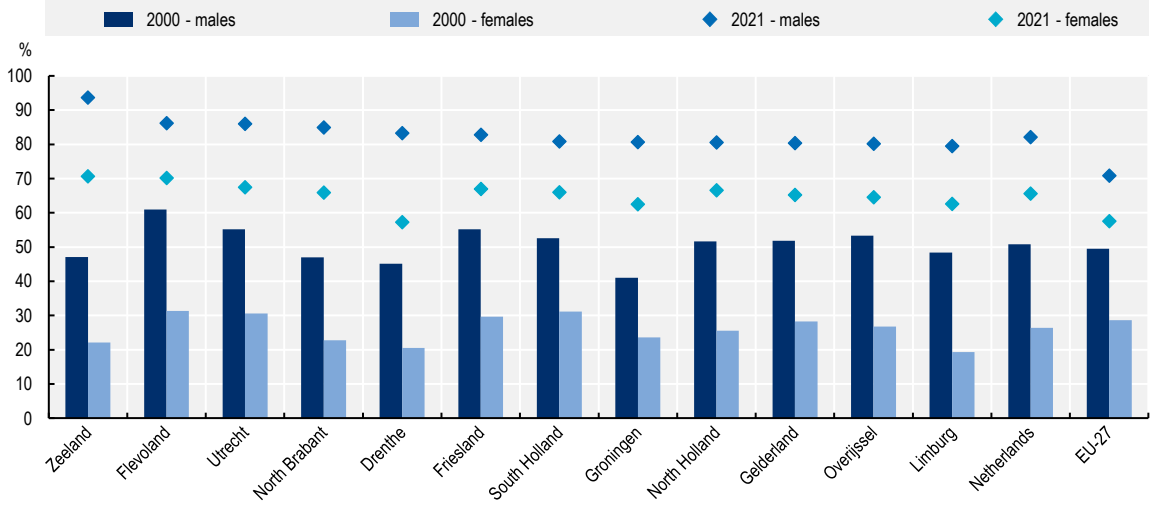
Note: Old-age dependency ratio defined as the population aged 65 or over divided by the population aged 15 to 64. 2050 values are projections. Utrecht, Amsterdam, The Hague and Rotterdam refer to the TL3 region of Utrecht, Groot-Amsterdam, Agglomeratie 's-Gravenhage and Groot-Rijnmond respectively.
Source: Eurostat table PROJ_19RDBI3 (Demographic balances and indicators by type of projection and NUTS 3 region).

Labour force participation among workers aged 55 to 64 in the North Holland region has risen sharply since 2000 and now is well above the European average for both men and women.

Figure 3.13 shows that the labour force participation rate among older workers aged 55 to 64 increased in all Dutch regions over the past two decades. In North Holland, it rose from 26% to 67% and from 52% to 81% for females and males respectively. While this rise is largely in line with changes in economic activity among older workers in the Netherlands, other European countries did not make such improvements in the retention of older workers. In the EU-27, female labour force participation increased from 29% in 2002 to 58% in 2021. Male labour force participation rose from 50% to 71% over the same period. In 2021, labour force participation of women aged 55 to 64 in North Holland was therefore 19 percentage points lower than economic activity rate among 25 to 54 year old workers, while the same gap stood at 11 percentage points for men. The larger activity gap between the two female age groups can be explained by a cohort effect. Female economic activity is still rising within all age groups, such that future cohorts of female old-age workers are more likely to remain economically active.

Figure 3.13. Economic activity has risen sharply among older people in all Dutch provinces

Labour force participation rate in the population aged 55 to 64 in 2000 and 2021, males and females



Note: The EU-27 average for 2000 is based on 2002 data as earlier data was not available.
Source: Eurostat table lfst_r_lfp2actrtn (Activity rates by sex, age, educational attainment level, country of birth and NUTS 2 regions).

Labour force participation of workers aged 65 and above has also increased across the Netherlands, but economic activity of old-age workers in the North Holland region remains below that of some other OECD metropolitan areas. The current normal retirement age of 66.3 in the Netherlands is among the highest across OECD countries. The pension age will further increase gradually to 67 until 2024. While it is not possible to defer the basic old-age pension in the Netherlands, it is possible to combine the receipt of pension benefits with a working activity (OECD, 2021[20]). Not many workers in the Netherlands make use of this option. In 2021, the labour force participation of workers aged above 65 stood at 10% in both the North Holland region and the Netherlands as a whole. This is above the EU-27 average of 6% but well below the economic activity rate of old-age workers in OECD metropolitan areas such as Stockholm (19% in 2021), Prague (14% in 2021) or Zurich (12% in 2021).[5]

In response to the growing need to reduce early retirement, municipalities can support local initiatives to retain senior workers and extend healthy working lives. For example, Oslo Airport's successful Life Phase Policy combined awareness raising for senior employees to participate in life-long

learning, promoting flexible working hours for workers above 62 and workplace health promotion (Box 3.5). While directly relevant to the metropolitan areas of Amsterdam which hosts the Amsterdam Airport Schiphol in the municipality of Haarlemmermeer, one of the key lessons from Oslo Airport's Life Phase Policy was that similar strategies to retain older workers can easily be applied in companies of any size.

Box 3.5. Retaining older workers in the workforce at Oslo Airport

Oslo Airport (OSL) employs 500 workers. In 2009, OSL acknowledged the need to promote healthier and longer working lives. In response, OSL developed an initiative called the "Life Phase Policy" with an initial target to increase the average retirement age at OSL by six months until 2012. By the end of the project, results exceeded expectations and the average retirement age had increased by three years, from 63 to 66.

The initiative consisted of several programmes targeting senior workers at OSL:

- **Ageing and life-phase human resource (HR) training programme***:* A training programme designed to teach managers was developed jointly with the University of Stavanger to teach managers the challenges senior workers face at the workplace.
- **Workplace health promotion***:* All employees aged above 50 were offered health checks and professional health-related guidance at the workplace free of charge.
- **Awareness-raising events for adult learning targeted at senior workers***:* Seminars for workers over 50 raised awareness of skills development measures available to older workers.
- **Flexible working hours***:* Employees aged above 62 were allowed to switch to part-time work and take additional time of.
- **Job relocation and retraining***:* Instead of categorising workers as having a disability, workers who faced physical constraints due to their age could participate in training that would prepare them for less physically demanding work within a different role at OSL.

Source: European Agency for Safety and Health at Work (2016[22]), *Oslo Airport's Life Phase Policy: Norway,* https://osha.europa.eu/en/publications/norway-oslo-airports-life-phase-policy (last accessed 09/11/2022); OECD (2020[23]), *Promoting an Age-Inclusive Workforce,* OECD Publishing, Paris, https://doi.org/10.1787/59752153-en.

Non-standard work: temporary work, part-time work and self-employment are salient features of Dutch labour markets

Labour markets across the OECD have undergone a gradual transition away from traditional open-ended contracts. Non-standard forms of work includes temporary, part-time, or self-employed work. This definition therefore covers a range of categories that include both precarious and non-precarious work and is discussed in more detail in Box 3.6. Changing consumer preferences and new technological developments are two important factors explaining the increase in non-standard work forms. In response, many firms have shifted their supply chain management towards just-in-time delivery and customised services. New technologies such as online platforms that connect service providers with workers have also led to an increase of non-standard work and the outsourcing of tasks, in particular in the hiring of temporary help or freelance contractors.

Non-standard work changes local labour markets and has advantages and disadvantages. For some workers, the increase in options of short-term work opportunities may ease the entry into the labour market. Thus, non-standard work can encourage labour force participation among those who would otherwise have stayed economically inactive. For instance, part-time work opportunities have been linked

to an increase in labour force participation among Dutch women by allowing them to combine professional with personal responsibilities (Bosch, van Ours and van der Klaauw, 2009[23]). In some instances, non-standard work forms may also facilitate school-to-work transitions for young people who would otherwise struggle to find their way into the labour market. However, for others, it may worsen their working conditions in terms of reduced job security, higher income volatility, and slower career progression (OECD, 2018[17]).

Box 3.6. Defining non-standard work

This report adopts the simplest OECD definition of a non-standard work (NSW) arrangement (OECD, 2015[25]): It defines all employment as NSW that it is not full-time dependent employment with a contract of indefinite duration. This includes:

- **Temporary work**, defined as workers in fixed-term contracts, including casual employees (duration is not fixed, but hours can vary), and seasonal workers;
- **Part-time work**, defined as people in employment who usually work less than 30 hours per week in their main job in OECD statistics made comparable across OECD countries and defined as people in employment who usually work less than 35 hours per week in their main job in Dutch statistics (OECD, 2021[26]);
- **Self-employment**, which includes both own-account workers and self-employed with employees, unless these categories are explicitly distinguished.

One shortcoming of the proposed definition is that, if non-standard work is treated as an aggregate category, no distinction is made between precarious and non-precarious forms of work. For this reason, the report does not aggregate the three forms of NSW but reports statistics on temporary work, part-time work and self-employment separately.

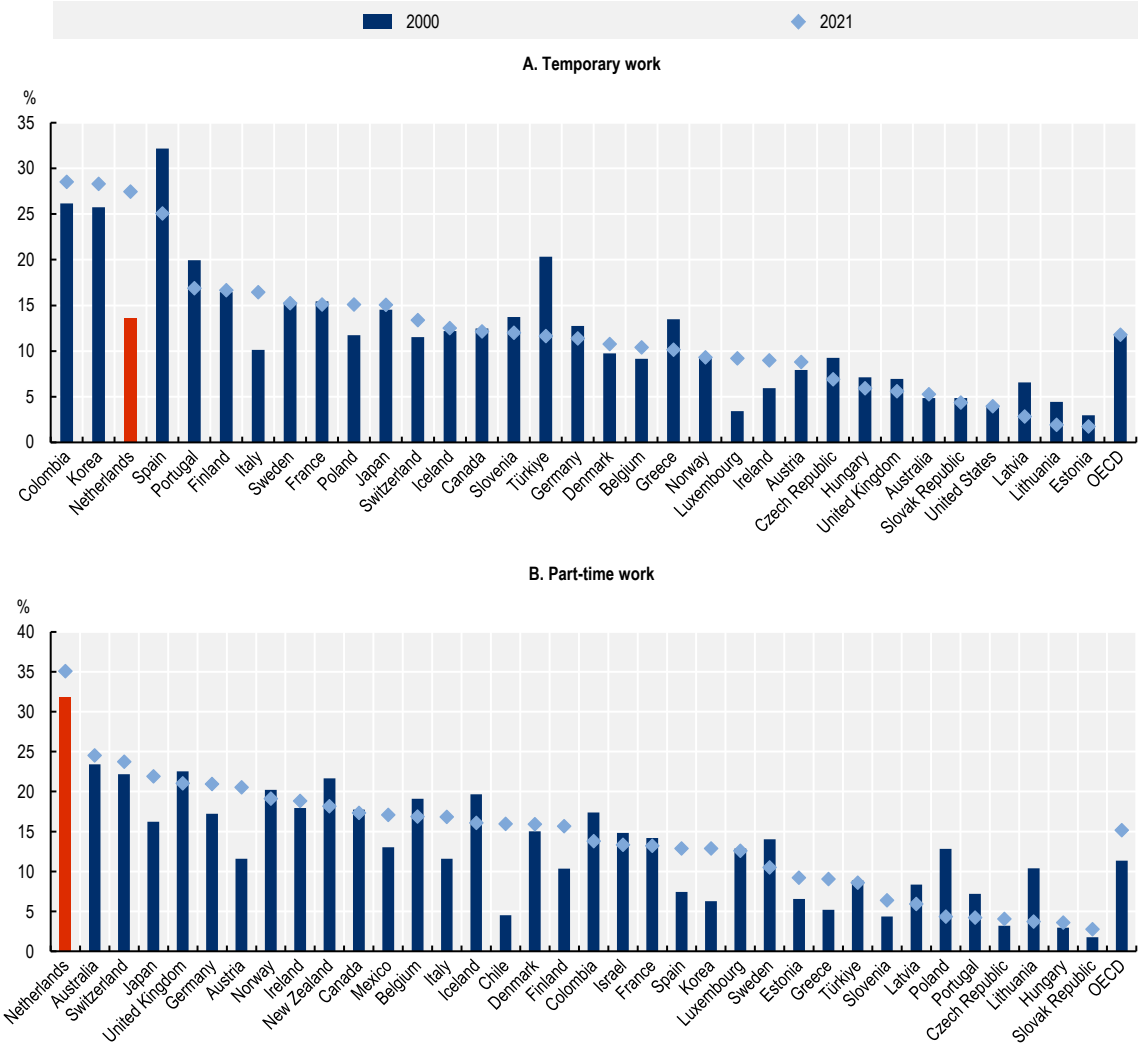
An additional challenge lies in the fact that the distinction between different forms of employment has become increasingly ambiguous. For example, there is a growing grey area between self-employment and wage employment. The growing numbers of own-account workers who only have one client – often a large company – operate in between these two categories (OECD, 2015[25]). This ambiguity is at the heart of the current debate on the benefits and downsides of the gig economy.

Source: OECD (2015[25]), *Non-standard work, job polarisation and inequality,* OECD Publishing, Paris, https://doi.org/10.1787/9789264235120-en; OECD (2021[26]), *Labour Force Statistics in OECD Countries: Sources, coverage and definitions,* https://www.oecd.org/els/emp/LFS%20Definitions%20-%20Tables.pdf (last accessed 09/11/2022).

In 2021, the Netherlands had the third highest share of workers on temporary contracts and the highest share of part-time workers in the OECD. Figure 3.15 shows that temporary contracts have become much more widespread in the Netherlands since 2000 (Panel A). The share of workers on fixed-term contracts rose sharply over the past two decades, from 14% in 2000 to 27% in 2021. Across the OECD, the share of workers on temporary contracts stayed constant at around 12% over the same period. Thus, while the share of workers on temporary contracts in the Netherlands was close to the OECD average in 2000, it rose to a level significantly above the OECD average by 2021. Across the OECD, only Colombia and Korea saw a larger share of their workforce working on fixed-term contracts. Part-time work incidence in the Netherlands was already the highest across all OECD countries in 2000 and subsequently rose only marginally from 32% to 35% in 2021. Thus, more than 1 in 3 Dutch employees now work less than 30 hours a week.

Figure 3.14. Non-standard employment is common in the Netherlands compared to other OECD countries

Share of temporary and part-time work, 15-64 year olds



Note: 2000 or earliest data available. 2021 or latest data available. To make part-time work incidence comparable across OECD countries, a common definition is applied. Part-time employment is defined as people in employment who usually work less than 30 hours per week in their main job. The part-time work incidence reported here may therefore be lower than national definitions that define part-time work as anyone working less than the national definition of the number of hours worked in a full-time job. See also the note of Figure 3.15.

Source: OECD (2022), "Labour Market Statistics: Employment by permanency of the job & Full-time and part-time employment – common definition: incidence", OECD Employment and Labour Market Statistics (database).

Improving the conditions for non-standard work, and in particular those of workers on temporary contracts, has recently gained traction in the Netherlands. The Dutch labour market offers a high level of protection to regular workers but little protection to temporary workers. The "Commission for Work Regulation" (*Commissie Regulering van Werk* or "Borstlap Commission") – further discussed in chapter 4 – gave three main recommendations in response to the large labour market duality. First, regular employment contracts should be made more flexible in terms of job requirements and hours worked to give employers margins to respond to changes in demand. Second, incentives should be reduced to hire workers on temporary contract. This includes new requirements for employers to prove that self-employed workers are actually self-employed, a phasing out of tax deductions for the permanent self-employed, the introduction of a minimum disability insurance coverage for all workers and the introduction of a higher

minimum wage for workers on temporary contracts to compensate for the additional risk. Third, all workers, regardless of contract type, should have better access to continuous training and education (OECD, 2021[27]).

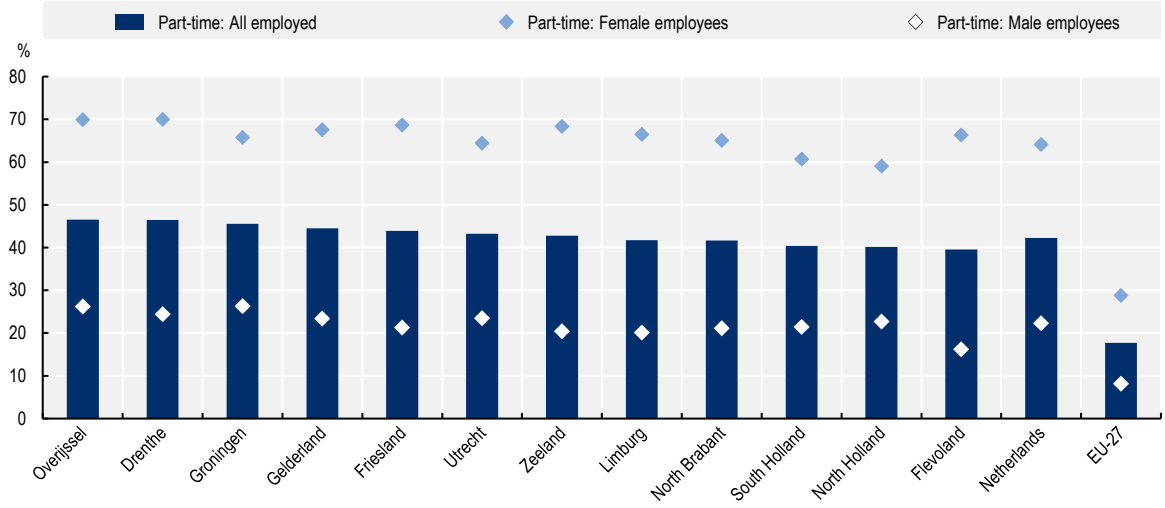
The share of employees working part-time in the Netherlands is the highest across the OECD

One of the striking features of the Dutch labour market is the high share of employees working part-time across all regions. Figure 3.15 shows that in the Netherlands, 42% of all employed workers worked part-time in 2021. Among men, the share of part-time workers stood at 22% and 23% in the Netherlands and the North-Holland region respectively, compared to 8% on average in the EU-27. Among women, 64% worked part-time in 2021. While part-time work among women is high across all Dutch regions, some regional variation exists. In North-Holland, 59% of employed women work part-time, the lowest share in the Netherlands, compared to 70% of employed women in Overijssel. However, part-time work incidence among women in all Dutch regions lies significantly above the EU-27 average, which stood at 29% in 2021.

Despite the very high share of part-time work among Dutch employees, few state that working part-time is involuntary. Part-time work can be involuntary if, for example, it is due to a lack of availability of full-time job opportunities or if a lack of care services force caregivers to cut down on working hours. In 2021, only 3% of Dutch women and 5% of Dutch men aged 15 to 64 who worked in a part-time job reported that their part-time employment was involuntary.[6] In the EU, 30% of all part-time employed reported to be working part-time involuntarily. This indicates that in the Netherlands, there is a large cultural component to working part-time that translates into reduced working hours. However, it is not clear if those who state that their part-time work is voluntary do so conditional on the institutional barriers that are currently in place. Institutions such as parental leave arrangements, access to high-quality flexible childcare and after school care could still provide a partial explanation for the very high share of part-time employment if, for instance, caregiver responsibilities prevent full-time employment (OECD, 2021[27]). In 2021, 413 200 part-time workers aged 20 to 64 indicated they would like to work additional hours.[7] In Groot-Amsterdam, 4 000 part-time workers stated they would be willing to work full-time and available to do so (UWV, 2022[28]).

Figure 3.15. About 2 in 3 women work part-time in the Netherlands, with little regional variation

Percentage of 15-64 year old employees working part-time in 2021



Note: Part-time work incidence defined as people in employment who usually work less than 35 hours per week in their main job, see OECD (2021[26]).
Source: OECD calculations based on Eurostat table lfst_r_lfe2eftpt (Employment by sex, age, full-time/part-time, professional status and NUTS 2 regions (1 000)).

The option of part-time work has significantly increased labour force participation among women in the Netherlands over the past decades. In the early 1980s, economic inactivity rates of working-age women in the Netherlands were among the highest in the OECD. Over the next two decades, labour force participation among Dutch women rose fast, an effect that can be attributed to new options of working part-time. However, unlike in Scandinavian countries, where this initial rise in female employment driven by part-time work was followed by a gradual transition of women from part-time to full-time work, part-time work remained a salient feature of women's employment in the Netherlands (Bosch, van Ours and van der Klaauw, 2009[23]).

Part-time workers earn significantly lower annual income and get promoted less often than full-time employees. While part-time work may allow some women to reconcile work with family responsibilities, it has repercussions for career trajectories. On average, workers in part-time employment in the Netherlands worked around 18.2 hours a week in 2017, compared to 39.4 hours worked among those in full-time employment. Average annual gross earnings of a part-time single worker with no children who works 20 hours per week in the Netherlands stood at 34% of a single full-time employee with not children (Harding, Paturot and Simon, 2022[28]). Part-time workers in the Netherlands are also less likely to get promoted, even after differences in job and worker characteristics are accounted for (Russo and Hassink, 2008[30]).

In the past, the Dutch government tried to increase working hours among women through tax incentives, increasing female economic activity but not hours worked. In 2001, the Dutch government passed a tax reform that reduced the cost for women with high-income partners to enter the labour market. Prior to the reform, progressive income taxation and the option to transfer unused tax allowances between partners discouraged female labour force participation. The reason was that tax allowances had to be applied to women's own income if it exceeded EUR 4 000 annually. Transferring tax allowances to partners who could apply these to a higher marginal tax rate instead of working was therefore attractive to women with high-income partners (Bosch and van der Klaauw, 2012[31]). When this general tax allowance was replaced by tax credits, i.e. a reduction in tax that was independent of the marginal tax rate, female labour force participation increased by an estimated 3.5 percentage points. The 2001 reform also included a direct reduction in the marginal tax rate. However, working women slightly decreased their hours worked in response to the lower marginal tax rate, such that the combined effect of the reform was an increase in average weekly hours worked among females of only 0.4 hours (Bosch, van Ours and van der Klaauw, 2009[24]).

Policies to decrease the relatively high net childcare costs in the Netherlands and efforts to expand paternity leave are potential levers to increase female full-time employment. Net childcare costs in the Netherlands are relatively high compared to other OECD countries. In in the Netherlands, a couple with two children aged 2 and 3 earning wages corresponding to the national average paid 15% of their total household income on childcare in 2021, once all benefits are considered. This compares to 9% on average in the OECD and as little as 1% in countries such as Germany (OECD, 2022[32]). As a consequence, Dutch children spend relatively little time in childcare. For instance, OECD research shows that children below the age of 3 only spent 16 hours a week in early childhood education and care in 2016, compared to above 30 hours on average in 23 OECD countries that were analysed (OECD, 2019[33]). The recent increase in central government funding to municipalities for these to improve childcare services and the planned gradual increase in spending to cover childcare costs by the central government could incentivise both men and women to work full-time instead of taking on caregiver duties at home. Current efforts to increase paternity leave would allow Dutch men to take on more childcare responsibilities which could also have a positive impact on female full-time employment (IMF, 2021[34]).

There is some regional variation across Dutch regions in childcare costs due to market forces. In some OECD countries such as the Netherlands, Ireland and the United Kingdom, childcare is mostly provided by private providers. When childcare costs are determined by local demand and supply by private providers, these systems can show strong regional variation in childcare fees. OECD (2022[31]) research

shows that average childcare costs charged to parents for centre-based childcare in North Holland were approximately 5% above regions such as Midden-Noord-Brabant and approximately 3% above the country average in 2018.

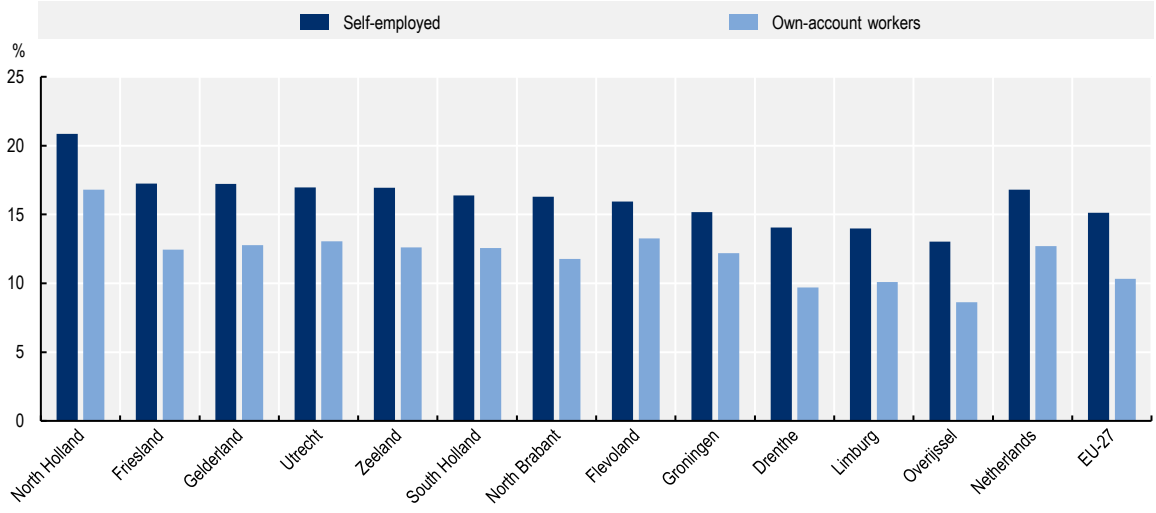
A large share of workers in the North Holland region are self-employed

Another dimension of non-standard work is self-employment, which is high and increasing fast in the North Holland region. Self-employment in the Netherlands is on a par with the EU average but the share of self-employed and own-account workers in North Holland is significantly higher than in other Dutch regions as shown on Figure 3.16. In 2021, the share of self-employment in total employment stood at 18% in the Netherlands, compared with 15% on average across EU-27 countries. Among the self-employed, 76% were registered as own-account workers in 2021, compared with 68% in EU-27 countries. In the North-Holland region, these numbers are significantly higher. In 2021, the self-employed made up 21% of total employment. Among these, 81% were own-account workers.

In its input to a government initiated Independent Commission on the Regulation of Work, the OECD (2019[36]) **establishes that the high level of non-standard work in the Netherlands is driven by institutional factors.** Taxation differences between employees and own-account workers allows workers to have a higher take-home pay, for instance because tax rates are lower, and some social contributions are not payable for own account workers. The Netherlands has the largest payment wedge between employees and self-employed individuals among OECD countries for which data is available.[8]

Figure 3.16. Self-employment in the North Holland region is significantly above the Dutch average

Self-employed and own-account workers as a share of total employment in 2021, 15-64 year olds



Note: The term "own-account worker" refers to self-employed workers without any employees. The bar "self-employed" includes own-account workers.
Source: OECD calculations based on Eurostat table lfst_r_lfe2estat (Employment by sex, age, professional status and NUTS 2 regions (1 000)).

In 2000, the share of self-employment in total employment was much lower in North Holland and then started rising steadily over the past two decades. Self-employment as a share of total employment in the North Holland region stood at 13% in 2000, compared to 10% in the whole of the Netherlands and well below the EU-27 average of 18%. Since then, self-employment has risen fast in Amsterdam and its surrounding area. One factor that contributed to the rise of self-employment in Amsterdam in particular is

the emergence of the digital economy. Some self-employed workers in the digital economy have been able to benefit from new markets and opportunities by finding high-value added work as independent professionals or freelancers. However, for others, self-employment in the digital economy takes on precarious forms, as some work for a single client that is effectively their employer, without having the benefits of a formal employer-employee relationship including social security or work regulation that protects employees (OECD, 2018[17]).

In the Netherlands, young self-employed workers in particular are less likely to participate in formal and informal adult learning. Table 3.3 shows the difference between participation in formal and/or non-formal learning between (i) self-employed and regularly employed (columns 1 and 2) and (ii) part-time employed and full-time employed (columns 3 and 4). On average, self-employed aged 20 to 39 are 11.0 percentage points less likely to participate in adult learning compared to those in regular employment (column 1). Even when conditioning this estimated difference on sex, educational attainment and occupation, it remains large at 10.2 percentage points. Column 2 shows that self-employed workers aged 40 to 64 participate approximately as often in adult learning as regular employees. Only minor differences exist in adult learning participation between part-time workers and full-time employees in the Netherlands, even when those part-time workers are excluded who explicitly state to be working part-time to pursue further education or training. Column 4 shows that older part-time workers tend to participate marginally less in adult learning compared to full-time employees in the same age bracket, at least when differences in sex, education and occupations are accounted for.

Table 3.3. Young self-employed in the Netherlands were significantly less likely to participate in adult learning in 2020 compared to those in regular jobs

Estimated probability of individuals' participation in formal and/or non-formal learning by age and professional status

	(1) Self-employed, aged 20 to 39	(2) Self-employed, aged 40 to 64	(3) Part-time workers, aged 20 to 39	(4) Part-time workers, aged 40 to 64
Unconditional difference: Probability of participation in adult learning	-11.0*** percentage points	- 0.0 percentage points	-0.9 percentage points	+0.0 percentage points
Conditional difference: Probability of participation in adult learning	-10.2*** percentage points	-0.1** percentage points	-1.1 percentage points	-2.1*** percentage points

Note: Self-employed are compared to all regular employees of the same age group. Part-time workers are compared to full-time workers of the same age group. All coefficients estimated by a linear probability model. Individuals are asked if they participated in formal and/or non-formal learning over the four weeks prior to being interviewed. Conditional difference refers to estimates conditional on sex, education (low/medium/high) and 1-digit ISCO-08 occupations. Estimates on part-time work exclude individuals who stated that they work part-time to pursue additional education and training. The asterisk next to the reported estimates indicate whether estimates are significantly different from zero at conventional confidence levels, where *p<0.1; **p<0.05; ***p<0.01.
Source: OECD estimations based on EU-LFS data.

Due to the high regional variation in the share of self-employment in total employment, some cities have taken their own measures to support adult learning among the self-employed. Across the OECD, continuous education and training among own-account workers is supported through five main instruments: Tax deductions, subsidies, financial incentives, wage replacement schemes and employment insurance plans (OECD, 2019[1]). Since March 2022, the new *Stimulering Arbeidsmarkt Positie* ("Improving labour market positions"; STAP) budget covers the costs of workers in the Netherlands who want to participate in adult learning of up to EUR 1 000 annually. STAP is available to all workers aged 18 and above and does not differentiate between different workers by employment contract (Ministry of Social Affairs and Employment, 2022[37]) (See also chapter 5). For cities, which often do not hold formal competences in areas such as income taxation, providing additional training subsidies to own-account

workers is an option. Box 3.7 provides an example from Vienna (Austria), where training is financed for some own-account workers through direct financial support.

Box 3.7. The Waff training account – education and training options for own-account workers in Vienna, Austria

In Vienna, Austria, the Waff Training Account provides training grants to certain own-account workers who have their business license or their main residence in Vienna, are in possession of a valid trade license, are insured under the Commercial Social Security Act and do not employ any employees.

Waff funds training and further education aimed at expanding entrepreneurial skills and training to improve commercial and business skills. The latter include courses in the areas of accounting, controlling, office organization or time management. Courses to acquire and improve digital skills are also funded. These include courses in the areas of social media, Photoshop, ICDL or e-billing. Finally, Waff also funds language courses such as business English or business German. Formal education that leads to degrees is not covered.

Waff covers 80% of the total training costs, up to a maximum of EUR 2 000. There is no limit on the number of courses that can be attended until the maximum coverage is reached. To ease facilitation, applications can be submitted before the training course begins up until four weeks after the start date of the course.

Source: Waff (2021[38]), *Weiterbildungsförderung für Ein-Personen-Unternehmen (EPU),* https://www.waff.at/wp-content/uploads/2021/09/waff_infoblatt_epu_2021_lay1.pdf (last accessed 09/11/2022) *; OECD* (2022[4]), *Future-Proofing Adult Learning in Berlin, Germany*, OECD Reviews on Local Job Creation, OECD Publishing Paris, https://doi.org/10.1787/fdf38f60-en.

The net-zero carbon transition will affect Dutch regions differently

The so-called green transition is another major development that will affect labour markets over the next years. The objective to reduce carbon emissions and move towards more sustainable economies will require industrial production to transition across the OECD. Fossil fuels will need to be replaced by renewable energy sources and emission-intense industries will adjust their production. These developments will eventually affect the labour market (OECD, Forthcoming[39]). Industries and sectors that benefit from the green transition will show stronger job creation. More emission-intensive industries and sectors, such as the manufacturing of chemical products are likely to experience a structural transformation that may lead to job loss or changing job requirements. Similarly, employment in both the air and water transport sector will likely be affected negatively (OECD, 2021[38]).

Like other global trends, the labour market exposure of regions to the green transition will depend on the distribution of jobs across economic sectors. OECD regions differ substantially in their industrial structures and these structures will determine net employment effects caused by structural changes due to the green transition. Currently, no clear empirical evidence exists on where the green transition might create new economic opportunities other than in the renewable energy sector. However, by looking at a subset of jobs that are emission-intensive, one can assess the extent to which jobs across OECD regions might be put at risk by a move towards net-zero economy. The OECD methodology to assess these employment risks is summarised in Box 3.8.

Box 3.8. Assessing employment risks due to the-zero transition

The OECD's dynamic general equilibrium model OECD ENV-Linkages allows illustrating economic impacts of climate mitigation policy scenarios several decades into the future, linking activity and employment to greenhouse gas emissions (Château, Dellink and Lanzi, 2014[41]). The model can be applied to calculate regional employment risks across sectors under the goals of the Paris Climate Agreement (OECD, 2021[40]). Two-digit International Standard Industrial Classification of All Economic Activities (ISIC) sectors identified as being at risk of employment losses due to the net-zero carbon transition include: Mining of coal and lignite; Other mining and quarrying; Manufacture of textiles; Manufacture of coke and refined petroleum products; Manufacture of chemicals and chemical products; Manufacture of rubber and plastics products; Manufacture of other transport equipment; Water transport; Air transport.

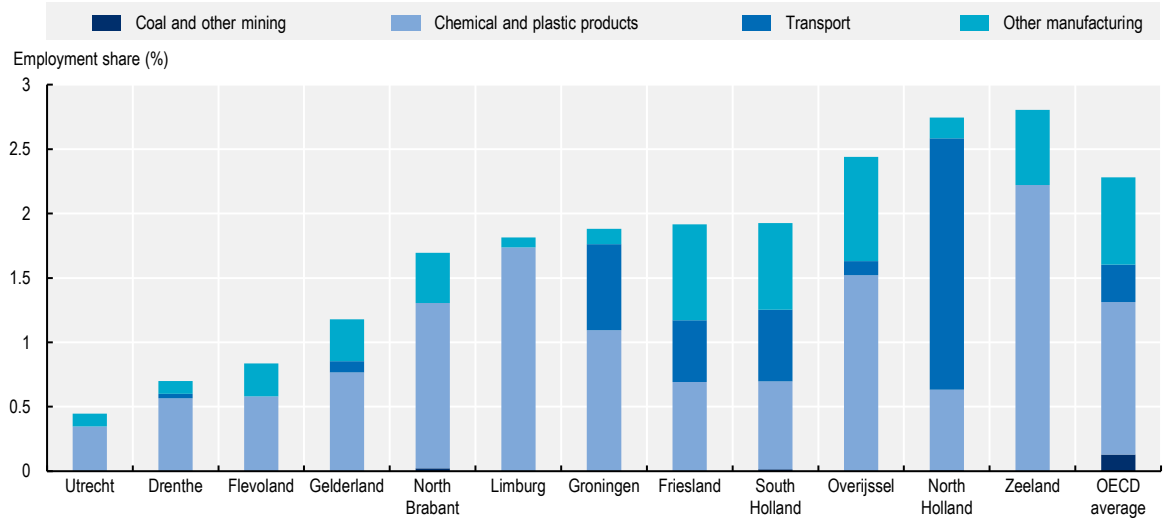
The petrochemical sectors contain most of the employment in sectors likely at risk of employment losses due to the net-zero carbon transition in OECD and partner countries: 32% of employment in sectors at risk is employed in the manufacture of rubber and plastics products and 20% is employed in the manufacture of chemicals and chemical products.

Source: OECD (2021[40]), *OECD Regional Outlook 2021: Addressing COVID-19 and Moving to Net Zero Greenhouse Gas Emissions*, OECD Publishing, Paris, https://doi.org/10.1787/17017efe-en.

North Holland's large transport sector may experience employment losses during the net-zero transition, but net employment effects are uncertain. Figure 3.16 presents data on the share of jobs in four sectors that entail, on average, high levels of emissions. Those sectors are transport, coal and other mining, chemical and plastic products, and other manufacturing. In the North Holland region, these sectors account for 2.7% of total employment, the second highest share across all Dutch regions and above the OECD average of 2.2%. This relatively large share of potential "brown jobs", i.e. jobs in sectors with high environmental footprint, is mostly explained by North Holland's relatively large transport sector. Balancing these jobs at risk against newly created jobs to derive net employment effects requires strong assumptions on where new jobs may be created. Employment gains are likely to occur in renewable power production and recycling of materials. A shift from fossil-fuelled energy towards more labour-intensive renewable energy will likely lead to some net employment growth in the energy sector (OECD, 2021[40]). The creation of new service jobs will also partly depend on policies to promote the green transition.

Figure 3.17. The green transition will put employment in North Holland's transport sector at risk

Percent of total regional employment in industries at risk due to the net-zero transition, large regions (TL2), 2017



Note: The y-axis shows the employment share in industries put at risk until 2040. For details on the methodology, see Box 3.8.
Source: OECD estimates based on EU-LFS data, originally published in OECD (2021[40]).

The demand in some occupations is likely to increase due to climate policy related public investment. Projections by ROA and the Netherlands Environmental Assessment Agency (*Planbureau voor de Leefomgeving*) show that additional government investment to meet emission reduction targets by 2030 and 2050 will lead to a rise in demand for machine operators, construction workers, metal workers, mechanics and electricians across the Netherlands. The mismatch between labour demand and available workers in technology and craft occupations is significantly higher in some regions such as Zeeland, Drenthe and Limburg than on national average (Weterings et al., 2022[42]). The study also shows that employment gains will largely depend on whether government investments are funded through additional public debt or through budget cuts that decrease consumption and investment in non-necessity goods. While there will be employment gains across all Dutch regions if climate investments are debt-financed, there will be net employment losses if climate-related investment require a balanced budget.

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Notes

[1]Eurostat table SDG_04_70 (Share of individuals having at least basic digital skills, by sex).

[2]The remaining 2% of jobs cannot be clearly categorised due to missing information on occupations in the labour force survey.

[3] MBO refers to *middelbaar beroepsonderwijs*, which literally translates to "middle-level applied education". MBO level 2 and 3 correspond to ISCED category 3, whereas MBO level 4 either falls into ISCED category 3 (middle management training) or category 4 (specialist training).

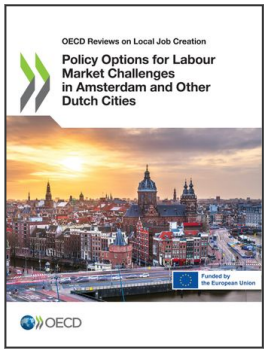
[4] Eurostat table lfst_r_lfsd2pop (Employment by sex, age, economic activity and NUTS 2 regions (NACE Rev. 2) (1 000)).

[5] Eurostat table lfst_r_lfp2actrtn (Activity rates by sex, age, educational attainment level, country of birth and NUTS 2 regions).

[6] Eurostat table lfsa_eppgai (Involuntary part-time employment as percentage of the total part-time employment, by sex and age (%)).

[7] Eurostat table lfsa_sup_age (Supplementary indicators to unemployment by sex and age).

[8] The Independent Commission of the Regulation of Work (so-called *Borstlap commission*) is discussed further in Chapter 4.



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