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Delegations will find attached a report entitled "Artificial intelligence, platform work and gender equality" prepared by the European Institute for Gender Equality (EIGE) at the request of the Slovenian Presidency.



Artificial intelligence, platform work and gender equality

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LIST OF ABBREVIATIONS

AI	Artificial intelligence
AI HLEG	The High-Level Expert Group on Artificial Intelligence
ANNs	Artificial neural networks
BPfA	Beijing Platform for Action
CEPYME	Spanish Confederation of Small and Medium Enterprises
CEOE	Confederation of Business Organisations (Spain)
CJEU	Court of Justice of the European Union
CNNum	Conseil national du numérique (French Digital Council)
COLLEEM	Collaborative economy and employment survey
EU	European Union
EIGE	European Institute for Gender Equality
ETUI	European Trade Union Institute
EU-OSHA	European Union Agency for Safety and Health at Work
FEPS	Foundation for European Progressive Studies
FNV	Federation of Dutch Trade Unions
FRA	European Union Agency for Fundamental Rights
ICT	Information and communications technology
IDB	Inter-American Development Bank
ILO	International Labour Organization
JRC	Joint Research Centre
NMT	Neural machine translation
OECD	Organisation for Economic Co-operation and Development
TFEU	Treaty on the Functioning of the European Union
STEM	Science, technology, engineering and mathematics
UGT	General Union of Workers (Spain)
WEF	World Economic Forum

A turning point for gender equality in artificial intelligence and platform work

Advances in computing power, enormous quantities of data and new algorithms have led to major breakthroughs in artificial intelligence (AI) in recent years. The COVID-19 pandemic, in particular, has highlighted the growing use of AI in everyday life. In general, AI refers to systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals. AI is set to radically transform all aspects of life, including the world of work. While AI systems can offer new opportunities for gender equality, their use also poses new challenges and risks creating or reinforcing patterns of gender inequality. While there is much debate on how AI will actually affect jobs and the workforce, current gender inequalities in the labour market and the distribution of unpaid work are likely to lead to gender-specific impacts. Similar concerns arise in relation to the increasing adoption of AI technologies to manage workers, as well as the emergence of platform work.

Following the publication of a White Paper on AI, on April 2021 the European Commission proposed a regulation laying down harmonised rules on AI and intending to safeguard European Union (EU) values and fundamental rights (including gender equality) and user safety (Artificial Intelligence Act). In addition, the EU aims to train more specialists in AI and to attract more women and people from diverse backgrounds into the sector. The EU Gender Equality Strategy 2020-2025 recognises AI as an area of strategic importance and a key driver of economic progress, thus it is important to ensure that the teams designing and maintaining AI systems reflect the diversity of society. The European Pillar of Social Rights and associated Action Plan promote a strong social Europe that is fair, inclusive and full of opportunity. In a new economy transformed by digitalisation and AI, EU policies intend to leave no one behind. Among the European Commission's initiatives to tackle new forms of precariousness emerging in the EU labour market is a legislative proposal on improving the working conditions of platform workers, due before the end of 2021.

The growing use of AI systems in the world of work, together with the COVID-19 crisis, has hastened the search for the best policy and regulatory options. A gender perspective must be integrated into policy efforts in order to avoid adverse consequences and ensure that AI systems do not perpetuate or amplify gender inequalities in the EU. However, there are extensive knowledge gaps in respect of the links between the labour market, AI, platform work and gender equality. This report fills in some of those knowledge gaps and highlights several key areas of concern that need to be considered in developing policies that redress gender inequalities in the AI ecosystem and platform work.

1. AI is transforming the labour market in multiple gendered ways

Women face a slightly higher risk of job loss due to automation

AI is transforming the labour market by changing the quantity and quality of jobs and tasks across different sectors and working conditions. This AI-driven wave of automation of work is characterised by the increasing ability of machines to perform many more types of tasks compared to previous waves of automation. Automation is likely to affect both female-dominated and male-dominated occupations, with slightly higher risks for women, who, on average, work more often in occupations that encompass routine and repetitive tasks (e.g. clerical support work or retail jobs) (Lawrence, 2018; Schmidpeter and Winter-Ebmer, 2018; Brussevich, Dabla-Norris and Khalid, 2019). Rather than being fully automated, it appears that most jobs are set to be transformed, with

workers switching to tasks that complement new technology (EIGE, 2020b). Gender-sensitive policies that address and manage these technological changes are central to strengthening inclusiveness and gender equality in the labour market.

Demand for AI talent grows, yet women are largely underrepresented

In parallel, the increasing adoption of technology and rising demand for new products and services are driving development of jobs in AI. However, available data indicates a major gender disparity among AI professionals, with men predominantly designing, coding, engineering and programming AI technologies. In the EU and the United Kingdom (UK), only 16 % of AI-skilled individuals are women (LinkedIn, 2019). The gender gap in the AI workforce widens with career length. Women with more than 10 years of work experience in AI represent 12 % of all AI professionals, compared to 20 % of women among those with 0-2 years' experience. There are several key reasons that prevent women from pursuing and maintaining an AI career. These include barriers that influence the likelihood of women's entry into the field through education and training (e.g. gender stereotypes, gender divide in digital skills and educational choices), and gendered barriers in women's occupation pathways, including strongly male-dominated work environments, sexual harassment and women's lack of access to funding.

Gender bias and discrimination in the algorithmic technologies used to manage the workforce amplify gender inequalities

The adoption of AI technologies for workforce management has surged across different industries, transforming hiring, task assignment, performance evaluation and promotion. Alongside the transformative potential of AI in the workplace, however, the risks of gender bias and algorithmic discrimination raise substantial concerns. For example, biased datasets used to train algorithms perpetuate historically discriminatory hiring practices. The biases and assumptions about gender, sex, race or disability embedded in the technical specifications of hiring tools can lead to biased evaluations of candidate performance in an interview or assessment. Similarly, the algorithmic scheduling used to optimise scheduling and task allocation has become popular in female-dominated fields, such as the retail and hospitality sectors. Algorithmic scheduling exacerbates the growing trend of 'just-in-time' scheduling by allowing the allocation of shifts at short notice, exacerbating work and income uncertainty, and increasing stress. Finally, with more people working from home due to the COVID-19 pandemic, the use of monitoring and surveillance tools has increased. These technologies allow employers to track workers' activity in real-time. However, many of the algorithmic monitoring and surveillance practices are highly invasive and potentially discriminatory. The use of surveillance technologies can penalise those workers who are teleworking and have to attend to their children or are interrupted by family members.

AI technologies enable new ways to reproduce gender stereotypes and gender-based violence in the labour market and beyond

Gender bias is often embedded in AI by design, reflecting, amplifying and scaling broader societal norms, views and personal biases of those designing these systems. Bias in design means that AI systems' default operational mode is discriminatory, exclusionary or sexist. While a certain margin of error in classification may be acceptable, bias in design means that for some demographic groups, such as women, there is a greater level of error than for other demographic groups (Feast, 2019). This occurs when the design of new machine learning algorithms is based on incomplete datasets, when labels used for training algorithms are biased, and when analysis and modelling techniques are biased. For example, facial and voice recognition technologies have lower accuracy

rates for women and non-white people compared to those for white men (e.g. Simonite, 2017, 2018). AI-based technology can also reinforce gender stereotypes to achieve better marketing outcomes. For example, virtual assistants, such as Alexa, Cortana and Siri, intentionally exhibit female features, are depicted as helpful and pleasant, and perform secretarial tasks traditionally assigned to women. Finally, new technologies have enabled new forms of gender-based violence. Increasing reliance on the internet to complete tasks, for example, means that many employees across industries face an increased risk of cyber bullying. Available research suggest that women are disproportionately the targets of cyber violence compared to men (EIGE, 2017a) and such issues are usually not covered by current anti-harassment policies or internal corporate guidelines.

2. Working conditions and work patterns of women and men engaged in platform work¹

EIGE carried out an online panel survey of platform workers in Denmark, Spain, France, Latvia, the Netherlands, Poland, Romania, Slovenia, Slovakia and Finland between November and December 2020. The sample comprised 4,932 platform workers, aged between 16 and 54 years, who had ever worked on digital labour platforms (such as Uber, Wolt, Bolt and many others). The results of that survey are described below.

More women start working on digital platforms

Across the 10 surveyed countries, there were somewhat fewer women (42 %) than men (58 %) platform workers. However, in recent years, the number of women in platform work has been growing. Crucially, COVID-19 led to spikes in platform work, with 36 % of women and 35 % of men starting or re-starting work on digital platforms because of the pandemic.

The majority of platform workers are young (on average, 30 for women and 32 for men), very well educated and with care responsibilities. The educational level of platform workers raises concerns about deskilling, as platform work often entails low-qualified tasks. Although platform work can be a way for some young workers to enter the labour market and gain experience, others may be at risk of getting entrapped in precarious jobs.

In addition to working via platforms, 76 % of women platform workers and 80 % of men also work full-time, part-time or are self-employed in other jobs. Overall, the gender differences in activity status are very small, although somewhat fewer women are employed full-time outside of platform work (44 % of women and 49 % of men). In contrast to what is commonly assumed, although most platform workers are young, only 6 % of women and 4 % of men surveyed are students. A significant proportion of platform workers have family responsibilities: a majority of regular platform workers live in couples with children (48 % of women and 40 % of men) or without children (23 % of women and 25 % of men), and 10 % of both women and men are lone parents. Only 20 % of women and 25 % of men are single.

Gender segregation in platform work is smaller than in the traditional labour market

Platform workers provide services either remotely or on location. Roughly one-third of women and men ever engaged in platform work perform remote tasks only (e.g. micro-tasks such as data entry), about one-fifth provide

¹ This study adopts Eurofound's understanding of platform work as a 'form of employment that uses an online platform to enable organisations or individuals to access other organisations or individuals to solve problems or to provide services in exchange for payment' (Eurofound, 2018b). According to this definition, platform work has several key features: paid work is organised through an online platform; three parties are involved: the online platform, the client and the worker; the aim is to carry out specific tasks or solve specific problems; the work is outsourced or contracted out; jobs are broken down into tasks; services are provided on demand.

on-location services only (e.g. childcare, delivery), and almost half have tried both types of work. While much of platform work is generally split along familiar gendered lines, the occupational choices by women and men seem less restricted than in the traditional labour market. For example, traditionally female-dominated sectors like childcare and housekeeping, and the traditionally male-dominated sector of delivery have a more gender-diverse workforce.

Easy entry but lower flexibility of platform work

The majority of women and men work on digital labour platforms because it is a good way to earn (additional) income. The flexibility of working time and place, especially in relation to family commitments, is more important for women than for men. More women and men with high education appreciate working on digital platforms for flexibility in choosing when and where to work. By contrast, fewer platform workers with low level of education have the autonomy to plan their working schedules, showing the difference in working conditions between platform workers with high and low levels of education.

Aside from easy entry, there is limited evidence of flexibility in platform work. More than one-third of women and men often perform platform work during evenings and/or weekends. The unpredictability of working hours and income are frequently mentioned as drawbacks of working on digital labour platforms, along with low or unfair pay. In addition, platform workers spend nearly the same amount of time for searching and actually implementing tasks via digital labour platforms.

Women and men spend similar amount of time in regular jobs or on digital platforms, but women carry the bulk of childcare and housework

Although the surveyed women and men spend the same number of hours working in a job outside of platform work, and on digital platforms, women on average spend about 2.5 hours per week more than men in household work, and 3.5 hours more on childcare. The differences are even greater in couples with children. Women's overall working time and schedules on online platforms are more affected by family factors. Men's working time and schedules are more affected by personal and professional factors.

Foreign-born platform workers, particularly men, are disproportionately affected by unfair treatment and discrimination

More men than women indicated some form of unfair treatment while providing services on digital platforms. Foreign-born men are disproportionately affected by unfair treatment and discriminatory practices. Women are slightly more likely to indicate that they were unfairly treated due to their age and sex, while men are more likely to report unfair treatment due to language or accent, skin colour, nationality, religious beliefs, sexual orientation or gender identity, and illness or disability.

3. Main policy and regulatory challenges and responses related to platform work, and implications for gender equality

While the rapid evolution, diverse nature and often ambiguous effects of platform work have received considerable attention from policymakers at EU and Member State level, much of the debate has overlooked the potential implications of platform work for gender equality.

Women and men platform workers have poor social protection

Platform work blurs the line between employment and self-employment. Platforms often refer to their activities as 'gigs' and 'tasks', 'favourites', or 'rides', rather than work or labour, with those performing the activities called 'partners' rather than workers. Most platforms then assert that platform workers are self-employed (or independent contractors). At national level, the lack of clear legal classification and the slow adoption of regulations have benefitted platforms in this regard. In countries without explicit approaches to regulate platform work, platform workers are considered self-employed by default. As a result, many platform workers do not meet the requirements to access maternity and parental leave. For example, in countries where the duration of employment is a condition for accessing maternity and parental leave benefits, the fragmented nature of platform work may mean that platform workers lack the continuity needed to satisfy job tenure requirements. In addition, emerging evidence indicates that reconciling care and paid work during the COVID-19 pandemic has entailed a greater challenge for women. However, platform workers could only implicitly benefit from measures taken to support workers with care responsibilities, and the extent to which they were able to benefit is unknown.

Collective bargaining is an important source of regulation in employment relations and social protection. This poses legal difficulties in the realm of platform work in many countries. Where collective bargaining is an option, efforts to include platform workers in collective agreements have appeared in the delivery sector and other traditionally male-dominated sectors. The national research revealed that both policymakers and trade unions are less aware of gender issues within platform work and the work that women do as platform workers. Women's work in the platform economy, for example in non-professional care services, is seen as a continuation of their traditional roles in (unpaid) domestic and care work, which has been historically viewed as low status and value, despite its major contribution to households and the economy. These historical and cultural connotations make a large share of women's work in the platform economy invisible, as well as creating another challenge in discussions on the classification of platform work as employment.

Fragmentation of tasks and long working hours have an adverse effect on work-life balance

Flexibility and autonomy are frequently cited as key benefits of platform work. However, the level of flexibility and autonomy afforded to a platform worker depends heavily on the type of services provided and the algorithmic management adopted by the platform (EIGE, 2020b). Many platform workers have to complete tasks for excessively long hours to earn enough, while platform penalties mean that others are unable to refuse assignments during unsocial hours. Women and men can thus control their work-life balance only to a very limited extent. In addition, the fragmentation of tasks performed via platforms (micro-tasks) and long unpaid time spent searching for tasks lead to platform workers working excessively long days without rest periods or paid leave. Although the fragmentation of work may conflict with existing working time regulations, these rules cannot be extended to platform workers classified as self-employed.

Platform workers are narrowly protected against discrimination and unfair treatment

Across the Member States studied, platform workers are generally unprotected under national Labour Codes, which typically apply only to employees. None of the Member States have adopted specific measures to ensure equal treatment and non-discrimination of platform workers, except for Spain that has enacted new legislation to prevent discrimination by algorithms used by platforms. Country-level research found no court cases on sex-based discrimination in platform work. Although this is expected to change shortly, there are two particular challenges in terms of pay discrimination and protection at the EU level. Firstly, the personal scope of most EU

directives is often limited to workers, as developed in the case-law of the CJEU. While the notion of worker is much broader at EU level than national level, it still does not cover genuinely self-employed workers. Secondly, the equal pay principle laid down in Article 157 of the Treaty on the Functioning of the European Union (TFEU) requires a single source (usually one employer) to be responsible for the pay disparity. This may be difficult to implement in the platform economy.

Introduction

Advances in computing power, enormous quantities of data and new algorithms have led to major breakthroughs in artificial intelligence (AI) in recent years. The COVID-19 pandemic, in particular, has highlighted the use of AI in everyday life. For example, the use of AI powers language translation software and car navigation, helps to recognise and fight cyberattacks, informs how much credit financial institutions offer different customers and which candidates are invited for job interviews, and affects who healthcare systems prioritise for COVID-19 vaccines. In general, AI refers to systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals. These systems can be purely software-based, acting in the virtual world (e.g. voice assistants, image analysis software, search engines) or embedded in hardware devices (e.g. advanced robots, autonomous cars, drones) (European Commission, 2018). While AI is already present in our everyday lives, it will continue to transform the way we live and work.

AI systems offer new opportunities for gender equality and quality of life, and the transformations they bring are expected to increase productivity and improve the quality of jobs and services. The use of AI also supports the creation of new jobs and can help to fight gender stereotypes. Some prominent examples include using machine learning tools to identify hate speech content or so-called revenge pornography (Lerman, 2019) or recent efforts to reduce gender bias in translation tools (Fox, n.d.). AI has also enabled the development of innovative gender equality tools, such as applications to detect gender bias in job postings, identify unequal pay, or support victims of gender-based violence and human trafficking.

At the same time, the use of AI poses new challenges and risks reinforcing gender inequalities. While the impact of AI on the future of work and society is much debated, current gender inequalities in the labour market and the distribution of unpaid work are likely to lead to gender-specific impacts. Similar concerns arise in relation to the use of AI technologies in workforce management, which change hiring, task assignment, performance evaluation and even promotion. If left unchecked, unaccountable and uncorrected, the design of AI technologies will reproduce controlling and restrictive conceptions of gender, while biased datasets will amplify gender inequalities and project current injustices into the future.

The application of AI is configuring employment relationships. The use of AI systems facilitates the expansion of one-off contracts for specific services and tasks, particularly through digital labour platforms. These non-standard forms of work, in which women, young people and people of migrant backgrounds have historically been overrepresented, increasingly blur the boundaries between workers and self-employed. Platform work creates new opportunities for workers, self-employed, customers and businesses. These include additional jobs and income for people who might have difficulty in accessing the traditional labour market and those who value the flexibility of platform work. However, many of these jobs fall outside current social and employment protection systems and create new forms of precarious employment. As work becomes more fragmented, there is a high risk of economic instability, discrimination, exclusion from collective representation, deteriorating work-life balance, poor skills upgrading, and lack of occupational health and safety. All of these issues have the potential to exacerbate gender inequalities in the labour market and other spheres of life. The COVID-19 pandemic aggravated these concerns, as social distancing measures pushed companies and societies to adopt new digital and data-driven technologies in real-time.

Even though much of the current EU policy framework on AI is still being developed, it nevertheless recognises the application of AI as entailing both an opportunity and potential risks, such as opaque decision-making or discrimination. Following the publication of a White Paper on AI, the European Commission proposed a regulation

laying down harmonised rules on AI and intending to safeguard EU values and fundamental rights, including gender equality (Artificial Intelligence Act). The EU Gender Equality Strategy 2020-2025 recognises AI as a key driver of economic progress, thus women must be among AI developers, researchers and programmers. The strategy requires segregation, stereotyping and gender gaps in education to be addressed. Ultimately, greater diversity in the AI development sector will contribute to the elimination of unfair biases in datasets.

Efforts to build an ecosystem of excellence and trust in European AI need to be seen in the framework of the European Pillar of Social Rights, which envisions a strong social Europe that is fair, inclusive and full of opportunity. In a new economy transformed by digitalisation and AI, the EU seeks to ensure that no one is left behind (e.g. through training and reskilling of workers). Building on the principles of the Pillar, the EU has launched a series of instruments that react to the new forms of precariousness emerging with digitalisation. A lack of transparency and predictability in working conditions, and insufficient social protection, for example, may disproportionately affect women. This includes the Commission's initiative to present a legislative proposal on improving the working conditions of platform workers by the end of 2021.

The European Institute for Gender Equality (EIGE) has been given a mandate to monitor progress in achieving the objectives of the Beijing Platform for Action (BPfA) in the EU and this report focuses on Area F, 'Women and the economy'. It explores the links between the labour market, AI, platform work and gender equality through the lens of three Area F strategic objectives: F.1: relating to women's economic rights and independence; F.5: addressing occupational segregation; and F.6: pertaining to work-life balance. Despite the significant progress the EU has made in this area, considerable differences remain in women's and men's access and opportunities to exert power over technologies and economic structures in their societies.

There are extensive knowledge gaps in respect of gender inequality in the new economic realities transformed by digitalisation. These gaps pose considerable challenges in identifying the different needs and priorities of women and men that must be addressed through the management of technological change. This comprehensive report draws from statistical evidence and a unique online panel survey on working conditions, work patterns and work-life balance of close to 5,000 women and men engaged in platform work. It was conducted in November-December 2020 in 10 selected Member States (DK, ES, FR, LV, NL, PO, RO, SI, SK, FI). The assessment of policy approaches to regulating platform work was carried out based on an EU-wide literature and data review and country-level research, including interviews with national stakeholders in the same 10 Member States. The report recognises the importance of intersectional inequalities and considers the wide and diverse experiences of people belonging to different social groups. By making gender and intersectional inequalities visible and addressing key political issues, this study provides substantial material to the ongoing debate in key areas of policy-making.

The report consists of five chapters. Chapter 1 explores several important ways in which increasing use of AI-based technology is affecting the labour market: job automation and transformation, the tools for algorithmic management of the workforce, the emergence of new forms of work organisation (specifically, platform work) and AI impacts on reproduction of gender stereotypes, sexism, and discrimination. Chapter 2 assesses working conditions, work patterns and work-life balance of women and men engaged in platform work, looking closely at gender segregation, unequal treatment and discriminatory practices. Chapter 3 outlines the key regulatory challenges in relation to platform work and explores EU and national policy approaches to regulating platform work, especially key challenges (such as employment status, access to social protection, equal treatment and discrimination). Chapters 4 and 5 present conclusions and policy recommendations drawn from the research findings.

1. AI-related transformation of the labour market from a gender perspective

This chapter presents an overview of research findings and statistical evidence on the impact of AI on the labour market and resulting changes in working conditions from a gender perspective. It describes how the application of AI-based technology reproduces discrimination, sexism and gender stereotypes and enables new forms of gender-based violence. It also provides insights into how AI can be used to fight gender stereotypes.

1.1. Automation of work and its implications for gender equality

Although AI is used across a variety of different industries and sectors, it is challenging to assess its direct impact on the labour market alongside broader processes of digitalisation. Firstly, AI technology is inseparable from information and communications technology (ICT), given that AI systems and processes are enabled by the use of computer infrastructure. The effect of AI on the labour market is thus difficult to distinguish from the effect of ICT development in general. Secondly, while the concept of a simple algorithm is clearly distinct from AI in theory, in practice a very similar set of skills is needed to produce both simple algorithms and more complex AI systems. Thirdly, comparable EU-level data on occupations and employment, for example, is too general to assess the scope of the AI workforce.

Automation of work refers to the replacement of (human) labour by machine input for some types of tasks within production and distribution processes (Eurofound, 2018a). Previous waves of automation featured technologies that were model-driven and could automate only those tasks that followed explicit, codifiable rules. By contrast, AI technologies can take action automatically from their observation of inputs and corresponding outputs. AI is built on a data-driven approach (United Nations Educational, Scientific and Cultural Organization (UNESCO), 2019) and the steady increase of computing power has made it possible to 'exploit enormous quantities of data [big data] with deep learning techniques, based on the use of formal neural networks' (UNESCO Courier, 2018). The new wave of automation is characterised by the increasing ability of machines to perform many more types of tasks than were possible in the previous waves of automation (Brynjolfsson et al., 2018).

Earlier estimates predicted that automation puts between one-quarter to close to half of all jobs at risk of obsolescence (Frey and Osborne, 2017; OECD, 2016). More recently, it has been suggested that about 10-20 % of jobs are at risk of automation in OECD economies (OECD, 2016; International Monetary Fund (IMF), 2018; PwC, 2018). These differences in estimates are partly due to the fact that some predictions focus on automation of whole jobs, whereas others analyse automation of specific tasks, assuming that not all tasks within an occupation can or will be automated (Rubery, 2019). Rather than being fully automated, it now seems that most jobs will instead be transformed, with workers switching to tasks that complement new technology (EIGE, 2020a). Entirely new jobs are also likely to appear, such as in the science, technology, engineering and mathematics (STEM) sector (Eurofound, 2020a).

Similar patterns are observed in automation processes enabled by AI technologies. Currently, the purpose of using AI is to assist humans in decision-making, with AI replacing routine and repetitive tasks that can be automated by using data. This might result in fewer jobs available within certain occupation groups. For example, the use of AI is changing medical diagnostics in healthcare, with image analysis used to help medical staff to identify and diagnose diseases such as cancer (Colback, 2020). Using AI has not replaced the human expert, but it can analyse far more data than any human could. The increase in efficiency might see humans only required to review the results of AI image analysis, implying a reduced need for human experts.

Ensuring that women and men from all groups benefit from advances in digitalisation and AI is one of the most pressing issues of technological change for the EU. Women's greater educational achievement has created opportunities for their employment in higher-skilled and better paid occupations. Gender-sensitive policies managing the current technological change are central to strengthening inclusiveness and gender equality in the labour market. These should also take into account the following gender-specific tendencies identified by EIGE (2020b):

- **Automation is likely to affect both female and male-dominated occupations.** Automation is driving the elimination of the clerical jobs that provided an expanding field of employment for women (Lordan, 2019). It is also deskilling many traditionally 'male' jobs, for example in transport, storage and manufacturing (Lordan, 2019), while providing opportunities for women with newer technological skills.
- **Women face a slightly higher risk of job loss due to automation.** Compared to men, women work more in occupations that encompass routine and repetitive tasks (e.g. clerical support work or retail jobs) (Lawrence, 2018; Schmidpeter and Winter-Ebmer, 2018; Brussevich, Dabla-Norris and Khalid, 2019).
- **Highly educated women often enter new jobs that are difficult to automate.** The growth in women's educational attainment has seen more women employed in high-skilled jobs (managers, professionals and technicians) that are unlikely to be automated in the near future (EIGE, 2020b).

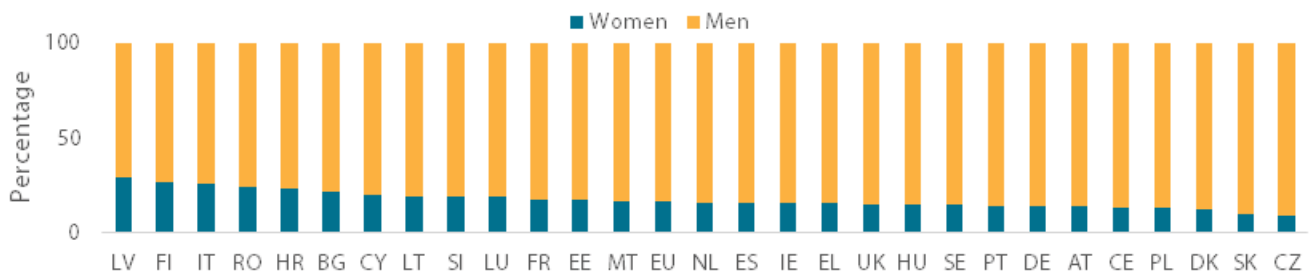
1.2. Who develops and implements AI in the EU?

1.2.1. Demand for AI high-skilled professionals grows, yet women are largely underrepresented

Greater adoption of technology and the increase in demand for new products and services are driving the development of jobs in data analysis and AI. Currently, the pool of data analysts and scientists, Big Data specialists, programmers/software developers and other AI professionals (whose main activity is to develop and implement AI technologies) is comprised of the most in-demand and fastest-growing specialisations around the world (World Economic Forum, 2020). Not only are these jobs highly paid, valued by society and considered prestigious, they also offer good working conditions, possibly because they primarily employ men. Briefly, the history of computing is an excellent example of how the perception of an occupation can change depending on its workforce. Between the 1940s and 1980s, it was mostly women who worked in computer programming, where wages were low and the work was considered clerical. Once men started to outnumber women in the field, however, both the wages and prestige of these jobs grew (Thomson, 2016).

Detailed data insights on the profiles of women and men with AI skills are scarce, especially in the EU context. A report published by LinkedIn (2019) was the first attempt to map the state of Europe's AI talent. Looking at the number of individuals who have both statistical modelling and Big Data computational skills (both of which are necessary to build and execute the algorithms that power AI technologies), the report found a major **gender disparity among AI professionals, with men predominantly designing, coding, engineering and programming AI technologies**. In the EU and the United Kingdom (UK), only 16 % of all AI-skilled individuals are women (LinkedIn, 2019). These figures vary somewhat across the Member States, with Latvia and Finland having the highest share of women (29 % and 26 %, respectively), and Czechia and Slovakia the lowest (9 % and 10 %, respectively). The gender gap in the AI workforce widens with career length. Women with more than 10 years of work experience in AI represent 12 % of all AI professionals, compared to 20 % of women among those with 0-2 years' experience. More detailed data capturing the representation of women and people from underprivileged backgrounds, such as Black and LGBTQI+ workers, is not available.

Figure 1. Gender gap among AI professionals in the EU (%)



Source: LinkedIn (2019)

Note: The EU aggregate refers to the EU-28 and includes the United Kingdom because during the reference period of the source research the United Kingdom was a Member State.

Women in AI are so rare that a recent magazine article on the Women in AI award described female-founded companies as being as rare as mythical creatures (Heikkilä, 2020). The State of European Tech Report, prepared in collaboration with 20 companies and organisations across the EU, reported that in a sample of over 1,200 European tech founders, 21 % were women (Atomico, Slush and Orrick, 2019). The report also noted that most of the tech founders are White/Caucasian (84 %), university-educated (83 %), and based in their country of origin (~ 75 %).

Such a large gender gap in the AI workforce in the EU is broadly comparable to global trends. According to the Global Gender Gap Report of the World Economic Forum (2018), of all LinkedIn’s professionals in AI globally, only 22 % are women and 78 % are men. Similar patterns are found at major technology firms like Facebook and Google, where some 15 % and 10 %, respectively, of AI researchers are women (Simonite, 2018). Recruiters for technology companies in Silicon Valley estimate that women make up less than 1 % of the applicant pool for technical jobs in AI and data science (UNESCO, Kraut and Chew, 2019).

The situation is similar in the AI research workforce. A large-scale analysis of AI research revealed that just 14 % of AI publications’ authors are women, with no improvement in that proportion since the 1990s (Stathoulopoulos and Mateos-Garcia, 2019). Based on the paper contribution to the top three machine learning academic conferences in 2017 (²) it was estimated that only 12 % of world-leading machine learning researchers are women (Simonite, 2017). A similar analysis extended the number to 21 leading AI conferences in 2018 and found that the proportion increased slightly, to just 18 % (Element AI, 2019). Across the G20 countries, just 7 % of ICT patents are generated by women, with the global average even lower, at just 2 % (UNESCO, Kraut and Chew, 2019).

1.2.2. Entry barriers are amplified by gender inequalities in AI companies and academia

There are several key factors preventing women from pursuing and maintaining an AI-related career. These include barriers that influence the likelihood of women’s entry into the field, such as gender stereotypes and the gender divide in digital skills and educational background. Exposure to technology is gendered from a young age, depriving girls of opportunities to normalise technology in their lives. In secondary school education, four out of five girls in the EU never or almost never engaged in coding activities (European Commission, 2019). In addition, young people are generally not taught about the ethics and social implications of technology, which is another lost opportunity to sensitise both women and men to the need for unbiased and equitable technology (Dillon and Collett, 2019). Gender segregation is particularly pronounced in tertiary education, with progress to reduce it having stalled or indeed begun to reverse. Although there are more women than men students in the EU (54 % compared to 46 %), fewer women enrol in STEM studies, which are especially relevant for AI-related occupations

(²) These included the Conference on Neural Information Processing Systems (NIPS), the International Machine Learning Society (ICML) conference, and the International Conference on Learning Representations (ICLR).

(EIGE, 2020a). STEM represents the most male-dominated fields of education: in 2018, women constituted about 28 % of graduates in engineering, manufacturing and construction, and only around 20 % of ICT graduates ⁽³⁾.

Even if young women aspire to pursue a career in science, they often do not opt for such a career or leave their science and technology jobs more quickly than men, due to numerous **gendered barriers to their occupational pathways** (EIGE, 2020b). The organisation of work and work culture, including requirements for continuous skills update (sometimes outside of working hours) and flexible or unpredictable working hours, are likely to play a crucial role in gender imbalance in the field. Strongly white male-dominated work environments, stereotyping, sexual harassment, gender discrimination, the gender pay gap, and women's lack of access to funding (e.g. start-up capital) present additional challenges for women working in AI careers and exacerbate the strong gender disparity in this field (Kapoor Center for Social Impact, 2017; Howcroft and Rubery, 2019, Esser et al., 2020; EIGE, 2020b).

Another barrier faced by women AI professionals is the persistent glass ceiling. Women are less likely to be positioned in senior roles and are therefore less likely to gain expertise in certain high-profile emerging skills and, in turn, are less likely to be promoted (Simonite, 2018; Whittaker et al., 2018; World Economic Forum, 2018; West, Whittaker and Crawford, 2019). Even when women access the top management and professional positions, they do not experience the same level of authority, power and monetary rewards as men in similar jobs, because of their gender (Reskin and Ross, 1990; Smith, 2002).

Not only are these gender-specific issues prevalent in AI, the big tech companies have made little effort to address them. There are even reports of women being penalised for advocating for improved diversity, fairness and ethics in their workplaces and in the tech sector (West, Whittaker and Crawford, 2019).

1.2.3. Gender equality and ethical literacy in AI are key to societal success

The current strong gender imbalance means that very few women and people from underprivileged backgrounds are benefitting from the opportunities brought by careers in AI. Given that AI is a key area of growth, this situation is likely to exacerbate existing gender inequalities, including in pay and labour market participation.

With little engagement of women and people from underprivileged backgrounds in the development and deployment of AI technologies, there are concerns about the implications for the AI technologies themselves. **Diversity in the AI workforce is central to developing and maintaining AI tools that are gender-sensitive and equitable** (Simonite, 2017, 2018; Whittaker et al., 2018). The implications at societal level are far greater, as those in charge of designing future technology have substantial power to shape how society functions (Dillon and Collett, 2019). The lack of women in the AI workforce is thus not only a question of gender balance, but has real implications for how AI industries work, and what gets developed, how and for whom (Wajcman, 2007; West, Whittaker and Crawford, 2019). Diversity in the AI workforce alone will not be sufficient to create gender equality, but it has crucial potential to bring together different views and experiences, and stimulate varied and profound discussion (Dillon and Collett, 2019).

Such diverse consideration is more likely to happen when girls and boys, women and men are sensitised towards developing unbiased and equitable technology and critically assessing AI. However, evidence suggests that young people are not taught about the ethics and social implications of technology (Dillon and Collett, 2019). Improving

⁽³⁾ Eurostat (educ_uoe_grad02) (2018).

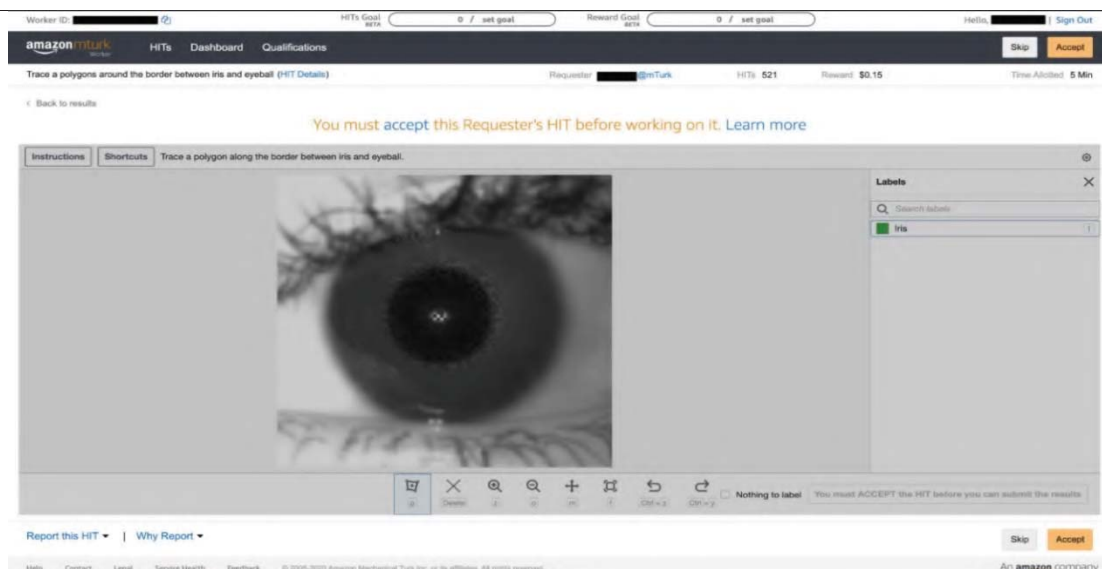
education on AI bias and ethics and encouraging transdisciplinary, critical thinking about technology, particularly among all aspiring AI professionals, could bring the EU closer to a more trustworthy AI.

1.2.4. Women’s substantial yet invisible role in technology

Women remain underrepresented in high paying, visible and socially valued AI-related positions. This is despite the fact that, historically, women have played a major role in computation and programming. Augusta Ada Byron, Countess of Lovelace, wrote the world’s first early machine algorithm in the 1840s. Towards the end of the 19th century, women in the US began to be hired as ‘computers’, performing calculations alongside men and coming to dominate the profession by the time of the Second World War (Grier, 2007). Unlike the Countess of Lovelace, who was a member of the wealthy aristocracy, most of these women did not come from affluent backgrounds. Rather, the computing profession was seen primarily as low-paid clerical labour, subordinate to professional staff. It remained largely female-dominated until the 1980s. Once men started to outnumber women in the field, however, the work began to be considered innovative, with a resulting increase in both wages and prestige (Thomson, 2016).

Even today, women and people of underprivileged backgrounds continue to bring important added value to the AI field **but their contribution is profoundly undervalued in proportion to the knowledge they help to create**. While ‘AI jobs’ are often assumed to mean high-skilled AI professions, the AI industry also includes low paid positions, many of which are often outsourced through digital labour platforms such as Amazon Mechanical Turk, an online crowdwork platform for micro-tasks (Figure 2). Recent data shows that slightly over half of the workers on Amazon Mechanical Turk are women (Moss et al., 2020). Women and men in these positions are referred to as the invisible AI workforce and perform tasks such as data labelling to support the training of machine learning algorithms. Although highly specialised skills and experience may sometimes be needed to label data, it typically does not require more than basic digital skills (to access the platform) and the ability to read.

Figure 2. Example of a human intelligence task (hit) in image recognition and classification



Source: Crowdwork platform Amazon Mechanical Turk (2020).

Note: The task is to ‘Trace a polygon along the border between iris and eyeball.’

In stark opposition to the highly skilled and well-paid AI creators and developers, the low skill level needed to work via Amazon Mechanical Turk is reflected in poor working conditions, including career prospects and pay ⁽⁴⁾. A recent study on Amazon Mechanical Turk found that workers earned a median hourly wage of only ~USD 2 per hour, and only 4 % earned more than USD 7.25/h for tasks such as data labelling (Hara et al., 2018). Although all workers seem to be poorly remunerated for their work, women's hourly earnings are, on average, about 10–20 % lower than men's (Adams and Berg, 2017; Adams-Prassl, 2020). Women taking care of young children are particularly disadvantaged, as care and domestic responsibilities interfere with their ability to schedule work and affect task completion speed (Adams-Prassl, 2020).

These examples show that the debate on the AI workforce falls short when it considers primarily the privileged part of the AI industry. Ensuring the visibility of all AI workers is a key step towards improving working conditions and gender equality in all AI jobs.

1.3. Algorithmic management of the workforce raises concerns for gender equality

As well as becoming widespread in daily life, AI has also made its way directly into the workplace. The adoption of AI technologies for workforce management has risen rapidly across different industries, transforming hiring, task assignment, performance evaluation and even promotion. Algorithmic workforce management refers to the use of various technological tools, facilitated by AI, to remotely manage workers (Moore, 2018; Mateescu and Nguyen, 2019a; Bri ne, 2020). It often relies on automated or semi-automated decision-making systems, real-time data collection to inform performance rating systems, and the use of 'nudges' to control, monitor and motivate workers' behaviour (Mateescu and Nguyen, 2019a, 2019b). Although many of the algorithmic management technologies have been developed by companies in the platform economy, they are increasingly used in more traditional work contexts to speed up the hiring process, increase productivity, and reduce costs. With the surge in remote work during the COVID-19 pandemic, the prevalence and market value of AI-based workforce management software is also on the rise, with uptake of these technologies expected to grow still further ⁽⁵⁾.

Despite the transformative potential of AI in the workplace, **the accompanying risks of gender bias and discrimination, violations of privacy, reduced worker autonomy and discretion, and negative psychosocial implications for workers' well-being** are of significant concern (Mateescu and Nguyen, 2019a). There are several well-known examples of how algorithms of various companies can perpetuate bias and discrimination, based on gender, race, disability or other characteristics. These include Amazon's discriminatory algorithmic hiring tool, Facebook (and other social media) selective algorithmic advertisement (ad) delivery based on gender, and error-prone IBM, Microsoft and Face++ facial recognition technologies miscategorising women and people of colour (see section 1.5.1). In many countries, algorithmic management tools were even adopted by public employment services to profile the unemployed and provide targeted support. However, in several instances, the risk of discriminatory outcomes saw these systems terminated (PL) or suspended (AT) shortly after their rollout (Niklas, Sztandar and Szemielewicz, 2015; Allhutter et al., 2020).

⁽⁴⁾ Amazon Mechanical Turk offers work tasks beyond data labelling, such as data verification and clean-up (e.g. identifying duplicate entries and verifying item details) and information gathering (e.g. filling in surveys) (<https://www.mturk.com/worker>). Data on workers on Amazon Mechanical Turk is generally not specific to the level or type of task but, rather, describes working conditions overall.

⁽⁵⁾ For example, the work management platform, Workfront, whose proprietary AI algorithm assists with task allocation and scheduling across teams, was just acquired by Adobe for as much as USD1.5 billion (<https://news.adobe.com/news/news-details/2020/Adobe-to-Acquire-Workfront/default.aspx>; <https://news.workfront.com/2017-11-09-Workfront-Enhances-the-Enterprise-Work-Experience-with-New-Product-Release>).

Although most of the algorithmic management tools involve human managers, those algorithmic decisions are given increasingly more weight (Bri ne, 2020). Advanced machine learning models rely on multiple self-calibrating algorithms, creating a ‘black box’ that makes it impossible for humans to trace how a system arrived at a decision (De Stefano, 2016; Moore, 2018; Bri ne, 2020). In view of the risks of bias and discrimination, it is particularly important to set up transparency and accountability mechanisms and ensure remedies for those who are harmed. Creators of AI systems must: (1) be transparent about their design choices, the procurement and use of training data; (2) include ethical considerations in their design; and (3) monitor the outputs and results of AI-based systems for potential bias and discrimination (Borgesius, 2018; European Union Agency for Fundamental Rights(FRA), 2018; Walsh, 2019; Yarger, Cobb Payton and Neupane, 2019; Xenidis and Senden, 2020).

Proposals for better transparency and accountability of algorithmic management tools often meet resistance, with development companies citing corporate secrecy or strategic efforts to maximise their profits or maintain their competitive advantage (Burrell, 2016). For example, prominent AI ethicist and researcher, Timnit Gebru was fired by Google because her research paper exposed risks of bias and normalising of abusive, sexist and racist language in Google’s big language models. Those models create considerable profits for the company - USD26.3 billion in the third quarter of 2020 alone (Simonite, 2020). Gebru’s dismissal sparked debate on the issue of ‘selective publication’ of research funded by big tech companies. A large share of AI research relies on private funding, with a recent study finding some 58 % of academic staff at four prominent US universities undertaking AI research have received grants, fellowships or other financial support from 14 major tech firms (Knight, 2020). With such a degree of dependency, big tech companies can use funding to discourage or silence researchers from pursuing certain projects or, conversely, incentivise them to agree with solutions proposed by tech companies, thus perpetuating algorithmic bias and discrimination.

To date, the gender-specific risks associated with algorithmic management of the workforce (e.g. algorithmic bias, discrimination) remain largely unaddressed. Women and men from underprivileged backgrounds are particularly vulnerable. The following sections discuss the risks associated with algorithmic management in detail, considering several important areas for gender equality in the labour market: recruitment and hiring, scheduling and task allocation, monitoring and surveillance, and performance review and evaluation.

1.3.1. Algorithmic recruitment and hiring tools risk discriminatory outcomes

Many workplaces and major staffing agencies are increasingly using algorithmic tools to deliver job ads, screen and sort CVs, match job seekers and available jobs, schedule candidate interviews, and conduct assessments (Bogen and Rieke, 2018; Heilweil, 2019; Yarger, Cobb Payton and Neupane, 2019). Algorithmic tools are often seen as means to speed up the process and reduce unconscious bias and discriminatory practices in hiring (Bri ne, 2020; FRA, 2018). Among other things, those tools can remove any gender or ethnic information on CVs before they are seen by human evaluators or other algorithms. However, evidence shows that replacing a human recruiter with non-human technology is not always a clear-cut solution, as automated decisions and algorithmic bias may also produce discriminatory outcomes (Lambrecht and Tucker, 2016; Thelwall, 2018; Yarger, Cobb Payton and Neupane, 2019).

Frequently discussed **sources of algorithmic bias include biased datasets used to train models, technical specifications of algorithmic models, and the lack of human supervision** (Borgesius, 2018; FRA, 2018). Firstly, algorithms are trained to predict outcomes using historical data, which itself can be missing, biased and non-representative or it can reinforce historical patterns of discrimination. For example, Amazon’s automated employment recruiting platform was developed to evaluate, score, and rank job applicants, using highly efficient machine learning algorithms capable of processing thousands of applications in seconds. However, those

algorithms also exhibited profound gender bias (Dastin, 2018). Amazon's algorithm evaluated applicants' qualifications and ranked them based on data extracted from candidates hired in previous searches. As most of the earlier hires were men, the algorithm penalised CVs that included the word 'women's' (Johnson, 2019). This shows that algorithms can reiterate and amplify an organisation's historical practices and culture and may exhibit bias and discrimination if data selected to train algorithms is not carefully selected and duly audited.

Secondly, bias can occur due to the technical specifications of the algorithm, i.e. in defining the target variables and class labels and the selection of model features. A video interviewing platform has recently come under scrutiny for using semi-automatic algorithmic models to predict job performance of prospective employees based on their facial movements, word choice and voice (Harwell, 2019). The video interviewing platform states that its algorithmic model does not analyse characteristics such as age, gender and race. However, it does not reveal the variables used to predict the 'top performers', so potential gender and culturally biased assumptions about facial expressions and mannerisms cannot be ruled out. This can penalise those who do not fit the look, for example, or who have a disability such as a speech impairment (Bogen and Rieke, 2018; Engler, 2019; Harwell, 2019). Speech and facial recognition software have been proven to perform poorly when dealing with the voices and faces of women and non-white people (see section 1.5.1) (Buolamwini and Gebru, 2018). A flawed recognition system can generate discriminatory and unfair outcomes by giving less accurate performance scores to these groups of people, exacerbating the fact that error rates are already higher by default due to model specifications and biased data used to train the models (Bogen and Rieke, 2018; Buolamwini and Gebru, 2018).

Thirdly, the lack of human supervision, output auditing, and due diligence assessments of the ways in which the algorithms interact with other systems (e.g. ad delivery systems on social media sites) can also embed bias. A study by Lambrecht and Tucker (2016) tested STEM job ad delivery through Facebook in more than 190 countries, replicating the results on Google, Twitter and Instagram. They found that the ad was designed to be gender-neutral, yet was shown to fewer women than men across these four major advertising platforms. This was because the cost-optimising algorithm determined it was more expensive to show it to women. Briefly, in the online advertising market, women are considered a prized demographic because they tend to control household income and engage in ads, making them more likely to make ad-based purchases. As a result, social media platforms seeking to maximise profits by reducing costs delivered the ad to more men. Without due diligence and impact assessment of automated recruitment tools – including an awareness of what the algorithm is optimised for, as shown in this example – even ads intended to be gender-neutral can have clearly discriminatory outcomes.

1.3.2. Algorithmic scheduling and task allocation disadvantage women

Algorithmic workforce management tools are commonly used for the allocation of shifts and tasks. Automatic scheduling software has become an especially popular tool to optimise scheduling and task allocation in female-dominated fields such as the retail and hospitality sectors (Parent-Thirion et al., 2019). It relies on a wide range of data (consumer behaviour, sales, seasonal patterns of consumption) to determine labour needs and make decisions about scheduling and task allocation (Mateescu and Nguyen, 2019a).

Automated scheduling is sometimes presented as a predictable and stable alternative to current 'on-call' shifts in the hospitality and retail industries (Briône, 2020). In practice, however, it is a continuation of the growing trend of 'just-in-time' scheduling by allowing the allocation of shifts at short notice, based on hourly, daily or weekly consumer traffic (De Stefano, 2016; Mateescu and Nguyen, 2019a). Automated scheduling technologies contribute to increasing scheduling uncertainty and pose a challenge to the work-life balance of women, particularly lone mothers, who remain the primary providers of unpaid domestic and care work (EIGE, 2018; Rani and Grimshaw, 2019; Petrongolo and Ronchi, 2020). Unstable schedules increase stress and exacerbate work and income

uncertainty, as workers' incomes vary depending on their schedules. Those same fluctuating schedules prevent them from undertaking additional jobs to supplement their income or compensate for cancelled shifts (Brody, 2018). For workers whose work pattern is entirely or mostly unpredictable, the EU Directive on Transparent and Predictable Working Conditions requires employers to inform them of the reference hours and days within which they may be required to work, the minimum period of advance notice before the work starts, and the number of guaranteed paid hours.

Here again, the lack of transparency on the criteria and metrics used to make decisions about schedules is concerning. For example, algorithmic scheduling software could use data on workers' past employment patterns, shift swaps, requested absences and sickness leave to allocate new tasks and shifts. Workers with care responsibilities are more likely to have a fragmented work history and schedule, meaning they may be allocated less predictable and stable shifts in the future. If algorithmic scheduling uses prior performance metrics to allocate tasks and shifts, it raises the question of what is considered good performance. Certain skills that are more difficult to quantify, such as emotional intelligence, empathy, and teamwork, may not be included in the performance metrics used for shift allocation (Mateescu and Nguyen, 2019a, 2019b; Briône, 2020). Performance-based metrics can place a lot of psychological pressure on workers, prompting them to focus on improving the evaluated metrics rather than focusing on overall task delivery.

Algorithmic scheduling can increase '**digital wage theft**', where employers use time-tracking software that generates detailed records of activities that are then used to deduct 'low productivity time' from paid work time (Detrixhe, 2018). Women are more vulnerable to digital wage theft, given their higher participation in atypical, informal or flexible employment, as well as in sectors such as healthcare, service, and retail (Petrescu-Prahova and Spiller, 2016). Digital wage theft can also occur through rounding, where software is set to alter employees' start and finish times according to pre-defined increments (typically the nearest quarter hour). Similarly, automatic break deductions occur when the system deducts pre-set time increments for lunch or other breaks, regardless of whether or not the break was taken (Tippett, 2018). In healthcare, for example, workers are required to be constantly alert and reactive to changing situations, which may prevent them from taking breaks. Nurses in critical units often do not use their full lunch break or other break periods and often continue to work after their shift ends.

While wage theft is not exclusive to algorithmic management of the workforce, the lack of transparency and accountability makes these issues far more difficult to identify and address in the use of automated systems.

1.3.3. Invasive monitoring and surveillance tools penalise 'non-standard' performance and workers with care responsibilities

A wide range of sophisticated tracking and monitoring technologies are available to track workers' activities in real-time. These technologies include not only time-keeping applications and devices, but also tools and wearables to track biometric data, location, on-site and online activities. The granular surveillance of workers' behaviour, movements and actions on a minute-by-minute basis has been on the rise in traditionally male-dominated sectors (e.g. manufacturing, logistics), but is increasingly used in platform work and other sectors, such as IT, finance and accounting, and the legal industry (De Stefano, 2016; Briône, 2020).

Evidence shows that many algorithmic monitoring and surveillance practices are highly invasive and potentially discriminatory (De Stefano, 2016; Mateescu and Nguyen, 2019a). Firstly, they often penalise those who do not fit the 'standard' patterns of movement, speed, behaviour or working practices. The standard is often based on the patterns most representative of those of an able-bodied male (De Stefano, 2016; Mateescu and Nguyen, 2019a).

For example, Amazon has a patent for a wristband that can track warehouse workers' every move, nudging them (through vibrations) where they are judged to be under-performing. Tracking every move, pause and break (Yeginsu, 2018), the wristband raises substantial concerns for privacy. There is also a question as to whether it takes gender data into account, such as women using a restroom more often and for longer periods due to physiological reasons, including menstruation and pregnancy (Plaskow, 2008).

Secondly, these systems penalise workers who cannot work uninterrupted for longer periods of time, such as women with caring responsibilities. During the COVID-19 pandemic, employers increasingly use surveillance technologies, including camera and keystroke monitoring, to keep track of their remote-working employees (Skelton, 2020). This is particularly concerning, given that the closure of schools and the lack of availability of social support systems create a greater burden of care and education for workers with caring responsibilities, especially women and lone mothers (EIGE, 2020a). The use of surveillance technologies can disproportionately affect workers who are teleworking and have to leave their desks to attend to their children, or who are interrupted by family members.

Finally, the collection of non-work-related data poses another significant concern. Through wearable technology, company-sponsored health and wellness applications, plans and programmes, and various online behaviour trackers, companies gain access to potentially sensitive non-work-related data, such as health data (De Stefano, 2016; Mateescu and Nguyen, 2019b). The blurred line between work-related and non-work-related data may lead to the collection of information about underlying health conditions, pregnancy or disability. This data could then be used in algorithmic prediction or evaluation tools and potentially lead to bias and discrimination, affecting a worker's employability and access to health insurance and social security (Mateescu and Nguyen, 2019b).

1.3.4. Algorithmic performance review and evaluation are likely to underrate women

AI-based systems have transformed how work performance is evaluated (Ducato, Kullmann and Rocca, 2018). More specifically, AI-based performance evaluations use data collected through customer evaluations and surveys, and through automated tracking and monitoring software that sets performance benchmarks. This collection of real-time data on employee behaviour may identify and deter rule-breaking behaviour. However, bias may exist in customer-sourced reviews, performance benchmarks and universalised targets that can systematically underrate women's performance (Mateescu and Nguyen, 2019b; Briône, 2020).

Customer-sourced review and rating systems are increasingly used in chain restaurants, call centres, freelancing sites and particularly platform work. After service is delivered, customers are prompted to rate and evaluate workers' performance, often in form of a five-star rating or other forms of a satisfaction survey. Despite their potential to encourage workers' accountability and inform customer choices, customer-sourced ratings may simply reflect customer bias and eventually lead to discriminatory outcomes (Ducato, Kullmann and Rocca, 2018). Various studies have found bias in performance evaluations by managers (Castilla, 2008; Elvira and Town, 2001), online evaluation of teachers (Mitchell and Martin, 2018) and customer reviews and ratings in online market places (Hannák *et al.*, 2017). However, customer-sourced review and rating systems allow customers to directly express their biased preferences in ways that companies do not permit, thus perpetuating bias without consequence (Rosenblat *et al.*, 2017; EIGE, 2020a). Biased reviews can affect future prospects for promotion or new employment (Ducato, Kullmann and Rocca, 2018). This is especially concerning when review and rating systems give workers no possibility of challenging customers' views or indeed submitting evaluations of customers' behaviour (EIGE, 2020b). In online marketplaces, customer rating and review data may feed into recommendation and search systems for workers. Biased customer reviews can therefore negatively affect workers' remuneration, their ability

to continue working in online marketplaces and platforms, and access to other employment opportunities (Hannák et al., 2017).

By contrast, performance benchmarks are created by tracking workers' behaviour, speed of movement, and typical output per hour. Based on real-time data, these benchmarks can be used to 'nudge' workers to adjust their behaviour if the benchmarks are not being met. Real-time performance benchmarks create a stressful work environment, pressuring workers to meet demanding and constantly shifting efficiency benchmarks that set universalised targets for all workers (De Stefano, 2016; Mateescu and Nguyen, 2019b; Briône, 2020). Universalised performance targets are not neutral, as they often do not take into account physical and other differences between workers. With an increasingly diverse workforce, the use of demanding universalised targets can increase safety and health risks and stress levels (Moore, 2018).

Universalised targets may systemically disadvantage certain groups of workers. Women entering occupations that typically employ men (e.g. factory, storage or logistics centre) may be disadvantaged if performance or speed benchmarks are determined by universalised performance rates of all workers in the setting (Moore, 2018). As these benchmarks only measure those aspects of work that are easy to quantify, they leave out other aspects, such as preparatory work, emotional and affective labour and customer relations, which is often carried out by women and remains largely unacknowledged (Moore, 2018). Therefore, using quantitative performance metrics to inform decisions about promotion and compensation may negatively affect women. If performance metrics are supplemented with industry data on average salaries, which tend to be higher for men, there is a high risk that the combination of performance metrics and external data could perpetuate the gender pay gap.

1.4. The emergence of contingent labour via digital labour platforms

The growth in the number of workers engaged in non-standard forms of employment is changing conventional norms about where and when work is performed and the overall structure of work as we know it (Petrongolo and Ronchi, 2020). Technological developments have not only changed work patterns and places of work, they have also led to the emergence of new forms of work and flexible working arrangements (Santana and Cobo, 2020) and changed the relationship between employer and employee (Eurofound, 2015). These developments have significant implications for working conditions and the labour market in general, including gender equality.

Digital labour platforms are the most prominent products of technological advances transforming the labour market in the past decade. On the one hand, platforms incorporate elements of firms and markets, as they bring together supply and demand for a certain good or service, and directly manage the transaction. On the other hand, however, they can also transcend traditional markets, with some arguing that they provide more transparency and efficiency and expand the range of economic activity (Pesole et al., 2018).

Box 1. Definition of platform work

While a precise definition is still evolving, Eurofound defines platform work as 'a form of employment that uses an online platform to enable organisations or individuals to access other organisations or individuals to solve problems or to provide services in exchange for payment' (Eurofound, 2018b). Eurofound notes the main features of platform work as follows:

- Paid work is organised through an online platform;
- Three parties are involved: the online platform, the client and the worker;
- The aim is to carry out specific tasks or solve specific problems;
- The work is contracted out;
- Jobs are broken into tasks;

— Services are provided on demand.

The Eurofound definition of platform work clearly distinguishes between digital labour platforms (e.g. TaskRabbit, Freelancer, Deliveroo, Uber), which encompass platform work, and digital capital platforms (e.g. Airbnb, Etsy), where income is not generated through labour and which therefore do not constitute platform work.

Platform work can be further classified into two types, based on whether workers can work online remotely or must meet the client/go to a specific place to implement the task:

- **Digital labour markets for (remote) web-based services:** remote delivery of electronically transmittable services (e.g. freelance marketplaces), also referred to as cloud work (Duggan et al., 2020), crowdwork (Popiel, 2017), online freelancing or global-reach platform work (World Economic Forum, 2020a).
- **Digital labour markets for on-location services:** delivery of services is physical, while matching and administration services between customers and service providers are digital (e.g. transportation, cleaning or delivery services), also referred to as 'app work' (Duggan et al., 2020), location-based digital labour, or mobile labour markets (Schmidt, 2017).

In platform work, algorithms have two main purposes - to match customers with workers and to evaluate worker performance on platforms (Duggan et al., 2020). Algorithmic management is commonplace within platform work. Digital platforms use algorithms to perform tasks that are undertaken by human resources staff in the traditional workplace, such as worker assignment (matching work demand and supply) and performance monitoring and management, without the need for face-to-face interaction. In practice, AI-based algorithms are used by the platform provider to manage interactions between platform users, both service providers and their clients (Schmidt, 2017).

In platform systems, working relationships are no longer comparable to those in the traditional labour market. One of the clear purposes of using AI-based systems to manage the workforce is to cut costs, which means that all aspects of management that can be outsourced usually are (Schmidt, 2017; Duggan et al., 2020). By eliminating some management structures in platform work, human resource management services are often outsourced to the users themselves, with individual workers self-assigning their jobs (e.g. as software developers, transcribers, drivers). In the context of performance evaluation, if clients are not satisfied with the results and rate their satisfaction with a particular worker as low, these workers can be algorithmically rejected from future jobs, either by blocking their account on the platform or by making certain jobs invisible to them at the front-end of the platform interface (Schmidt, 2017).

The emergence of platform work affects women and men in different ways (EIGE, 2020b). Some earlier assessments emphasised the potential of platform and internet work to contribute positively to gender equality, for example overcoming the cultural stereotypes that lead to gender segregation and offering stay-at-home mothers an opportunity to work⁽⁶⁾. More recent studies, however, either do not take a gender perspective of the shifts and changes stemming from the rise of platform work, or conclude that there is insufficient evidence to determine gender effects. Chapter 2 seeks to close these data gaps by presenting comprehensive evidence on

⁽⁶⁾ See, for example, Kuek S.C. et al. (2015). The global opportunity in online outsourcing. Washington, DC, World Bank; Codagnone C., Abadie F. and Biagi F. (2016). The future of work in the 'sharing economy', Joint Research Centre (JRC) Science for Policy Report EUR 27913. Seville, Institute for Prospective Technological Studies. Hyperwallet (2017). The Future of Gig Work is Female: A study on the behaviours and career aspirations of women in the gig economy.

working conditions and work patterns of women and men engaged in platform work from a gender perspective in the EU, drawn from a large-scale EIGE 2020 survey.

1.5. AI impacts the reproduction of gender stereotypes, sexism and discrimination

With the greater adoption of AI systems across a wide range of sectors, societal-level biases can translate into systemic discrimination and gender inequalities in the labour market. The previous sections described how the use of AI is changing work and working conditions. This section focuses on gender bias in the design of AI systems, including its sources and mitigation strategies. It also looks at the role of AI in perpetuating gender stereotypes and sexism and, finally, new risks for gender-based violence, including cyber violence.

1.5.1. Reinforcing gender stereotypes in AI design

Gender bias is often embedded in AI design, reflecting, amplifying and scaling broader societal norms, views, and personal biases of those who design these systems. Bias in design means that AI systems' default operational mode is discriminatory, exclusionary or sexist. While a certain margin of error in classification may be acceptable, bias in this context means that for some demographic groups, such as women, there is a greater level of error (Feast, 2019). This occurs when the design of new machine learning algorithms is based on incomplete datasets, when labels used for training algorithms are biased, and when analysis and modelling techniques are biased.

When biased AI systems are embedded into workforce management tools, they can have discriminatory and exclusionary outcomes. One example is the use of facial and voice recognition technologies to identify employees and ensure security, track attendance, or monitor performance. These technologies have been found to have lower accuracy rates for women and non-white people compared to white men (Simonite, 2017, 2018; Bajorek, 2019). A study of three major gender classifiers used in facial recognition technology produced by IBM, Microsoft and Face++ found that facial recognition technology is more accurate in recognising male faces than female faces, with a difference in error rates ranging from 8.1 % – 20.6 %. These systems were also found to be more accurate for lighter faces than darker faces, with a difference in error rate between 11.8 % and 19.2 %. The highest error rates – and thus the least accurate performance of these systems – were found for darker female faces, with error rates ranging from 20.8 % – 34.7 % (Buolamwini and Gebru, 2018). This was the result of a training dataset that lacked female voices or images (i.e. incomplete datasets), was erroneously labelled by humans (label misclassification), or machine learning models were optimised for white male faces and voices (analysis and modelling techniques) (Feast, 2019). Algorithmic management tools built on biased AI systems have substantial implications for equal treatment and opportunities in the workplace. These tools pose major challenges for the current EU and national anti-discrimination and data protection laws, which are yet to develop legal remedies to bias in AI (Xenidis and Senden, 2020; Zuiderveen Borgesius, 2020).

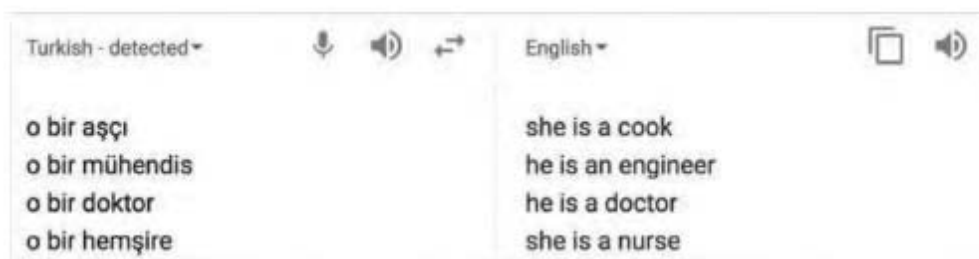
AI-based technology can reinforce gender stereotypes to achieve better marketing outcomes. Digital/virtual assistants, such as Alexa, Cortana and Siri, intentionally exhibit female features, including their names and voices, and are depicted as helpful, sympathetic and pleasant. They perform secretarial tasks traditionally assigned to women, such as scheduling and setting reminders (Catalyst, 2019; UNESCO, Kraut and Chew, 2019). The feminisation of voice assistants is significant, as virtual assistants have become ubiquitous and human-computer interaction is becoming increasingly hands-free and reliant on voice (UNESCO, Kraut and Chew, 2019). The design of voice assistants reaffirms gendered ideas about women being subservient and always available (at the touch of a button), and even flattered by sexual harassment and verbal abuse (UNESCO, Kraut and Chew, 2019). Such examples may contribute to the normalisation of gender stereotypes and even gender-based violence, particularly through verbal sexual harassment. AI research organisations in Denmark developed voice assistants with

genderless voices, such as Q, with the intention of breaking down stereotypes and the gender binary, as well as promoting inclusion and diversity through technology (7).

The ways in which products are marketed and disseminated to the public shape the demand for stereotypical AI product design. For example, one CEO of a tech company said that he 'gave his digital assistant a 'helpful, young Caucasian female' voice because commercial success exerts 'a kind of pressure to conform to the prejudices of the world' (Ward, 2017). Similarly, in a study conducted in Germany, participants rated robots that were assigned either stereotypically male personality traits, such as confidence and assertiveness, or stereotypically female personality traits, such as agreeability and politeness (Kraus et al., 2018). Male-identified robots were rated as more trustworthy, reliable and competent, while female-identified robots were rated as more likeable. The study also found that participants preferred robots whose gender features matched those typically associated with certain occupations, reacting better to female robots in healthcare and service, and male robots in security services. This serves to highlight that efforts towards trustworthy AI must be accompanied by attempts to tackle the root causes of gender inequality.

Another well-documented example of how algorithms perpetuate and amplify gender stereotypes are AI-powered algorithmic translation tools that produce biased translations. In recent years, translation tools, such as Google Translate, started using Neural Machine Translation (NMT), which is a machine learning algorithm that uses neural networks on enormous amounts of data. If trained well and with enough data, those algorithms can learn how to produce sentences that are fluent from start to finish. However, when NMT is trained on examples from a biased world, it reflects those biases in its translations. This bias became evident when Google started translating from non-gendered to gendered languages. For example, when translating sentences related to professions, it would provide only one (stereotypical) translation for a query, even though the translation could have both a feminine and masculine form (Figure 3). The translation algorithm would simply use the pronoun that was most frequently associated with that profession, not realising that it had learned a sexist view of the world. There are ongoing efforts to address gender bias on Google Translate (Kuczarski, 2018).

Figure 3. Google translate output from gender neutral to gendered language



Source: Kuczarski (2018).

Key factors to explain the persistent gender bias in algorithmic decision-making are the **lack of diversity among professionals who design, code, engineer and programme AI technologies and the male-dominated leadership of the major tech companies**, combined with their lack of gender sensitivity (Simonite, 2017, 2018; Whittaker et al., 2018) (see section 1.2.1). The lack of diversity among AI experts and designers explains the lack of interest and research in algorithmic bias and associated risks. More diverse teams may have greater awareness of potential sources of bias and be more likely to flag problems that could have negative social consequences before a

(7) <https://www.genderlessvoice.com/about>

product is launched. For example, they could highlight the limited representation of certain demographic groups in training datasets, label data with greater accuracy, test the limitations of image searches and facial and voice recognition systems, and flag stereotypical or sexist design features (Simonite, 2018). The lack of diversity in tech company leadership has an impact on the issues prioritised for investment and research, or considered of strategic importance. Issues of bias are more likely to be prioritised by more diverse leadership. The current lack of diversity has directly influenced the limited attempts to address algorithmic bias embedded in Big Data, training datasets and predictive models, all of which continue to carry the risk of perpetuating and amplifying gender stereotypes (Johnson, 2019).

1.5.2. New forms of gender-based violence emerge with the use of AI technology

The gendered design of digital assistants (see section 1.5.1) may contribute to the normalisation of gender-based violence. The subservience and servility 'embodied' by the industry's leading voice assistants are of particular concern when digital assistants are exposed to verbal sexual harassment (UNESCO, Kraut and Chew, 2019). Studies have shown that digital assistants exposed to verbal sexual harassment typically evade abuse by asking the user to submit another query, or respond to abusive language positively or in a flirtatious manner. These assistants are presented as female, increasing the risk of reinforcing the image of women as compliant and forgiving, while normalising sexual harassment and abusive language towards women (Catalyst, 2019; UNESCO, Kraut and Chew, 2019). This normalisation of abusive language towards representations of women in technology may, in turn, normalise overt hostility towards women offline, both within and beyond traditionally masculine sectors.

New technologies facilitate new forms and venues for gender-based violence, both within and outside the workplace. For example, in the workplace, due to the increasing reliance on the internet and technologies to complete tasks, many employees face an increased risk of cyber harassment, cyber bullying, and data theft. Available research suggest that women are disproportionately the targets of cyber violence compared to men (EIGE, 2017a) and such issues are typically not covered by current anti-harassment policies or internal corporate guidelines. With the increasing use of algorithmic management tools that may remove human managers from the decision-making process, the reporting procedures for such incidents are increasingly unclear and thus more difficult to address (Moore, 2018).

A highly concerning example of the new form of gender-based violence enabled by AI and machine learning is the proliferation of deepfake pornographic videos that almost exclusively target women and inflict substantial harm on their personal and professional lives. Deepfake videos are produced by using AI to merge, combine, replace and superimpose images and video clips onto a video, creating a fake video that appears authentic. With the current state of technology, availability of data, and even the proliferation of specialised deepfake apps for smartphones, anyone can produce fake videos using explicit content without the consent of those involved.

Machine learning algorithms could be also used to recognise and remove harmful content, ranging from hate speech to so-called revenge porn ⁽⁸⁾ to deepfakes. However, given that AI algorithms self-calibrate over time, it can become very difficult to assess the authenticity of a video. While deepfake video production and use is on the rise, there is little parallel AI research on face manipulation detection, with a resulting lack of datasets to assist in

⁸ Non-consensual pornography (the most common form of which is known as 'revenge porn') involves the online distribution of sexually graphic photographs or videos without the consent of the individual in the images. The perpetrator is often an ex-partner who obtains images or videos in the course of a prior relationship, and who now aims to publicly shame and humiliate the victim, in retaliation for ending a relationship (<https://eige.europa.eu/thesaurus/terms/1488>).

the detection of face manipulation and other alterations (Maras and Alexandrou, 2019). The difference in the pace of development between deepfakes and face manipulation detection AI systems may reflect the general bias in the industry, whereby issues of gender equality and social justice are less of a priority. These differences may also reflect technical and procedural issues, such as the need to collect new types of data that is either still scarce or has yet to be systematically collected.

2. Working conditions, work patterns and work-life balance of platform workers from a gender perspective

Between November and December 2020, EIGE carried out an online panel survey ⁽⁹⁾ of platform workers. The survey sought to **increase understanding of working conditions, work patterns and work-life balance of women and men engaged in platform work from a gender perspective**. The countries surveyed included Denmark, Spain, France, Latvia, the Netherlands, Poland, Romania, Slovenia, Slovakia and Finland. These countries were selected to ensure a diverse coverage of relevant aspects, such as geographical heterogeneity and prevalence of platform work, different levels in digital performance and gender equality (as illustrated by the Digital Economy and Society Index (DESI) and EIGE's Gender Equality Index) and distinct welfare and social protection systems.

Several studies and surveys of platform workers have been conducted to date, including at EU level. However, general knowledge on platform work is still scarce, with a gender perspective in both the conceptualisation of the study and interpretation of the findings essentially unavailable (European Parliament, 2017; Pesole et al., 2018; Huws et al., 2019; Piasna and Drahokoupil, 2019; Urzi Brancati et al., 2020). EIGE's survey of platform workers fills in this knowledge gap and focuses on gender dynamics in various areas central to gender equality in the labour market, such as working conditions, work patterns, work-life balance, the division of unpaid care, and multiple discrimination. Both **the survey design and data collection timeframe ensured coverage of the impact of the COVID-19 pandemic**. This makes the latter platform work survey unique, not only in providing a gender perspective, but in gathering information on the experiences of women and men platform workers during the COVID-19 crisis.

The survey was conducted using opt-in online panels ⁽¹⁰⁾. It covered daily internet users, with the aim of identifying platform workers among them. To increase the chances of capturing platform workers, the survey targeted the demographic groups in which more platform workers are identified ⁽¹¹⁾. Of the 15,809 daily internet users who accessed the survey, platform workers were defined as those respondents who have ever worked on digital labour platforms, with the final validated sample comprising 4,932 platform workers, aged between 16 and 54 years. The sample size across the selected Member States ranged from 364 respondents in Denmark to 542 respondents in Slovakia. Regular platform workers were defined as those who worked on digital platforms at least occasionally ⁽¹²⁾ in the past six months. This applied to two-thirds (63 %) of platform workers ($n = 3,088$). Post-stratification weighting was carried out to adjust for the differences between the sample and population distributions on key variables and to ensure that the sample accurately reflected the socio-demographic structure of the target population (see methodology report for details).

The questionnaire included 39 questions. The first two sections were used to identify platform workers in the full sample, with a further 11 sections. Of those, nine were used to collect responses from respondents who had ever

⁽⁹⁾ An online panel survey (or web or internet panel) refers to a sample database of potential online respondents willing to respond to web questionnaires. More information is available at: <https://research.google/pubs/pub42493/>

⁽¹⁰⁾ The sampling of survey respondents was implemented using consumer panel aggregator, CINT. CINT has access to 50 million members of the public through opt-in access panels in over 80 countries.

⁽¹¹⁾ Previous experience with conducting COLLEEM surveys was used to prioritise panel groups with higher expected prevalence of platform workers (e.g. those in the categories of internet, e-commerce, IT, media, telecommunication, tourism, human resources).

⁽¹²⁾ Working at least occasionally pulls together three answer categories: I worked irregularly or occasionally, from time to time; I worked regularly for a period of less than three months; and I worked regularly for a period of more than three months.

worked via online platforms. One section on work patterns and another on the motivation to work on digital platforms focused on regular platform workers, for whom these issues were likely to be most relevant.

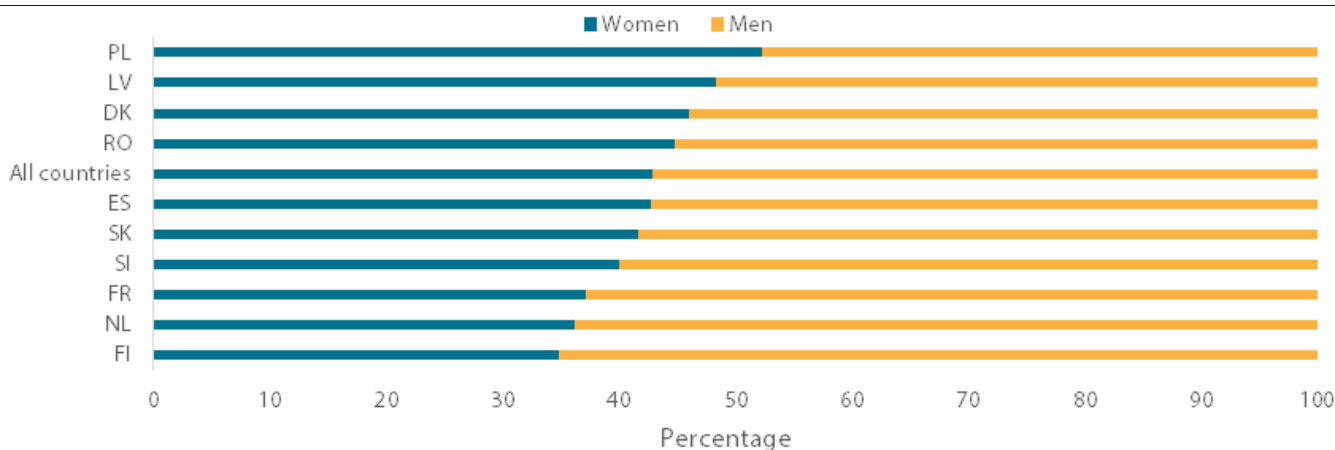
2.1. Profile of platform workers: young, highly educated, and with care responsibilities, especially among women

- Although there are still fewer women than men platform workers in the selected countries, on average, ‘gender neutral’ participation is noted in platform work (i.e. occupations or sectors have 40-60 % of employees of one gender (EIGE, 2018).
- In recent years, the share of women platform workers is increasing, partly due to the COVID-19 pandemic and the related acceleration of digital forms of work.
- Both women and men platform workers in the survey were relatively young, with a major share being highly educated. More than half of women and men platform workers had caring duties for dependent children.

Earlier studies in the EU found that women tend to be underrepresented in platform work and that, generally, platform workers tend to be young and very well educated (European Parliament, 2017; Pesole et al., 2018; Huws et al., 2019; Piasna and Drahokoupil, 2019; Urzi Brancati et al., 2020). The two waves of the collaborative economy and employment (COLLEEM) survey in 2017 and 2018 noted that ‘the profile of platform workers [was] becoming less male-dominated as more women [were] starting to work via digital platforms’ (Urzi Brancati et al., 2020, p. 21). EIGE’s survey looks at later trends and provides a further socio-demographic profile of women and men platform workers.

Across the 10 countries surveyed, there were fewer women (42 %) than men (58 %) platform workers. The share of women was almost close to that of men in the 25-34 age group (46 % and 54 %, respectively), whereas an underrepresentation of women (37 %) was observed among those aged 35 and older. The share of women varied quite substantially across the Member States, ranging from almost half in Poland and Latvia, to about one-third in Finland and the Netherlands (Figure 36 in Annex 4). The equivalent age distribution was also observed among regular platform workers, of which 43 % were women and 57 % were men (Figure 4). The highest share of women was observed in Poland (52 %) and the lowest was in Finland (35 %).

Figure 4. Regular platform workers, by country and sex (%)^a

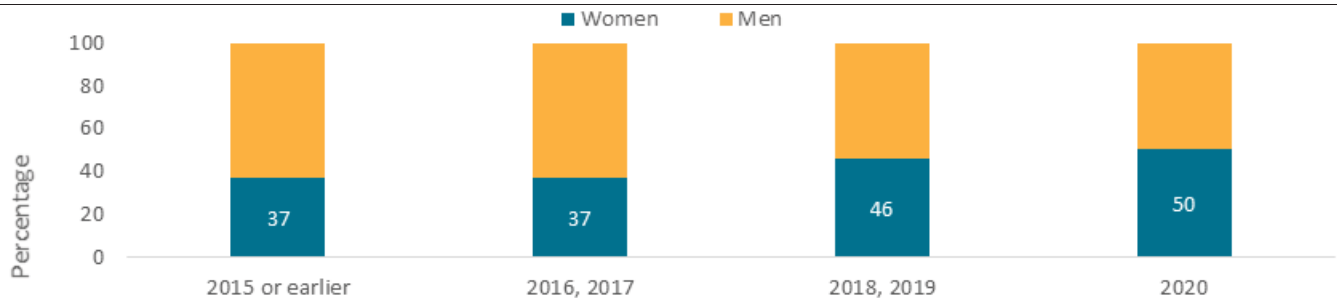


Source: EIGE (2020), Online panel survey of platform workers.

Note: ^a Of regular platform workers (n = 3,088); weighted results.

The trend towards gender balance in platform work pre-dated the COVID-19 pandemic. The share of women among regular platform workers who started platform work in 2017 or earlier was around 37 % (Figure 5). During 2018-2019, the women's share of new platform workers increased to 46 %, going on to reach 50 % in 2020. Similar observations were found in other studies, which also noted that the share of women platform workers is on the rise in recent years (e.g. Urzi Brancati et al., 2020).

Figure 5. Year regular platform workers started platform work, by sex (%)^a



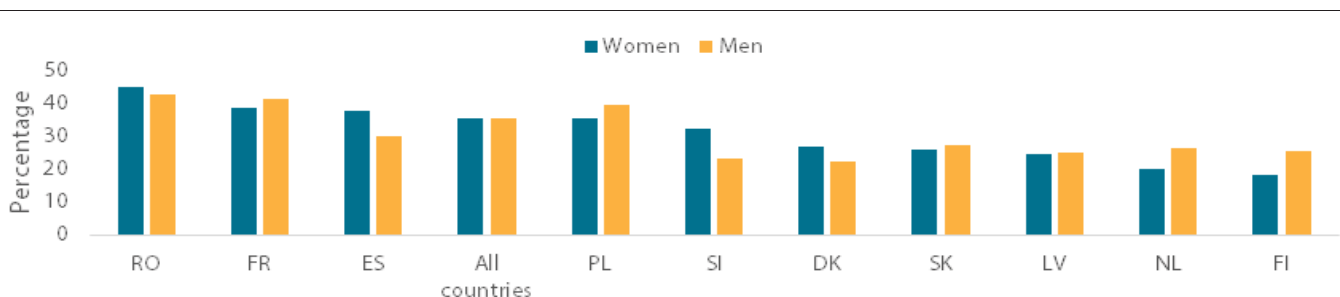
Source: EIGE (2020). Online panel survey of platform workers.

Note: ^a Of regular platform workers ($n = 3,087$); weighted results.

The COVID-19 pandemic and the associated move to digital forms of work increased the attractiveness of platform work for both women and men. As many as 36 % of women and 35 % of men platform workers started or re-started working on digital platforms because of the COVID-19 pandemic (Figure 6) or related policy measures, such as lockdown, quarantine, closure of businesses or schools (see section 2.6.3). In comparison to all platform workers, there was a slightly higher share of women among those whose work is performed completely online. Of this group, women represented 50 % of online platform workers who joined in 2019 and 52 % of those who joined in 2020.

The Member States show significant variation in levels and gender gaps with respect to COVID-19 prompting workers to start or re-start working via online platforms (Figure 6). For example, 45 % of women and 43 % of men platform workers in Romania indicated that they (re-)started working via online platforms due to COVID-19. Similarly, higher shares of women than men were noted in Spain, Slovenia and Denmark. In the remaining six countries, a slightly (SK, LV) or considerably (FR, PL, NL, FI) higher share of men than women indicated that the COVID-19 pandemic had influenced their decision to (re-)start working via online platforms.

Figure 6. Starting or re-starting platform work due to COVID-19, by country and sex (%)^a



Source: EIGE (2020). Online panel survey of platform workers.

Note: ^a Of all platform workers ($n = 4,932$); weighted results.

The high share of platform workers in younger (25-34) and prime (35-54) working ages point to the importance of platform jobs in both early career and more advanced career pathways. Among EIGE's survey respondents, the average age of platform workers was 30 years for women and 32 years for men. The majority of women (43 %) belonged to the 25-34 age group, whereas the women in younger and older age groups constituted about the same share (28 % and 29 %, respectively) (Figure 7). Reflecting a slightly higher average age, a lower share of men

(38 %) was noted in the 25-34 age group, but a higher share (37 %) among those aged 35 or older. Comparatively, COLLEEM reported the average age of platform workers providing services at least monthly as close to 35 years in 2017 and close to 34 in 2018 (Pesole et al., 2018; Urzi Brancati et al., 2020). Although average platform workers are, on average, younger people, most of them are not students: only 6 % of women and 4 % of men platform workers are students.

A high share of highly educated platform workers, especially among women, might imply a rising share of the workforce in precarious and deskilling jobs. In line with previous studies (Eurofound, 2020b), the platform workers in EIGE's survey are well educated, with as many as 47 % of women and 41 % of men having completed tertiary education (Figure 7). The latter shares are much higher compared to the general population. In the EU-27 in 2020, for example, 31.4 % of women and 26.5 % of men aged 15-64 years had attained tertiary level education ⁽¹³⁾. A high share of very well-educated platform workers suggests several things about the positive and negative aspects of platform jobs. In line with the relative youth of platform workers, these jobs can be a stepping stone to enter the labour market. However, given the rising share of platform jobs (Oxford, 2021), this might also imply an increasing risk of workers trapped in low-qualified and precarious jobs (see section 2.3). Emerging studies (e.g. Eurofound, 2020a) note that many highly educated platform workers are at risk of deskilling, as platform work often entails low-qualified tasks.

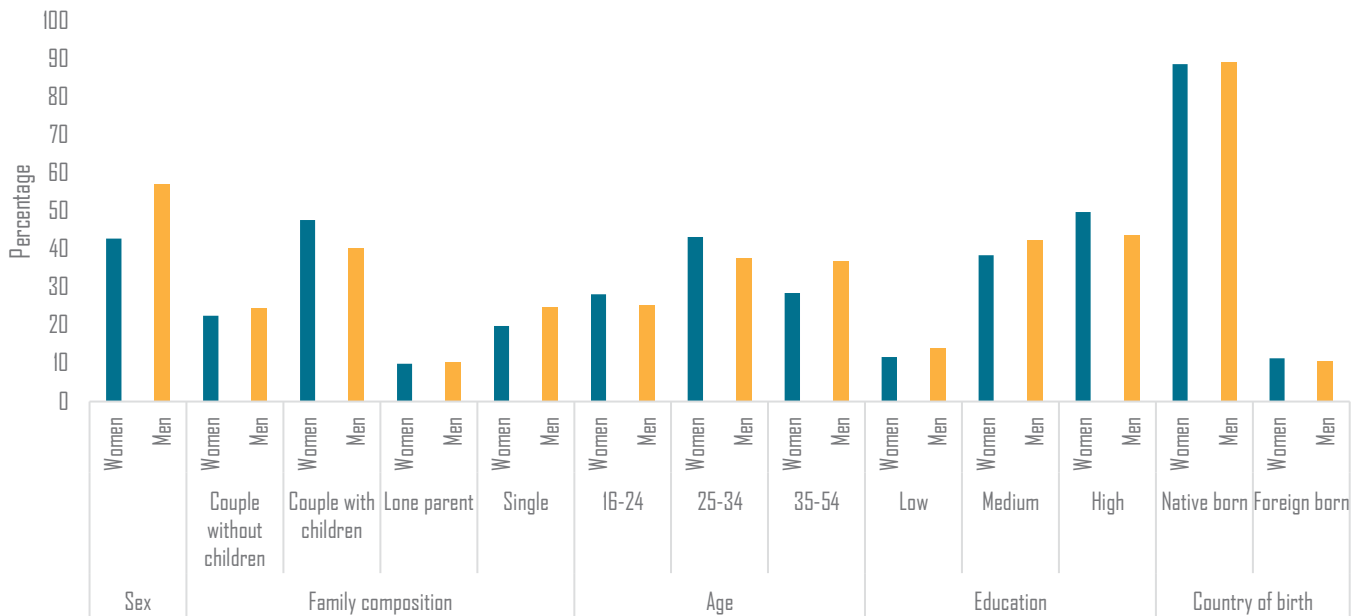
The take-up of platform work is particularly high among foreign-born women and men, which might signal increased barriers to accessing traditional jobs. On average, about 11 % of women and men regular platform workers were born outside of the EIGE's surveyed countries (Figure 7). There was significant variation in the proportions of foreign-born women and men platform workers across the different Member States. In the Netherlands, for example, 27 % of women who regularly worked on platforms were foreign-born, compared to 15 % of men. By contrast, in Poland, only 2 % of women regular platform workers were foreign-born, compared to 10 % of men (Figure 38 in Annex 4).

Despite a slightly younger average age, more women (58 %) than men (50 %) platform workers have children, with the share of lone parents (both women and men) constituting about 10 % of platform workers (Figure 7). Across the surveyed countries, as few as 20 % of women and 25 % of men were single ⁽¹⁴⁾, with the remainder living in couples without children. Household composition indicates that a significant proportion of platform workers have family responsibilities, including caring for dependent children. This suggests that 'platform work may have implications that go beyond the service providers themselves, potentially extending to dependent children and spouses' (Pesole et al., 2018).

⁽¹³⁾ Based on Eurostat 2020 data [edat_lfs_9903].

⁽¹⁴⁾ The sum for women exceeds 100 % due to rounding.

Figure 7. Regular platform workers by sex, family composition, age, education level, country of birth (%)^a



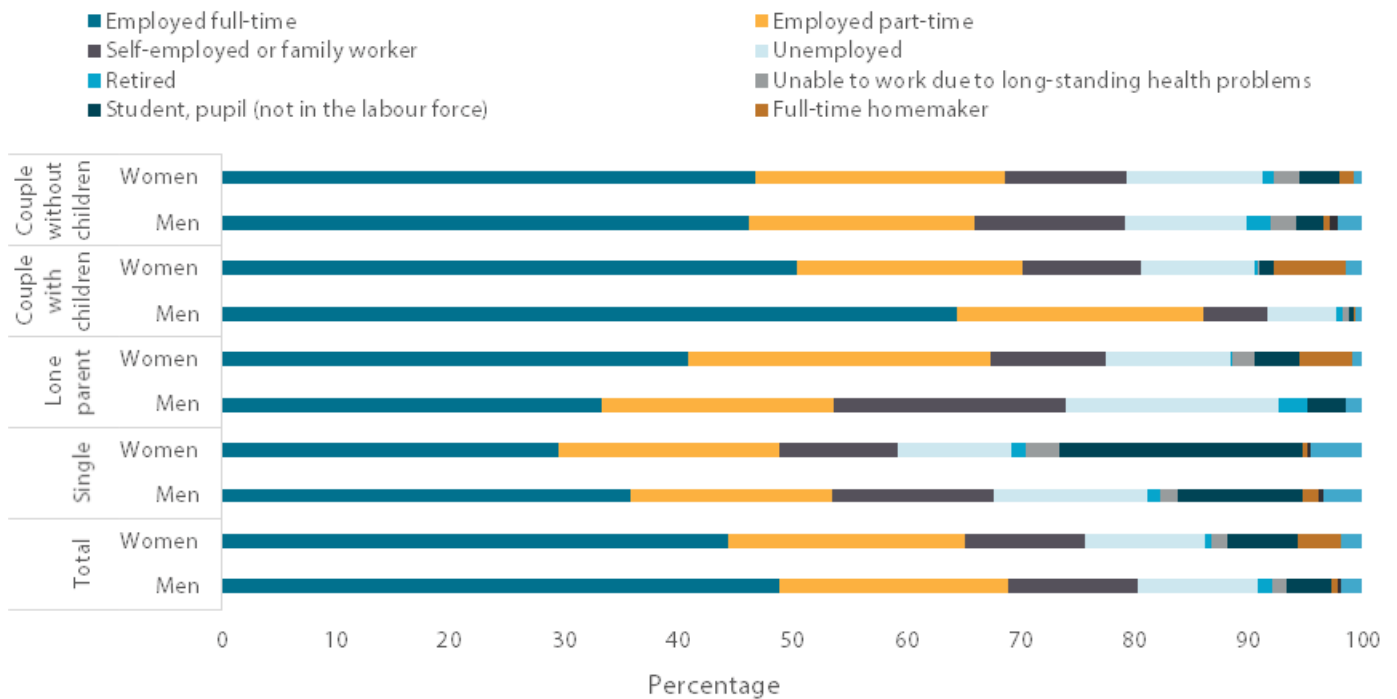
Source: EIGE (2020). Online panel survey of platform workers.

Note: ^a Of regular platform workers (n = 3,088); weighted results.

As many as 76 % of women platform workers and 80 % of men platform workers also have full-time or part-time jobs or are self-employed. EIGE's survey shows that somewhat fewer women than men were employed full-time (44 % of women and 49 % of men) in addition to their platform work. That difference is primarily driven by fewer women living in couples or with children working full-time. Within the latter group, 50 % of women and 65 % of men worked full-time. About one-fifth of women and men platform workers were employed part-time, while about one-tenth were self-employed. One-tenth of the platform workers surveyed indicated that they were unemployed and searching for 'traditional' jobs at the time of the survey (November-December 2020).

Close to 5 % of single women platform workers were retired, with almost 3 % unable to take on traditional jobs due to longstanding health problems. These shares are the highest of all other household types. More than 6 % of women living in couples with children and close to 5 % of women who were lone parents reported being full-time homemakers. That activity status was not observed among men, irrespective of their household composition. Overall, the shares of women and men platform workers across other activity statuses suggest that platform work constitutes primary income for about one-quarter of women and about one-fifth of men.

Figure 8. Platform workers by activity status, family composition and sex (%)^a



Source: EIGE (2020). Online panel survey of platform workers.
 Note: ^a Out of all platform workers ($n = 4,932$); weighted results.

2.2. Income, work flexibility and family commitments as motivating factors to do platform work are still influenced by prevailing gender norms

- Most platform workers, irrespective of their sex, said they worked on digital labour platforms because it is a good way to earn (additional) income and because they can choose when and where they worked.
- However, flexibility of platform work, especially in relation to family commitments, is more important for women than men.

Existing studies refer to the flexibility of platform work as the main motivating factor for engaging in this type of work (Urzi Brancati et al., 2020). The first COLLEEM survey noted that 'the flexibility and autonomy offered by platform work (flexibility on where and when to work, possibility to balance work and family commitments and being one's own boss)' outweighed negative factors (e.g. difficulty finding a regular job) (Pesole et al., 2018, p. 43). Incorporating a gender perspective, EIGE's survey further explored the factors motivating people to work on digital platforms, focusing on flexible and non-standard working arrangements as a work-life balance strategy (EIGE, 2019). Given prevailing gender norms, in particular the perceived family duties of women and men, the initial hypotheses of EIGE's survey was that flexibility of platform work may be a stronger motivating factor for women, while, for men, earning additional income (even at the expense of working longer hours) was expected to feature more strongly.

Figure 9. Motivating factors to work on digital labour platforms, by item and sex (%)^a



Source: EIGE (2020). Online panel survey of platform workers.

Note: ^a Of regular platform workers (n = 3,088); weighted results.

EIGE's survey shows that income and flexibility are important motivating factors overall for both women and men. However, prevailing gender norms partly influence related gender gaps. Challenging initial expectations, a higher share of women (45 %) than men (40 %), who are regular platform workers, indicated that digital labour platforms present a good way to earn (additional) income. The flexibility of platform work, especially in relation to family commitments, was in line with expectations, and was more important for women than for men in most countries. Flexibility, expressed as the ability to choose when and where to work, motivated about 43 % of women and 35 % of men. A higher share of women (36 %) than men (28 %) also indicated that they engage in platform work because they can combine it with household chores and/or family commitments (Figure 9).

Income was less important as a motivating factor for men who started platform work due to the COVID-19 pandemic compared to those who started platform work irrespective of the pandemic. Among respondents who started or re-started regular platform work due to COVID-19, 48 % of women and 39 % of men said they worked on digital platforms because it is a good way to earn (additional) income. A reverse gender gap is noted among regular platform workers who started to work via digital platforms irrespective of the COVID-19 pandemic. Of these, 50 % of women and 55 % of men indicated that they worked via digital platforms as a good way to earn (additional) income.

Important country differences exist in relation to the gender gaps in family commitments as a motivation to work on digital platforms. Across the Member States surveyed, family commitments were indicated by the highest share of women who are regular platform workers in Poland (41 %) and Spain (40 %). Of men, 33 % in Poland and 29 % in Spain noted this motivating factor. In contrast, 16 % of women in Slovenia and Finland indicated family commitments as motivation to work on digital platforms, compared to a higher share of men (18 % in Slovenia and 20 % in Finland) (Figure 44 in Annex 4).

Across different family situations, flexibility of platform work is most important among platform workers who live in couples with children, especially for women. Of the survey respondents, 47 % of women and 38 % of men in couples with children mentioned being able to choose when and where they worked as a motivating factor,

compared to 40 % of single women and 32 % of single men. Lone parents differed from this pattern, with only 35 % of lone mothers and 31 % of lone fathers mentioning the flexibility of platform work. Although both women and men lone parents constitute the same share of platform workers, household chores and family commitments was more often indicated as a more important motivating factor among lone mothers (31 %) than lone fathers (18 %).

Gender gaps in flexibility vary considerably between platform workers with high and low educational qualifications. Flexibility (choosing when and where to work) was more important for women (45 %) and men (38 %) with high educational qualifications than for women and men with low education (at 24 % and 29 %, respectively). These differences between women and men of different educational backgrounds stem partly from different platform jobs and the associated differences in working conditions and worker autonomy (see section 2.7). For example, women and men with low educational qualifications were less likely to indicate flexibility as a motivating factor because fewer of them could actually plan their own work schedules.

Box 2. Foreign-born workers mentioned different patterns of motivating factors

Earning an additional income was the key reason to engage in platform work overall, although this was cited by only 31 % of foreign-born women, compared to 47 % of native-born women. Among foreign-born women, the main reason to work via digital platforms was the ability to choose when and where they worked (37 %). Another important reason to work on digital platforms was working and accessing clients globally (23 % of foreign-born women, compared to 14 % of native-born women). As many as 22 % of foreign-born men worked on digital platforms because they were laid off from their job, compared to less than 10 % among native-born men, native-born and foreign-born women. This reflects the differences in circumstances between native-born and foreign-born respondents, with as many as 45 % of foreign-born women and 52 % of foreign-born men losing their job due to COVID-19, compared to 30 % of native-born women and 37 % of native-born men.

Source: EIGE (2020). Online panel survey of platform workers.

2.3. Platform work is less gender-segregated than the traditional labour market

- Platform work is split along well-known gendered lines, though gender differences are smaller than in the traditional jobs.
- Some traditionally female-dominated and physical presence requiring jobs, like child- or elderly care services, housekeeping and other home services, even show gender balance as digital platform jobs. Fewer women than men, nonetheless, provide delivery services.
- Platform work—and remote work in particular—has been especially important for women (more so than for men) as a strategy to mitigate the negative effects of the COVID-19 pandemic.
- Highly educated women are more likely than men to provide various low(er)-skilled services on digital labour platforms, pointing to a greater risk of deskilling for women.

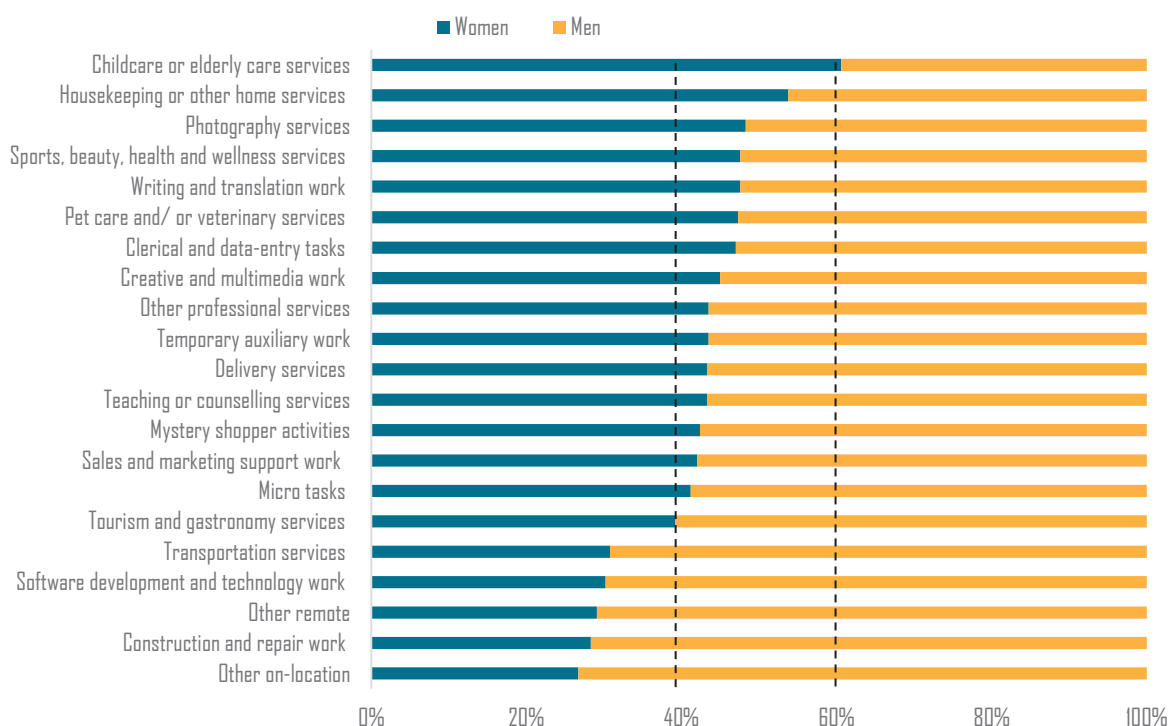
Previous studies have shown that platform work follows similar patterns of gender segregation as traditional labour markets. Huws et al. (2017) found that women are less likely than men to seek out platform work that involves driving or is performed outside the home. Piasna and Drahekoupil (2019) found that women are more likely than men to engage in click work or other freelance work, except for IT services, which are dominated by men. EIGE's survey generally supports these findings, noting that significantly more women than men platform workers provide childcare and elderly care services, whereas men dominate platforms jobs in construction, software development or transportation (Figure 10). In addition, the EIGE survey shows that **while much of**

platform work is split along well-known gendered lines, the occupational choices by women and men seem less restricted than in the traditional labour market.

Traditionally female-dominated sectors such as housekeeping and other home services as online platform jobs show gender balance, with close to 54 % engagement of women (Figure 10). This compares to a share of women as high as 89 % in domestic work in the overall labour market in the EU (EIGE, 2021a). Similarly, as platform work, the traditionally male-dominated delivery sector has also altered traditional gender divides. Although across the countries surveyed, fewer women (43 %) than men (57 %) provide delivery services, the gender difference is not very large (14 percentage points (p.p.)). This is in contrast to a Deliveroo survey in the UK in 2018, which showed that 93 % of their couriers were men (Public First, 2018). The EIGE survey suggests that an increasing share of platform workers in general and diversification of delivery jobs across platforms might be changing gendered attitudes towards delivery jobs as ‘typical’ for men.

The EIGE survey also suggests that women and men who rely more heavily on platforms for work (see section 2.4) are less likely to avoid occupations traditionally dominated by the other gender. For example, while only 7 % of women have performed construction and repair work via platforms as a secondary activity, 14 % of those who primarily work through platforms have done so. These shares are almost the same for men, regardless of whether they work through platforms primarily or as a secondary activity (19 % and 17 %, respectively). Similarly, more intensive work via platforms is associated with reducing gendered attitudes towards jobs that are typically dominated by the other gender. For example, around 10 % of men who work via platforms as a secondary activity have provided childcare services, compared to 16 % who primarily work through platforms (for women, the difference is smaller, at 25 % and 23 %, respectively).

Figure 10. Remote and on-location work tasks performed, by sex (%)^a



Source: EIGE (2020). Online panel survey of platform workers.

Notes: ^a Of all platform workers (n = 4,932); weighted results.

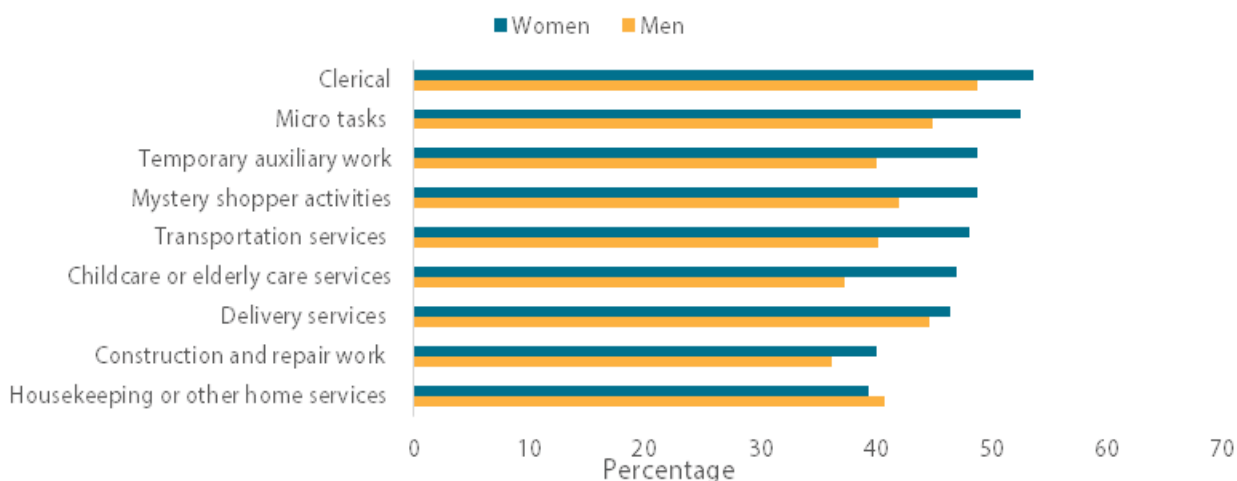
^b Some answer options shortened for readability.

Gender segregation is also important when it comes to platform work’s division across more or less qualified tasks. Previous research identified a degree of skills mismatch and over-qualification in platform work, noting that, for example, if high-educated workers engage in work requiring lower qualifications for longer periods of time, they

may be at risk of deskilling (Eurofound, 2020a). The EIGE survey provides evidence of both negative and positive platform effects on skills mismatch and the risk of deskilling, especially among women with high educational qualifications.

EIGE's survey shows that among those with high educational qualifications, **women are more likely than men to provide various low(er)-skilled services on digital labour platforms, pointing to a greater risk of deskilling for women** (Figure 11). This observation holds across a wide range of services, such as clerical and micro tasks, temporary auxiliary work, mystery shopper activities, or transportation services. In addition to high shares of platform workers performing tasks that do not match their level of education, gender gaps were most evident in jobs such as childcare or elderly care, temporary auxiliary work and transportation work. Despite being prone to skills mismatch overall, housekeeping and other home services had about equal (high) shares of high-educated women (39 %) and men (41 %). These findings suggest that for many highly educated workers, and women in particular, platform work is likely performed out of the need to earn an income amid a range of constraints (e.g. lack of opportunities elsewhere, low income in main job, inflexible and demanding care duties).

Figure 11. Share of respondents with high education who provide low-skilled services, by sex (%)^a

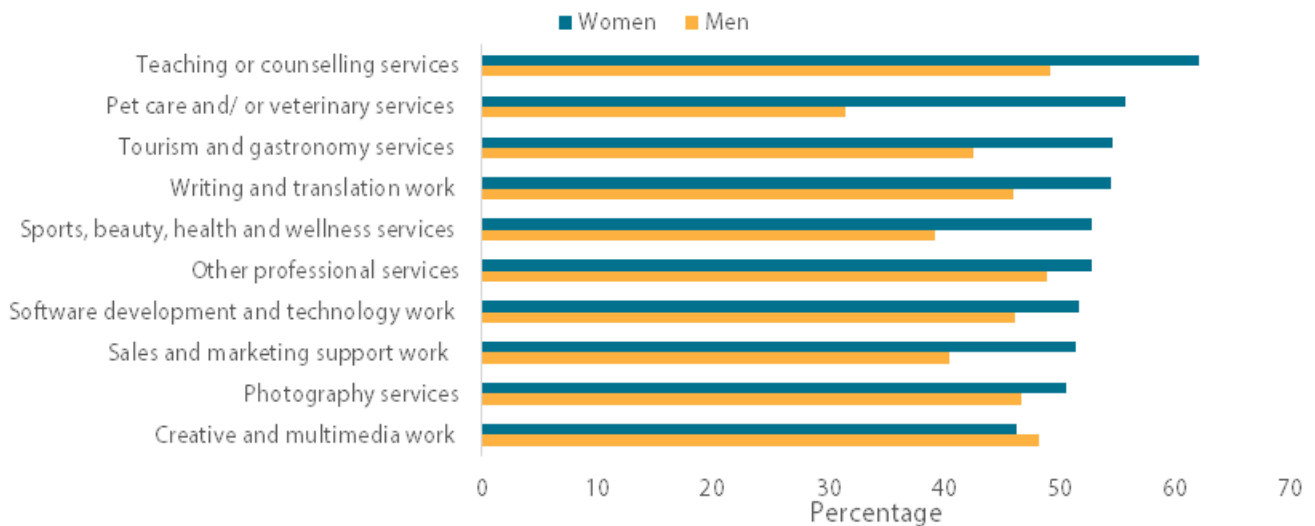


Source: EIGE (2020). Online panel survey of platform workers.

Note: ^a Of all platform workers (n = 4,932); weighted results.

Platform work may, however, function as an experience provider for younger and skilled professionals to enter the regular labour market (e.g. ICT professionals may work on digital platforms to build their portfolio), especially across certain service types. The EIGE survey found that women with high education were somewhat more likely than their male peers to provide a range of high-skilled services on digital labour platforms (Figure 12). The gender differences were most notable in pet care and/or veterinary services, but also in sports, beauty, health and wellness, and in teaching and counselling. In creative and multimedia services, high shares of both women (46 %) and men (48 %) have completed tertiary education.

Figure 12. Share of respondents with high education who provide high-skilled services, by sex (%)^a

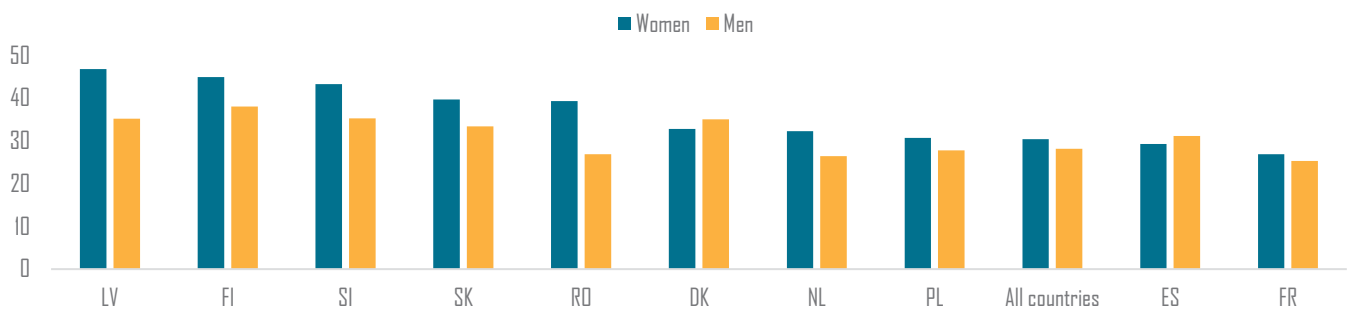


Source: EIGE (2020). Online panel survey of platform workers.

Note: ^a Of all platform workers ($n = 4,932$); weighted results.

The COVID-19 pandemic might have altered previous research on observed gender divisions in platform work from home or on-location. Unlike other research (e.g. Pesole, A. et al. (2018)), the EIGE survey shows a similar share of women and men performing platform work remotely and/or on-location. Roughly one-third (30 %) of women who have ever engaged in platform work perform remote tasks only, about one-fifth (22 %) perform on-location tasks only, and almost half (47 %) have tried both types of work. The shares are similar among men, at 28 %, 23 %, and 49 %, respectively ⁽¹⁵⁾. More distinctive country differences can still be observed in respect of the gender gap and overall shares of remote working via online platforms. Spain and Denmark are the only two countries where a lower share of women than men perform remote tasks only (Figure 13). The gender differences are largest in Romania and Latvia, with more women engaged in remote platform work than men.

Figure 13. Shares of women and men who perform remote tasks only, by country and sex (%)^a



Source: EIGE (2020). Online panel survey of platform workers.

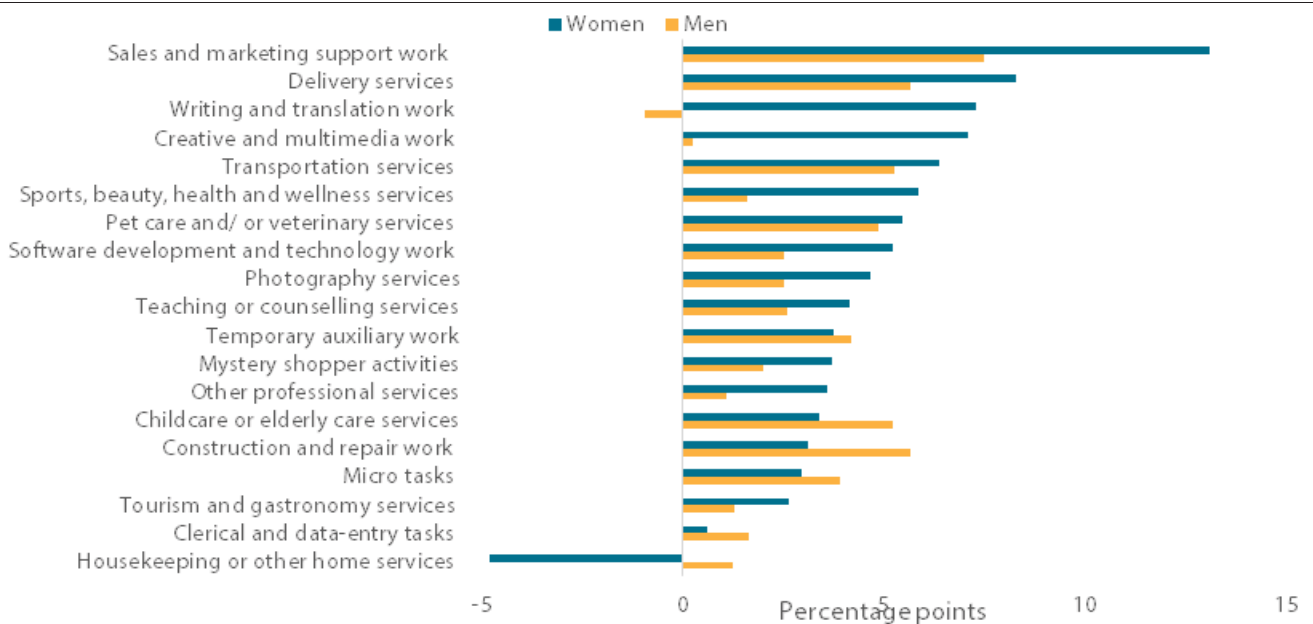
Note: ^a Of all platform workers ($n = 4,932$); weighted results.

Remote work has been especially important for women as a strategy to mitigate the negative effects of the COVID-19 pandemic. The EIGE survey suggests that the pandemic encouraged women to take up remote sales and marketing support jobs, for example, and to engage in delivery work via platforms. As many as 36 % of

⁽¹⁵⁾ The same pattern was observed among regular platform workers. Roughly one-third (34 %) of women who have ever engaged in platform work perform remote tasks only, about one-fifth (16 %) perform on-location tasks only, and almost half (49 %) have tried both types of work. The equivalent shares among men are similar, at 29 %, 20 %, and 51 %, respectively.

women who started platform work due to COVID-19 performed remote sales and marketing support, compared to 23 % of women who did so for reasons other than the pandemic. The difference is smaller among men, at 33 % and 25 %, respectively ⁽¹⁶⁾. For delivery work, 29 % of women who started platform work due to COVID-19 performed delivery services, compared to 21 % of women who did so for reasons other than the pandemic. Among men, the difference was also smaller, at 26 % and 20 %, respectively. Figure 14 illustrates the difference in the performance of varied platform work tasks between those workers who started or re-started platform work because of COVID-19 and those who engaged in platform work for other reasons. It shows quite large differences in taking up platform work tasks among women, with fewer differences (i.e. more notably for childcare or elderly care services) observed for men.

Figure 14. Difference between the shares of workers who started platform work because of COVID-19 and those who started platform work for other reasons, by work type and sex (p.p)^a



Source: EIGE (2020). Online panel survey of platform workers.

Note: ^a Of all platform workers (n = 4,932); weighted results.

2.4. Fewer women than men indicate platform work as their primary activity

- Fewer women than men engage in platform work as their primary activity (i.e. working more than 20 hours per week via platforms or receiving at least half of their income from platform work).
- Fewer women in couples without children (21 %) engage in platform work as their primary activity, compared to men in couples without children (29 %).
- Women who are students, full-time homemakers, or those who are unable to work due to illness are more likely than men to engage in platform work as their primary employment activity.

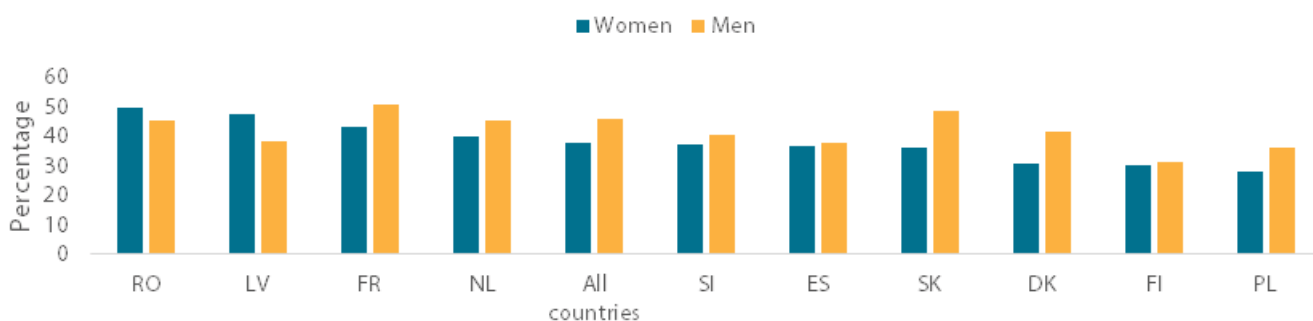
Previous research has found that most platform workers use platform work solely to supplement their income. Within the 10 % of the adult population that have ever engaged in platform work, only 1.4-2.5 % rely on platform work as their primary activity (i.e. working more than 20 hours per week via platforms or receiving at least half of

⁽¹⁶⁾ The difference between the two percentages and the difference expressed in Figure 14 is due to rounding.

their income from platform work) (Pesole et al., 2018; Urzi Brancati et al., 2020). Men constitute the majority of those for whom platform work is their main type of employment ⁽⁴⁷⁾.

According to the EIGE survey, of regular platform workers, about one-third (38 %) of women and almost half of men (46 %) engage in platform work as their primary activity (Figure 15). One of the main reasons for this gender gap is the lower share of women in couples without children (21 %) who primarily engage in platform work, compared to their male peers (29 %). Across the different modes of platform work, women on-location workers and women who provide both remote and on-location services are less likely than men to engage in platform work as their primary activity. Similar shares of women and men who provide remote services engage in platform work as their primary employment activity. This apparent gender-neutral uptake in remote platform work as a primary employment activity might explain the reverse gender gap in using platform work evident in Romania and Latvia (Figure 15). Across these two Member States, 50 % and 47 %, respectively, of women engage in platform work as their primary activity, compared to 46 % and 39 %, respectively, of men. Section 2.3 noted that more women than men are engaged in remote platform work in Romania and Latvia, and these findings could imply that increased participation in remote platform work is closely associated with more women using it as their primary activity.

Figure 15. Women and men regular platform workers who work more than 20 hours per week via platforms or earn at least half of their income via platforms, by country and sex (%)^a



Source: EIGE (2020). Online panel survey of platform workers.

Note: ^a Of regular platform workers ($n = 3,088$); weighted results.

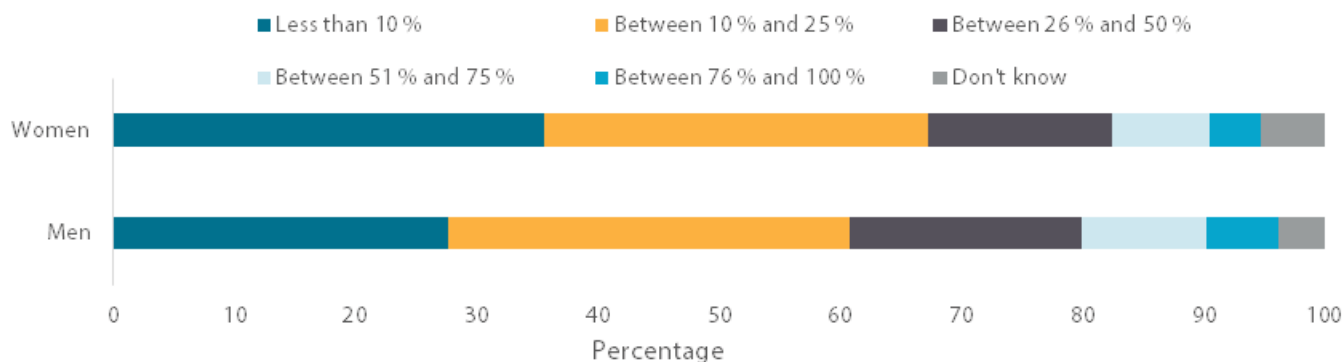
Of those for whom platform work is their primary activity, fewer women (62 %) than men (70 %) have other gainful activities outside of platform work. Women who are students, full-time homemakers, or unable to work due to illness are more likely than men to engage in platform work as their primary employment activity (15 % and 6 %, respectively). Meanwhile, men appear slightly more likely than women to take up platform work as their main activity while in-between jobs: 12 % of men who primarily work via platforms described themselves as unemployed, compared to 8 % of women. In contrast to primary platform workers, women and men who engage in platform work as a secondary activity (working 20 hours or less per week through platforms or earning less than half of their income from platform work) are more often employed outside of platform work (Figure 45 and Figure 46 in Annex 4).

Overall, in line with findings from other studies of platform work (Pesole et al., 2018; Urzi Brancati et al., 2020), income from platform work encompasses only a small share of platform workers' income among both women and men who regularly work via platforms. The EIGE survey shows that **women, on average, report platform work**

⁽⁴⁷⁾ The EIGE survey is not suitable to estimate platform work prevalence within selected labour markets as it targeted respondents who are most likely engaged in platform work (daily internet users). Among 15,809 surveyed daily internet users, the survey identified 4,932 platform workers (36 % of the sample). Of those daily internet users, platform work is the primary activity for 7 % of women and 12 % of men.

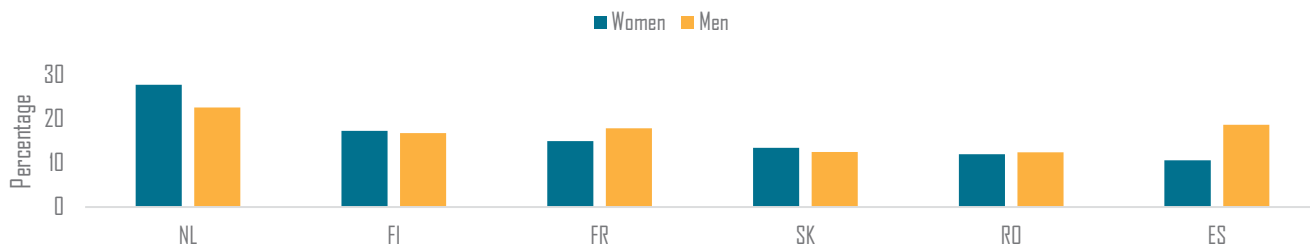
accounting for a smaller share of their overall income than men (Figure 16). This trend varies considerably by country ⁽¹⁸⁾. In the Netherlands, for example, a higher share of women (28 %) than men (23 %) report that platform work constitutes at least half of their income (Figure 17). By contrast, in Spain, almost twice as many men (19 %) as women (11 %) make more than half of their income through platforms. The differences may be explained by the different types of work performed by these women and men, but further research is needed to better identify underlying causes.

Figure 16. Share of income from platform work among regular platform workers, by sex (%)^a



Source: EIGE (2020). Online panel survey of platform workers.
 Note: ^a Of all regular platform workers (n = 3,088); weighted results.

Figure 17. Regular platform workers for whom platform work constitutes at least half of their income, by country and sex (%)^{a,b}



Source: EIGE (2020). Online panel survey of platform workers.
 Notes: ^a Of all regular platform workers (n = 3,088); weighted results.
^b Results displayed only for Member States with sufficient sample sizes.

2.5. Women platform workers have lower incomes than men, especially women in couples with children

- Women’s total income falls into lower income brackets more often than men’s total income. Single women are the most likely to be in the lowest income quartile, followed by lone mothers.
- For most women in couples with children, their income falls in the lowest income quartile in their countries. By contrast, most men in couples with children belong to the highest income quartile.
- More men than women report having a higher income than their partner or spouse.

A majority of both women and men who work via digital labour platforms receive income from mixed sources: traditional employment, self-employment and platform work (Figure 18). There are some country-specific gender differences, but, overall, they reflect differences in activity status across the countries. For example, the largest

⁽¹⁸⁾ Income-related national-level analysis was not possible in each Member State surveyed due to limited sample size.

gender gaps in receipt of earnings from employment were found among women and men in Slovenia and Slovakia (17 and 13 p.p. in favour of men), where there is also a large gender gap in full-time employment (see section 2.1). Similarly, the largest gender gap in receipt of earnings from self-employment was found among women and men in Slovakia (12 p.p. in favour of men), where there is also the largest gender gap in self-employment (7 p.p. in favour of men).

Figure 18. Income sources of platform workers, by sex (%)^a



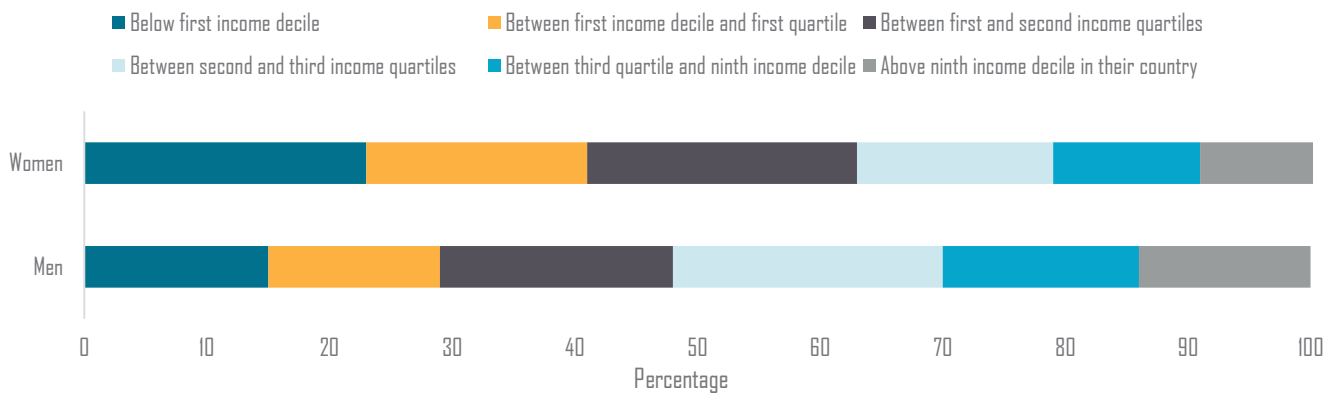
Source: EIGE (2020). Online panel survey of platform workers.

Notes: ^a Of all platform workers ($n = 4,932$); weighted results.

Generally, **women's total income falls into lower income brackets more often than that of men** (Figure 19). The total income of about 23 % of women platform workers is allocated below the first national income decile, compared to 15 % of men's income. About 10 % of women platform workers indicate their total income as being above the ninth income decile in their respective country, compared to 14 % of men. Generally, across all 10 EU Member States, there is a lower share of women than men among high income earners (Figure 47 in Annex 4). Even in the countries where, on average, platform workers earn higher total monthly income (e.g. NL, PL, RO, SK), there are still fewer women than men earning a monthly income in the ranges above the median (50th) percentile of their respective country.

Single women are the most likely to be in the lowest income quartile, followed by lone mothers. **For most women in couples with children, their income falls in the lowest income quartile in their countries.** By contrast, most men in couples with children belong to the highest income quartile (Figure 20). This reflects EIGE's research on gender gaps in pay (EIGE, 2019), which notes that across different life stages, gender gaps in net monthly earnings are greatest for women in couples with children under the age of seven (48 % compared to the total gender gap in net monthly earnings of 31 %). This life stage of family formation implies an earnings' 'penalty' for mothers and a 'reward' for fathers, a finding consistently observed in wider research and now also evident in platform work (EIGE, 2020b).

Figure 19. Total personal monthly income in their country, by sex and income categories (%)^{a,b}



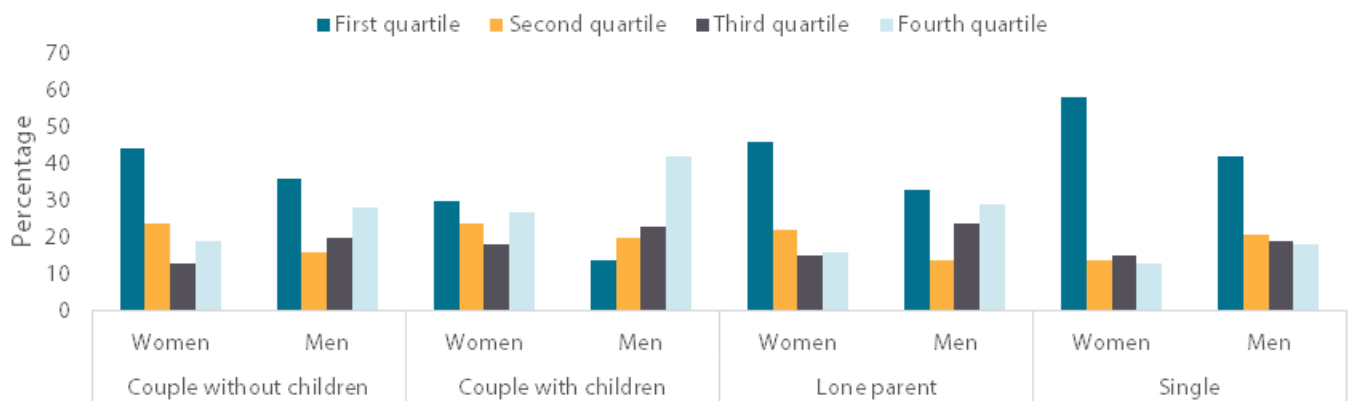
Source: EIGE (2020). Online panel survey of platform workers.

Notes: ^a Of all platform workers who answered the question ($n = 4,562$); weighted results.

^b Respondents were shown equivalent income ranges in their national currencies reflecting the national income ranges in their respective countries (

Table 1 in Annex 4).

Figure 20. Total income distribution in their country, by sex and family composition (%)^{a,b}



Source: EIGE (2020). Online panel survey of platform workers.

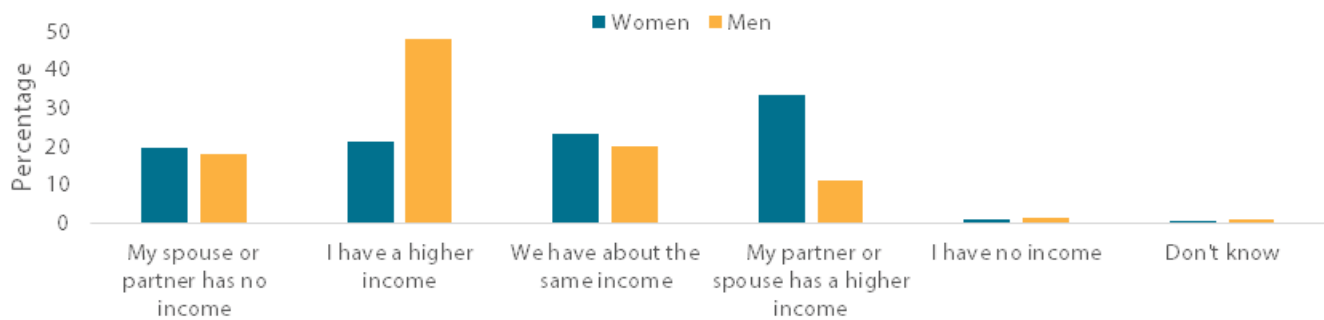
Notes: ^a Of all platform workers who answered the question ($n = 4,562$); weighted results.

^b Respondents were shown equivalent income ranges in their national currencies reflecting the national income ranges in their respective countries (

Table 1 in Annex 4).

The EIGE survey provides gender-specific information on personal income distribution within households of platform workers. Compared to women, more men platform workers have a higher income than their partner or spouse (27 p.p. difference). This gender gap is even higher among couples with children, where as many as 53 % of men (compared to 22 % of women) said that their income is higher than that of their partner or spouse (31 p.p. difference). Similarly, more women than men said that their partner or spouse has a higher income than theirs (22 p.p. difference, both in couples with and without children).

Figure 21. Differences in income in the household, by sex (%)^a



Source: EIGE (2020). Online panel survey of platform workers.

Note: ^a Of platform workers who live with their partner ($n = 2,957$); weighted results.

2.6. Women are more likely than men to indicate low or unfair pay as a drawback of platform work

- Unpredictable income and working hours are the main disadvantages of platform work for both women and men platform workers.
- Women are more likely than men to indicate low or unfair pay as a drawback of platform work, in particular women engaged in childcare/elderly services.
- Women platform workers are more likely than men to mention poor access to social security as a drawback of platform work. Women were also less likely than men to have received any type of support during the COVID-19 pandemic.

Recent studies have explored social protection and working conditions in platform work (Jarrahi and Sutherland, 2019; Pichault and McKeown, 2019; Wood et al., 2019; Jarrahi et al., 2020) and found low satisfaction with pay levels and job security (European Parliament, 2017). A European Parliament report showed that almost 70 % of platform workers do not have access to social protection schemes that cover pregnancy, maternity and parental leave (European Parliament, 2017b). There is little knowledge of working conditions on digital platforms from a gender equality perspective, as the authors of these studies did not use a gender comparative approach in their analysis of results, or used it only rarely.

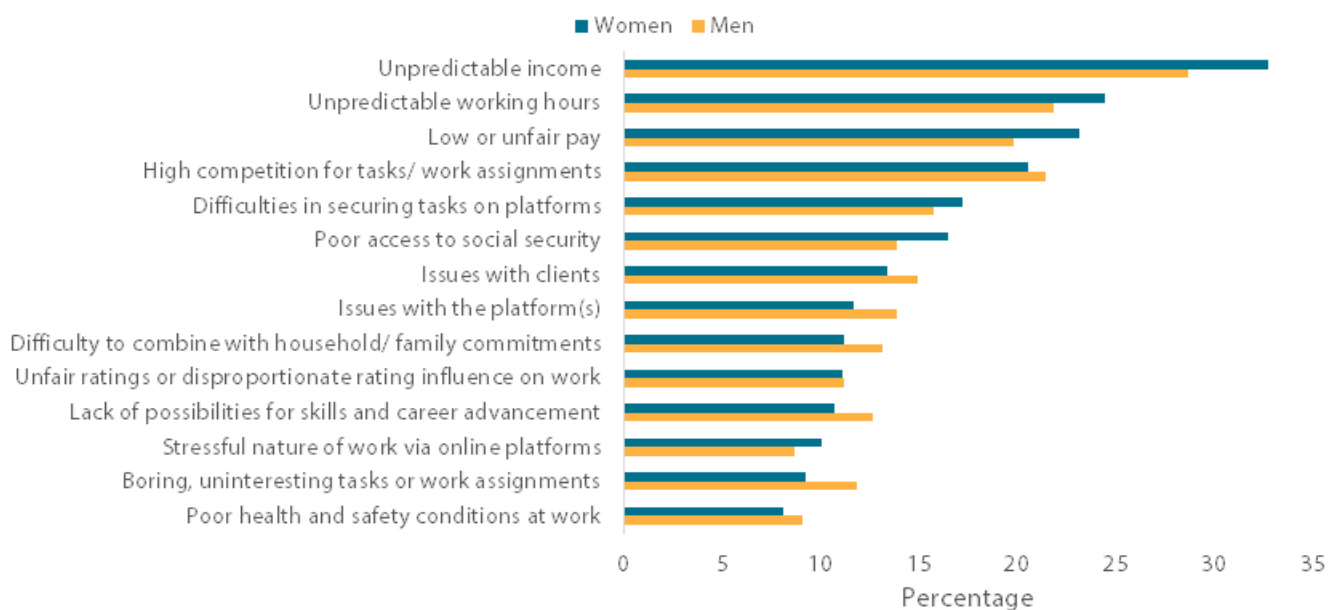
2.6.1. Three main drawbacks of platform work

Unpredictable income and working hours, alongside low or unfair pay, are noted as the main disadvantages by platform workers, with somewhat larger effects on women. Although there are some country-specific differences (Figure 48 in Annex 4), overall, most women and men are most dissatisfied with unpredictable income (33 % of women and 29 % of men), unpredictable working hours (24 % of women and 22 % of men), and low or unfair pay (23 % of women and 20 % of men) (Figure 22) ⁽¹⁹⁾. Respondents in couples with children – particularly women – were most likely to mention unpredictable income, unpredictable working hours, and low or unfair pay as drawbacks of platform work. These three drawbacks are also of greater concern for women and men platform workers who only work remotely. Although these findings challenge the perception that remote platform workers have better working conditions than on-location workers, they are aligned with previous research (Eurofound, 2019).

⁽¹⁹⁾ Survey respondents could select the response 'None' where they thought there were no drawbacks to platform work. Only 3 % of women and 1 % of men selected this answer.

Foreign-born women and men are less likely than native-born women and men to mention any of the three overall main disadvantages of platform work. This could be due to their relatively weak labour market position: if they are more likely to encounter equivalent disadvantages in traditional jobs, they might not recognise these as disadvantages specific to platform work. Various other platform-related drawbacks are also somewhat different among foreign-born women and men. For example, a slightly higher share of foreign-born than native-born women mentioned unfair ratings as a drawback of platform work (14 % and 11 %, respectively). Unfair ratings are important for platform workers as they can reduce their chances of finding work. A slightly higher share of foreign-born men platform workers mentioned the stressful nature of work (18 % compared to 7 % of native-born men) as a drawback of platform work.

Figure 22. Drawbacks of working via online platforms, by sex (%)^{a,b}



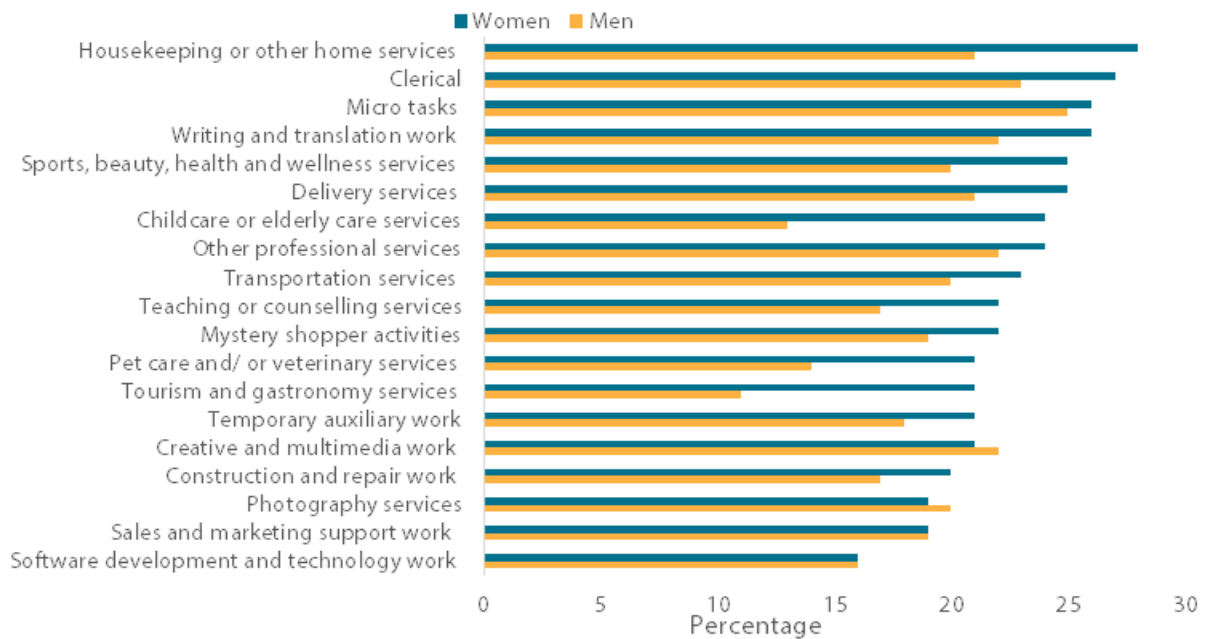
Source: EIGE (2020). Online panel survey of platform workers.

Notes: ^a Of all platform workers ($n = 4,932$); weighted results.

^b Some answer options shortened for readability.

Relatively small differences between women and men in respect of drawbacks (Figure 22) hide larger gender gaps across specific types of services (Figure 23; Figure 41 and Figure 42 in Annex 4). Remote platform workers, especially women, are more likely to mention unpredictable income and low or unfair pay as a drawback of platform work. This might be related to high global competition, especially for low-skilled remote tasks, which tends to push pay rates down (Eurofound, 2019). Women who work on-location, in particular in traditionally female-dominated child/elderly care and housekeeping, are also more likely than men who work in these services to mention low or unfair pay. By contrast, very low shares of both women and men platform workers in the traditionally male-dominated sector of software development and technology work report any of the three main drawbacks of platform work.

Figure 23. Platform workers who mentioned low or unfair pay as a drawback of platform work, by sex and type of service (%)^{a,b}

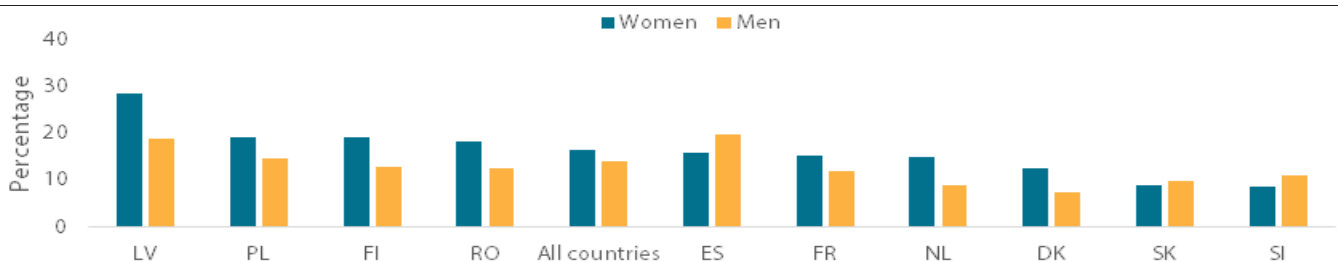


Source: EIGE (2020). Online panel survey of platform workers.
 Notes: ^a Of regular platform workers (n = 4,932); weighted results.
^b Some answer options shortened for readability.

2.6.2. Women are more likely than men to report poor access to social security

In the EIGE survey, women platform workers are somewhat more likely than men to mention poor access to social security as a drawback of platform work (17 % of women compared to 14 % of men). The gap is even larger among platform workers whose primary activity is platform work – 20 % of women compared to 12 % of men mention poor access to social security. Perceived poor access to social security varies in the countries surveyed, being mentioned most by women in Latvia and men in Spain (Figure 24) (²⁰). Across all Member States surveyed, women who indicated being self-employed in addition to the platform work are more likely than others to mention poor access to social security as one of the three major drawbacks of platform work (23 %).

Figure 24. Perceived poor access to social security in platform work, by country and sex (%)^a

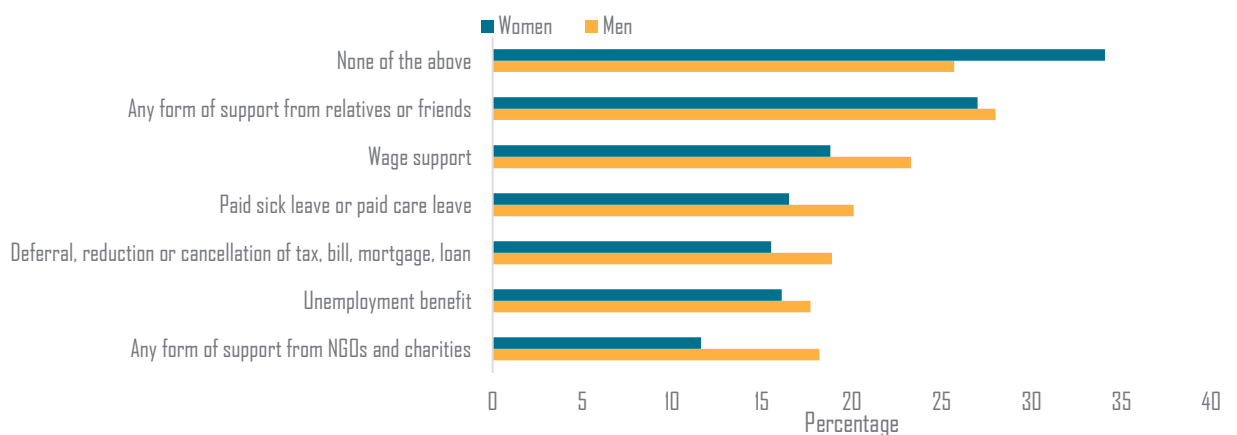


Source: EIGE (2020). Online panel survey of platform workers.
 Note: ^a Of all platform workers (n = 4,932); weighted results.

(²⁰) Lower shares of respondents indicating poor access to social security as a main drawback might signal particularly acute issues with coverage of social security. The EIGE survey asked respondents to indicate up to three key drawbacks. Given the range of negative issues, such as poor pay or unpredictability, which have a direct effect on immediate earnings, these observed shares of people listing poor access to social security as one of the three main drawbacks are of particular concern.

Since the beginning of the COVID-19 pandemic, 66 % of women and 74 % of men platform workers have received some type of direct or indirect income or in-kind support from governments, family or friends (Figure 25). Other estimates point to about one-third of the general population receiving such support (Eurofound, 2021); however the EIGE survey suggests a much more vulnerable income situation for platform workers. Like the general population, a majority of platform workers – 28 % of men and 27 % of women - received support from their relatives or friends. State supports (wage support, paid sick leave, paid care leave, unemployment benefits) were received more often by men than women platform workers. This could relate to men’s higher access to social security via traditional jobs, as well as women’s poor access to social security via platform work (EIGE, 2020b). At rates higher than in other groups, respondents who are employed are more likely to receive wage support (21 % of women and 25 % of men). By contrast, unemployed and inactive women are the most likely not to have received any form of support, at 46 % and 40 %, respectively.

Figure 25. Support received since the outbreak of COVID-19, by sex (%)^a



Source: EIGE (2020). Online panel survey of platform workers.
 Note: ^a Of all platform workers (n = 4,932); weighted results.

2.6.3. COVID-19 impacts on platform workers

Roughly one-third of women (32 %) and men (39 %) platform workers lost their paid jobs outside of platform work due to COVID-19 (Figure 26). This is slightly more than the share of people who lost their jobs in the general population ⁽²¹⁾, which stands at 29 % for 18-49-year-olds ⁽²²⁾ (Eurofound, 2020c).

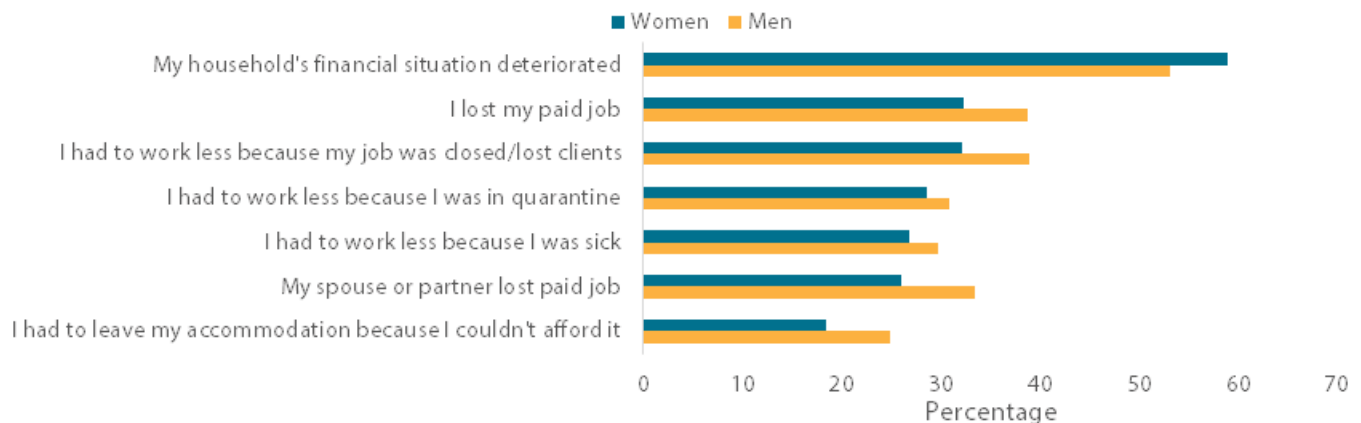
Women and low-educated men, as well as foreign-born women and men, have been particularly hard hit. As many as 38 % of women with low education and 58 % of men with low education lost their paid jobs and are also more likely to have had to leave their accommodation (32 % and 45 %, respectively) due to COVID-19. Similarly, as many as 45 % of foreign-born women and 52 % of foreign-born men lost their paid jobs due to COVID-19, and 31 % of foreign-born women and 44 % of foreign-born men had to leave their accommodation. At rates greater than other groups, both lone mothers and lone fathers lost their paid jobs (39 % of women and 50 % of men) or had to leave their accommodation (37 % of women and 42 % of men) due to COVID-19. The EIGE survey shows that dual-income families have better mitigated these pandemic-related shocks. Although about one-third of women and men in couples with children lost their paid jobs (32 % of women and 31 % of men), they are much less likely to have had to leave their accommodation (13 % of women and 19 % of men). The pandemic also

⁽²¹⁾ PPMI analysis based on (Eurofound, 2020c).

⁽²²⁾ The EIGE survey collected responses from platform workers aged 16-54 years.

impacted platform workers in other ways (Figure 26). For example, many platform workers saw their household's financial situation deteriorate due to COVID-19 (59 % of women and 53 % of men).

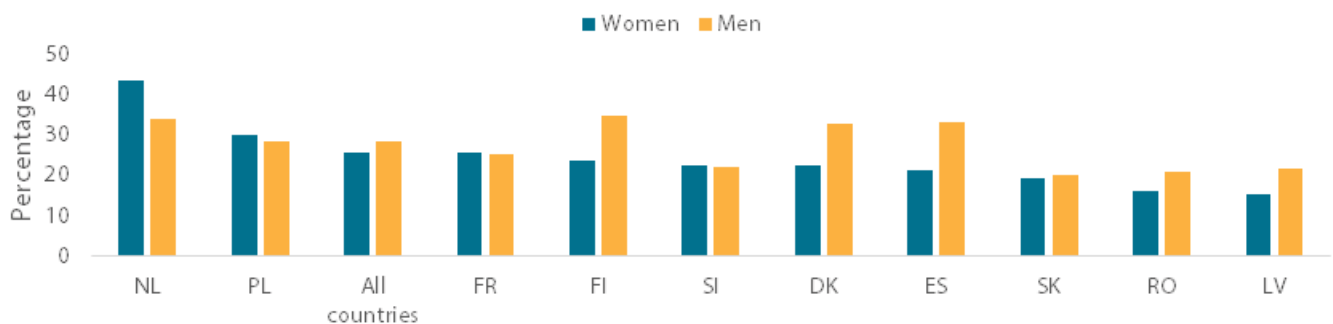
Figure 26. The impact of COVID-19 on platform workers, by sex (%)^{a,b}



Source: EIGE (2020). Online panel survey of platform workers.
 Notes: ^a Of all platform workers (n = 4,932); weighted results.
^b Some answer options shortened for readability.

Platform work served as an important source of income during uncertain times, with similar shares of women and men starting or re-starting platform work due to COVID-19 (36 % and 35 %, respectively (see section 2.1. and Figure 6). Among platform workers who lost their job, the numbers were even higher: almost half of women (44 %) and men (45 %) started or re-started working via online platforms due to COVID-19. In addition, 26 % of women platform workers and 29 % of men platform workers increased their hours worked on digital platforms due to COVID-19 (Figure 28). While the unstable working conditions associated with platform work can negatively affect platform workers (e.g. unpredictable hours and income, low pay (see section 2.6.1), remote access, low barriers to entry or ability to work immediately, ability to work more or less hours depending on one's personal circumstances also makes it an accessible source of income during economic downturns (Schmidt, 2017).

Figure 28. Increased working hours on digital platforms due to COVID-19, by country and sex (%)^a



Note: ^a Of all platform workers (n = 4,932); weighted results.
 Source: EIGE (2020). Online panel survey of platform workers.

2.7. Except for easy entry, there is little evidence supporting the claim that platform work offers flexibility to workers

- More than one-third of women and men engage in platform work during evenings and/or weekends.
- Between one-fifth and one-third of women and men regular platform workers are rarely or never able to secure tasks according to their own plans and schedules, work fixed starting and finishing times, or plan in advance when and how much they will work. This is particularly pronounced for

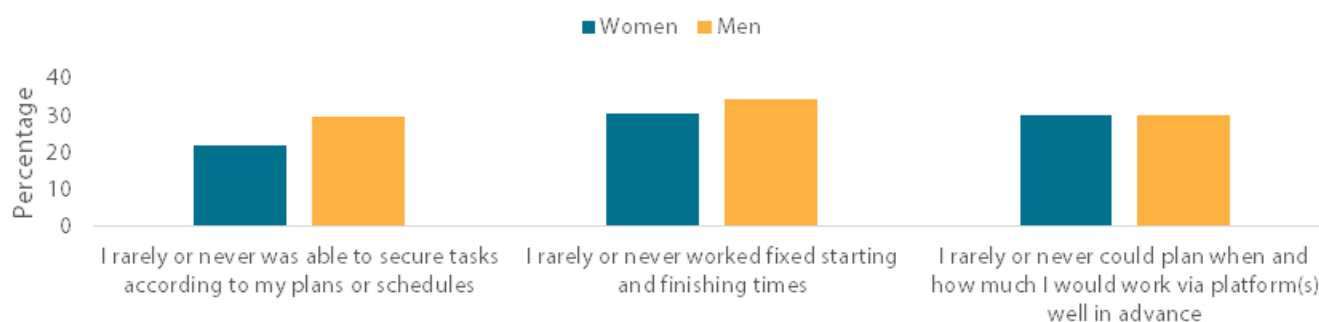
men.

- Women and men platform workers spend around 20 hours per week in platform work (half looking for tasks and half working on tasks).
- Women's overall working time and schedules on online platforms are more affected by family factors. Men's working time and schedules are more affected by personal and professional factors.
- Childcare and household chores particularly influence the work schedules of women in couples with children.
- On average, women spend about 2.5 hours more per week than men in household work, and 3.5 hours more per week than men on childcare. The gaps are even greater in couples with children.

The EIGE survey (see section 2.2) and previous research (European Parliament, 2017) suggest that the specific aspects of flexibility of platform work, such as ability to choose when and where one works, are an advantage and an important motivator to work on digital labour platforms. However, except for easy entry, there is little evidence that platform work offers greater flexibility to workers. In fact, the EIGE survey highlighted the negative aspects of flexibility, such as unpredictability of working hours and income (see section 2.6.1).

The EIGE survey shows that **platform work is often performed outside the regular working day, for both women and men**. As many as 36 % of women and 40 % of men who regularly work via platforms often or always work nights and/or weekends. In Romania, as many as half of platform workers often or always work nights or weekends. In other Member States, the percentage is somewhat lower, with about one-third of regular platform workers working at night and/or weekends (Figure 49 in Annex 4). Between one-fifth and one-third of women and men regular platform workers are rarely or never able to secure tasks according to their own plans and schedules, work fixed starting and finishing times, or plan in advance when and how much they will work (Figure 29). Men are less likely than women to work according to their own plans: 30 % of men said they are rarely or never able to do so, compared to 22 % of women, with self-employed and unemployed men particularly affected. In part, these findings are due to the sectors women and men work in, with some typically having more flexibility than others (Figure 10).

Figure 29. Regular platform workers' ability to determine their schedules, by sex (%)^{a,b}



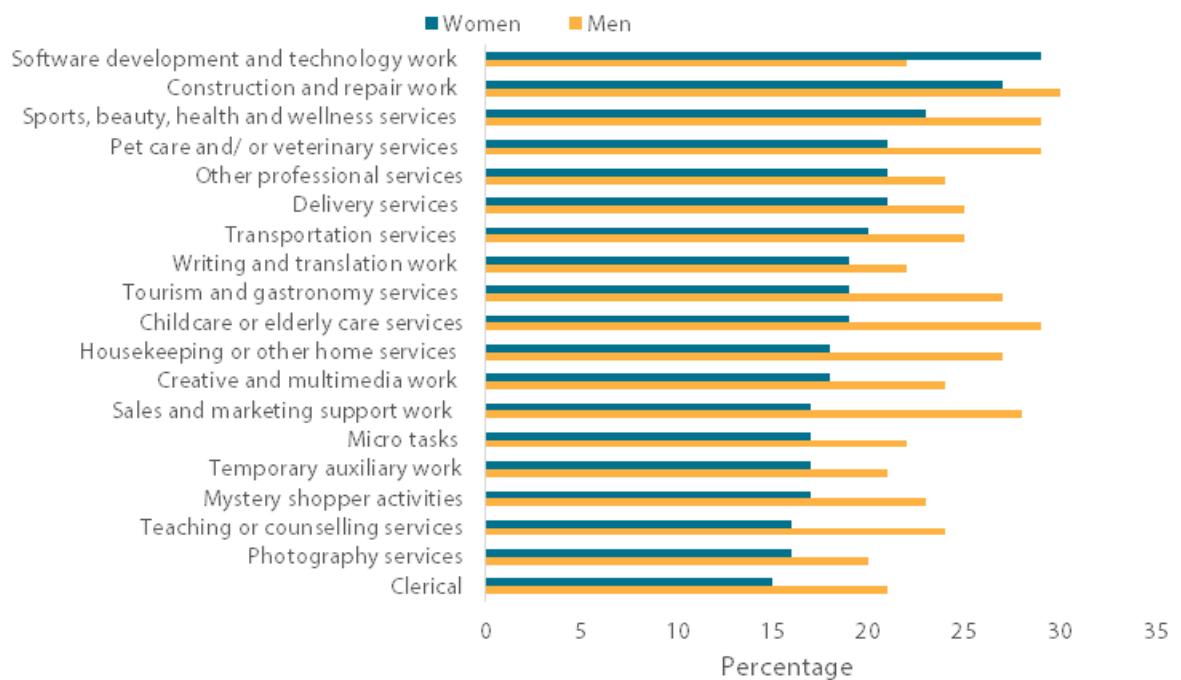
Source: EIGE (2020). Online panel survey of platform workers.

Notes: ^a Of regular platform workers ($n = 3,088$); weighted results.

^b Some options shortened for readability.

Across most remote and on-location services, women are less likely than men to report constraints on work flexibility (Figure 30; Figure 39 and Figure 40 in Annex 4). The opposite pattern is evident in software development and technology work, where women are more likely than men to say that they are rarely or never able to secure tasks according to their own plans and schedules (29 % of women compared to 22 % of men) or plan in advance when and how much they will work (21 % of women compared to 17 % of men).

Figure 30. Regular platform workers rarely or never able to secure tasks according to their plans or schedule, by sex and type of service (%)^{a,b}



Source: EIGE (2020). Online panel survey of platform workers.

Notes: ^a Of regular platform workers (n = 3,088); weighted results.

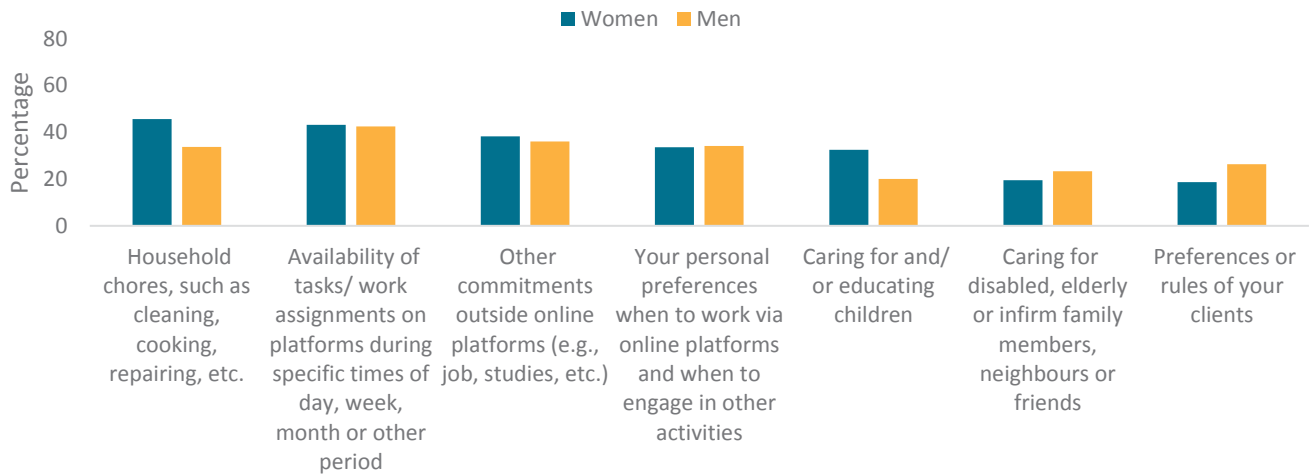
^b Some answer options shortened for readability.

Some groups face greater constraints than others, with the EIGE survey showing foreign-born men as particularly disadvantaged. More than half of foreign-born men can rarely or never secure tasks according to their own plans and schedules (54 %), work fixed starting and finishing times (51 %), or plan in advance when and how much they will work (53 %). This is compared to far lower shares among both native-born men (27 %, 32 % and 27 %, respectively) and among foreign-born women (39 %, 34 %, and 29 % respectively). These results are related to the type of services provided. More specifically, foreign-born men are somewhat more likely to work in delivery, construction and tourism, all sectors that potentially offer less predictable working schedules.

Compared to women and men in couples with children, lone mothers and fathers are less likely to benefit from the flexibility of platform work. One-third of lone mothers (30 %) and more than half of lone fathers (54 %) can rarely or never secure tasks according to their own plans and schedules, compared to 18 % of women and 15 % of men in couples with children. They are also less likely to work fixed starting and finishing times (33 % of lone mothers and 38 % of lone fathers, compared to 26 % of women and 29 % of men in couples with children), or plan in advance when and how much they will work (33 % of lone mothers and 41 % of lone fathers, compared to 29 % of women and 25 % of men in couples with children).

Women’s overall working time and schedules on online platforms are more affected by family factors. (Figure 31). Men’s working time and schedules on online platforms are more affected by professional factors. The gender gaps are the highest in the contexts of childcare and household chores (each entailing a 12p.p. difference). Childcare and household chores are a particularly important factor for women in couples with children. As many as one-third mentioned childcare and household chores (31 % and 35 %, respectively), compared to far fewer men in couples with children (22 % for each factor). Household chores are a particular issue for one-third of single women (27 %) and only one-fifth of single men (18 %).

Figure 31. Factors influencing platform workers' working time and schedules on online platforms, by sex (%)^a

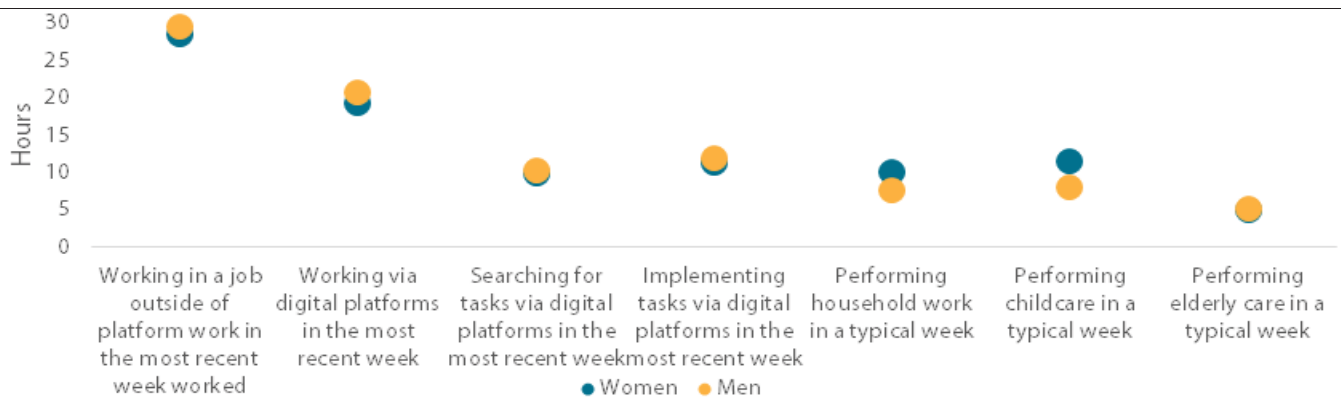


Source: EIGE (2020). Online panel survey of platform workers.

Note: ^a Of regular platform workers ($n = 3,088$); weighted results.

The EIGE survey assessed the total number of hours women and men platform workers spend performing unpaid household chores and caring for children and the elderly. It found no difference between women and men in the number of hours spent providing elderly care in a typical week (about 5 hours). However, women on average spend about 2.5 hours more per week on household work, and 3.5 hours more per week on childcare (²³). Besides household work and care responsibilities, both women and men platform workers spend close to 30 hours per week in employment outside of platform work, and almost 20 hours per week in platform work (half looking for tasks and half working on tasks (Figure 32)).

Figure 32. Time spent in paid and unpaid work, by sex (average number of hours)^{a,b,c}



Source: EIGE (2020). Online panel survey of platform workers.

Notes: ^a Working in a job outside of platform work in the most recent week worked assessed among platform workers employed full-time, employed part-time or self-employed ($n = 3,621$); weighted results.

^b Working via digital platforms in the most recent week, searching for tasks via digital platforms in the most recent week, implementing tasks via digital platforms in the most recent week assessed among regular platform workers ($n = 3,054$; $n = 3,060$; $n = 2,925$); weighted results.

^c Performing household work in a typical week, performing childcare in a typical week, performing elderly care in a typical week assessed among all platform workers ($n = 4,875$; $n = 4,675$; $n = 4,530$); weighted results.

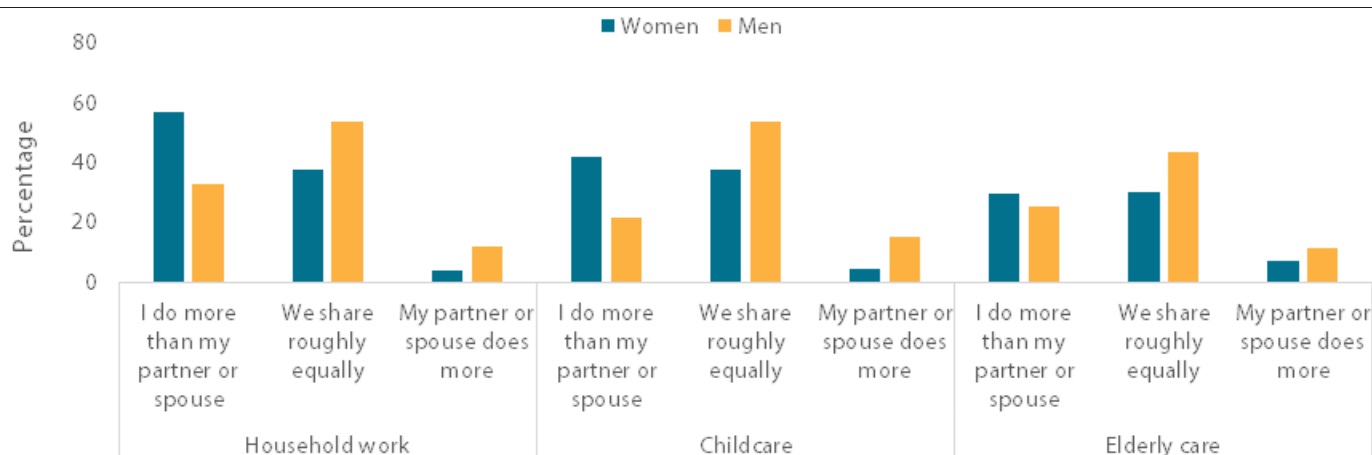
Due to the COVID-19 pandemic, close to two-thirds of women (62 %) and more than half of men (55 %) platform workers spend more time on household chores and care. Given the EU-wide lockdowns and closures of schools

(²³) Among women and men who live with their partner, there are no differences in the number of hours spent in paid work, both in employment and in platform work, or on elderly care. However, compared to men, women spend over three additional hours per week doing household work and close to four additional hours on childcare (Table 2 in Annex 4).

during the first wave of the COVID-19 pandemic, a higher share of both women and men platform workers who live with children increased the time spent on household chores and care (among lone parents, 71 % of women and 61 % of men; in couples with children, 70 % of women and 58 % of men). It follows the broader trend in the general population, where women primarily supported their children with online schooling during the pandemic (EIGE, 2021b). However, even with greater involvement of men in childcare and household activities, women still take on most of these duties (Figure 33 **Error! Reference source not found.**).

Across the three areas of domestic labour – household work, childcare and elderly care – more women than men state that they do more work than their partner or spouse. Similarly, more men than women say their partner or spouse does more work than they do. Men’s perception of equality in the division of domestic labour is far higher than that of women: 38 % of women and 54 % men believe they share housework equally with their partner or spouse, while 38 % of women and 54 % of men believe they share childcare equally (16 p.p. difference). Although data from both members of the couple would make this analysis more robust, the results nevertheless point to a trend whereby women and men’s perception of equality in the division of domestic labour differs.

Figure 33. Division of household work, by sex (%)^a



Source: EIGE (2020). Online panel survey of platform workers.

Note: ^a Of platform workers who live with their partner ($n = 2,957$); weighted results.

The gender gap in the perception of equality in the division of household work is smallest in Finland, Denmark and the Netherlands, which also score high in the domain of time of EIGE’s Gender Equality Index (EIGE, 2020b). In Denmark, more women than men think that the division of household work is equal between them and their partner or spouse (4 p.p. difference). By contrast, the gender gap is highest in Poland, Slovenia, Spain and France, at around 20 p.p.

2.8. Men report higher prevalence and variance of unfair treatment than women

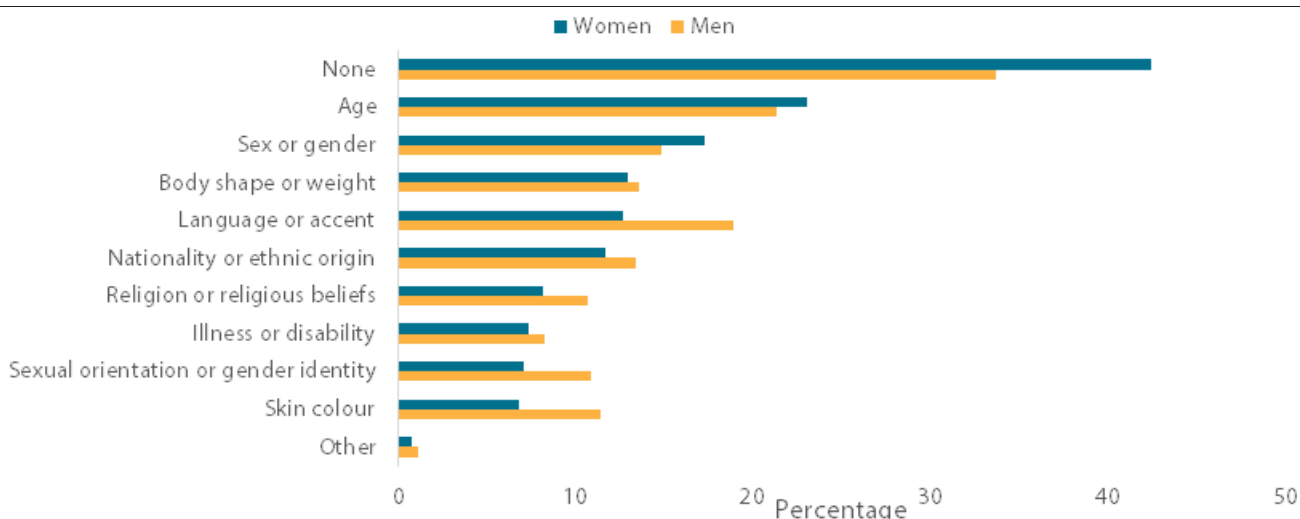
- More men than women have experienced some form of unfair treatment while providing services on digital platforms.
- Women are slightly more likely to note unfair treatment due to age and sex, while men are more likely to report unfair treatment due to language or accent, skin colour, nationality, religious beliefs, sexual orientation or gender identity, and illness or disability.
- Foreign-born men are disproportionately affected by unfair treatment and discrimination, compared to native-born and foreign-born women, and native-born men.

The EIGE survey shows that various forms of unfair treatment and discrimination are very present in digital platform work, adding to the list of its significant drawbacks. Almost two-thirds (63 %) of all platform workers in

the sample (including regular and not) have experienced perceived unfair treatment while engaging in platform work (58 % of women and 66 % of men).

Unfair treatment due to age, language or accent, and sex are most frequently cited among all platform workers, but with varying importance among women and men. Women are slightly more likely to note unfair treatment due to age and sex. Men are more likely to indicate unfair treatment due to language or accent, skin colour, nationality, religious beliefs, sexual orientation or gender identity, and illness or disability. Existing research shows that the format of service provision (on location or remote) and the ability of the client to select workers might influence the likelihood of discrimination experienced by platform workers (Eurofound, 2018c). Gender segregation may mean that women’s jobs have a higher degree of anonymity, whereas more men perform tasks with higher interaction levels that expose their appearance, voice, and name to clients and supervisors. The EIGE survey indicates that the share of men is higher in sectors like delivery, transportation and other on-location tasks, which might explain why they also report higher levels of discrimination due to accent, skin colour, and religion.

Figure 34. Reasons platform workers ever felt treated unfairly while providing services via online platforms, by sex (%)^a

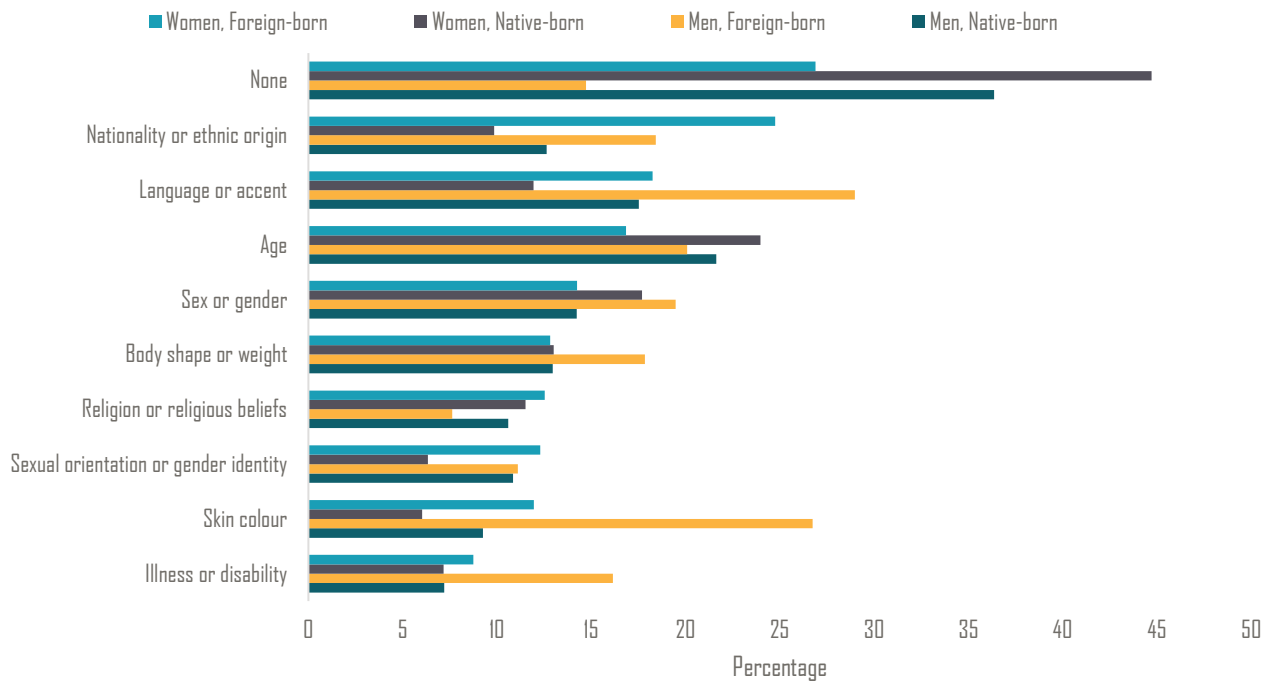


Source: EIGE (2020). Online panel survey of platform workers.
 Note: ^a Of all platform workers (n = 4,932); weighted results.

Foreign-born men are particularly likely to have experienced unfair treatment compared to native-born and foreign-born women, and native-born men (Figure 35). As many as 85 % of foreign-born men have encountered unfair treatment for one or more of the reasons mentioned below, compared to 77 % of foreign-born women, 64 % of native-born men, and 55 % of native-born women. These reported differences might be in part explained by differences in the countries of origin between foreign-born women and men in the sample, as well as unassessed characteristics such as their race or religion. Nonetheless, these contrasting observations require further research to better understand the realities of platform work for foreign-born versus native-born women and men.

People with lower education and lone parents are also somewhat more likely to report unfair treatment. For example, 70 % of women and 82 % of men with low education, 59 % of women and 68 % of men with medium education, and 52 % of women and 57 % of men with high education selected at least one type of unfair treatment, compared to 63 % of the total. Overall, as many as 65 % of lone mothers and 89 % of lone fathers have experienced at least one type of unfair treatment. People with low level of education, as well as lone parents, likely experience unfair treatment at disproportionate rates due to their other demographic characteristics.

Figure 35. Reasons platform workers ever felt treated unfairly while providing services via online platforms, by sex and country of birth (%)^a



Source: EIGE (2020). Online panel survey of platform workers.
 Note: ^a Of all platform workers ($n = 4,932$); weighted results.

3. Platform work and gender equality: policy and regulatory challenges

The rapid development of platform work, its diverse nature and ambiguous effects have received considerable attention from policymakers at EU and Member State level. However, most of the public and policy debate has overlooked the gendered consequences of platform work (EIGE, 2020b). This chapter explores the main policy and regulatory challenges and national responses to platform work from a gender perspective. It focuses on the gendered aspects of key issues in relation to platform work - the employment status of platform workers and resulting access to social protection, work-life balance, and protection from discriminatory practices.

The assessment of the main policy and regulatory challenges and opportunities is based on EU-wide country-level research, including literature review, desk research and interviews with national stakeholders in 10 selected Member States (DK, ES, FR, LV, NL, PO, RO, SI, SK, FI).

3.1. Employment status of platform workers and access to social protection

Social protection systems primarily consist of statutory (minimum level) protections offered by the State, supplemented in some countries by collective schemes administered by social partners in relevant sectors. The growth of platform work and women's increased access to that work raise questions about the appropriateness and gender-responsiveness of social protection systems to the realities of many women and men platform workers (Bastagli and Hunt, 2020).

While some higher-skilled platform workers may generate a high and stable income through platforms (Manyika et al., 2016), many others are subject to high levels of precariousness and lack access to social protection (European Parliament, 2017). Two main factors underpin platform workers' (lack of) access to social protection. Firstly, the employment status and relationship between the platform and the worker, whereby platform workers can be classified as either employees of the platform or self-employed (or independent contractors). Secondly, whether platform work constitutes a primary or supplementary activity. Some platform workers rely on platforms for their main income, while others rely primarily on income from other sources (e.g. employment, self-employment, social benefits or other allowances), with online platform work being additional income.

Platform work blurs the line between employment and self-employment (Behrendt and Nguyen, 2018). Looking at vocabulary, in particular, platforms often refer to their activities as 'gigs', 'tasks', 'favourites' or 'rides', rather than work or labour, with workers instead called 'partners' (De Stefano, 2016). Most platforms assert that platform workers are self-employed (or independent contractors). At national level, the lack of clear legal classification and the slow adoption of regulations have benefited platforms in this regard. In countries without explicit approaches to regulate platform work, platform workers are considered self-employed by default (DE, LV, PL, RO, SK).

The labour market status classification of platform workers is important because the employment relationship confers many rights and obligations for both employer and employee. Platform companies benefit from classifying platform workers as self-employed (Deakin, 2020). The main benefits of this legal status include having to pay lower or no social security contributions for workers, having to comply with fewer or no employment regulations, and making task-specific payments instead of providing stable salaries. In turn, the self-employed platform worker bears all the costs, including their equipment, and is responsible for their own social protection. Equally important in times of crisis like the COVID-19 pandemic, is the possibility for platforms to terminate contracts (or, rather, close a platform worker's account) at any time, without needing to give a reason or offer compensation (European Union Agency for Safety and Health at Work (EU-OSHA), 2017; Rosin, 2020).

Platform workers are in 'bogus' self-employment or, more accurately, in 'disguised employment' when they are formally registered as self-employed or independent contractors but work under the same working conditions as an employee would, i.e. subordinated to an employer (International Labour Organization (ILO), n.d.; Kilhoffer, et al., 2020; Williams and Puts, 2019). Disguised employment appears to be increasing in the platform economy (ILO, n.d.; Williams and Puts, 2019) through dependent self-employment and other in-between categories used across the Member States studied (Box 3).

The introduction of labour platforms has transformed sectors where standard employment relationships or genuine self-employment were the norm. Many businesses now outsource tasks such as data entry or translation, work that in the past would have been delegated to an employee (Behrendt and Nguyen, 2018). Similarly, trade union representatives note that, in Poland, Uber drivers work under an agreement to rent a car (a civil law contract), concluded with an intermediary. Civil law contracts are very common among Polish platform workers, but they only cover old age and disability insurance, while contributions towards unemployment, sickness and maternity, paternity and parental leave are voluntary (Owczarek, 2019). In Slovenia, some platform workers are employed on student work contracts, which offer limited social protection (Box 7) and frequently disguise an actual employment relationship (Franca, 2020).

Certainly, some platform workers may voluntarily forgo longer-term protection in exchange for a higher short-term income (Kilhoffer, et al., 2020; Williams and Puts, 2019). However, bypassing social security contributions can, in the long-term, exacerbate the care needs of the most vulnerable. On the platforms' side, it raises questions about the equitable and sustainable financing of social protection systems that address gendered risks over the life course and provide a safety net in critical situations of poverty and insecurity (Behrendt and Nguyen, 2018).

Significantly, the issue of employment status forms the basis for the protection of platform workers and has a strong gender dimension. For example, self-employed women have been found to have limited access to maternity benefits (European Parliament, 2017) and many self-employed also lack access to parental leave (EIGE, 2020a) (see section 3.1). Women platform workers (particularly those living in couples with children) are less often in regular employment besides platform work (see section 2.4) and are therefore less likely to have access to social protection from other sources. Even those in other employment besides platform work are more often in part-time employment or non-standard forms of work that offer similarly poor social protection.

Box 3. An in-between category for platform workers may not resolve the lack of access to social protection

An intermediate category of workers applicable to platform workers and new forms of employment is used in Germany, Italy, Spain and Austria, and has recently been proposed in France (Frouin, 2020). Unlike bogus self-employment, this new category of 'economically dependent self-employment' ⁽²⁴⁾ combines elements of both subordinate/dependent and independent work. Platform workers falling into this category would benefit from some labour and social protection, but not at the level of employees (De Stefano, 2016). Among self-employed persons in the EU, more women than men find themselves in "dependent self-employment", particularly in the household services sector (ILO, 2017). Based on a comparative analysis of existing regulation governing similar categories, an in-between category for those in dependent self-employment would only narrowly extend social protection to platform workers (Prassl, 2018). Such an in-between categorisation may not be the best approach to

⁽²⁴⁾ Dependent self-employed people depend on one or a small number of clients for their income and may receive direction on how the work is to be done.

increase the gender-responsiveness of social protection systems. In addition, this categorisation is likely to increase complexity, and may also be used to disguise actual employment relationships and circumvent employer obligations (De Stefano, 2016).

The second factor relating to the level of financial dependency of the worker on the platform is an important predictor of access to social protection. The more reliant a platform worker is on the platform to gain income, the less likely they are to have access to social protection (European Parliament, 2017b). A majority of platform workers are supplemental earners, who are more likely to have some access to social protection derived from their primary activity. Nevertheless, poor access to social protection should be a matter of concern for supplemental earners, as their income replacement would be lower than it should be in case of sickness or care leave. An increased number of women and men have taken on platform work to mitigate the negative effects of the COVID-19 pandemic after losing their jobs. This makes it ever more urgent to ensure that all platform workers, particularly the non-negligible number of workers who are most dependent on platform work to gain an income, can access social security on an equal footing with those in conventional employment.

Box 4. Working time regulations may have an ambivalent impact on platform workers

The question of labour classification of platform workers as employees or self-employed is relevant in respect of the EU legal framework on working time. The Working Time Directive uses the broadly conceptualised definition of 'EU worker', excluding genuinely self-employed persons. Where platform workers are classified as EU workers, their employers are obliged to monitor their daily and weekly rest periods. In turn, the Directive on Transparent and Predictable Working Conditions has been described as the first step towards ensuring a balance between flexibility and security for workers in the digital economy (Vyas, 2020). However, given the scope of the Directive, transposition at Member State level may continue to exclude many platform workers.

Instead of a top-down approach, platforms like Uber in the Netherlands have agreed with the Ministry of Infrastructure and Water Management to share working time data with officials, resulting in a reduction of excessive working days. Similarly, the platform Temper does not regulate the amount of work that workers do but limits the possibility to schedule several jobs back-to-back.

It is difficult to gauge how improved working time regulations for platform workers would impact gender equality. More stringent regulation of working time may put some of the many platform workers who are supplemental earners (both women and men) in a more precarious situation as they would be unable to top-up their main source of income. However, regulation of working time could promote greater work-life balance and, potentially, more equal division of unpaid care work (De Spiegelaere and Piasna, 2017). This suggests that gender-sensitive discussions on working time regulations should go hand-in-hand with talks on fair wages and social protection, online and offline, as well as work-life balance.

3.1.1. Regulation of platform work at national level remains gender-blind

Generally, gender inequalities in platform work have not been a topic of concern for stakeholders, including policymakers and trade unions. In the few countries where explicit regulations have been introduced for platform work, gender issues are not identified as a challenge requiring distinctive attention in policymaking, resulting in gender-blind regulations.

Discussions at national level have recognised the shortcomings of current labour laws and social protection systems in respect of the platform economy. However, they have focused on the classification of platform workers as employees or self-employed persons. In countries such as Slovenia and Finland, those discussions have often

centred on the general precariousness of work and the emergence of new and non-standard forms of employment. The stakeholders interviewed perceive this phenomenon as gender-neutral, despite the proven gendered dimension of precarious work, with women disproportionately represented (European Parliament, 2020; EIGE, 2017).

Latvia and Finland, for example, have a skewed and sometimes stereotyped view of platform workers as young, able-bodied men, mostly students, and with a migrant background. This could account for the lack of attention given to gender aspects of platform work. This is in addition to the general lack of awareness of gender inequalities and the scarcity of sex-disaggregated data on platform work across all Member States studied.

Only three of the Member States studied (ES, FR, RO) have taken concrete measures to regulate the employment status of platform workers (Kilhoffer et al., 2020). Their measures differ, however. Romania has adopted a rather limited approach by introducing special permits for ride-sharing platforms only. In Spain, the social partners agreed new legislation for food delivery services via online platforms, which presume an employment relationship between the worker and the platform (Eck and Simon, 2021) (Box 5). The new legislation aims to end bogus self-employment in the sector, as many platform workers were misclassified as (economically dependent) self-employed persons. In both cases, the legislative efforts have focused on the traditionally male-dominated sectors of transportation and delivery services. In France, substantive legislative efforts began as early as the 2010s. Policy measures adopted included a legal definition of digital labour platforms and their obligations towards platform workers, clarification of the employment status and social protection of platform workers (in particular, the possibility of re-qualification of contracts from self-employment to dependent employment), and the facilitation of social dialogue on pay and working conditions. However, the French national response to regulating platform work did not apply a gender perspective.

Countries have approached platform work as part of broader government initiatives to respond to the transformation of work in the context of digitalisation. However, the lack of awareness of gender issues or systematic gender mainstreaming is a missed opportunity for developing new gender-responsive regulations. Denmark, for example, created the Disruption Council, followed by the Council on Sharing Economy in 2019, with a focus on ensuring maximum participation in the labour market in light of new forms of employment. The stakeholders interviewed noted that gender inequalities have not arisen in Council debates. In Finland, the government's programme 2019-2023 ⁽²⁵⁾ targets being a global leader in gender equality and pledges to review employment legislation in light of the digitalisation of the world of work. However, discussions on these topics have run in parallel thus far.

3.1.2. Gender segregation patterns in platform work could explain the slow adoption of gender-responsive regulations

Gender affects the services platform workers provide in the Member States studied (EIGE, 2020b). As observed in previous studies (e.g. Pesole et al., 2018), while gender differences in the take-up of platform work have decreased in recent years, platform work is generally split along well-known gender lines (see section 2.3). For example, 70 % of platform workers on the Danish platform Happy Helper (which provides on-demand housekeeping services) are women (Happy Helper, 2018) and two-thirds of the workers on Worksome (which provides highly skilled services in software development and data science) are men (Cevea, 2018). Similarly, in Spain, food delivery

⁽²⁵⁾ Programme of the Prime Minister (2019). Inclusive and competent Finland – a socially, economically and ecologically sustainable society, https://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/161664/Inclusive%20and%20competent%20Finland_2019_WEB.pdf?sequence=7&isAllowed=y

platforms (Deliveroo, Glovo, UberEats, etc.) engage mostly young men (up to 87 % of their platform workers are men) (Adigital and Afi, 2020). Nonetheless, the COVID-19 pandemic prompted many women to take up platform work, particularly delivery services.

Notwithstanding the emerging trends, traditionally female-dominated sectors of platform work have received little or no attention compared to traditionally male-dominated platform work. This is evident across the 10 countries studies, particularly in Spain (Box 5), Latvia, Poland, Romania, Slovenia and Slovakia, where regulators have prioritised the more visible on-location delivery and personal transportation sectors. Policymakers in Romania, Slovenia and Slovakia have focused on establishing licences for platforms providing transportation services. Romania and Latvia have regulated transportation services provided by platforms to ensure fair competition with taxi services. None of the studied Member States has implemented national regulations for platform work in traditionally female-dominated sectors.

Box 5. Spain adopts new legislation regarding platform work in delivery and courier services

In a landmark case in September 2020, the Spanish Supreme Court found that Glovo (an on-demand courier service platform) was not a mere intermediary, but, rather, a company that provides delivery and courier services. Thus, Glovo's platform workers ('riders') are not self-employed workers, but have an employment relationship with Glovo ⁽²⁶⁾.

In early 2020, before this ruling, the Spanish Ministry of Employment had commented on the urgent need to regulate riders. In October 2020, a dialogue was set up between the Ministry of Employment, representatives of the employers (CEOE and CEPYME) and trade unions (CC.OO. and the General Union of Workers (UGT)) to agree the main aspects of a future Act that would regulate platform work. The new regulation of delivery and courier services was adopted by Royal Decree-Law 9/2021 of 11th May (commonly known as the 'Rider Law') and it presumes the existence of an employment relationship between the rider and the platform. However, it has been criticised by trade unions for excluding many other services, some predominately provided by women, where the category of self-employed continues to be misused.

One explanation for the lack of attention to women's work via platforms is that it continues to be invisible, undervalued and frequently unrecognised as labour. Many women platform workers take up traditionally female occupations, such as housekeeping services, childcare and caring for the elderly. **Women's work in the platform economy is seen as a continuation of their traditional roles in (unpaid) domestic and care work, historically viewed as low in status and value** and not requiring specific qualifications, despite its major contribution to households and the economy. These historical connotations not only make women's work in the platform economy invisible, they are an added challenge in discussions on the classification of platform work as employment and, arguably, lead to prioritising some services or tasks over others.

3.1.3. Platform workers would benefit from better regulation of certain sectors of the off-line economy

Despite the challenge in clarifying the status of platform workers, there is a strong case to support considering platform workers employees, given that services performed via platforms and in the off-line economy are often

⁽²⁶⁾ Spanish Supreme Court (2020). Recurso de casación para la unificación de doctrina, Available at: <https://www.poderjudicial.es/cgpj/es/Poder-Judicial/Tribunal-Supremo/Noticias-Judiciales/El-Tribunal-Supremo-declara-la-existencia-de-la-relacion-laboral-entre-Glovo-y-un-repartidor>

identical. This is particularly true of on-location platform work, where services and tasks resemble economic activities that were previously regulated with standard employment relationships (De Stefano and Aloisi, 2018). However, the simple extension of existing social protection regimes in female-dominated sectors may not guarantee that women platform workers can access them.

On-location services dominated by women, such as housekeeping and care services, have traditionally been characterised by high levels of informality in the off-line economy (Bastagli and Hunt, 2020). Care and domestic work are sectors where workers are frequently formally excluded from many social protections, where informal and unregulated conditions prevail, and where supervision of work takes place in the private sphere (Ticona and Mateescu, 2018). In the Member States studied, **the ‘feminised nature’ of care and domestic work performed by platform workers makes women’s labour in the platform economy invisible and undervalued.** It is invisible because it has long been associated with the private sphere and thus deemed inherently separate from paid labour (EIGE, 2021a). This invisibility in the off-line economy results in a lack of protection for women providing domestic and care services via platforms, mirroring their overall precarious employment status in the off-line economy.

In Spain, for example, most domestic workers are women whose work remains largely undeclared to the social security system, despite incentives for employers to cover their social security contributions ⁽²⁷⁾. Even when they are registered, domestic workers are covered by the Special Scheme for Domestic Workers, which provides low social protection. They are not eligible for unemployment benefits ⁽²⁸⁾ or occupational risk prevention ⁽²⁹⁾. The country-level research found a similar situation in Slovakia, where platforms that provide housekeeping services, such as Domelia, do not require platform workers to provide any documentation proving self-employment. By contrast, platforms operating in sectors such as personal transportation services and delivery services require a taxi licence or proof of social insurance.

In view of the concentration of women in precarious forms and sectors of the economy, gender-responsive regulation of platform work could start by ‘formalising’ sectors and workers traditionally excluded or not covered by adequate legislation (Bastagli and Hunt, 2020). The importance of improving social protection of platform workers engaged in these sectors should not be treated lightly, given increasing reliance on external care services due to looming demographic changes, such as an ageing population, increased life expectancy, lower birth rates and smaller household size (De Stefano and Aloisi, 2018; EIGE, 2021a).

In sectors characterised by high levels of precariousness, **the mediation of platforms has the potential to improve working conditions by bringing these activities into the formal labour market** and providing financial inclusion for traditionally marginalised groups (Hunt and Samman, 2019). In those countries where transportation services provided by platforms have been regulated to guarantee fair competition with taxi services, for example, this may reduce previously undeclared work, as platforms collect data on transactions, clients and workers (Kilhoffer et al., 2020). In Spain, the research suggests that platforms can play a role in the professionalisation of care workers (Inter-American Development Bank (IDB) Lab and Digital Future Society, 2021). Some of the measures that platforms could take to professionalise the sector include requiring platform workers to have a number of years of experience or qualifications to register on the platform, banning clients unwilling to pay the minimum or

²⁷ Real Decreto-ley 28/2018, de 28 de diciembre, para la revalorización de las pensiones públicas y otras medidas urgentes en materia social, laboral y de empleo’, Official State Gazette, 28 December 2018 (314).

²⁸ Real Decreto Legislativo 8/2015, de 30 de octubre, por el que se aprueba el texto refundido de la Ley General de la Seguridad Social, Official State Gazette, 30 October 2015 (261).

²⁹ Ley 31/1995, de 8 de noviembre, de prevención de Riesgos Laborales, Official State Gazette, 8 November 1995 (269).

recommended fee, and mediating between clients and platform workers in case of conflict (IDB Lab and Digital Future Society, 2021).

Box 6. Remote platform workers are significantly less visible and protected

The mainstream narrative and emerging approaches to regulate platform work have focused on on-location services, which are more visible in everyday life. Remote work has been an important strategy for platform workers to mitigate the effects of the COVID-19 pandemic (see section 2.3), yet remote workers were significantly less likely than on-location platform workers to receive support during the pandemic. They are also more likely to mention unpredictable income and working hours and low/unfair pay as drawbacks of platform work.

The (re)classification in employment and extension of social protections remains most challenging for web-based remote platform workers. Web-based platform work attracts workers who can be located anywhere, thus posing a challenge for the application of national labour laws and social security coordination (Kilhoffer et al., 2020). Within the EU, it may be difficult to bring remote platform work within the scope of the free movement of workers ⁽³⁰⁾ and the Rome I Regulation. The cross-border aspect of remote platform work also raises concerns about the platform economy 'freeriding' the financing of social security at the expense of the off-line economy (Behrendt and Nguyen, 2018, p. 25).

3.1.4. Many platform workers do not meet the requirements to access maternity and parental leave

The country-level research found that despite the existence of relevant provisions for both employees and self-employed individuals, many platform workers do not meet the requirements to access maternity and parental leave. **In countries where duration of employment as a condition for accessing maternity and parental leave benefit may disadvantage platform workers**, who, due to the fragmented nature of platform work, may lack the continuity needed to satisfy job tenure requirements.

In Poland, where platform workers are usually considered self-employed (or working under a civil law contract), access to maternity leave depends on the level of contributions paid by women. In Slovakia, the entitlement to maternity leave is dependent on two conditions. Firstly, a self-employed platform worker must have paid contributions (compulsory or voluntary) for at least 270 days during the two years before the birth. Secondly, a platform worker may not have had any insurance debts during the previous five years. In cases where these conditions are not met, women platform workers can still receive a parental allowance of EUR 270 per month.

A standard employment relationship is also the main gateway to access parental leave ⁽³¹⁾ (EIGE, 2020b). All of the studied countries, except Spain, allow self-employed platform workers to benefit from parental leave if they meet the eligibility criteria. In Latvia, as with maternity benefits, parental leave is calculated based on a 12-month period, starting retroactively three months before leave is being taken. Similarly, in order to be eligible for parental leave,

⁽³⁰⁾ Article 45 TFEU provisions on the free movement of workers guarantee a right to non-discrimination based on nationality in employment, working conditions and access to employment.

⁽³¹⁾ The Directive on work-life balance for parents and carers defines parental leave as leave from work for parents on the grounds of the birth or adoption of a child, to take care of that child (Directive 2019/1158 on work-life balance for parents and carers promoting equal sharing of caring responsibilities between parents (repealing Directive 2010/18/EU).

a self-employed platform worker in Romania must have worked at least 12 months over the 24 months immediately prior to taking leave.

Where tasks are taken individually, a minimum contribution payment per task may impose an excessive burden for self-employed platform workers. Similarly, using work duration to determine contributions and accumulated periods of insurance is detrimental to platform workers, whose work is frequently overly fragmented. In addition, the income generated through platform work may be below the threshold for income tax and social security. This may be particularly acute for women platform workers, who are more likely to work part-time (see section 2.4). There is a clear gap between statutory access and effective entitlement for platform workers (European Parliament, 2017b). The available evidence indicates that social protection, such as pregnancy or childcare and care leave, is not available to almost 70 % of platform workers (European Parliament, 2017b).

Box 7. Many women platform workers work under less protected student contracts

Some platform workers in Slovenia are employed on student work contracts. These contracts are the most common forms of precarious work and are often used to disguise an actual employment relationship. The share of women is particularly high in student work (Eurofound, 2021; SURS, 2020), which raises concerns about their access to social protection. The Employment Relationships Act provides student workers with protection against discrimination and unequal treatment according to gender, regulation of working hours, breaks and rest, minimum hourly rate (EUR 4.56 gross or EUR 5.40 net in 2020) and minimum pension, disability and health insurance. However, student workers are not entitled to unemployment insurance or parental leave insurance, nor does the law protect them from termination of employment. Student work is considered the cheapest and most flexible form of work.

Given the gender and age structure of student work, where women outnumber men, young women platform workers could be more vulnerable to the precariousness of student work. For example, the lack of parental leave insurance for student workers may have particularly negative consequences for young mothers, who would have to combine childcare, study and side earning as student workers, leaving them at risk of high vulnerability in case of dismissal.

In countries such as France and Finland, all employees and self-employed platform workers have mainly the same rights and eligibility conditions for maternity and parental leave schemes. Existing international and European standards and commitments ⁽³²⁾ advise Member States to provide maternity and parental leave to all workers, including the self-employed and those in non-standard forms of employment. There is a case for expanding current legislation to widen eligibility and coverage of women and men platform workers, irrespective of their employment status.

3.1.5. Collective representation and agreements need to be more inclusive of platform workers, especially women

Social partners have a powerful role to play in regulating and therefore shaping platform work. Denmark, for example, has adopted collective agreements. In April 2018, a company-level collective agreement between the

⁽³²⁾ For example, the ILO Maternity Protection Convention, 2000 (No. 183); Council Recommendation on access to social protection for workers and the self-employed (2019/C 387/01).

house cleaning services platform Hilfr and the trade union 3F ⁽³³⁾ gave workers the choice to acquire employee status (and thus be covered by the agreement) or remain self-employed. The collective agreement provides significant protection: it grants an hourly minimum wage, pays unemployment benefits in case of sickness, protects against dismissal, grants the right to holidays, and offers working time protection ⁽³⁴⁾. It also provides rules on the cancellation of shifts and provisions on data protection (see section 3.2.1). However, the stakeholders agreed to postpone discussions on maternity and paternity leave until future negotiations.

Efforts to include platform workers in collective agreements have appeared primarily in the delivery sector and other traditionally male-dominated sectors. The demands of on-location, (mainly) food delivery and transportation platform workers are much more visible, not only in the media and policy debates, but also in collective action. The collective agreement between Hilfr and 3F was praised as one of the most significant advances for platform work, as it expanded social protection for platform workers while recognising that some wished to remain self-employed (De Stefano, 2018). Collective bargaining often takes place at sectoral level, and the country-level research found a number of collective agreements applicable to platform workers in traditionally male-dominated sectors.

In January 2021, the Danish Chamber of Commerce and 3F Transport concluded a national agreement for food delivery services. The agreement protects platform workers who have been (re)classified as employees (Fagbladet3f, 2021). Similarly, in the Netherlands, the Court of Amsterdam ruled in 2019 that the relationship between Deliveroo and its food delivery riders could be qualified as an employment relationship ⁽³⁵⁾. The collective agreement for professional goods transport by road therefore had to be applied retroactively. The Federation of Dutch Trade Unions (FNV) is now preparing lawsuits against UberEats, Temper and Deliveroo (RTL Nieuws, 2020; Walther Ploos Van Amstel, 2020). Similar examples are found in Italy and Germany, where some platform workers can be covered by collective agreements in logistics, construction, building cleaning and facility management, among others.

Despite the existence of applicable collective agreements, it is often unclear if self-employed platform workers are entitled to trade union representation and protection. Several countries have taken measures to ensure that certain self-employed workers can participate in collective agreements, but obstacles remain in Latvia, Romania, Slovakia and Finland (Kilhoffer et al., 2020). However, according to EU competition law, the self-employed are considered individual undertakings and thus risk infringing competition rules when they bargain collectively ⁽³⁶⁾. Poor union coverage of platform workers is likely to have gendered consequences, for example in terms of pay and capacity to negotiate improved social protection. This highlights the importance of the European Commission's ongoing process to address the issue of collective bargaining for the self-employed, the revision of EU competition law (

³³ Collective agreement between Hilfr and 3F is available at: <http://ow.ly/d/83Wv>

³⁴ Originally, the agreement also established minimum fees for those who wished to remain self-employed.

⁽³⁵⁾ Court of Amsterdam (2019). Maaltijdbezorging die door de bezorgers voor Deliveroo worden uitgevoerd, valt onder de werkingssfeer van de cao. (7044576 CV EXPL 18-14762), <https://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:RBAMember States:2019:210>

⁽³⁶⁾ Article 101 TFEU. For general information, see Lianos, Countouris, and De Stefano (2019).

Annex 3: Policy context) and the need for gender-impact assessment of relevant EU action. Country-level research highlights that women platform workers remain less organised overall than their male counterparts. This has led feminist organisations in the Netherlands, such as Women Inc, to raise awareness and lobby the government for improved social protection and job security for domestic workers, including platform workers.

In cases where platform workers are excluded from collective bargaining on working conditions or traditional trade unions, some platform workers have used grassroots initiatives to exchange their work experiences, applicable regulations, and job search. These informal initiatives use social media to raise awareness of the problems platform workers encounter and their exclusion from labour law and social protection (Eurofound, 2018c). These initiatives are present in Spain, Romania and Slovakia.

The focus on certain sectors and on-location platform work remains problematic across all countries when addressing gendered aspects of platform work. As in the general labour market, encompassing collective bargaining is a crucial means of combating pay inequality and low pay, properly valuing women's work and providing work-life balance arrangements for platform workers. All platform workers, including self-employed domestic workers ⁽³⁷⁾ engaged in platform work, should be protected in their right to bargain collectively regardless of employment status ⁽³⁸⁾.

3.1.6. There is an abundance of case-law on on-location platform work

In the EU Member States, most court cases have been brought against platforms providing on-location food delivery and transportation services (Eurofound, n.d.; Beltran de Heredia Ruiz, 2021; Kilhoffer et al., 2020). In the absence of clear regulations, courts, labour inspections and other authorities in some Member States, such as Spain (Gómez, 2020), the Netherlands (Zekić, 2019), and Finland (Jokinen, 2020) are increasingly asked to clarify the status of platform workers as employees or self-employed workers. Rulings are made on a case-by-case basis, with the courts considering the specific circumstances. Courts have therefore reached different conclusions for workers active on the same platform, the same sector or county (Box 8; Eurofound, 2018d).

It appears that a status clarification is easier to bring to court in food delivery and transportation services. However, the classification as self-employed or employed is equally essential in gender-related inequality in working conditions and social protection.

Box 8. Contradictory rulings on platform work in the Netherlands

In January 2019, the District Court in Amsterdam oversaw proceedings between the Federation of Dutch Trade Unions (FNV) and Deliveroo. The Court ruled that Deliveroo's delivery workers were working as employees of the platform (CLINT, 2019). That ruling was subsequently confirmed by the Court of Appeal in February 2021. Several months later, however, the same District Court ruled that there was no employment relationship between Helping and the workers who provided cleaning and housekeeping services for third parties via its online platform. This meant that the collective labour agreement for cleaning and window cleaning companies was not applicable to Helping's platform workers. Rather, the District Court found that there was an employment relationship between the cleaners and the private individuals they did domestic work for. Those

⁽³⁷⁾ Domestic workers' right to collective bargaining regardless of employment status is reaffirmed under the ILO Domestic Workers Convention (189) of 2011.

⁽³⁸⁾ Countouris, De Stefano and Lianos (2021) suggest extending the right to bargain collectively beyond the 'EU worker' definition to those (solo) self-employed who are not genuinely operating a business undertaking on their own account. This would entail acknowledging that the notion of 'self-employment' is not equivalent to an 'undertaking'.

working via Helping would therefore be covered by the Regulation on Domestic Services, which currently offers limited rights for domestic workers, with no access to health insurance or unemployment benefits (CLINT, 2019).

Despite several court cases, seeking legal help might be impossible for many platform workers, unless they are assisted by trade unions and a legal system that allows collective representation in courts. Platform workers might not seek any assistance, however, and thus forgo labour law and social security protection. Filing a complaint can be costly, complicated and uncertain. It may also lead to retaliation from the platform, such as seeing their account deleted (Lane, 2020).

3.1.7. The COVID-19 pandemic highlights platform workers' poor access to health insurance and unemployment benefits

The COVID-19 pandemic has had an impact on platform work. Many people (re-)started working via platforms, as government-mandated mobility restrictions and business closures saw them lose their main income (see section 2.6.3). Despite the expansion of platform work in some sectors, platform workers' poor access to certain types of social protection, such as sick pay or unemployment benefits, has now come to the fore (Eurofound, 2020c). Many platform workers have not received any type of support, particularly women platform workers, despite substantial deterioration in their households' financial situation during the COVID-19 pandemic (see section 2.6.3).

Before the pandemic, self-employed platform workers had to arrange their own health and unemployment insurance. Now, while many countries have provided employees and self-employed workers with (additional) social protection, **platform workers are not always able to access these schemes, due to low pay or the fragmented nature of platform work**. Rubery and Tavora (2021) highlight that the coverage of support schemes launched during the pandemic was characterised by greater inclusion of those in self-employment and other types of insecure contracts, who are normally not eligible for protection against job or income loss. However, none of the national measures adopted in the Member States studied explicitly addressed the situation of women and men platform workers. Even in schemes targeting the self-employed, many were unlikely to be able to meet the thresholds. Denmark, for example, launched a temporary compensation scheme for self-employed workers, including platform workers, who have a monthly revenue of at least EUR 1,500. Similarly, the Netherlands set up emergency measures for employees and self-employed workers. However, self-employed platform workers are unlikely to benefit, as they do not work enough hours to meet the threshold or are not registered with the Chamber of Commerce. In Latvia, lockdown allowances were provided to employees and self-employed workers who experienced a decrease in economic activity. However, the level of allowance depended on the level of social security insurance contributions previously paid. A strict contribution-related approach, such as that in Latvia, is likely a deterrent for platform workers to access the support scheme (Rubery and Tavora, 2021).

The lack of sex-disaggregated data makes it difficult to gauge the extent to which women and men platform workers have been able to benefit from available support schemes, but the different forms of those schemes already evidence some gendered differences. For example, while self-employed people in Slovenia were granted EUR 1,100 per month, students, including student workers ⁽³⁹⁾, received only EUR 150 (Box 7). Spain provided a special subsidy across sectors for employees who stopped/partly stopped providing services, equivalent to 75 % of the regulatory base salary. In addition, for the first time domestic workers were also entitled to a subsidy covering 70 % of their regulatory base salary.

⁽³⁹⁾ The share of Slovenian women in student work is particularly high (Eurofound, 2021; SURS, 2020).

3.2. Equal treatment and discrimination

A high number of platform workers in the EIGE survey reported experiencing some form of unfair treatment while providing services via online platforms. Age, gender (more frequently reported by women) and language or accent (more frequently reported by men) were the most commonly reported grounds for unfair treatment. None of the Member States studied has adopted any explicit measures to ensure equal treatment of platform workers. Similarly, the country-level research found no court cases on sex based discrimination in platform work.

Across the Member States, platform workers are generally unprotected under national Labour Codes, which only apply to employees. In Slovenia, for example, the Employment Relationships Act only protects platform workers in regular employment, student work and economically dependent self-employees. Self-employed platform workers can only seek help from the courts and the Advocate of the Principle of Equality.

In other countries, platform workers can be covered under specific legislation for the self-employed or legislation on equal treatment, non-discrimination and equality between women and men. In Romania, Law 178/2018 (supplementing Law 202/2002) provides for all workers to benefit from equal opportunities and equal treatment between women and men in employment relations, including the self-employed. In Finland, some articles of the Act on Equality between Men and Women (609/1986) ⁽⁴⁰⁾ on preventing discrimination were extended to freelancers and self-employed workers in 2004, which may subject to certain conditions also protect platform workers. However, enforcement against discrimination experienced by self-employed platform workers is complicated. To date, these laws have not been tested, as there are no case-law or complaints to courts, gender equality and anti-discrimination bodies, or labour dispute committees. Finnish representatives of trade unions and the Non-Discrimination Ombudsman assume that the lack of complaints stem from the difficulties experienced by unions and authorities in reaching and representing platform workers rather than an absence of issues (Box 9). This sentiment is shared by the stakeholders interviewed across the studied Member States.

Box 9. Sexual harassment in platform work

Spanish trade union UGT has a communication channel for platform workers, with many of the queries coming from women platform workers in the care and household services sectors. Claims primarily relate to the absence of contracts, and sexual harassment perpetrated by clients/employers or their family members.

Spanish trade union CC.OO. recently gathered experiences from women platform workers providing delivery services (CC.OO., 2021). According to the women interviewed, many clients demand that they enter the house or open the door naked or in underwear. They are frequently blackmailed by clients, who threaten to leave bad reviews. Some workers have been blocked by their platform for several days following bad reviews by abusive clients. According to some of the interviewees, this harassment is premeditated, as clients can see their names and pictures on the platform. Given their dependency on the platform, women platform workers find it difficult to decide whether or not to deliver to someone who has previously harassed them. According to the Spanish platform Glovo, they have a zero-tolerance policy against harassment or discrimination, but they failed to detail their protocol in cases of sexual harassment (20 Minutos, 2021).

Romanian and Slovakian stakeholders note that the informal and precarious status of many platform workers prevents them from seeking help in cases of sexual harassment for fear of retaliation. In addition, sexual

⁽⁴⁰⁾ Ministry of Social Affairs and Health (1986). Act on Equality between Women and Men' (609/1986), https://finlex.fi/en/laki/kaannokset/1986/en19860609_20160915.pdf

harassment remains a taboo subject in Romania.

There is a lack of data across the studied Member States, with no court cases and no specific responses at policy level. Similar to the off-line labour market (Foundation for European Progressive Studies (FEPS), 2019), sexual harassment in platform work is likely systematically under-reported. Questions arise regarding the liability of platforms in cases of sexual harassment, including where the platform worker is themselves the perpetrator during the supply of a service (di Torella and McLellan, 2018).

Although employees are more likely to be protected by non-discrimination laws, particular EU laws address those engaged in a self-employed activity. Directive 2010/41/EU established the principle of equal treatment between men and women engaged in self-employment. Directive 2004/113/EC on the principle of equal treatment between men and women in the access to and supply of goods and services may also be relevant. This Directive relates to platform work in three situations where there is a provision of a service, namely the relationship between: (1) the online platform and the platform worker (provided an online platform used for supply and demand is considered a service), (2) the online platform and the service recipient (customer, consumer), and (3) the platform worker and the service recipient (i.e. customer, consumer).

Courts may have a formative role in promoting non-discrimination by interpreting and then developing the interpretation of non-discrimination laws. To date, however, cases have been chiefly initiated in the delivery and transportation sectors (see section 3.1.6), which are traditionally male-dominated. Despite the lack of European and national level rulings on issues such as the use of algorithms and their potential (scope of) discrimination, it is expected that this will change in the near future. Finally, equality bodies and other enforcement authorities also have a role to play in cases of discrimination in the platform economy, as receivers of official complaints of discrimination, with the power to act, as appropriate.

3.2.1. Gender-based discrimination is replicated and reinforced by algorithmic decision-making

Despite the widespread belief that algorithms are free of bias, in recent years it has become clear that algorithmic models and the data they use can produce biased outcomes (Kullmann, 2018, see section 1.4). Interviews with national stakeholders, particularly policymakers and trade unions, revealed that they are aware of such issues. As yet, Spain is the only one of the 10 Member State studied that has adopted legislative changes to prevent discrimination based on gender or other grounds from being reproduced by algorithms used by platforms in delivery and courier services. Discrimination by algorithmic decision-making has also permeated policy discussions in France, following the publication of a set of recommendations by the Conseil National du Numérique (CNNum) ⁽⁴¹⁾.

Forthcoming regulation of platform work in Spain ⁽⁴²⁾ will require all platforms (not only food delivery platforms, which are the focus of the new regulation) to **make information on the algorithms used to regulate the working conditions of platform workers available to trade unions**. This requirement responds to the pressing need for algorithm transparency on issues such as pricing, allocation of tasks, ratings, and deactivation, in order to promote non-discriminatory algorithms and prevent gender and other social biases. The transparency requirements include any algorithms or AI systems that could have an impact on working conditions, including platform workers' access

⁽⁴¹⁾ Established in 2011, CNNum is an independent advisory commission to the French government. It issues opinions and recommendations on questions relating to the impact of digital technologies on the economy and society.

⁽⁴²⁾ Spanish Ministry of Labour announcement of new legislation is available at: <https://prensa.mites.gob.es/WebPrensa/noticias/laboral/detalle/3958>

to and maintenance of employment and profiling. According to members of the Spanish Government, this is intended to neutralise bias and performance penalties (Aranguiz, 2021). In a July 2020 report, France's CNNum recommended a set of measures to limit potential discriminatory algorithm bias. The report recommends amending Article L. 1132-1 of the French Labour Code, which prohibits all forms of discrimination at the workplace. According to CNNum, the article should be supplemented with a paragraph prohibiting discrimination resulting from an automated decision-making system. In the event of proven biases, the labour platform would be obliged to make every effort to correct these biases and to inform users in a clear, fair and transparent way. In addition, CNNum has called for administrative authorities and social judges to be better trained and equipped to investigate cases of algorithmic bias.

Finally, in Denmark, the Hilfr-3F collective bargaining agreement includes provisions on data protection to ensure that workers are not penalised by derogatory, false or biased feedback received from customers (De Stefano, 2018). Such provisions are particularly important where biased data or ratings are used to decide whether jobs are offered or whether to deactivate the account of a platform worker. These provisions are a step towards greater transparency in the platform economy. They also increase platforms' accountability in preventing discriminatory biases from creeping into ratings and algorithms (Kilhoffer et al., 2020).

Box 10. Intersectional discrimination in platform work

The EIGE survey has shown that foreign-born platform workers are more likely to report unfair treatment due to skin colour, nationality or ethnic origin, illness or disability, and language or accent. It also showed that workers who belong to minority groups, particularly women platform workers born outside the EU, report experiencing unfair ratings much more frequently. Directive 2000/43/EC on implementing the principle of equal treatment between persons irrespective of racial or ethnic origin and Directive 2000/78/EC on establishing a general framework for equal treatment in employment and occupation can play a role in platform work and gender equality, especially where there is a possibility for intersectional discrimination.

According to Article 10 TFEU, 'the Union shall aim to combat discrimination based on sex, racial or ethnic origin, religion or belief, disability, age or sexual orientation' in its policies and activities. While intersectional discrimination has not yet been regulated at EU level, recent policy documents by the European Commission refer to the adoption of an intersectional approach. Most significantly, the EU Gender Equality Strategy 2020-2025 acknowledges and commits to considering the unique experiences of discrimination as a cross-cutting principle in the implementation of the Strategy⁽⁴³⁾. The EIGE survey findings demonstrate the need to adopt an intersectional perspective in any EU action related to platform work (i.e. the forthcoming legislative proposal on the working conditions of platform workers) or risk leaving the most vulnerable platform workers behind.

3.2.2. Genuinely self-employed women platform workers are only narrowly protected against pay discrimination

Women and men platform workers pointed to unpredictable and low/unfair pay as two of the main disadvantages of platform work, particularly among those who perform micro-tasks, writing and translation work and multimedia and creative work (see section 2.6.1). This is consistent with previous studies, which found some forms of remote

(43) Other recent documents that adopt an intersectional perspective include the EU Roma Strategic Framework (2020-2030), https://ec.europa.eu/info/sites/info/files/eu_roma_strategic_framework_for_equality_inclusion_and_participation_for_2020_-_2030_0.pdf; and the EU Anti-Racism Action Plan (2020-2025), https://ec.europa.eu/info/sites/info/files/a_union_of_equality_eu_action_plan_against_racism_2020_-_2025_en.pdf

platform work (e.g. clickwork) particularly poorly paid, below the local minimum wage (Hara et al., 2018), and insufficient to make a decent living (Eurofound, 2018c). While this may be less of a problem for platform workers topping up their main income from another job, low and unpredictable income could have severe consequences for the well-being and quality of life of those who rely on platform work as their main employment activity (EIGE, 2020b; Huws et al., 2019; Pesole et al., 2018).

Studies have shown gender pay gaps in the platform economy, with women earning less than men (Adams and Berg, 2017), even though many platforms do not know the gender of the workers. Women are more likely to be in 'bogus' self-employment, which provides lower earnings than paid employment (EIGE, 2014). **Lower incomes from platform work risk reducing women's economic independence and increasing the likelihood of poverty over the course of their lives.** Research has shown that a gender gap exists in pensions, and this endangers the principle of gender equality (EIGE, 2015). For those who perform platform work as their main activity, the coverage and capacity to contribute to pension schemes is limited (Eichhorst and Rinne, 2017; De Stefano and Aloisi, 2018). By avoiding paying social security contributions for their workers, including contributions towards old-age pension, platforms can worsen gender inequalities in pensions and exacerbate the care needs of the most vulnerable.

Two particular challenges exist with regard to protection against discrimination. Firstly, the personal scope of most EU directives is often limited to workers, as developed in the case-law of the CJEU (Directive 2006/54/EC) ⁽⁴⁴⁾. While the notion of worker at EU level appears to be much broader than the notion of employee at national level, EU 'worker' does not cover genuinely self-employed people. Platform workers who are considered to be genuinely self-employed are thus not protected by the equal pay principle laid down in Article 157 TFEU (Kullmann, 2018). However, the personal scope might be less of an issue in France or Romania, where laws against discrimination at work apply regardless of individuals' employment status.

Secondly, the equal pay principle laid down in Article 157 TFEU requires a single source (i.e. usually one employer) to be responsible – and able to resolve – pay disparity. This may present compliance difficulties in the platform economy. The single source requirement is less of an issue in situations where the online platform determines the level of pay and manages the payment, compared to situations where the customer determines the level of pay and the payment, which is then communicated via the platform (Kullmann, 2018). Neither the personal scope nor the single entity requirement is likely to change in the European Commission's Proposal for a Directive to strengthen the principle of equal pay for equal work or work of equal value between men and women through pay transparency and enforcement mechanisms ⁽⁴⁵⁾. This is evidenced by Recital 11 of the preamble to the Proposal, which clearly states that platform workers may benefit from the Directive only where they fulfil the EU worker criteria.

⁽⁴⁴⁾ CJEU, *Allonby*, 13 January 2004, (C-256/01); CJEU, *Jany*, 20 November 2001, (C-268/99).

⁽⁴⁵⁾ Legislative train schedule (n.d.). Initiative to improve the working conditions of people working in the platform economy, <https://www.europarl.europa.eu/legislative-train/theme-a-europe-fit-for-the-digital-age/file-improving-working-conditions-of-platform-workers>

Conclusions

The AI-related transformation of work has uneven gendered impacts on the labour market

The new wave of automation driven by AI technologies is characterised by the increasing ability of machines to perform many more types of tasks than in previous waves. The process of automation and the take-up of new technologies affects employment structure, as the demand for skills changes, existing jobs are transformed or disappear, and new occupations emerge. Automation is likely to affect both female and male-dominated occupations as some of them are by high levels of routine content and are thus at increased risk of automation. While certain key tasks carried out (mostly by men) in transport, storage and manufacturing activities (e.g. physical manipulation of heavy goods) may become automated, emerging evidence suggest that women face a slightly higher risk of job loss due to automation, as it leads to the elimination of many clerical jobs (Lordan, 2019). However, new jobs offer broader opportunities for women with technological skills. The growth in women's educational attainment creates opportunities for the employment of women in high-skilled jobs (managers, professionals, technicians) and social jobs that are unlikely to be automated in the near future.

The potential of automation to challenge existing gender inequalities goes hand-in-hand with: (1) gender-responsive regulation, institutions and policies; (2) combating gender stereotypes, such as those relating to women's participation in STEM (3) policy measures that favour more equal division of paid and unpaid care work; and (3) equal representation of women in decision-making.

The gender gap among AI professionals challenges the idea of a gender-responsive and equitable future for AI technologies

The demand for AI professionals is growing rapidly, with these workers engaged in highly valued and well-paid jobs. However, there is a considerable gender disparity: men dominate AI design, programming and management, while the 'invisible' jobs in AI are often performed by women and people from less privileged backgrounds, frequently dislocated from the main company. Data labellers via labour platforms are an example of 'invisible workers' of AI. They are profoundly undervalued and have poor working conditions and pay, at stark odds with the knowledge they help to create.

Several key factors prevent women from pursuing and maintaining a career in AI. These include gender stereotypes and the gender divide in digital skills, strongly male-dominated work environments, the gender pay gap, and the lack of work-life balance. Attempts to increase women's entry into AI need to be accompanied by efforts to address gender inequality in AI careers. AI is a crucial area of growth, but without more stringent policy measures, it will likely exacerbate existing gender inequalities. The gender imbalance also affects how AI industries work, including what, how and for whom AI is developed. Diversity in the AI workforce is key to developing and maintaining AI tools that are equitable and free of bias. The implications at societal level are considerable, as those in charge of designing future technology have significant power to shape how societies function.

AI design can reinforce gender stereotypes and facilitate new forms of gender-based violence

Gender bias is often embedded in AI design, reflecting and amplifying broader societal norms and the personal biases of those designing these systems. When biased AI systems are embedded into workforce management tools, they can have discriminatory and exclusionary outcomes in various spheres of life. They can also have substantial implications for equal treatment and opportunities in the workplace. These tools pose major challenges for current EU and national anti-discrimination and data protection laws, which are yet to establish legal remedies to bias in AI.

AI-based technology can reinforce gender stereotypes and enable new forms of gender-based violence. The gendered design of digital assistants is a prime example of technology reaffirming gender stereotypes and gendered division of labour. Increasing reliance on the internet and technology to complete tasks in the workplace means that many employees face an increased risk of cyber harassment and data theft. Available research suggests that women are disproportionately the targets of cyber violence compared to men (EIGE, 2017a). On a positive note, however, machine learning algorithms can also be used to recognise and remove harmful content, such as non-consensual pornography. Crucially, the EU policy framework and regulation of AI is currently being developed. It urgently needs to adopt technical and ethical standards for design, training and monitoring of data that will prevent and tackle gender bias and discrimination.

Regulations and policy discussions on platform work are largely gender-blind, despite increasing numbers of women entering the field

The emergence of platform work and the consolidation of platform practices affect women and men in different ways. Earlier evidence found that women were underrepresented in platform work in the EU. More recently, platform work seems to have become more gender-balanced. EIGE survey data suggests that the trend may have started several years before the COVID-19 pandemic (EIGE, 2020b). Platform work seems to attract a significant proportion of workers with care responsibilities and foreign-born workers, many of whom lost their jobs due to COVID-19.

The EIGE survey shows that women platform workers are better educated than men, yet are more likely to provide low-skilled services, suggesting a greater risk of deskilling for women. Gender segregation in platform work is smaller than in the general labour market, particularly among those who primarily work through platforms. This suggests that people who rely more heavily on platforms to find work are more likely to avoid traditional occupational choices. Women are more represented in lower income brackets, particularly lone mothers, and men are more often engaged in higher paid platform jobs. The greatest differences are evident among women and men in couples with children.

Research at country level shows that policymakers and trade unions generally do not acknowledge gender issues in platform work. Policy research has similarly avoided adopting a gender perspective. This has resulted in gender-blind regulations and an accumulation of court cases and collective agreements in the most visible and traditionally male-dominated on-location services, such as food delivery. Women's work in the platform economy remains somewhat invisible or is seen as a continuation of their traditional roles in (unpaid) domestic and care work. Overall, just as platform work is evolving so too are the gender relations within it. While platform work does not necessarily provide quality jobs for different groups of women and men, it is changing (or outsourcing) standard working relationships and incorporating female-dominated and informal sectors of the economy, such as domestic work. It is imperative to remain cautious about the gender-transformative potential of the platform economy in the labour market and beyond.

The COVID-19 pandemic has worsened the situation of platform workers and exposed their poor access to social protection

The EIGE survey shows that roughly one-third of platform workers lost their main job due to the COVID-19 pandemic. This is slightly higher than in the general population. Almost half started or re-started working via online platforms due to COVID-19. For women, remote platform work has been an important strategy to mitigate the negative effects of the pandemic, namely their deteriorating financial situation. Younger platform workers, those with low levels of education, and foreign-born workers were particularly vulnerable. The support they received (if any) was generally not sufficient to alleviate the adverse effects of the pandemic.

In most countries, platforms are not recognised as employers, with workers classified as self-employed by default. The strict contribution-based approach or tenure requirements to access social protections result in platform workers remaining largely unprotected. The situation is particularly dire for those who primarily depend on platforms to access work. Platform workers who only supplement their main income should also be concerned, however, as their income replacement would be lower in case of sickness or care leave. The classification of platform workers as self-employed also hinders their capacity to seek collective representation, negotiate improved working conditions and social protection, or contest pay inequalities.

Platforms rely on their workers' social protection by their other employers or their own arrangements. This bypassing of social security contributions at the expense of the off-line economy raises questions about the equitable and sustainable financing of social protection systems in the EU, particularly when the pandemic has put a strain on social security systems.

Algorithmic workforce management tools can hinder work-life balance

The rapid surge in AI technologies impacts workforce management in both platform work and traditional work contexts. Algorithmic management of the workforce benefits organisations by speeding up processes, increasing productivity and efficiency, and reducing costs. However, it also entails potential harms, including reduced workers' autonomy, high risk of privacy violations, and biased and discriminatory decisions.

The EIGE survey found that the perceived work-life balance is one of the main reasons women and men living in couples with or without children engage in platform work. Such work is perceived as flexible, offering broader opportunities for women's labour market participation. However, the survey shows that one-third of women and men regular platform workers are rarely able to plan when they work. When platform work provides their main source of income, platform workers are constrained to work at specific hours to earn enough. If platform work is a secondary job, it is frequently performed in addition to the regular working day. The survey shows that up to two-fifths of regular platform workers often or always work nights and/or weekends. In addition, half of women note that their working hours on platforms are scattered throughout the day. The fragmentation of work performed via platforms and the unpaid time that platform workers spend looking for tasks lead to excessively long working hours. During the pandemic, many platform workers became more dependent on platforms to gain an income, while simultaneously becoming more time-poor in light of the increased burden of household chores. However, the current EU definition of 'worker' and the predominant national classification of platform workers as self-employed make it difficult to extend existing working time regulations to platform workers.

Platform workers are vulnerable to intersecting forms of discrimination and lack legal protection

A high number of platform workers indicate experiencing some form of unfair treatment while providing services via online platforms due to age, sex and language or accent. Women platform workers are more often exposed to pay discrimination and sexual harassment. Platform workers who belong to disadvantaged groups (e.g. foreign-born women and men) are particularly exposed to unfair customer ratings, especially women. There is greater awareness of the need for algorithm transparency on issues such as pricing, allocation of tasks, ratings and deactivation, as well as the need to promote non-discriminatory and bias free algorithms. However, self-employed platform workers are not yet covered by the anti-discrimination protections that are guaranteed to workers with traditional employment contracts. Algorithmic discrimination and unfair treatment or ratings can reduce platform workers' chances of finding work via platforms, while interactions with abusive clients affect their well-being at work.

Policy recommendations

AI-related transformation of the labour market

I. Systematically integrate a gender perspective into the policy framework on AI-related transformation of the labour market

AI technologies will open up many opportunities for society and the economy. However, the analysis here has shown that the use of AI can also have a detrimental effect on gender equality. Challenges are evident in automation of work, non-standard forms of employment, the AI workforce, and algorithmic management of the workforce. AI also contributes to reproduction of gender stereotypes, sexism and discrimination and enables new forms of gender-based violence. The COVID-19 pandemic has given these concerns a new urgency, as social distancing measures drive companies and societies to adopt new digital and data-driven technologies in real-time.

Fundamental rights and the principles of equality and non-discrimination are the basis of a human-centred, trustworthy AI, as stipulated by the Commission's European Strategy on Artificial Intelligence (Annex 3). The European Commission's Proposal for a Regulation laying down harmonised rules on artificial intelligence (Artificial Intelligence Act) represents a promising step towards minimising the risk of erroneous, biased and discriminatory AI-assisted decision-making at EU and national level. As enshrined in the BPfA, gender must be mainstreamed into the policy cycle and appropriate tools used, such as gender monitoring and evaluation, with a view to promoting gender equality and tackling discrimination in the AI ecosystem. Equally crucial is the adjustment of the current legislative framework (e.g. directives related to the principle of equal treatment of women and men) to set up accountability mechanisms and access to remedies in the case of harm. The Commission has committed to this review in its White Paper on AI - a European approach to excellence and trust.

Alongside preventing discriminatory outcomes of AI, more attention should be paid to other effects of AI on gender equality in the labour market. Efforts to understand and tackle the root causes of the risks AI poses for gender equality remain limited to date. Rather than adopting a gender mainstreaming approach throughout the process or targeted measures, discussions on the socioeconomic changes brought by AI have run almost in parallel with policy developments on gender equality.

II. Ensure that AI applications such as virtual assistants support gender equality and promote the development of AI technologies fighting gender inequalities

AI-based technology can exacerbate gender stereotypes, often to achieve better marketing outcomes. The EU Gender Equality Strategy 2020-2025 recognises that gender stereotypes are a root cause of gender inequality and need to be addressed, given their detrimental impact on all areas of society. It is essential to ensure that gender stereotyping is not translated into AI-based technologies. For example, companies could end the practice of making AI applications such as virtual assistants female by default, instead allowing users to select from a variety of options and avoiding clearly stereotypical descriptors for 'female' and 'male' options. Programmers could also ensure that digital assistants discourage verbal harassment and abusive language and respond to users in gender-sensitive ways.

Targeting developers and operators of AI devices as part of the Commission's planned actions on combating gender stereotypes could raise awareness of the importance of equitable and accountable AI. Member States should invest in education on AI, bias and ethics, and encourage transdisciplinary critical thinking about technology, particularly among aspiring and practising engineers and computer scientists. Similarly, it is imperative

to train gender analysts about the development of AI and possibilities to mitigate bias. General AI literacy programmes for girls and boys, women and men have the potential to enable individuals to critically assess the opportunities and challenges of AI.

The EU and Member States should promote the development of AI technologies that can help to eliminate gender inequalities and gender-based violence and support projects with these objectives. There are already some powerful examples, such as genderless voice assistants and tools to identify hate speech content or so-called revenge porn, reduce gender bias in translation applications, job postings and pay, and to help victims of gender-based violence and human trafficking. Gender-responsive requirements could be added to general public-funded programmes, e.g. requirements for gender-balanced development teams and gender-impact assessment of AI technologies.

III. Focus on entry and retention of women and men from diverse backgrounds in efforts to redress the gender imbalance in the AI workforce

One of the key factors explaining the persistent gender bias in algorithmic decision-making is the lack of diversity among AI professionals and researchers. The EU has already made several positive steps towards increased diversity by incentivising girls' and women's participation in STEM education and training. Nevertheless, gender segregation in education remains particularly pronounced and progress has stalled. More intensive efforts are needed on the part of the EU and Member States to reverse this trend and encourage girls, women and people from diverse backgrounds to participate in AI-relevant education and training at all levels.

Evidence shows that even if young women in school aspire to pursue a career in science, they often do not opt for careers in science in the end. Similarly, women entering STEM jobs leave them far faster than their male peers. In both cases, gendered barriers to their occupational pathways need to be addressed. The future EU regulatory framework for AI should include more stringent measures engaging not only women and girls but also industry and academia to address recruitment and retention barriers to diversity in AI.

In light of the BPfA strategic objectives and Member States' commitment to remove barriers and discrimination in education and employment at all levels, the following measures should be considered. These measures also partially intersect with the proposal of the High-Level Expert Group on Artificial Intelligence (AI HLEG) (AI HLEG 2019b).

- Close the gaps in digital skills between girls and boys, especially those from more disadvantaged backgrounds. This can be done by targeting children from an early age and boosting their self-confidence and motivation in the wider application of digital skills. The digital curriculum in schools should also be revised from a gender perspective.
- Intensify and broaden the variety of actions promoting the participation of girls, women and people from diverse backgrounds in AI-relevant education programmes at all levels. This should include dedicated and substantial scholarships, based on inclusive practices.
- Ensure that women's disproportionate responsibility for domestic and care work does not hinder their ability to participate in the AI community on an equal footing to men. Women must enjoy equal access to education and training, work transitions, re-skilling and upskilling, especially in the growing field of AI, and at a time when COVID-19 has disproportionately affected women's position in the labour market.
- Sponsor networking and coaching initiatives for women in AI-relevant academic and private entities, especially upon entry into the AI community.

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- Put in place mechanisms to fight gender inequality within the AI community. Attempts to increase women's representation – including in senior roles and in management – need to go hand-in-hand with efforts to tackle gender discrimination in the workplace, pay inequality, gender stereotyping and sexual harassment. Work-life balance measures should be set up and implemented.
 - Set and monitor reporting requirements for AI-relevant academic and private entities, based on sex-disaggregated and intersectional data. At a minimum, this should include key information on numbers and characteristics of workers, their jobs and working conditions.

In addition to high-skilled professionals, AI jobs also include low-paid positions, many of which offer poor working conditions and few career prospects. Ensuring visibility of all AI workers in policy debates surrounding the AI workforce would be an important step towards improving working conditions and gender equality in all AI jobs.

Gender equality and platform work

I. Integrate a gender perspective in Member State and EU regulation of platform work at all stages of the policy cycle

The predominant narrative on platform work is gender-blind, as are emerging approaches to its regulation. The focus is typically on on-location services, such as delivery and transport, in traditionally male-dominated sectors. These services are more visible in everyday life, especially compared to remote work in other sectors (e.g. writing and translation work, micro-tasks, housekeeping services). Gender segregation in platform work (and beyond), stereotyped preconceptions about who platform workers are, and lack of sex-disaggregated data may explain the prioritisation of some services or tasks over others. In line with the EU Gender Equality Strategy 2020-2025 and EU and Member States' commitments to gender mainstreaming (as defined in the BPfA), regulation at national level and the forthcoming legislative proposal on the working conditions of platform workers ⁽⁴⁶⁾ should adopt a gender mainstreaming approach at all stages of the policy cycle. That approach should be adopted in consultation with women and men platform workers and by undertaking gender impact assessments.

II. Address gender inequalities in platform work and ensure that platform work does not contribute to labour market segmentation or deskilling

The analysis has shown that platform work is not immune to gender inequalities, but, rather, mirrors overall labour market trends. Closing the gender gap in the labour market means including improving work-life balance, addressing horizontal and vertical gender segregation, and tackling the gender pay gap and gender pension gap. These are some of the key lines of action of the EU Gender Equality Strategy 2020-2025. In this context, the EU and national-level gender equality policies should address the negative trends in gender equality that are apparent in platform work.

While platform work can be a stepping stone in the transition from education into the labour market, or between jobs, such as during the COVID-19 pandemic, it should not trap people in insecure work. The analysis here has shown that women with high education are often found to provide low-skilled services on digital labour platforms, pointing to a risk of deskilling. The EU and Member States should ensure a smooth transition to quality jobs for all, paying particular attention to the structural disadvantages faced by both women and men with diverse backgrounds in the labour market. At the same time, attention should be paid to platform work practices that reduce the professionalism of certain occupations and resulting impacts on gender equality. In some instances, for example, platform work has commodified professional work that is usually subject to specific qualifications in the

⁽⁴⁶⁾ Announced by the European Commission as part of the European Pillar of Social Rights Action Plan (2021).

overall labour market. Ultimately, the EU and Member States should take action to counteract de-professionalisation of specific jobs on platforms (e.g. education or healthcare professionals) and to prioritise the promotion of women's economic rights and independence, given their increased adoption of platform work.

III. Address the legal uncertainty in the employment status of platform workers to combat disguised employment

Platform workers are frequently considered self-employed by default and are thus engaged in predominately unregulated jobs. Companies (and clients) benefit from classifying platform workers as self-employed: they pay lower or no social security contributions for workers, have to follow fewer or no employment regulations, and make task-specific rather than salary payments. Self-employed platform workers then bear all the costs, including social protection coverage. More often than not, however, self-employed platform workers actually work under the same conditions as regular employees, but with limited protection.

Platform work can increase women's and men's participation in the labour market, providing them with some flexibility around care and other activities, and a way out of discrimination in the traditional workplace. However, with limited regulations and protections, there is a risk that platform work will lead to a greater vulnerability and risk of poverty over the course of their lives. The European Pillar of Social Rights Action Plan (2021) highlights that as the number of vulnerable and precarious self-employed individuals in the platform economy rises, it is increasingly vital to clarify platform workers' employment status. This report has provided evidence to support classifying platform workers as employees, which would also contribute to more gender-responsive regulation of platform work.

IV. Take concrete steps to ensure that women and men platform workers can access social protection, irrespective of their employment status

Research has shown that platform workers have limited access to effective social protection. Platform workers, predominantly those classified as self-employed, often have poor access to maternity and parental leave, sick pay and unemployment benefits. This may be because they do not meet the employment-related conditions or because the low pay and fragmented nature of platform work do not satisfy contribution-based or job tenure requirements. As highlighted by the EU Gender Equality Strategy 2020-2025, social protection systems should not perpetuate structural gender inequalities. In line with the Council Recommendation on access to social protection for workers and the self-employed (2019/C 387/01), Member States should adopt measures so that all platform workers, whether in employment or self-employment, can adhere to and benefit from corresponding social protection systems. This is also consistent with the BPfA, which calls on governments to ensure that social security policies equally benefit those in non-standard forms of work. Finally, the transposition of the Work-Life Balance Directive at national level should ensure that platform workers can benefit from its provisions in relation to paternity, parental and care leave benefits.

V. Ensure that policies to alleviate the impact of COVID-19 on businesses and the self-employed take into account the needs of women and men platform workers

The analysis has shown that the COVID-19 pandemic has had an extremely harmful impact on women and men platform workers. Many lost their primary jobs, had to leave accommodation they could no longer afford, and suffered from a deteriorating household financial situation. Platform workers did not receive support in terms of paid sick leave, wage support, or deferral or cancellation of their mortgage or bills. However, platform work was an especially important strategy for many women and men to mitigate the negative effects of the pandemic. Some Member States provided employees and self-employed persons with some additional social protection and

work-life balance measures during the pandemic. Unfortunately, many platform workers may not have been able to access these schemes due to their self-employment status, duration of job tenure, or income thresholds.

VI. Extend working hours regulations and work-life balance measures to women and men platform workers, irrespective of employment status, and promote equal sharing of care responsibilities between women and men

The BPfA recognises the importance of adopting legislation that promotes equal sharing of care responsibilities and housework between women and men. Such legislation could facilitate greater flexibility for individuals to divide their time between employment, family responsibilities and rest. One of the main reasons for working on digital platforms is the perception that they allow work to be more easily combined with household chores and family commitments. However, the analysis shows that many platform workers are working an excessive number of hours, between their main employment, platform work and unpaid work, particularly women who take up a bulk of household work and childcare. Many are unable to choose when to work and their hours are scattered throughout the day. The penalties imposed by platforms for interrupted work are also detrimental to combining work with care responsibilities at home. The Directive on transparent and predictable working conditions could be the first step towards ensuring a balance between flexibility and security for workers in the digital economy. Its transposition at Member State level should not exclude women and men platform workers. Similarly, national transposition of the Work-Life Balance Directive should ensure that platform workers can benefit from its provisions in relation to flexible working arrangements.

VII. Improve platform workers' collective bargaining coverage and support stronger collective representation of all platform workers

As platform workers are generally considered self-employed, they are not entitled to collective representation. Some EU Member States have adapted their rules to ensure that self-employed workers can access collective bargaining, although obstacles remain in EU competition law. The European Commission is engaged in a process to address the issues of collective bargaining for the self-employed and revise the EU competition law. Crucially, this process must also adopt a gender perspective. The country-level research shows that where collective bargaining is an option, trade unions are more aware and responsive to the needs and demands of platform workers in traditionally male-dominated sectors, such as delivery, logistics, construction and engineering. All platform workers, including the self-employed and domestic workers (who are predominantly women) ⁽⁴⁷⁾ working primarily in their personal capacity should have the right to bargain collectively, irrespective of their employment status. This could be done by extending the right to bargain collectively beyond the 'EU worker' definition to those (solo) self-employed who are not genuinely operating a business undertaking on their own account, and acknowledging that 'self-employment' is not equivalent to an 'undertaking' (Countouris et al., 2021).

The European Pillar of Social Rights Action Plan (2021) highlights the need to consolidate social dialogue at national and EU level to mitigate the impact of the COVID-19 pandemic and improve outreach to platform workers (among other groups). The EU Commission recently launched a consultation with EU social partners on possible EU action to improve the working conditions of platform workers ⁽⁴⁸⁾, which should take care to ensure

⁽⁴⁷⁾ Domestic workers' right to collective bargaining, regardless of employment status, is reaffirmed under the ILO Domestic Workers Convention (189) of 2011. ILO (2011). Convention concerning decent work for domestic workers (No. 189), https://www.ilo.org/dyn/normlex/en/?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C189

⁽⁴⁸⁾ European Commission (2021). Protecting people working through platforms: Commission launches a first-stage consultation of the social partners, https://ec.europa.eu/commission/presscorner/detail/en/IP_21_686

that the needs of women platform workers are equally represented. Finally, the EU and national governments could support and strengthen trade unions and other platform workers' initiatives by providing financial and technical resources for gender-sensitive capacity-building and targeted initiatives to improve gender equality.

VIII. Ensure that EU non-discrimination law and protection against discrimination, including the principle of equal pay for work of equal value, is applied to platform workers regardless of their employment status

The EIGE survey shows that as many as 58 % of women and 66 % of men platform workers have experienced some form of unfair treatment while providing services via online platforms. The most frequently mentioned basis for that treatment was age and sex (among women) and language or accent (among men). Unfair ratings are also found to disproportionately affect platform workers belonging to a minority group, especially women born outside the EU.

The European Commission's recent proposal for a Directive to strengthen the principle of equal pay for equal work or work of equal value between men and women through pay transparency and enforcement mechanisms explicitly mentions platform workers. However, they would only benefit from this regulation where they fulfil the 'EU worker' criteria. This would exclude most platform workers, who are currently classified as self-employed. The shortfalls in existing and upcoming regulations in protecting platform workers highlight the urgency of clarifying their labour market status.

There is also a pressing need to address algorithm transparency at policy level, particularly on issues such as pricing, allocation of tasks, ratings and deactivation in order to promote non-discriminatory algorithms and prevent gender and other social biases. New regulation in Spain ⁽⁴⁹⁾ requires platforms to make information on the algorithms used to regulate the working conditions of platform workers in delivery and courier services (including their access to and maintenance of employment and profiling) available to trade unions. This is intended to neutralise bias and discriminatory penalties for performance, and could serve as a useful example for other Member States.

IX. Tackle gender data gaps in AI and invest in research to understand how AI can combat – or reproduce – gender inequalities in the labour market and beyond

The collection and handling of large datasets used in AI systems in the EU need to be explored to understand how these processes can reinforce gender bias and discrimination. The purpose for which the data is used should be consistently questioned and scrutinised against EU values and principles, including gender equality and fundamental rights.

Sex-disaggregated data on the nexus of the labour market, AI, platform work and gender equality is absent, fragmented or relies on commercial data. More EU data is needed to understand how greater use of AI-based technology affects the labour market, including algorithmic management of workforce and its impacts on gender equality. Collection of publicly available, robust qualitative and quantitative data on the engagement of women and men in STEM subjects throughout the educational cycle and in the AI workforce should also be improved to identify both the main barriers to gender equality and potential solutions.

While there are genuine efforts in the EU to collect quantitative evidence on platform work, more attention must be paid to exploring the gendered challenges faced by platform workers. Key data gaps include the gender pay

⁽⁴⁹⁾ Royal Decree-Law Royal 9/2021, of May 11th, which modifies the revised text of the Workers' Statute Law, approved by Legislative Royal Decree 2/2015, of October 23, to guarantee the labour rights of persons dedicated to delivery services in the field of digital platforms. Available at: <https://www.boe.es/buscar/doc.php?id=BOE-A-2021-7840>

gap, gender segregation, platform workers' access to social protection, workers' skills and career paths, labour union coverage, work-life balance, and occupational health and safety. Across the Member States studied, there is a lack of information on unequal treatment and discrimination, as well as violence and harassment, including sexual harassment.

Finally, there is an urgent need to understand how the gendered aspects of AI and platform work intersect with other social inequalities, including race and ethnicity, class, age, disability status or migration status. The disproportionate numbers of women and men from migrant backgrounds in some sectors of platform work, for example, highlights the importance of exploring platform work from both a gender and an intersectional perspective.

Annex 1: Defining AI and other key concepts

Artificial intelligence (AI) was first named as such in 1955, on the premise ‘that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it’ (McCarthy et al., 2006; p. 12; UNESCO, 2019; p. 5). Since then, it has become apparent that certain aspects of human intelligence are much harder to simulate than others. As efficient as they can be, AI systems today are not the same as human intelligence, which is marked by awareness and conscious action. Instead of relying on thinking in the human sense, such systems are programmed to make decisions and take action based on their calculation of probabilities of certain outcomes (UNESCO, 2019). In other words, AI systems are ‘limited by the historical data from which they learn and restricted to functioning within set parameters’ (Colback, 2020).

Various approaches have been used to describe AI and there is no standard definition of what it actually involves (JRC, 2020). Part of the reason lies in the fact that conceptualisations of AI differ across different disciplines. Philosophy-oriented disciplines, for example, are concerned with questions of the true meaning of intelligence and how to distinguish ‘natural’ from ‘artificial’ intelligence.

There is a long tradition of analysing the relationship between gender and technology, (including AI) in feminist scholarship (Wajcman, 2007). Feminist scholars have raised important concerns about the lack of a critical view of technology in general and AI in particular, as systems that operate within existing power structures (e.g. Adam, 1998; Ferrando, 2014). They urge a broader consideration of how AI systems are used to ‘represent knowledge, what kind of knowledge and whose knowledge they contain’, and ultimately whether and how they can worsen or improve gender inequalities (Adam, 1995). Rather than being value-free, new technologies – particularly AI and machine learning – are products of technical, social, and cultural processes. When these processes mirror the society that created them, they are not neutral but exacerbate social inequalities, including those related to gender (Shestakofsky, 2017; Howcroft and Rubery, 2019). During the 1990s, feminist scholars increasingly focused on the liberating potential of technology for women (Wajcman, 2007).

Contemporary theories of gender and technology aim to highlight both the pessimism about the inherent masculinity of technology and the optimism about the liberating potential of technoscience for women (Wajcman, 2004). They argue that they are co-produced, with technologies having previously ‘yielded unintended consequences and unanticipated possibilities’ (Wajcman, 2007, p. 294). In addition to philosophical questions about technology, the contemporary approach considers social aspects in access and use of technology, including outside of AI. It reveals that ‘women users produce new, advantageous readings of artefacts [which are] dependent on their broader economic and social circumstances’ (Wajcman, 2007, p. 294). For example, Wajcman points out that young Western women’s experiences with using mobile phone often differs from their use by older generations of women, or women in locations outside the West (Wajcman, 2007). Contemporary theories of gender and technology thus draw attention to intersecting inequalities in access, use and experience of technology and technological artefacts. Looking at these processes within their broader social and economic context opens up new possibilities in analysing the impact of technology on gender equality.

Engineering-oriented disciplines are more concerned with pragmatic, technological definitions of AI. They primarily focus on its applications, for example, in natural language processing, computer vision and robotics (UNESCO, 2019). In engineering-oriented disciplines, AI is seen as a system built on the data-driven approach of machine learning, which is based on artificial neural networks (ANNs) (UNESCO, 2019). ANNs are defined as

systems that 'learn' to perform tasks by considering prior data (labelled examples) and that generally do not need to be explicitly instructed on every single task-specific rule or model UNESCO (2019). Deep learning, based on ANNs of several layers, enables the machine to recognise complex concepts, such as human faces, human bodies, speech, and all types of image classification. It also includes applications such as language translation and pattern recognition software (Wang, 2003; UNESCO, 2019).

In its efforts to develop a common understanding of AI, the European Commission has taken a technological view. It defines AI as a generic 'umbrella' term that refers to systems that rely on data and computational infrastructure to display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals. It encompasses technology from algorithms to deep neural networks (European Commission, 2018; Johnson, 2019). AI and algorithms are not synonymous, however. An algorithm is conceptualised as a set of precisely defined steps and rules to accomplish a task (Eurofound, 2018a). AI, in contrast, is a system that, based on prior data, is able to simulate reasoning and make a decision without an explicit instruction. In other words, an algorithm is procedural and will always produce an action it was programmed to do. By contrast, the performance of complex AI models is based on the probability of an outcome, and in general, correctly classifies new data in less than 100 % of cases. To illustrate the difference, consider a simple example of automated customer service: an automated voice that asks you to press a key to choose the type of service you require is an example of an algorithm-based technology, while a digital assistant that responds to voice commands is AI-based technology. Before taking action, it may need to ask you to repeat what you have said.

From these definitions and examples, it is clear that several conditions need to be satisfied in order for AI to be able to perform tasks. AI needs data from various sources, which it can classify, store and process. It also needs strong computing resources, and decision-making principles, based on machine learning algorithms (UNESCO, 2019). Coupled with ICT, AI-based technology is now used across different industries and areas of life, such as transport, health, education, entertainment, industry and business, including marketing and customer services (UNESCO, 2019). In the future, its use will radically transform all aspects of life, including crucial areas for gender equality, such as the world of work.

Annex 2: Methodological overview

The analysis is based on three strands of research. The first was an assessment of the EU policy context, literature review, and an analysis of available statistical evidence on AI-related transformation of the labour market. The second was an online panel survey on working conditions, work patterns and work-life balance of close to 5,000 women and men engaged in platform work in 10 selected Member States (DK, ES, FR, LV, NL, PO, RO, SI, SK, FI). The fieldwork for the survey was carried out between November and December 2020. The survey focused on identifying and collecting data from platform workers among daily internet users ⁽⁵⁰⁾. With a 31.2 % incidence rate, the final validated sample of platform workers comprised 4,932 respondents.

Compared to earlier panel surveys of platform workers, the selected targeting approach contributed significantly to increasing the internal validity of the platform work analysis. Firstly, the survey collected a larger sample of platform workers, meaning more degrees of freedom for specific analyses focusing on gender patterns. Secondly, the focus on platform workers specifically allowed tailored and focused measurement instruments to be developed. However, this approach does not allow generalisation of the survey findings to the population of daily internet users (only specific groups were targeted) nor to the population of platform workers (no reliable statistics exist to calibrate the data). This also means that the possibilities to estimate platform work prevalence rates are limited and rely on numerous assumptions.

The third was an EU-wide literature and data review and country-level research in the same 10 countries to assess policy approaches to regulating platform work. The country-level research was based on desk research and interviews with national stakeholders conducted between October and December 2020. The stakeholders interviewed included representatives of policy-making and regulating authorities, representatives of the digital labour platforms active in the country, social partners or relevant non-governmental organisations (NGOs) and experts or research in platform work, labour and social protection, labour law and gender studies. The interviews discussed contextual factors, such as prevalence of platform work, employment status and labour market classification of platform workers, access to social protection, work-life balance and equal treatment and non-discrimination.

Data collection was carried out in the 10 selected Member States. The countries were chosen to provide a wide range of contexts to the analysis. These include differing levels in the digital performance (illustrated by the DESI (ranging from above 70 points in FI to around 40 points in RO)), different levels of gender equality (measured by the EIGE Gender Equality Index (ranging from above 75 points in DK and FI to less than 55 in SK and RO)), and distinct welfare and social protection systems (Nordic (DK, FI), continental (FR, NL), Central and Eastern Europe (LV, PL, RO, SK) and Southern European countries (ES, SI)).

⁽⁵⁰⁾ 'Internet users' here means daily internet users.

Annex 3: Policy context

The study covers three broad policy areas: AI, gender equality and equal treatment, and labour and employment transformed by digitalisation. The current EU policy framework demonstrates the emergence and rapid development of AI as both an opportunity and challenge for gender equality. AI has been high on the EU agenda since the European Commission launched its Communication on Artificial Intelligence for Europe in 2018. The principle of equality between women and men has since been presented as a matter of social responsibility and an ethical issue in various policy documents on AI and on the digital transformation of the labour market, including the emergence of platform work. In parallel, policy developments in the area of gender equality have signalled the importance of taking a gender perspective on AI and digitalisation. The focus is on preventing discriminatory outcomes and ensuring that women and men benefit equally from the opportunities presented by the digital transformation of the world of work.

Equality, non-discrimination and fairness are key principles to underpin all AI systems in the EU

The EU policy framework on AI and digitalisation generally shows some gender sensitivity by recognising that AI and the digital transformation of the world of work may create new forms of inequalities and perpetuate existing unequal gender relations and other intersecting inequalities, whether through bias in datasets or excluding new forms of work from legislation.

The Communication on Artificial Intelligence for Europe (2018) sets the basis for discussions on a coordinated EU approach to address the challenges and opportunities of this new technology. The Communication presents the Commission's vision for AI developed and used in the EU that is ethical, secure and innovative, based on the following three pillars:

1. Being ahead of technological developments;
2. Ensuring an appropriate ethical and legal framework;
3. Preparing for socioeconomic changes brought about by AI.

The Communication, together with the Coordinated Plan on Artificial Intelligence and the Communication on Building Trust in Human-Centric Artificial Intelligence, form the so-called Commission's European Strategy on Artificial Intelligence. The (then-candidate) President of the European Commission, Ursula von der Leyen reiterated those policy priorities in the area of AI in her Political Guidelines for the next European Commission 2019-2024, presented in July 2019. Under the topic of 'A Europe fit for the digital age', von der Leyen envisioned a Europe that 'strive[s] for more by grasping the opportunities from the digital age within safe and ethical boundaries' (2019, p. 13). The President also pledged to put forward legislation for a coordinated European approach on the human and ethical implications of AI. Priority is given to getting Europe up to speed on digital skills for young people and adults, with a focus on increasing Europe's competitiveness, while preserving high privacy, security, safety and ethical standards. The President recognised that diversity and gender equality are critical components of economic growth because 'diverse groups produce better results' (2019, p. 11).

In June 2018, the European Commission created the AI HLEG to support the implementation of the EU strategy on AI, including policy recommendations on ethical, legal and societal issues related to AI, as well as socioeconomic challenges. The AI HLEG notes that fundamental rights, equality, non-discrimination and solidarity, as well as the principle of fairness, must underpin all AI systems (AI HLEG, 2019b). In April 2019, the AI HLEG released its Ethics Guidelines for Trustworthy AI, stating that AI should be lawful, ethical and robust, both from a technical and social perspective. In June 2019, it published its Policy and Investment Recommendations for Trustworthy AI. These two documents outline a series of recommendations to ensure that a trustworthy European AI contributes to growth and competitiveness, as well as inclusion, empowerment, benefit and protection of all human beings.

These policy documents highlight three major challenges for the EU in dealing with AI. Firstly, there is a need to ensure that no one is left behind. In a new economy transformed by automation and AI, society as a whole – and particularly those workers whose jobs are likely to be affected – must be supported to develop new skills. Secondly, the EU needs to train more specialists in AI to guarantee competitiveness and growth. Thirdly, there is a legitimate concern that AI systems can generate biased outputs, leading to direct and indirect discrimination against certain groups of people.

The problem of AI systems generating and exacerbating discrimination, including gender-based discrimination, and resulting in breaches of fundamental rights is a priority area of concern in EU policy. To mitigate this risk, the Commission, in its White Paper on Artificial Intelligence - A European approach to excellence and trust (2020), proposed the creation of a regulatory framework for AI and the adjustment of the current legislative framework (including, for example, directives related to the principle of equal treatment of men and women). One of the legal requirements of this future AI regulatory framework would be to ensure that the use of AI systems does not lead to discrimination.

EU measures for unbiased AI focus on inclusive datasets and diverse teams

Two main strategies have been proposed to avert biased outputs that lead to discrimination: using inclusive datasets and promoting diverse AI teams (AI HLEG, 2019a). The first strategy consists of using data that is as inclusive as possible and reflects dimensions such as gender and ethnicity to avoid unfair bias in datasets (e.g. using mainly data from men, leading to suboptimal results for women). The Commission has pledged to address this issue in a horizontal regulatory proposal on AI, scheduled for the second quarter of 2021. The proposal will include requirements on the quality of training datasets and testing procedures for bias detection and correction. These requirements are intended to prevent negative discriminatory effects early on, and to enable continuous monitoring of compliance with equality legislation throughout the AI lifecycle.

In addition to inclusive datasets, the teams that design and maintain AI systems should reflect the diversity of users and society. There is a growing need to ensure not just that diverse teams are working in AI, but that there is an adequate supply of skills in a labour market that is transformed by AI and digitalisation.

The Commission has called for increased involvement of women and people from diverse backgrounds in the development of AI to ensure a digitally skilled workforce. Efforts should begin by increasing their participation in AI education and training. The Commission, for example, supports digital opportunity traineeships in companies, EU Code Week ⁽⁵¹⁾, which aims to teach young people (especially girls) to code, and the European Network of Women in Digital. It also created the Women in Digital Scoreboard ⁽⁵²⁾ to track progress towards equality in the digital economy at Member State level (European Commission, 2018b). Coupled with incentives for women to enter tech and AI through educational opportunities, future policy responses should also engage employers to address attrition as a barrier to diversity in AI (Xiang and Brown, 2020). At present, the Commission has only *invited* social partners to consider gender balance and diversity in AI jobs (European Commission, 2018). In other words, as yet, there no compulsory measures to guarantee gender balance and diversity.

A future EU regulatory framework for AI should include more stringent measures to address the underrepresentation of women and people from diverse backgrounds in AI. The AI HLEG (2019) has proposed a

⁽⁵¹⁾ EU Code Week website is available at <https://codeweek.eu/>

⁽⁵²⁾ Women in Digital Scoreboard (2020) is available at <https://digital-strategy.ec.europa.eu/en/library/women-digital-scoreboard-2020>

series of ambitious actions to increase gender balance and diversity in AI. In addition to gender mainstreaming and gender budgeting, the AI HLEG (2019) suggests the following targeted measures:

- Implement gender quotas, with a suggested target of at least 30 % of female talent in AI higher education, AI workforce and AI eco-systems by 2030;
- Attract female talent into AI and related subjects through dedicated and substantial scholarships, based on inclusive practices;
- Sponsor initiatives for networking and coaching for women in AI;
- Incorporate gender research into AI research programmes to increase diversity;
- Address gender bias in algorithmic decision-making, particularly in relation to labour markets.

These policy documents view gender stereotypes as a key factor preventing women and girls from pursuing an education and a career in AI. This is in addition to a high prevalence of 'male norms and networks' that disadvantage women in selection processes and push them to leave their digital jobs. While several measures are proposed to coach women on entry into AI, there is still a lack of focus on addressing gender stereotypes as a cultural phenomenon that results in strong horizontal gender segregation in the labour market. Policies to incentivise the representation of women in traditionally male sectors should also tackle the undervaluation of female-dominated work and underrepresentation of men in occupations such as nursing and teaching. Instead of a cultural shift from underrepresentation and gender stereotypes, current efforts to increase the proportion of women in science and technology are presented purely as a mechanism to increase the talent pool, boost the European economy, and increase the relevance and quality of innovation outputs for society as a whole.

Gender-based discrimination is frequently mentioned as one of the potential risks of AI, and a gradual uptake of gender equality objectives is evident in the policy context in recent years. Nevertheless, the European Strategy on Artificial Intelligence remains fairly gender-blind. Fundamental rights and the principles of equality and non-discrimination are considered to be the basis for a human-centric and trustworthy AI developed in the EU. Yet, not much in-depth analysis seeks to understand how such a baseline approach could shift existing gender inequalities. For example, while the AI HLEG (2019) proposes tackling gender bias in algorithmic decision-making (e.g. in hiring and management), it omitted how the principle of equality between women and men would be applied in practice to prevent unfair outcomes in the labour market.

Trends in EU equality policy

The prevention of sex based discrimination and biased AI outcomes, together with the promotion of greater diversity within teams working in AI, are key themes in the EU Gender Equality Strategy 2020-2025.

The EU Gender Equality Strategy sets out the key policy objectives for von der Leyen's term in the field of gender equality. It promises to address the longstanding gender equality challenge of gendered choices in study subjects and, subsequently, careers. It reiterates the importance of AI as a leading driver of economic progress and the relevance of women as researchers, programmers and users to avoid gender bias. The Strategy calls for a dual approach to gender equality in every EU policy area, together with intersectionality as a horizontal principle for policy implementation. More specifically, it mentions the new framework programme for research and innovation, Horizon Europe (2021-2027), launched in February 2021. Horizon Europe includes some new and strengthened requirements for gender equality compared to its predecessor (European Commission, 2021a)

- The integration of a gender dimension as a requirement by default across the programme;
- Having a gender equality plan is an eligibility criterion for public bodies, research organisations and higher education establishments;

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- Specific funding for the development of gender equality plans in research and for gender studies and intersectional research;
 - Flagship measures and activities promoting gender equality, including a target of 40 % women-led companies invited to pitch their projects, a target of 50 % women among members of advisory structures, a prize for women innovators, and a dedicated initiative to support women-led start-ups;
 - Gender balance among researchers involved in projects is strongly encouraged and will be taken into account for equally ranked proposals. It will also be considered in evaluation panels and other advisory bodies.

EU approach to navigating the digital transformation of the labour market

Launched in 2017, the European Pillar of Social Rights frames the conversation on the digital transformation of the labour market. It provides guidance on relevant issues related to the digitalisation of work and new forms of employment, in its chapters on fair working conditions and on access to social protection. The Pillar contains 20 principles for a more inclusive and fairer Europe. It emphasises the need to ensure and foster equality of treatment and opportunities between women and men in all areas, particularly in the labour market, and the right to equal pay for work of equal value. It also highlights that equal opportunities must be upheld, regardless of intersecting inequalities. Most recently, the European Pillar of Social Rights has been operationalised in an Action Plan, launched in March 2021. The Action Plan includes targets to equip citizens and workplaces for the digital transition.

Aside from the question of a digitally-skilled EU workforce, a series of policy initiatives aim to tackle other challenges brought about by the broader digital transformation of labour markets, such as the emergence of the platform economy, and new and non-standard forms of work ⁽⁵³⁾ linked to the increased use of algorithmic workforce management. These initiatives adopt a gender perspective to different degrees. Chief among them is how to ensure appropriate social protection for workers engaged in these new and non-conventional forms of work linked to digitalisation.

In 2018, the European Commission created a High-Level Expert Group on the Impact of the Digital Transformation on EU Labour Markets. That High Level Group has raised concerns about how women and minorities are disproportionately overrepresented in non-standard and new forms for work. It has called for equalisation of the treatment of standard and non-standard work arrangements to reduce penalties (e.g. reduced access to government services) and ensure that all Europeans with non-standard employment have access to social protection, including parental leave (High-Level Expert Group on the Impact of the Digital Transformation on EU Labour Markets, 2019). This recommendation was partly followed by the Commission in the adoption of Directive 2019/1152 on transparent and predictable working conditions across the EU. This Directive has been described as the first step towards ensuring a balance between flexibility and security for workers in the digital economy (Vyas, 2020). It has the potential to contribute to more equal gender relations by introducing new minimum rights for workers, including those in non-standard forms of employment, provided they fulfil basic criteria (e.g. minimum number of working hours). Similarly, the Council Recommendation on access to social protection for workers and the self-employed was formally adopted in November 2019. The Recommendation encourages Member States to take measures so that all individuals in employment and self-employment can access corresponding social protection systems, including maternity and paternity benefits.

⁽⁵³⁾ Examples of non-standard employment include on-call work, temporary agency work and platform work.

The Commission has paid particular attention to the collaborative economy – and more specifically platform work – due to its significant growth and potential in recent years. In June 2016, the Commission published its Communication on a European agenda for the collaborative economy, providing guidance for Member States on the application of existing EU rules to the platform economy, including fair working conditions and adequate and sustainable consumer and social protection. Gender issues within the collaborative economy are not identified or analysed, however, and this Communication remains entirely gender blind. Most recently, the European Commission has committed to launching a legislative proposal on the working conditions of platform workers by the end of 2021, as part of the implementation of the European Pillar of Social Rights. As of April 2021, it is gathering evidence on the working conditions of platform workers through a first-stage consultation with social partners ⁽⁵⁴⁾. In January 2021, the Commission presented an inception impact assessment on collective bargaining agreements for the self-employed and the scope of application of EU competition rules. Two months later, it launched a public consultation on that inception impact assessment to gather views from stakeholders and ensure that EU competition law does not stand in the way of initiatives to improve working conditions through collective agreements for solo self-employed. This EU initiative is relevant to the platform economy, as many platform workers are classified as self-employed ⁽⁵⁵⁾.

In addition to the EU Gender Equality Strategy 2020-2025, the content of some EU non-discrimination legislation and other gender-relevant directives crosscuts with AI and the digital transformation of the world of work. There is a collection of directives ⁽⁵⁶⁾ that aim to ensure appropriate social protection and work-life balance for working parents and carers. These directives, particularly the most recent Directive on Work-Life Balance, encourage more equal sharing of parental leave between women and men and address women's underrepresentation in the labour market. However, their conceptualisation of employment as the standard relationship between a full-time employee with an open-ended contract and a single employer (and usually linked to a workplace with well-defined spatial and physical boundaries) largely excludes those in self-employment and non-standard forms of employment that are increasingly common due to the digital transformation of work (Kullmann, 2018; Vyas, 2020).

The topics of equal pay for equal work and pay transparency have been prominent in EU political debate for several years ⁽⁵⁷⁾. The issue of equal pay and pay transparency brings specific and unprecedented challenges for policymakers in a world of work transformed by AI (Kullmann, 2018). In her Political Guidelines, Ursula von der Leyen committed to introducing binding pay transparency measures. In March 2021, a proposal for a Directive on pay transparency to ensure that women and men in the EU get equal pay for equal work was finally presented. The proposal sets out pay transparency measures, including pay information for job seekers, a right to know the

⁽⁵⁴⁾ If social partners do not wish to conclude negotiations themselves, the Commission will proceed with a second stage consultation on the envisioned EU action. If social partners again opt not to negotiate, the Commission will put forward an initiative by the end of the year. More information is available at https://ec.europa.eu/commission/presscorner/detail/en/IP_21_686

⁵⁵ Subject to the outcome of the impact assessment, the adoption of an initiative is scheduled by the end of 2021. More information is available at <https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12483-Collective-bargaining-agreements-for-self-employed-scope-of-application-EU-competition-rules/public-consultation>

⁵⁶ This includes the Directive on the right to a compensated maternity leave (Directive 92/85), the Directive on the right to parental leave (Directive 2010/18), and the new Directive 2019/1158 on work-life balance for parents and carers promoting equal sharing of caring responsibilities between parents (repealing Directive 2010/18/EU).

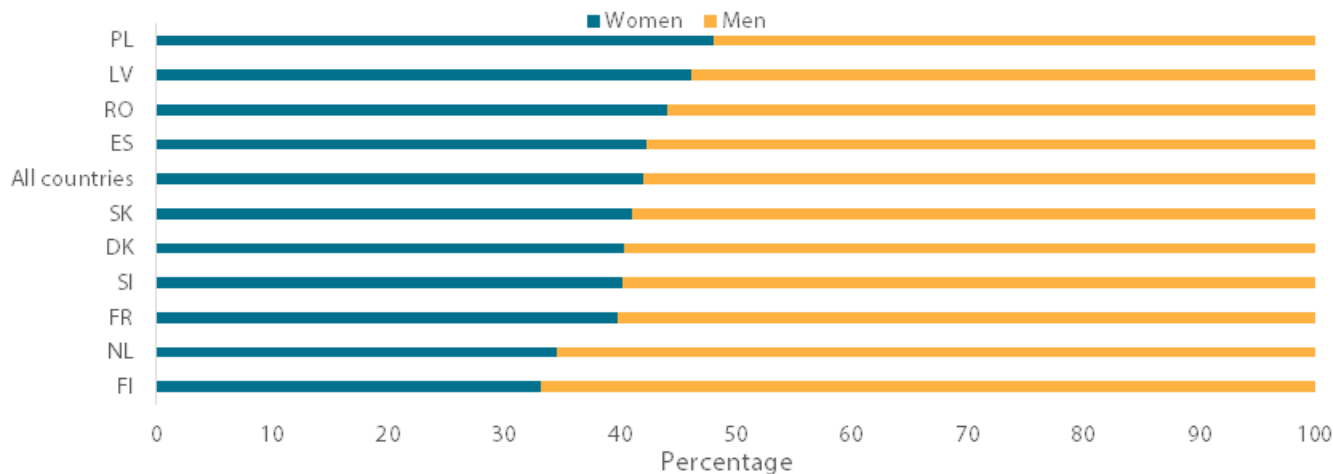
⁽⁵⁷⁾ The main legislative documents on the topic of equal work and pay transparency include Directive 2006/54/EC on the implementation of the principle of equal opportunities and equal treatment of men and women in matters of employment and occupation, complemented by Directive 2010/41/EU on equal treatment between men and women engaged in an activity in a self-employed capacity, which also addresses maternity benefits for self-employed women. In 2014, the Commission adopted its Recommendation on strengthening the principle of equal pay between men and women through transparency, in order to provide guidance for EU countries to implement the equal pay principle more effectively.

pay levels for workers doing the same work, gender pay gap reporting obligations for big companies, and a pay assessment for employers whose reporting reveals a gender pay gap of at least 5 %. The proposal also strengthens the tools for workers to claim their rights, opens access to justice, and includes the right to compensation for pay discrimination for employees ⁽⁵⁸⁾. However, those in new and non-standard forms of employment are unlikely to be covered by the Directive.

Finally, social dialogue is recognised to be central to the EU policy context on AI-related transformation of the labour market. In the past decade, social partners have produced a variety of statements on the impact of digitalisation on the economy, both sector-specific and cross-sectoral in nature. The European Social Partners Framework Agreement on Digitalisation was signed in 2020 by BusinessEurope, the European Trade Union Confederation (ETUC), the European Centre of Employers and Enterprises providing Public Services (CEEP) and SMEUnited. This represents the most recent shared commitment of the EU cross-sectoral social partners to manage the substantial implications of digitalisation for labour markets. Unfortunately, this agreement between employers and workers does not envisage any explicit commitments to addressing gender inequalities stemming from or perpetuated by the digitalisation of the world of work.

Annex 4: Additional figures

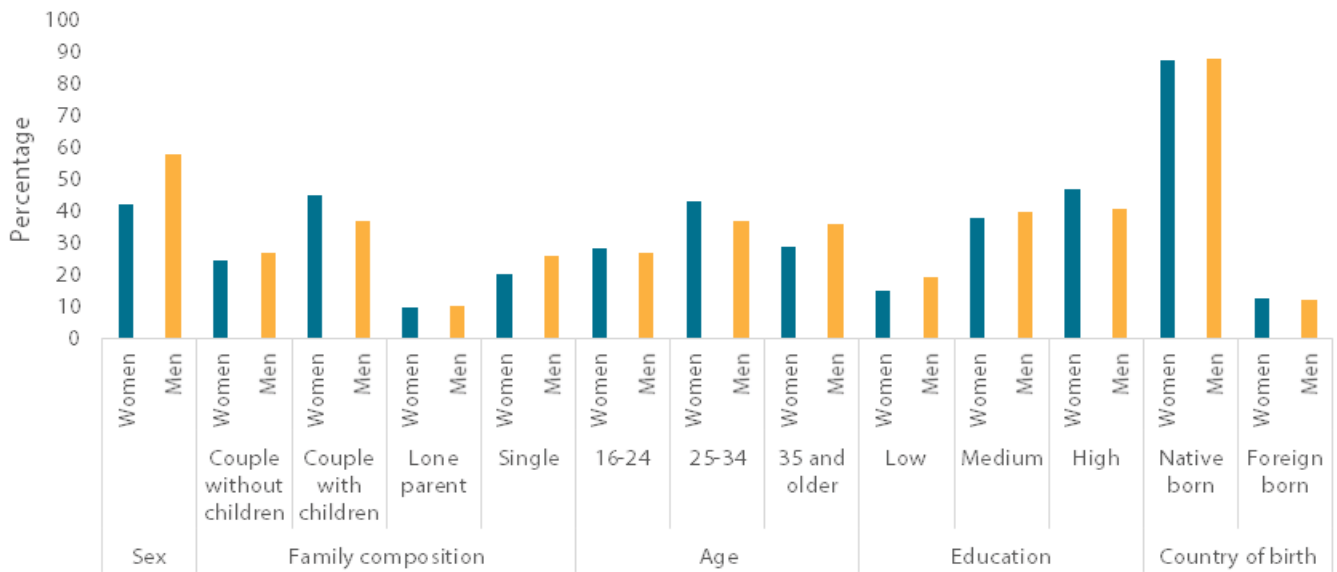
Figure 36. All platform workers, by country and sex (%)^a



Source: EIGE (2020). Online panel survey of platform workers.
 Note: ^a Of all platform workers (n = 4,932); weighted results.

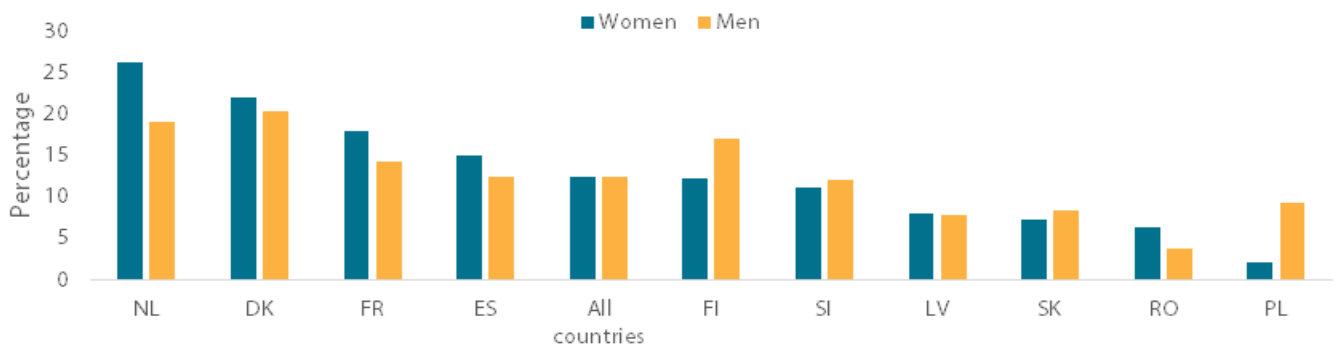
⁽⁵⁸⁾ The proposal is now with the European Parliament and the Council for approval.

Figure 37. All platform workers by sex, family composition, age, education level, and country of birth (%)^a



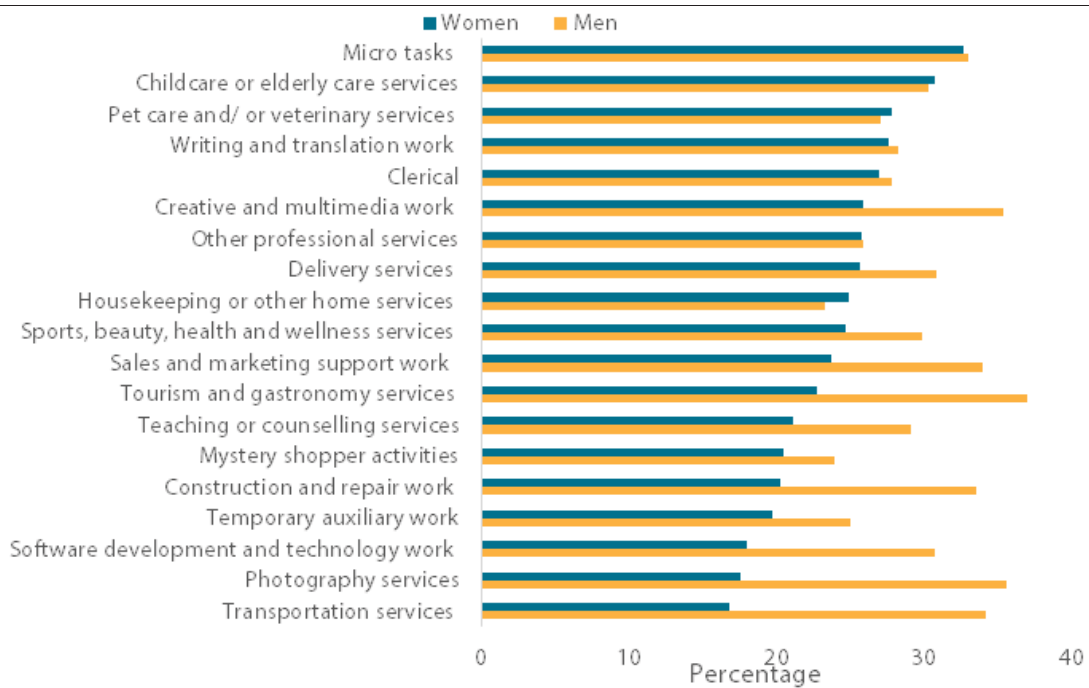
Source: EIGE (2020). Online panel survey of platform workers.
 Note: ^a Of all platform workers (n = 4,932); weighted results.

Figure 38. Foreign-born platform workers, by country and sex (%)^a



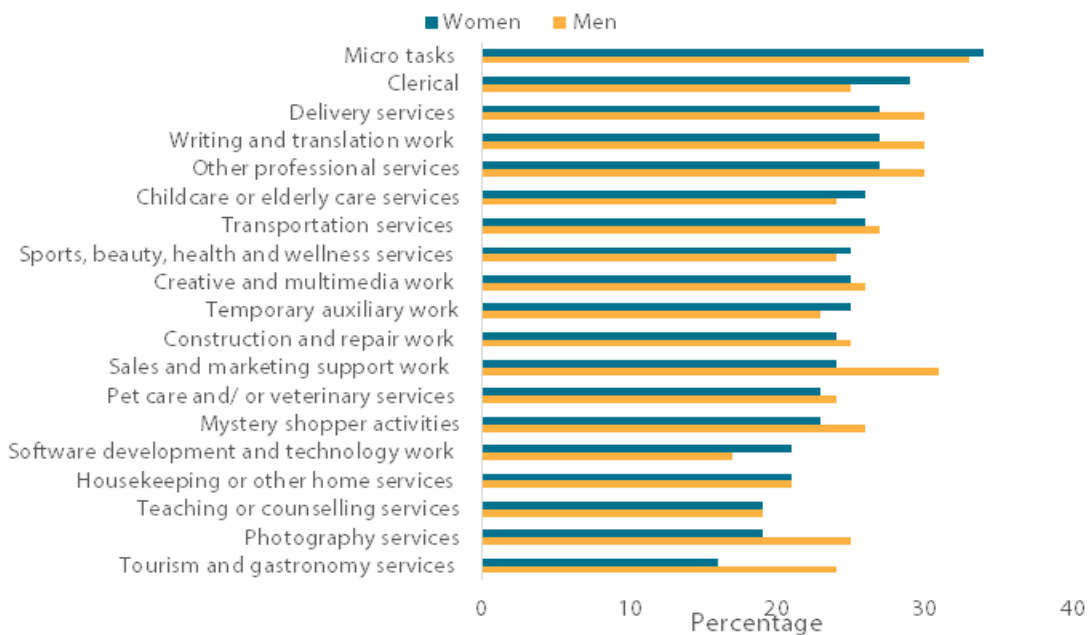
Source: EIGE (2020). Online panel survey of platform workers.
 Note: ^a Of all platform workers (n = 4,932); weighted results.

Figure 39. Regular platform workers who rarely or never work fixed starting and finishing times, by sex and type of service (%)^{a,b}



Source: EIGE (2020). Online panel survey of platform workers.
 Notes: ^a Of regular platform workers ($n = 3,088$); weighted results.
^b Some answer options shortened for readability.

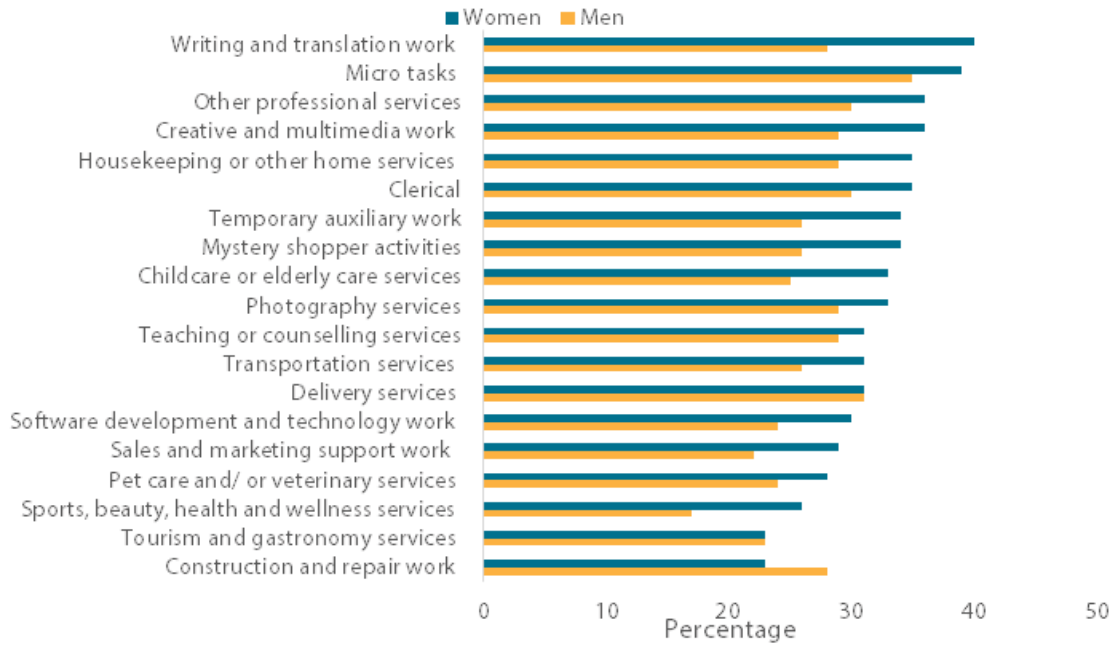
Figure 40. Regular platform workers who said they rarely or never plan when and how much they will work via platform(s), by sex and type of service (%)^{a,b}



Source: EIGE (2020). Online panel survey of platform workers.
 Notes: ^a Of regular platform workers ($n = 3,088$); weighted results.

^b Some answer options shortened for readability.

Figure 41. Platform workers mentioning unpredictable income as a drawback of platform work, by sex and type of service (%)^{a,b}

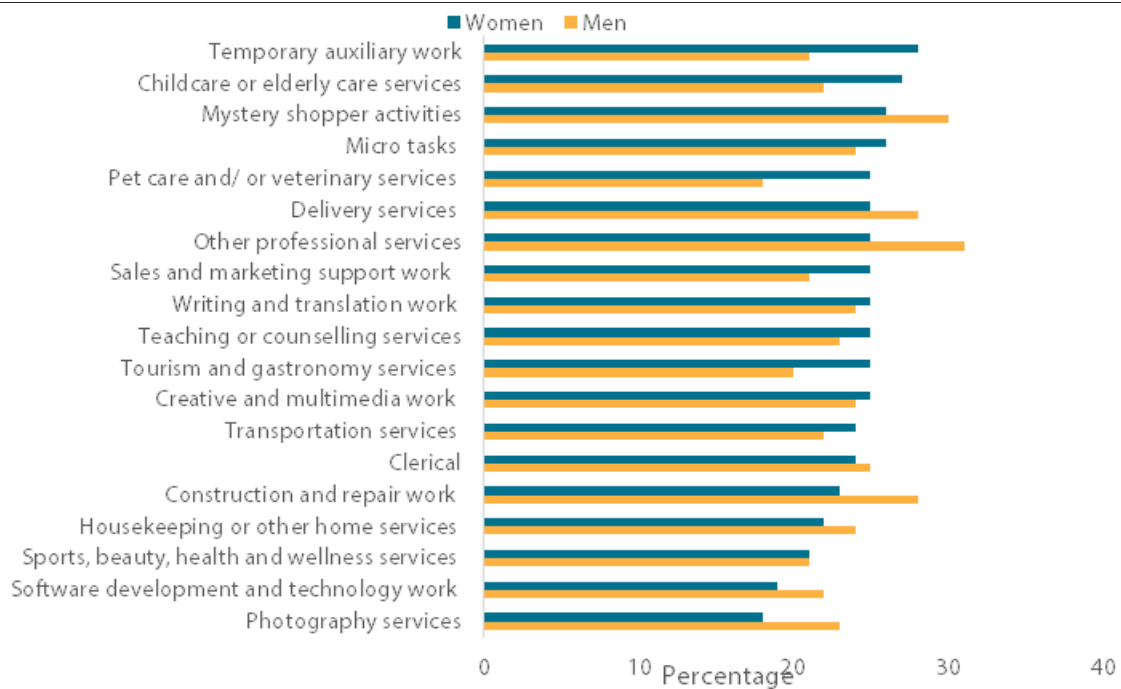


Source: EIGE (2020). Online panel survey of platform workers.

Notes: ^a Of regular platform workers ($n = 4,932$); weighted results.

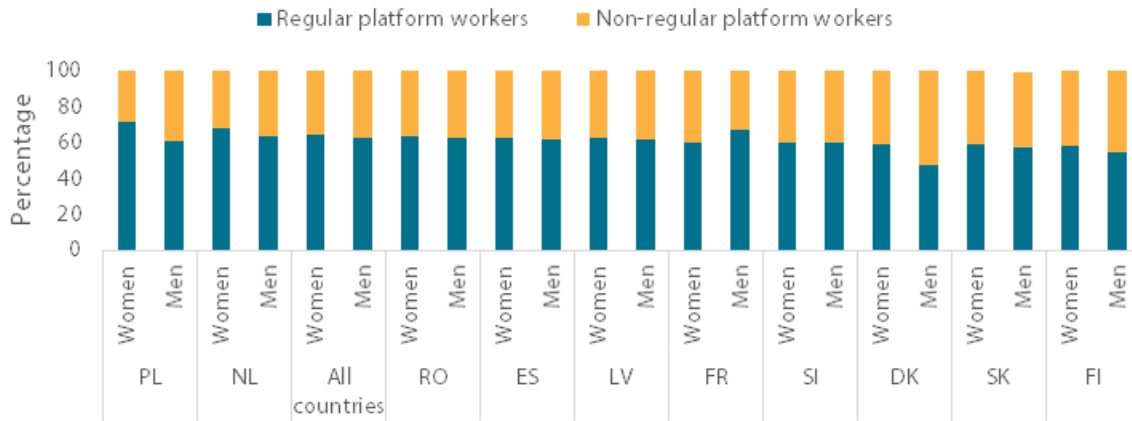
^b Some answer options shortened for readability.

Figure 42. Platform workers mentioning unpredictable working hours as a drawback of platform work, by sex and type of service (%)^{a,b}



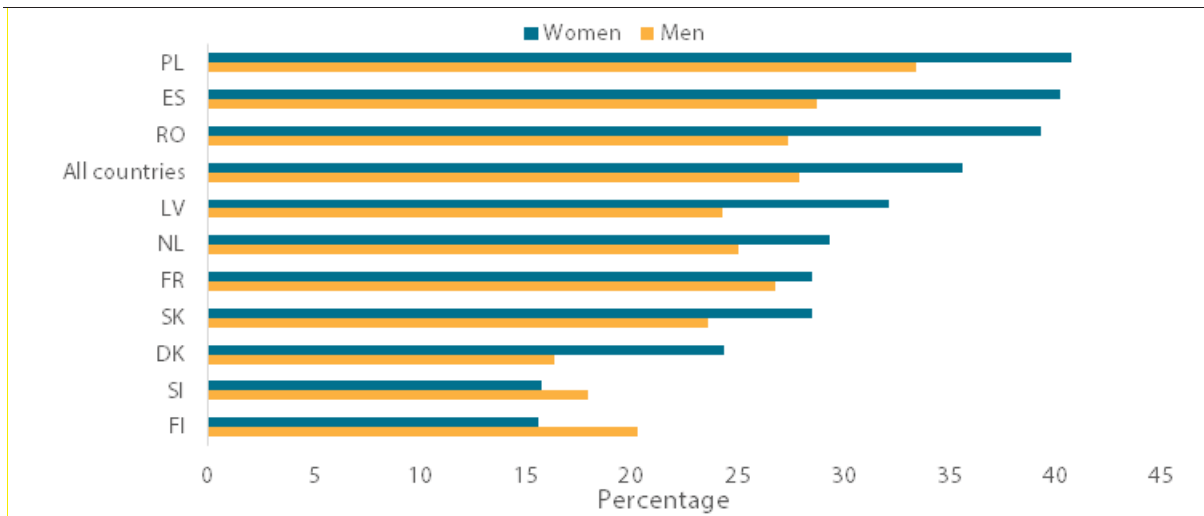
Source: EIGE (2020). Online panel survey of platform workers.
 Notes: ^a Of regular platform workers ($n = 4,932$); weighted results.
^b Some answer options shortened for readability.

Figure 43. Regular platform workers among all platform workers, by sex and EU Member State (%)^a



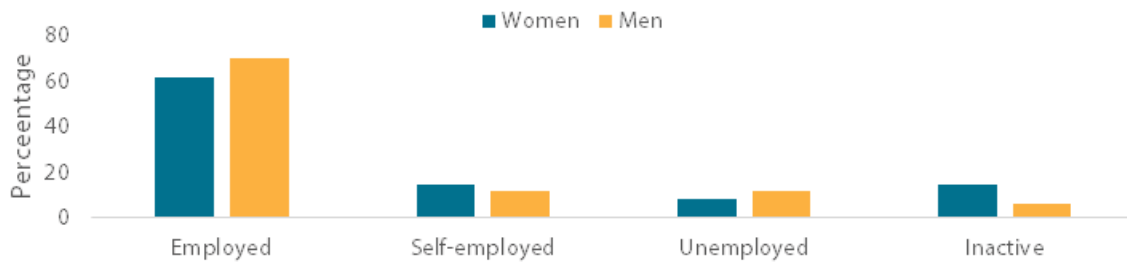
Source: EIGE (2020). Online panel survey of platform workers.
 Note: ^a Of all platform workers ($n = 4,932$); weighted results.

Figure 44. Family commitments as motivation to work on digital labour platforms, by country and sex (%)^a



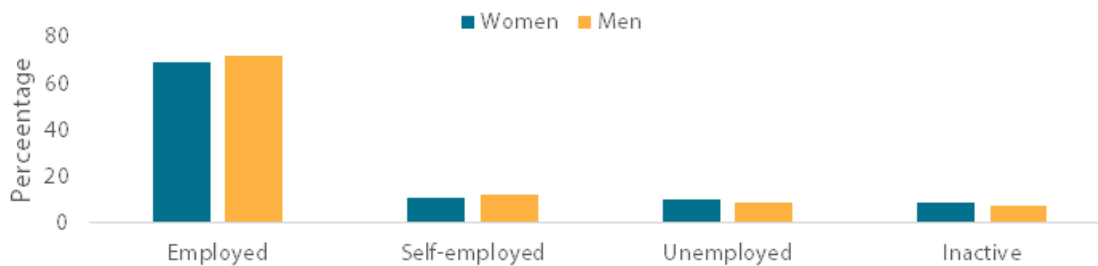
Source: EIGE (2020). Online panel survey of platform workers.
 Note: ^a Of regular platform workers ($n = 3,088$); weighted results.

Figure 45. Regular platform workers who work on platforms as their primary activity, by sex and activity status (%)^a



Source: EIGE (2020). Online panel survey of platform workers.
Notes: ^a Of main platform workers ($n = 1,240$); weighted results.

Figure 46. Regular platform workers who work on platforms as their secondary activity, by sex and activity status (%)^a



Source: EIGE (2020). Online panel survey of platform workers.
Note: ^a Of supplementary earners ($n = 1,763$); weighted results.

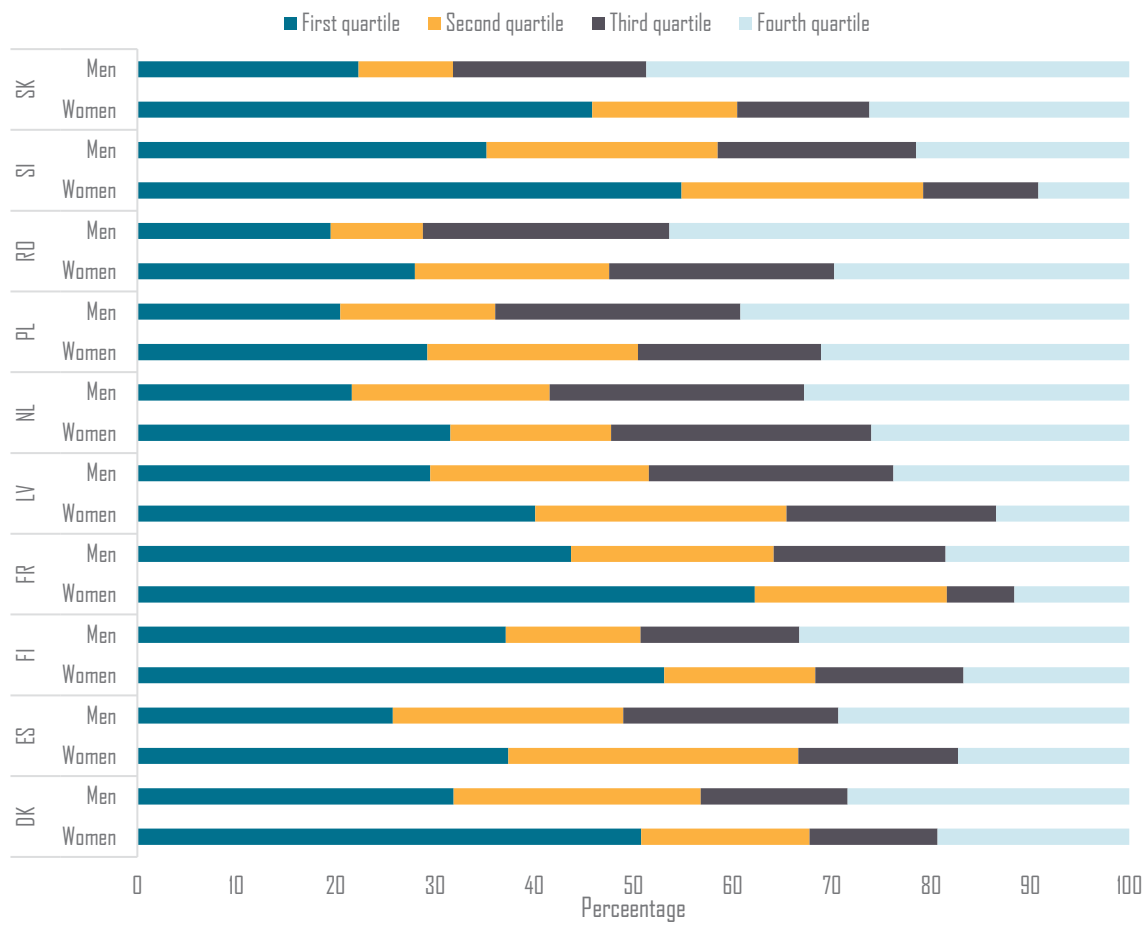
Table 1. National income ranges

Member State	Income ranges					
	Below the first poorest income decile (<10 %)	Between the first income decile and the first quartile (10–25 %)	Between the first and second income quartiles (25–50 %)	Between the second and third income quartiles (50–75 %)	Between the third quartile and the ninth income decile (75–90 %)	Above the ninth income decile (>90 %)
DENMARK	Op til DKK 10,700	DKK 10,701–14,300	DKK 14,301–19,000	DKK 19,001–25,400	DKK 25,401–32,500	Mere end DKK 32,500
SPAIN	Menos de EUR 550	EUR 551–850	EUR 851–1,250	EUR 1,251–1,850	EUR 1,851–2,500	Más de EUR 2,500
FRANCE	Jusqu'à EUR 1,050	EUR 1,051–1,400	EUR 1,401–1,850	EUR 1,851–2,550	EUR 2,551–3,350	Plus de EUR 3,350
LATVIA	Līdz EUR 300	EUR 301–450	EUR 451–700	EUR 701–1,050	EUR 1,051–1,450	Vairāk kā EUR 1,450
NETHERLANDS	Tot EUR 1,200	EUR 1,201–1,500	EUR 1,501–2,100	EUR 2,101–2,700	EUR 2,701–3,600	Meer dan EUR 3,600
POLAND	Do PLN 1,301–	PLN 1,301–	PLN 1,801–	PLN 2,501–	PLN 3,401–	Powyżej

	PLN 1,300	1,800	2,500	3,400	4,600	PLN 4,600
ROMANIA	Până la RON 600	RON 601– 1,000	RON 1,001– 1,500	RON 1,501– 2,300	RON 2,301– 3,100	Peste RON 3,100
SLOVENIA	Do EUR 650	EUR 651-900	EUR 901–1,200	EUR 1,201– 1,500	EUR 1,501– 1,900	Preko EUR 1,900
SLOVAKIA	Menej ako EUR 400	EUR 401-550	EUR 551-650	EUR 651-850	EUR 851–1,000	Viac ako EUR 1,000
FINLAND	Enintään EUR 1,200	EUR 1,201– 1,500	EUR 1,501– 2,100	EUR 2,101– 2,800	EUR 2,801– 3,600	Yli EUR 3,600

Source: PPMI, based on 2018 EU-SILC and ECHP survey data [ilc_di01] acquired from Eurostat on 15 July 2020.

Figure 47. Total personal monthly income in their country, by country, sex and income categories (%)^{a,b}



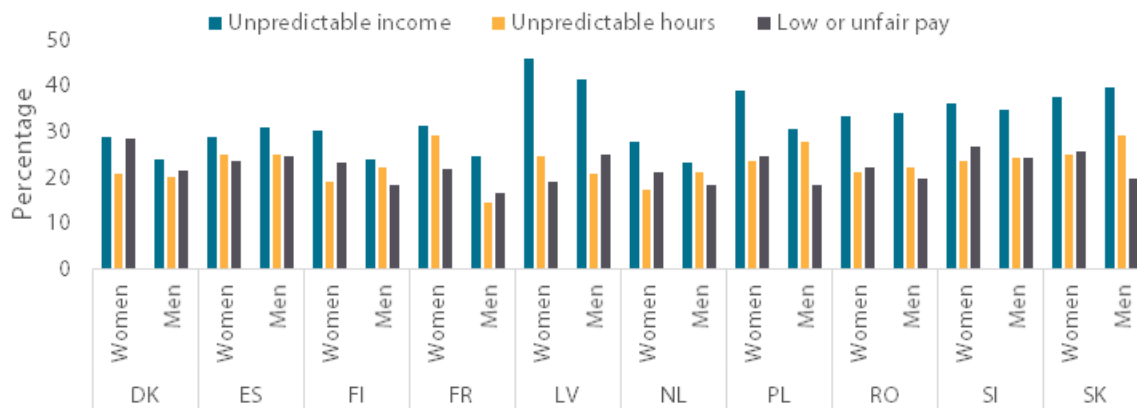
Source: EIGE (2020). Online panel survey of platform workers.

Notes: ^a Of all platform workers who answered the question ($n = 4,562$); weighted results.

^b Respondents were shown equivalent income ranges in their national currencies reflecting the national income ranges in their respective countries (

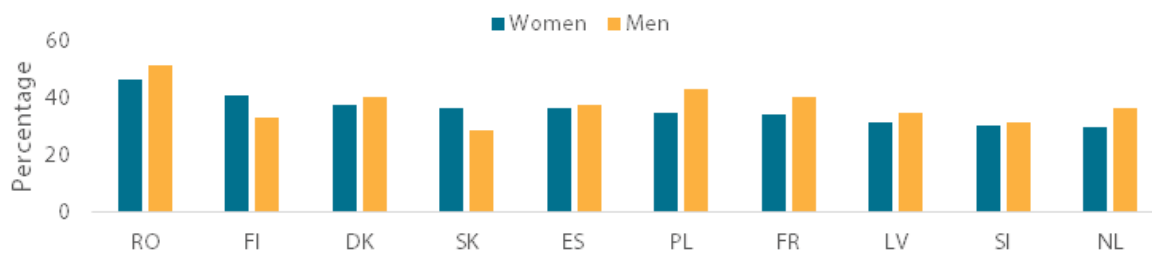
Table 1 in Annex 4).

Figure 48. Three main drawbacks of working via online platforms, by sex and country (%)^a



Source: EIGE (2020). Online panel survey of platform workers.
 Note: ^a Of all platform workers (n = 4,932); weighted results.

Figure 49. Regular platform workers who often or always work nights or weekends, by sex and country (%)^a



Source: EIGE (2020). Online panel survey of platform workers.
 Note: ^a Of regular platform workers (n = 3,088); weighted results.

Table 2. Time spent in paid and unpaid work among partnered platform workers, by sex

Hours spent:	Sex	Mean	Standard Error	95 % Confidence Interval	
Working in a job outside of platform work in most recent week worked ^a	Women	29.48	0.73	28.06	30.91
	Men	30.35	0.67	29.03	31.66
Working via digital platforms in most recent week ^b	Women	19.23	0.87	17.52	20.95
	Men	21.09	0.89	19.35	22.83
Searching for tasks via digital platforms in most recent week ^b	Women	9.59	0.60	8.41	10.78
	Men	10.00	0.61	8.81	11.20
Implementing tasks via digital platforms in most recent week ^b	Women	11.32	0.55	10.23	12.40
	Men	12.16	0.55	11.08	13.25

Performing household work in a typical week ^c	Women	10.96	0.55	9.87	12.04
	Men	7.74	0.37	7.01	8.48
Performing childcare in a typical week ^c	Women	12.73	0.72	11.32	14.13
	Men	8.88	0.48	7.95	9.81
Performing elderly care in a typical week ^c	Women	4.93	0.47	4.01	5.85
	Men	5.30	0.40	4.51	6.09

Source: EIGE (2020). Online panel survey of platform workers.

Notes: ^a Of platform workers employed full-time, part-time or self-employed ($n = 2,387$); weighted results.

^b Of regular platform workers ($n = 1,881$; $n = 1,883$; $n = 1,802$, respectively); weighted results.

^c Of all platform workers ($n = 2,925$; $n = 2,799$; $n = 2,698$, respectively); weighted results.

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