Pillars – Pathways to Inclusive Labour Markets

Report

Pathways of Digital Transformation

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Pathways of Digital Transformation – Outlook on Organising Work via Online Platforms

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1 Introduction

In his seminal paper "Wiring the Labor Market", David H. Autor describes how the internet opens up new channels that improve worker-firm communication and the accompanying consequences for the labour market (Autor, 2001). He identifies three aspects that are likely to be affected:

1) the way employer-employee matches are made, e.g., via online job boards,
2) the work done by employees may be increasingly delivered online rather than on-site,
3) the demand for labour may become less dependent on local market conditions.

The first aspect has already taken off some time ago and today online job search is certainly the dominant search mode. The latter two have only taken off later with platform business models gaining in importance and more recently with the increase of working from home during the Covid pandemic. Yet already 20 years ago, David Autor described today's developments pretty accurately. Autor described how the work of employees is delivered online and how this makes labour more independent of local labour market conditions: Remote access to company networks enables employees to perform some or all of their work from home or elsewhere. Improvements in communication and control technology also allow remote work for people who monitor equipment or other blue-collar workers. The most obvious advantage of working from home is less time lost in unproductive commuting. However, Autor also already cites analyses that suggest that telecommuting and face-to-face interactions complement each other and are likely to both play a role in the organisation of work (Autor 2001, Gaspar and Glaeser, 1998).

When the work product is primarily information, improvements in information and communications technology allow a decentral work organisation that transmits the work to the location of the workers rather than having all work performed at the location of the firm. While Autor uses an example of a low-skilled, routine task i.e., check-processing at U.S. bank branches, today, also high skilled, non-routine tasks are outsourced e.g., to the so-called digital nomads offering their information intensive work from all around the world. This is often organised via platforms.

This article provides a review of recent research on remote work i.e., platform work and working from home. First, we look at studies for the USA and Europe that aim to quantify the extent of platform work using different approaches (Sections 2.1 and 2.2) Then we analyse recent numbers of self employed in Europe (Section 2.3) and summaries the results in Section 2.4. In the second part of the article, we ask what we can learn from other strands of literature that also investigate remote work. Section 3.1 looks at research on networks of programmers to analyse collaboration in technology-driven environments. Section 3.2 gives an overview of the recent working from home literature regarding productivity, feasibility and current trends. Section 4 concludes.

2 Organising Work via Platforms

Digitalisation is giving rise to new, innovative business models based on digital platforms. The most prominent platforms are probably in the B2C segment in e-commerce such as eBay or Amazon, social networks such as Instagram or TikTok or services such as Airbnb or Uber where users can connect, or potential buyers and sellers of products and services are brought together. One further version of the platform business model are platforms that bring together demand and supply for labour, however, not organised via the classic way of an employment contract with one firm but via contracts for single projects or tasks. Through these platforms new forms of work arrangements have emerged in which the platforms act as intermediaries. Firms can post tasks or projects on the platform and workers bid on them.

A characteristic feature of work organised via platforms is that platform workers are not employees of the platform but choose the type and scope of their work independently. At the same time, they depend on the order situation and are in competition with other platform workers. Besides industry or type of work, a crucial aspect of platform work is whether the work is performed location-dependent on-site or location-independent online. Examples for location dependent tasks are transportation and delivery or household-related services, like cleaning, gardening or craftsman services. Potential tasks that can be performed online range from very simple activities (often called microtasks), such as typing up cash register receipts, to activities aimed at workers with a higher level of qualification, such as the creation of websites, to complex projects with a long duration and high budget e.g., the development of software modules. For those tasks that can be performed from anywhere in the world labour platforms increase the competition for workers – even up to an international level. Or as David Autor put it, demand for labour may become less dependent on local market conditions.

This new way of organisation of work has received attention, especially by lawyers and policy makers. A central aspect of the debate revolves around the question whether the relationship between platforms and platform workers constitutes an employer-employee relationship or a contracting relationship. This classification determines whether platform workers are subject to workers' rights and social security. There is a fear that platforms increase precarious employment. To decide whether and what kind of regulatory action is potentially needed to enhance the legal situation and regulatory framework for platform workers a comprehensive measurement of platform labour markets is important. Informed policymaking requires a clear understanding of the prevalence, development and characteristics of platform work. Box 1 gives an overview of the current EU plans regarding the rules on platform work.

Box 1: Overview of current EU Plans Regarding Rules for Platform Work

In December 2021, the European Commission presented the “Proposal for a Directive of the European Parliament and of the Council on Improving Working Conditions in Platform Work”. In June 2023, the Council adopted its position on the proposal. With the directive, the EU aims at improving the working conditions and social rights of people working in the platform labour market. To this end, the proposed directive addresses two issues:

- determine the correct employment status of people working for digital platforms,
- establishes rules on the use of artificial intelligence (AI) in the workplace.

A person working via a platform is presumed to be an employee if three of the following criteria are fulfilled:

The digital labour platform …

… determines upper limits for the level of remuneration.
… requires the person to respect certain rules with regard to appearance, conduct towards the recipient of the service or performance of work.
… supervises the performance of work, including by electronic means.
… restricts the freedom to choose one's working hours or periods of absence.
… restricts the freedom to accept or to refuse tasks.
… restricts the freedom to use subcontractors or substitutes.
… restricts the possibility to build a client base or to perform work for any third party.

The application of the legal presumption results in the digital work platform having the burden of proving that there is no employment relationship. If it gets established that a person is in an employment relationship national labour and social rights apply.

Digital work platforms use algorithms to manage coordinate people who provide work via the platform. However, it is often unclear how the algorithms work and how decisions are made. Therefore, the directive aims at …

… increasing transparency regarding the use of algorithms.
… ensuring human monitoring of working conditions.
… giving platform workers the right to contest automated decisions.

Further, to allow for enforcement and traceability, the directive intends to increase transparency by making key information about their activities available to national authorities.

Currently the proposal for the directive is in interinstitutional negotiations.

Sources: https://www.consilium.europa.eu/en/policies/platform-work-eu/; https://www.europarl.europa.eu/legislative-train/theme-a-europe-fit-for-the-digital-age/file-improving-working-conditions-of-platform-workers; last accessed 10.12.2023.

2.1 The Extent of Platform Work in the USA

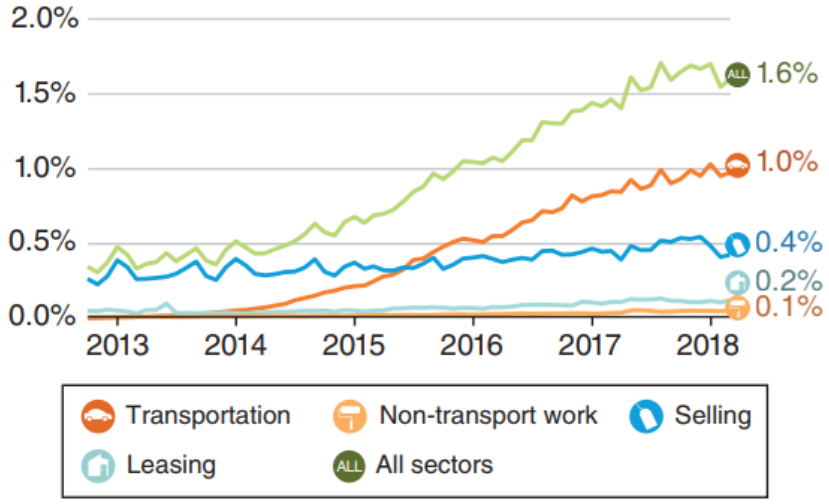
As a new form of work organization, platform work is still barely captured in administrative data and standard labour surveys. Several special surveys and other approaches to capture its size and characteristics have been undertaken in recent years. Most of these studies analyse the US labour market. Overall, these studies do not find that platform work already plays a significant role. In this section, we give an overview of the most recent and methodologically most convincing studies on platform work in the USA.

Why are the results of these studies also relevant for European policymakers? For various reasons, we assume that the results for the American labour market represent an upper limit for platform work. There is a very active start-up scene in the US, bringing new digital platform-based business models to the market. In addition, many markets in the US are less regulated than in Europe, e.g., rideshare providers like Uber cannot even implement their business model in many European countries. This is especially relevant as the transportation sector is by far the dominant sector of platform work in the USA. And finally, labour markets are more regulated in Europe. Stronger employment protection and social security systems make dependent employment relatively more attractive.

In 2015, Katz and Krueger (2019) conducted a survey on alternative work arrangements – temporary help agency workers, on-call workers, contract workers, and independent contractors or freelancers – in the USA. The results point to an increase of alternative work arrangements in the U.S. economy between 1995 and 2015. The survey included questions on whether the workers used an intermediary and whether that intermediary was online. The results indicate that in 2015 about 0.5 % of all workers identify customers through an online intermediary such as Uber or TaskRabbit.

An innovative approach to measure the extent of platform work was developed by Farrell and Greig (2016) who use money transfers from platforms to private bank accounts. In a recent paper Farrell et al. (2019) summarise the development of platform work between 2013-2018. The analysis of the Online Platform Economy is based on data from October 2012 to March 2018 from 2.3 million distinct account holders who received 38 million payments from 128 platforms. The platforms are divided into 4 categories: transportation sector (36 platforms), non-transport work sector (70 platforms), selling sector (7 platforms), and leasing sector (15 platforms). Participation in the Online Platform Economy has increased strongly: from 0.3 % in the first quarter of 2013 to 1.6 % in the first quarter of 2018. Growth was particularly strong in the transportation sector, which by 2018 dominated in the number of participants and total transaction volume. With 55 % of the 128 platforms, the non-transport work sector includes the most platforms and correspondingly the biggest variety of services, from dog walking to bookkeeping. Yet, participation was only 0.1 % and it never generated more than 4.5 % of total transaction volume (Figure 1). (Farrell et al., 2019)

Figure 1: Share of account holders receiving payments from online platforms 2012-2018 (USA)

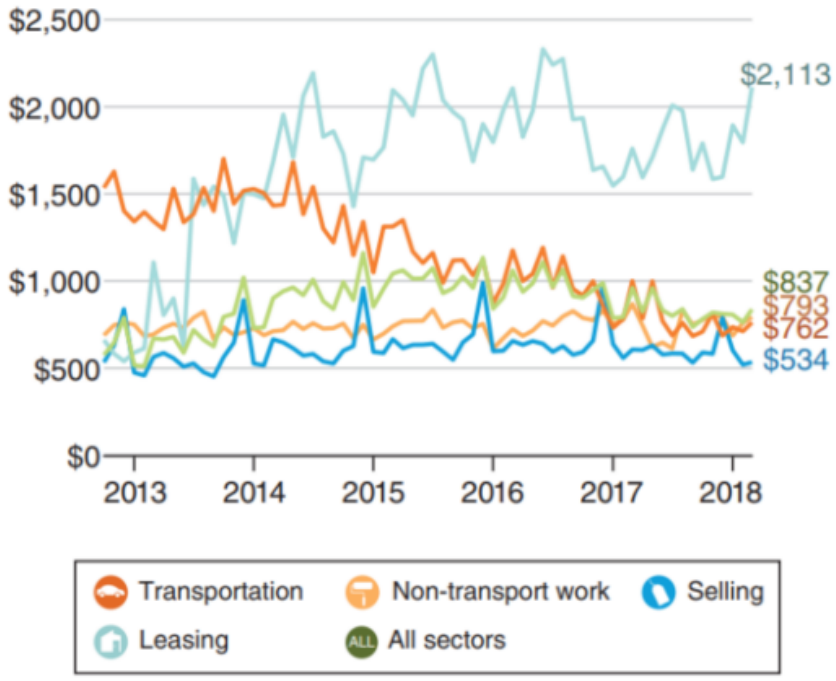


Source: Farrell et al., 2019

Further the authors find that participation in the online platform economy is rather irregular: 58 % of those generating earnings through transportation platforms had earnings in three or fewer months. In the other categories, over two-thirds had earnings in three or fewer months. Figure x shows average monthly revenues of platform participants active by month and displays different sector-specific patterns. Average monthly platform revenues among drivers fell steadily while revenues in the leasing sector grew strongly. Average revenues in the non-transport work and the selling sector have been essentially constant (with regular peaks in the holiday season). One should note that the revenues in the selling and leasing sectors cannot be interpreted as labour income as they include the value of the goods sold.

Overall, the authors conclude that participation in the online platform economy seems to provide only supplemental sources of income. Even the dominant transportation sector is mainly used as an occasional source of income.

Figure 2: Average monthly revenues of those active in the respective month 2013-2018 (USA)



Source: Farrell et al., 2019

Another approach to measure the size of the platform economy in the US is employed in a study by Garin et al. 2022. The authors use tax records and exploit a characteristic of the US tax system: Firms have to report all wage and salary payments to employees as well as most payments to self-employed. For the analysis, the authors identify 50 important online platforms that are used by self-employed workers to offer labour services to firms or individual clients. (In contrast to Farrell et al. 2019 above, they do not include platforms involve the selling of goods or rental of durable capital.)

The authors do not find a change in the prevalence of contract work. In each year since 2005 for ca. 10 percent of workers contract payments were reported.[1] An exception was platform-based transportation work: Between 2012 and 2018 the share of the workforce with income from platform-based transportation work rose from nearly zero to one percentage point, which corresponds to over two million workers. In each year since 2014, less than 10 percent of workers offering labour services via platforms offered other services than transportation-related ones. The majority of platform workers also in the transportation sector earned only small amounts that were supplemental to their wage income. This suggests that platform work is predominantly used to smooth income fluctuations from a main dependent job. The participants in platform work differ from participants in other types of freelancing work. For the latter, the authors observe a U-shaped pattern over the personal earnings distribution i.e., contract income

[1] In contrast, the share of workers reporting self-employment income on tax returns has grown since 2000. Garin et al. 2022 show that this rise largely reflects changes in taxpayer reporting behaviour and not a rise in platform work.

is most common at the bottom and the very top of the income distribution. For participants in platform work, in contrast, contract income is most common at the bottom of the income distribution. Overall, the authors conclude that the analysed tax data does not point to a large shift of the organization of work towards platform work outside of the transportation sector. (Garin et al., 2022)

The studies described so far refer to periods before the Covid pandemic. To the best of our knowledge the only study on platform work that includes the period of the Covid pandemic is by Greig and Sullivan (2021). Like Farrell and Greig 2016 above, they use money transfers from platforms to private bank accounts to estimate the extent of platform work. They track payments received from 38 online platforms (transportation, non-transport work, selling, leasing) between April 2018 and June 2021.

Prior to the Covid pandemic, monthly participation in platform work peaked at 2.5 percent, with almost 7.5 percent of households earning platform income within the past year in January of 2020. After a National Emergency was declared on 13 March 2020, monthly participation fell to 1.9 percent. Platform work in transportation and leasing decreased the strongest while platform work in the selling sector kept growing. Platform work in transportation and leasing gradually recovered until June 2021. For the recovery of the transportation sector a switch from transport of persons to delivery of goods certainly played an important role. Overall, by mid-2021 all four sectors were back to pre-pandemic levels. (Greig and Sullivan, 2021)

2.2 The Extent of Platform Work in Europe

The European Commission's Joint Research Centres – JRC conducted the COLLEEM-survey, an online survey on labour platforms in Europe (Urzi Brancati, Pesole and Fernandez Macias, 2020). It was carried out between September and November 2018 and consists of a total of 38,878 responses from internet users at the age between 16 and 74 years in 16 European countries: Croatia, Czech Republic, Finland, France, Germany, Hungary, Ireland, Italy, Lithuania, the Netherlands, Portugal, Spain, Sweden, Slovakia, Romania, and the United Kingdom.

Overall, 11% of the respondents indicated that they did platform work to some extent. The authors grouped the respondents in categories based on the extent of platform work:

- 2.4% of the respondents were sporadic platform workers (provided labour services via platforms less than once a month)
- 3.1% were marginal platform workers (provided labour services via platforms at least monthly, but spend less than 10 hours a week and get less than 25% of their income via platforms)
- 4.1% secondary platform workers (provided labour services via platforms at least monthly and spend between 10 and 19 hours or get between 25% and 50% of their income via platforms)
- 1.4% main platform workers (provided labour services via platforms at least monthly and work on platforms at least 20 hours a week or get at least 50% of their income via platforms)

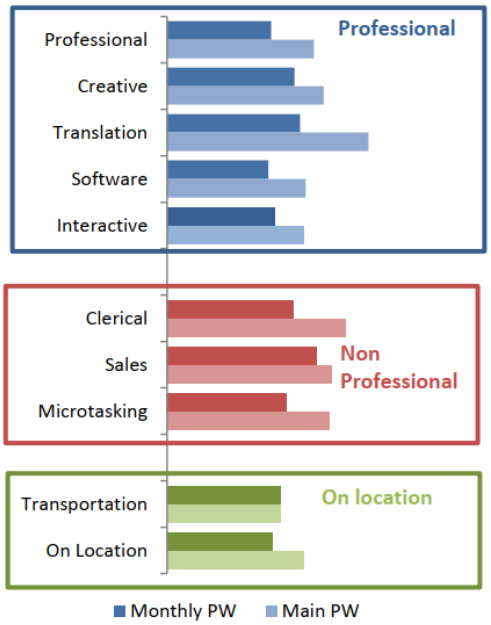
However, as COLLEEM is a voluntary online survey specifically on platform work these numbers cannot be transferred to the whole population. One should expect an upward selection bias relative to the whole population as platform workers are (i) more likely to be digital-savvy and to come across an online survey on online work and (ii) more likely to take part in the survey than someone who is not active in platform work. The results should therefore not be interpreted as the extent of platform work in the population as a whole but rather as an upper bound of the take up rate of platform work among the digital-savvy part of the population. However, these online surveys can give some indication regarding the structure of platform work and characteristics of platform workers in Europe.

In the COLLEEM survey, respondents were asked which of the following types of activities they perform:

1. Online clerical and data-entry tasks e.g., customer services, data entry, transcription etc.
2. Online professional services e.g., accounting, legal, project management etc.
3. Online creative and multimedia work e.g., animation, graphic design, photo editing etc.
4. Online sales and marketing support work e.g., lead generation, posting ads, social media management, search engine optimisation etc.
5. Online software development and technology work e.g., data science, game development, mobile development etc.
6. Online writing and translation work e.g., article writing, copywriting, proofreading, translation etc.
7. Online micro tasks e.g., object classification, tagging, content review, website feedback etc.
8. Interactive services e.g., language teaching, interactive online lessons, interactive consultations etc.
9. Transportation and delivery services e.g., driving, food delivery, moving services etc.
10. On-location services e.g., housekeeping, beauty services, on-location photography services etc.

The activities were classified into three categories, based on a combination of skill level and place of provision of the work: professional online, non-professional online and low & high skilled on-location. Figure 3 shows the frequency of each task type by platform workers who provide services at least monthly and who do it as main job.

Figure 3: COLLEEM 2018: Frequency of Task Types



Source: Urzi Brancati et al. 2020.

There is a noticeable difference between the structure of the type of work in the surveys for Europe and the results in studies for the USA. Transportation, the by far dominant sector in the USA, is relatively less common in Europe. Transportation consists of two types of transportation – of people and of goods. So called rideshare services like Uber are simply not allowed in many European countries. Thus, the observed market developments are the result of an increase of platform business models as well of (de)regulation. Delivery of meals, groceries etc. has become popular and increased strongly also in Europe during the Covid-19 pandemic, which occurred only after the survey was conducted and is therefore not captured. The prevalence of delivery services will depend on regional concentration pattern of the population. Such services are only profitable if the demand and supply within a reasonable distance are high enough.

Recognising the drawback of an online study not being representative for the population as a whole, Piasna et al. (2022) addressed the issue when designing the ETUI Internet and Platform Work Survey. They used a probability sampling technique (random digit dialling that randomly selects individuals based on their mobile phone number) and computer-assisted telephone interviews for the survey. While this approach of calling people by phone can reduce the online bias, another bias may arise. Who will pick up the phone and answer the survey? Probably, people at an on-site workplace are not very likely to do so. In contrast, those who work remotely and flexibly via the internet are probably more likely to answer their phone and take part in such a survey.

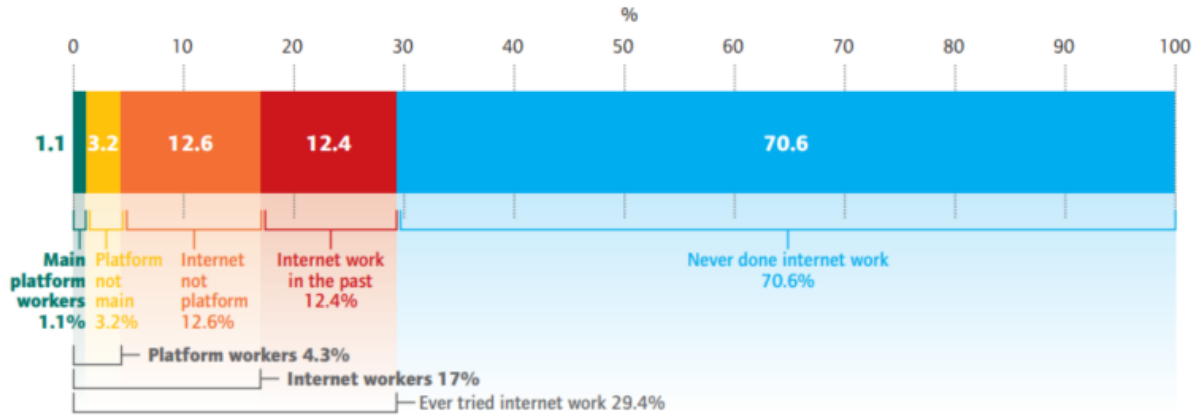
Fieldwork took place in early 2021 when the Covid pandemic was going on for a year and had already given a push towards more digitalisation in many areas of life. Thus, this survey may already catch potential Covid-induced shifts towards more platform work. The survey was conducted in 14 EU countries (Austria, Bulgaria, Czechia, Estonia, France, Germany, Greece,

Hungary, Ireland, Italy, Poland, Romania, Slovakia and Spain) with a total sample size of 24,108 respondents.

The ETUI Internet and Platform Work Survey is not only looking at platform work but more generally at the extent to which the internet, including online platforms but also websites or mobile applications, is used to generate income. Internet work as defined in the survey includes i) platform work: remote click-work, remote professional work, on-location work, transport, delivery, other freelance services or tasks; ii) other internet work: influencer, renting, selling self-made products online, selling or re-selling other products online. The tasks performed by remote professional workers were gathered in more detailed categories: writing and translation, graphic design and multimedia, software and web development, sales and marketing support and other activities.

Overall, nearly 30% of the respondents indicated that they have ever tried to generate income by finding work or connecting with clients through online platforms, apps or websites; 17% did internet work over the past 12 months. Over 4% of the respondents indicated that they carried out work via a digital labour platform. About a quarter of these platform workers indicated that they work more than 20 hours a week or earn more than 50% of their income on digital labour platforms and are therefore classified as main platform workers (Figure 4).

Figure 4: ETUI Internet and Platform Work Survey: The Extent of Internet and Platform Work

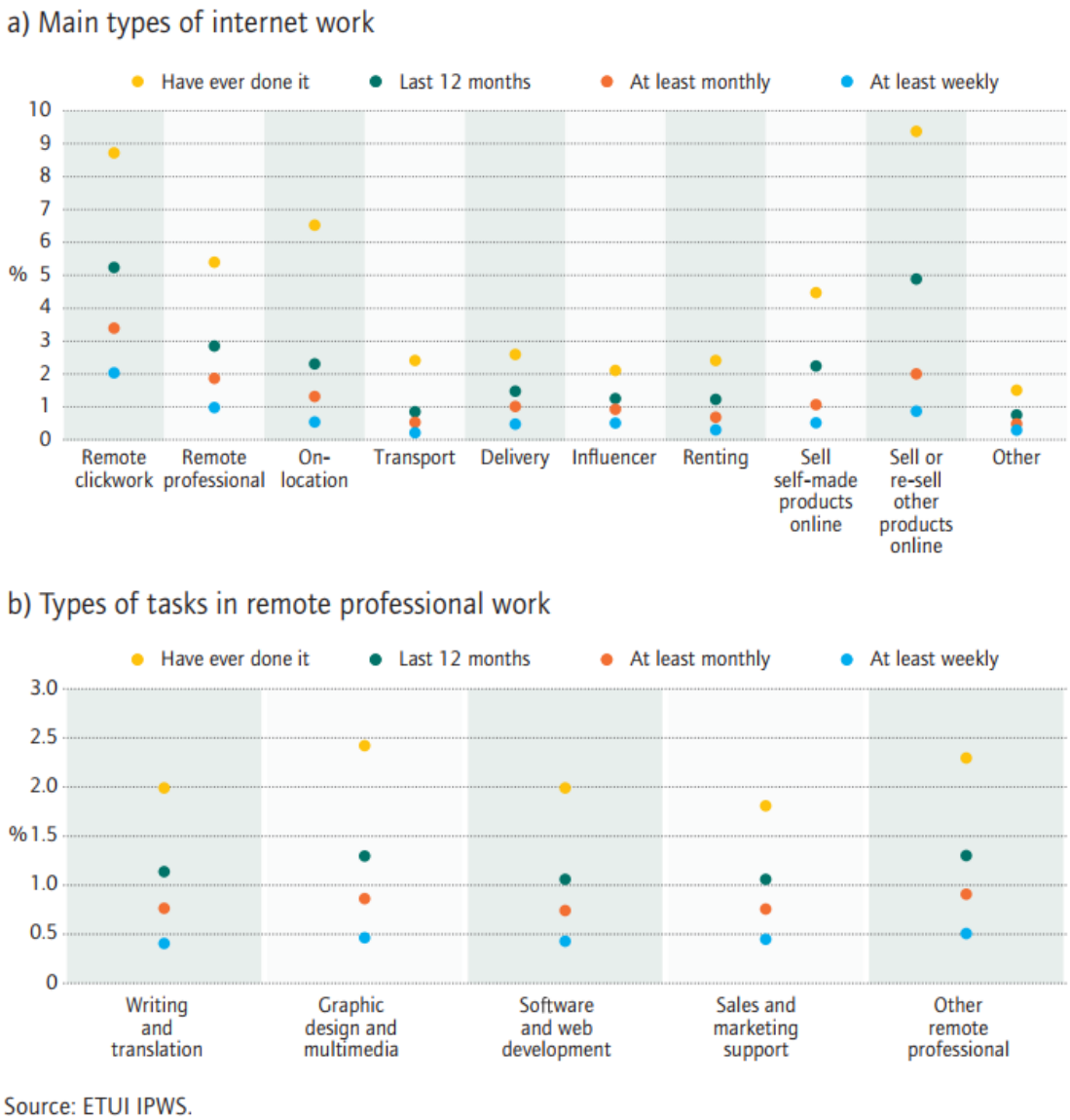


Note: Average across 14 EU countries. All working age adults.
Source: ETUI IPWS.

Piasna et al. (2022)

The most common activities of internet work performed by respondents in the past 12 months were remote click work and selling and re-selling of products online with about 5% of respondents. Nearly 3% of respondents indicated that they did remote professional work in the past 12 months and just over 2% that they did on-location work or sold self-made products online. (Figure 5a)) Remote professional work is fairly evenly distributed across the different types of activities (Figure 5b)).

Figure 5: ETUI Internet and Platform Work Survey: Internet Work by Type of Activity



Source: ETUI IPWS.

Using a probability sampling technique and computer-assisted telephone interviews, Piasna et al. (2022) find lower shares for platform work than Urzi Brancati et al. (2020) despite fieldwork of Piasna et al. took place 3-5 years later. This supports the concern that online surveys on online platforms deliver upwards biased results. Piasna and co-authors seem to successfully address the issue that platform workers are more likely to be digital-savvy and come across an online survey. Yet, concerns remain of different response probabilities of those that take part in internet work versus those that do not. If the latter are less likely to take part in the survey the results might still overestimate the real extent of online or platform work. A strategy to overcome this issue might be to integrate questions regarding platform work in existing representative surveys. However, this also is not without its problems.

Bonin and Rinne (2017) conducted a representative population survey on the prevalence of crowd working and platform work in Germany on behalf of the Federal Ministry of Labor and

Social Affairs. Fieldwork took place between mid-April and mid-June 2017 as part of a representative multi-subject survey. Ca. 10,000 German-speaking adults were asked whether they currently carry out work that they acquired via the Internet or an app.

Analysing the answers of the survey respondents that indicated that they acquire jobs online, Bonin and Rinne found evidence of a substantial measurement error. A review of the information provided by the respondents regarding the name of the website or app through which they currently mainly acquire jobs brought to light different types of errors:

- Some of the respondents sold products or services via a personal homepage.
- Some of the respondents mentioned online job boards, such as the online information service of the Federal Employment Agency.
- Frequently the internet was merely used as a communication channel (e-mail contact to customers or employers).
- Oftentimes respondents used the internet or apps to conduct business as customers (e.g., online banking) or to have work or services performed by third parties.

After correcting these errors in the data, the results indicate that less than one percent of adults carry out work that they acquired via the Internet or an app. Ca. 0.3 percent engaged in what the authors called crowd working, completing jobs online that were also acquired online. Ca. 0.6 percent did what the authors called platform work, performing jobs offline that were acquired online. Only one third of those who use these new forms of work earned money on a regular basis is this way. The vast majority of users earn only incidental income via jobs acquired online.

The authors infer from their experience with the survey that many citizens find it difficult to distinguish the new forms of work organization from other web-based activities. In future surveys, they advise to provide detailed explanations to delineate the terms. However, such clarification is not possible in the form of written information via a survey questionnaire, and in the case of telephone interviews also ample opportunities for feedback should be provided in addition to a careful introduction to the topic in order to avoid misunderstandings on the part of the respondents. This speaks against the way of the multi-topic survey, as it was followed for this study, because this form of telephone survey leaves hardly any room for this. (Bonin and Rinne, 2017)

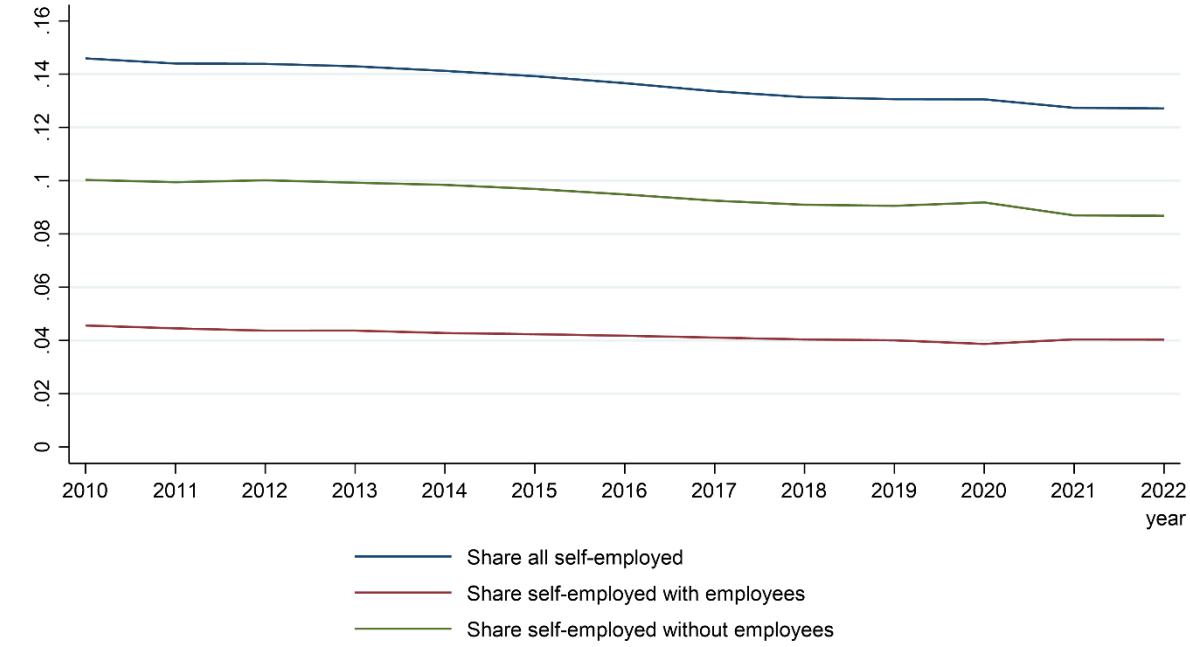
2.3 Self-Employed without Employees as a Proxy for Trends in Platform Work

As a relatively new form of work organization, the empirical basis for the extent of platform work is so far rather thin. Therefore, as seen above, researchers have developed various approaches to measure platform work. A way of approaching the subject using existing data is to look at the development of the number of self-employed without employees. As platform workers are most likely to appear in this category a significant rise in platform work should be reflected in an increase in the number of self-employed without employees.

Labour market participation as self-employed with or without employees is one of the categories in the European Union Labour Force Survey (EU-LFS). The EU-LFS is a cross-sectional and longitudinal household sample survey, collated by Eurostat from data provided

by EU member states. Figure 6 shows the share of self-employed (with and without employees) relative to total employment in the EU-27 until the year 2022. The development of the self-employed with and without employees is very similar, both have decreased over the last decade. In particular in the last years, one cannot observe an increase in the share of self-employed without employees, which should be the case if platform work had increased substantially in this period.

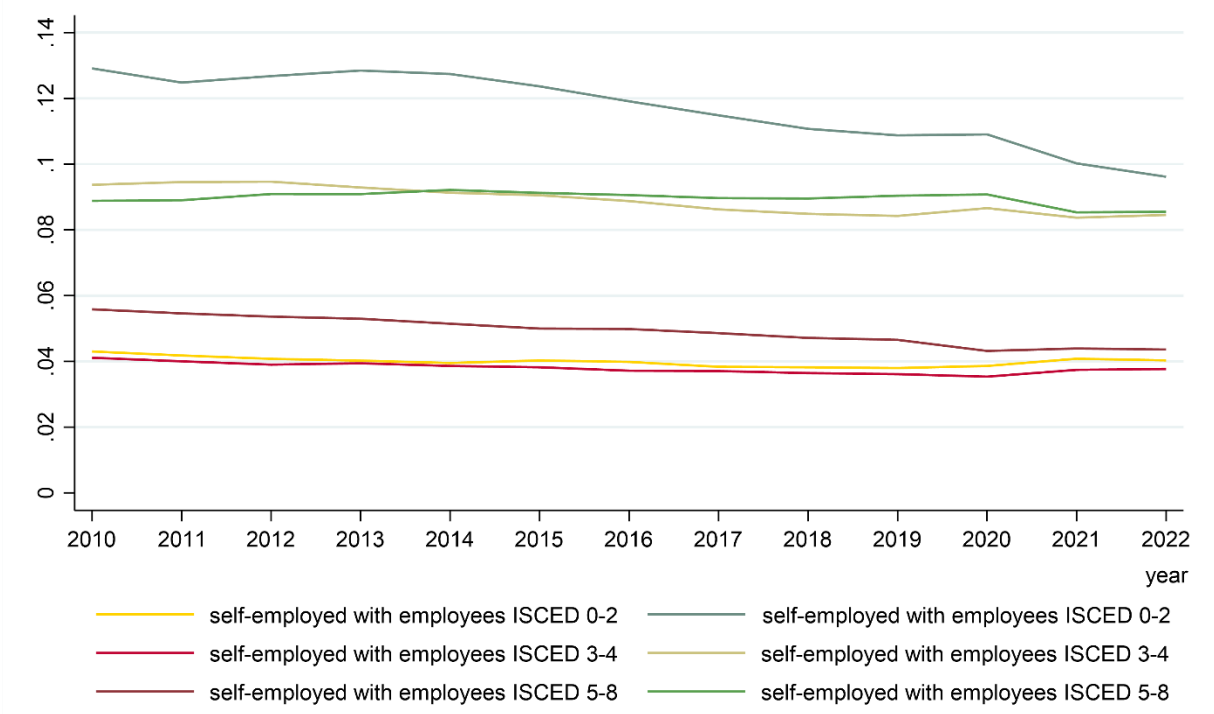
Figure 6: Share of Self-Employed with and without Employees Relative to Total Employment in EU-27, 2010-2022



Source: Own calculation based on EU Labour Force Survey.

Figure 7 illustrates the development of the share of self-employed with and without employees relative to total employment by education levels. The share for self-employed without employees with primary education or less (ISCED 0-2) has decreased substantially while the shares for self-employed without employees with secondary (ISCED 3-4) and tertiary education (ISCED 5-8) has remained stable.

Figure 7: Share of Self-Employed with and without Employees Relative to Total Employment by level of Education (ISCED) in EU-27, 2010-2022

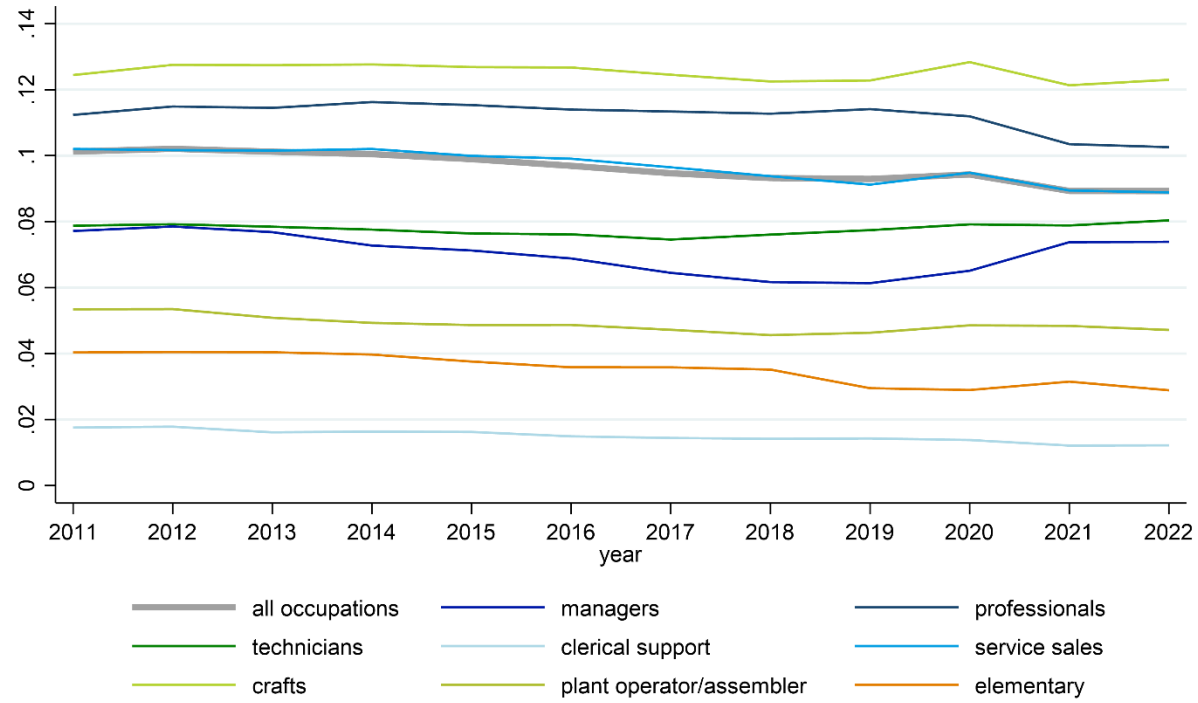


ISCED – International Standard Classification of Education
ISCED 0-1: primary education or less
ISCED 3-4: secondary education
ISCED 5-8: tertiary education
Source: Own calculation based on EU Labour Force Survey.

Figure 8 shows the development of the share of self-employed without employees relative to total employment by occupation. Again, the shares are quite stable for all occupations groups.

Overall, we do not find an indication that platform work has become more common for a certain education level or in an occupation group in the last years.

Figure 8: Share of Self-Employed with and without Employees Relative to Total Employment by Occupation in EU-27, 2011-2022



Source: Own calculation based on EU Labour Force Survey.

A possible explanation why the number of self-employed without employees did not increase can be found in the task-based approach, which was introduced by Autor, Levy and Murnane (2003). The authors state "(1) that computer capital substitutes for workers in carrying out a limited and well-defined set of cognitive and manual activities, those that can be accomplished by following explicit rules (what we term 'routine tasks'); and (2) that computer capital complements workers in carrying out problem-solving and complex communication activities ('nonroutine' tasks)." (Autor et al. 2003, p. 1280). While routine tasks i.e., a limited and well-defined set of cognitive and manual activities, are in principle suited to be performed remotely by platform workers, they are also suited to be performed by a computer or a machine. On the other hand, nonroutine tasks cannot easily be transferred to a machine as they require creativity, communication with colleagues, cooperation, coordination etc. At the same time this limits their potential of being performed by platform workers. Thus, one can assume that routine as well as non-routine tasks, albeit for different reasons, are not likely to be transferred to platforms to a large extent.

Based on the observation of limited growth of online freelance work in the USA in spite of its technical feasibility and low cost, Stanton and Thomas (2020) also draw on the task approach as a possible rationale. They look at data on self-employment trends in the USA and find that the highly educated are much less likely to be self-employed than they were historically. The authors ponder that differences in the task content of jobs may be a reason for this development: Educated workers are less likely to perform routine tasks and more likely to perform tasks that

require interaction and communication with others and coordination across tasks. Such requirements likely increase the overhead of organising work beyond firm boundaries. Thus, tasks that require communication and coordination tend to remain within firm boundaries and limit the growth of task-based online work.

2.4 Summary of Evidence on Platform Work in the USA and Europe

Platform work is still barely captured in administrative data and standard labour surveys. Hence, these sources provide little information regarding the size and structure of platform work. The above-mentioned studies for the USA and Europe employ different and in part innovative approaches to measure the extent of platform work.

Based on different data and approaches, the studies for the USA come to the same conclusion: The platform economy does not play an important role in the US labour market and income generated via platform work is rather low and complementary to another main job. Even the dominant transportation sector with the famous Uber, that has reshuffled the market for passenger transport, is mainly used as an occasional source of income.

Reliable data on the extent of platform work in Europe is rather scarce. Most studies are based on online surveys of platform workers which raises concerns regarding representativeness relative to the population as a whole and especially an upwards bias of the survey results: Online platform workers are more likely to come across these online surveys and are more likely to answer than someone who is not active in platform work. Yet, these surveys are useful to learn about the characteristics of platform work(ers).

There is a noticeable difference between the structure of the type of work in Europe and USA. Transportation, the by far dominant sector in the USA, is relatively less common in Europe, which is most likely due to the fact that Uber is not allowed in many European country. As in the USA, platform work is used rather sporadically and as a supplement to another job.

The differentiation of platform work is often not very strict in the surveys and even unclear to respondents. Therefore, what is referred to as platform work in the public debate might include other forms of income generation e.g., renting, selling or re-selling, using online job boards for job search or using the internet as an influencer or as a communication channel.

Looking at self-employed without employees is a possibility to approximate platform work as platform workers are most likely to appear in this category. In Europe, the share of self-employed without employees did not increase in the last years which suggests that platform work did not increase substantially. In the USA, the highly educated are much less likely to be self-employed than they were historically. A possible explanation for these trends can be found in the task-based approach. While routine tasks i.e., a limited and well-defined set of cognitive and manual activities, are in principle suited to be performed remotely by platform workers, they are also suited to be performed by a computer or a machine. On the other hand, nonroutine tasks cannot easily be transferred to a machine as they require creativity, communication with colleagues, cooperation, coordination etc. Such tasks tend to remain within firm boundaries and also limit growth of task-based online work. Thus, one can assume that routine as well as non-

routine tasks, albeit for different reasons, are not likely to be transferred to platforms to a large extent.

The overall picture allows the conclusion that the significance of platform work especially as a main form of income is rather small. One might argue that most of the studies are from a time before or at the early onset of the Covid pandemic, which led to a stark increase in the digitalisation of firms and a transition to more flexibility regarding the location of work, and that the extent of platform work might have changed since. However, where more recent data is available (Greig and Sullivan, 2021, self-employed without employees in EU-LFS) there is no indication for a significant increase in the number of platform workers. Therefore, we conclude that coordination and communication costs or contracting frictions across firm boundaries continue to represent a major obstacle for shifting tasks to platforms.

3 What can we learn from other strands of literature?

Platform work has not yet been studied intensively. The reasons for this include that it is still perceived as a not widely relevant type of work organisation and especially the lack of comprehensive data. Therefore, our approach is to examine what we can infer about platform work from other strands of literature. In the following sections, we look at selected studies from the literature on knowledge spillovers and working from home.

3.1 Is distance really dead? – Collaboration in technology-driven environments

Over two decades ago, economist and journalist Frances Cairncross predicted the "Death of Distance" triggered by the internet as it would create a world in which transmitting information costs virtually nothing. Once the internet achieved global reach, it would allow people worldwide to exchange information and ideas and enable new business plans that transform communication, commerce, and companies. Thus, Cairncross concludes that distance will become irrelevant (Cairncross 2001). Following this line of argument, one should expect a boom of labour platforms and the gig economy.

Two decades later, however, the benefits of urban density are beyond dispute (Duranton and Puga, 2020). The spatial concentration of economic activity in urban environments makes firms and workers more productive and increases innovation through spillover effects. Atkin et al. (2022) show the importance of face-to-face interactions for knowledge spillovers in Silicon Valley. The authors attempt to open the black box of knowledge spillover using geolocation data from smartphones to capture meetings between workers of different establishments. They then link worker interactions with patent citations between the workers' employers – a proxy for knowledge flows. The analysis of worker meetings and citations reveals a strong positive relationship between face-to-face interactions and knowledge flows. Further, the authors compute the potential impact on knowledge flows if remote work became more prevalent (note that period of analysis is before the Covid pandemic).[2] A back-of-the-envelope calculation

[2] We will discuss what is known today about productivity effects of working from home in section 3.2.

suggests that if 25% of workers worked from home instead of in the office face-to-face meetings would decrease by 17% and patent citations by 5.2%. (Atkin et al. 2022)

One example of a new business plan enabled by modern communication technologies as expected by Cairncross is GitHub the world's largest online platform for open source software development. Fackler and Laurentsyeva (2020) investigate whether geographic distance still plays a role in this virtual environment. GitHub hosts a collaborative version control system, and the repositories cover a wide variety of software projects. Users have to set up an account and provide their location, amongst other information, to create new projects or to contribute to existing ones. In public projects, all contributions and project progress can be observed. Thus, collaborative software development via GitHub allows for a comprehensive insight in programmers' location and interaction.

The authors find a negative effect of geographic distance on online collaborations although the production process as well as the output of software programming are immaterial. The estimations suggest that the effect is weaker than those found for trade, but the effect is still sound. Further, the authors show that the effect is non-linear, i.e., an additional kilometre decreases collaboration more when distance is low. Beyond a distance of 100 km, the effect remains roughly the same. However, national borders reduce virtual collaboration. The authors further analyse whether the effect of distance changed between 2012 and 2020 as internet speed increased and new online collaboration tools were developed. The results do not point towards a substantial decrease of the role of distance over this period. Overall, these findings suggests that offline work and personal contact are still important even in a virtual environment such as GitHub.

Based on GitHub data as well, Goldbeck (2023) looks at spatial collaboration patterns of ca. 190.000 software developers in the United States. With 80% of GitHub users concentrated in just 10 out of 179 US economic areas, the author finds a high spatial concentration despite the advanced digitalisation and remote collaboration potential of software engineering. Goldbeck compares the colocation effect in software engineering with networks computer science inventors. He finds that the colocation effect in the network of computer science inventors is even larger than for software developers. He attributes this to the increased need for face-to-face interaction as computer science inventors work on more creative, novel and innovative projects.

Abou El-Komboz und Fackler (2023) also use GitHub data to study the relevance of distance for knowledge flows in software engineering. They analyse the relationship between tech cluster size and knowledge workers' productivity in the USA and Canada. The authors' findings indicate that physical proximity to a large number of other knowledge workers, i.e., cluster size, leads to spillovers and has a positive effect the productivity and the quality of work of GitHub software programmers.

Overall, these studies suggest that the internet and new modes of online cooperation have not led to a "death of distance". This is especially noteworthy as with Silicon Valley and GitHub, these studies analyse technology-driven environments. In all likelihood it is safe to say that Silicon Valles techies and GitHub programmers have all the equipment and knowledge to use

all kinds of digital communication tools. And yet, face-to-face interactions still play a role for knowledge spillovers.

Implications for Platform Work

What does this imply for platform work? Platform work also includes many other types of work than software development. Compared to other typical tasks performed by remote professional workers – writing and translation, graphic design and multimedia, sales and marketing support (Piasna et al. 2022) – software development can be rather well described and specified. Therefore, we would expect the least need for personal meetings and communication in this field, which makes it a good candidate for organising work via platforms, even more than tasks in the other fields. However, the aforementioned studies clearly show that personal interactions still take place and increase the productivity of software development in technology-driven environments. Given that the persons involved are all tech-savvy, there is really no good reason why the technical potential of platform work has not yet been exploited here.

3.2 Working from Home – Productivity, Feasibility, Outlook

Similarities of Platform Work and Working from Home

While evidence on the impact of platform work is still scarce, a different type of work organisation has recently received quite some attention: Working from Home (WfH). During the Covid19 Pandemic, WfH has become the prime measure to enable social distancing while keeping businesses running. Why is this interesting for the context of platform work? Platform work and WfH share core characteristics of how work is organised: decentralised and independent of location, digital infrastructures and digital communication are necessary, monitoring and supervising are more difficult. A major difference however is that WfH goes along with being employed by an employer and being integrated in the employer's organisation while platform work means working independently for usually more than one client.

With the boom of WfH also research on the topic has taken off and knowledge about the advantaged, disadvantages and challenges of this form of work organisation has increased. Given the similarities of the two forms of work organisation, the obvious question is whether insights about WfH can be translated to platform work. To address this question the next section gives an overview of the literature on WfH. The subsequent section discusses whether the results can be transferred to the case of platform work.

Since the beginning of the pandemic, the worldwide boom of WfH has not only influenced the social and political debate but has also drawn academic attention to the topic. Although the economics literature addressed the topic of WfH as early as 2000, the research focus has changed and diversified significantly in the last few years.

Productivity when Working from Home

Since the seminal paper by David Autor "Wiring the Labor Market" (Autor 2001) the topic of WfH received little attention in economic research. The topic was taken up again from an economic perspective in a field experiment that addressed the effects of WfH on productivity and employee satisfaction (Bloom et al. 2015). The authors conducted a randomised experiment

in a Chinese travel agency. For the experiment, a part of the travel agency's workforce was randomly selected to work from home for nine months, while the other part, the control group, continued to work in the office. A comparison of the two groups showed that the work performance of the group that worked from home increased by 13%. Of this, 9 percentage points were attributable to increased work time due to fewer breaks and sick days. The remaining 4 percentage points could be directly attributed to increased work productivity, i.e., a higher number of calls per minute. As a reason for the increased work productivity, the members of the WfH group primarily indicated the more pleasant work environment at their homes. Further, the WfH group saw a reduction in the number of resignations by 50% and a general increase in job satisfaction. However, the study identified a 50% lower promotion rate in the WfH group. Overall, the effect on the travel agency's productivity was substantial: Total factor productivity of the firm increased by 20-30%. The cost savings per employee working from home were about $2,000 annually. About two-thirds of this cost saving could be attributed to the reduction in office space and the remainder to increased job performance and lower employee turnover. The success of the experiment prompted the company to allow all employees to choose freely between working in the office and working from home. About half of the group previously working from home returned to the office, while about two-thirds of the control group chose to continue working in the office. The respondents named lack of social contacts when working from home as the decisive reason for returning or remaining in the office. In addition, the authors showed that the employees whose work performance decreased when working from home returned to the office, while those whose work performance improved when working from home continued to work from home. As a result of this self-selection of employees, average work performance increased by 22% in the long term - twice as much as the direct effect of the experiment (+13% increase in productivity).

A recent study by Emanuel and Harington (2021) analysed a similar work type that was shifted to WfH during the Covid pandemic. The authors analysed data from call centre employees of a large U.S. online retailer to determine the extent to which the Covid-induced increase in WfH changed employee productivity. Similar to the work of Bloom et al. (2015), Emanuel and Harington's results confirm an average positive productivity effect as a result of WfH.

A study by Gibbs et al. (2021) also looked at productivity effects of WfH but found different results than Bloom et al. (2015) and Emanuel and Harington (2021). For their study, Gibbs et al. (2021) analysed data from over 10,000 higher-skilled employees of a large Indian IT services firm. The jobs involve significant cognitive work, collaboration in teams, working with clients, and innovation. The authors have information on labour output as well as data on hours worked, thus, allowing them to calculate individual productivity. The results indicate that during the Covid-induced WfH period, the number of hours worked increased significantly, while labour output decreased slightly. Thus, workers appeared to have compensated for decreased productivity by working additional hours. Overall, the authors calculated an 8-19% decrease in productivity. They state higher coordination and communication efforts when working from home as reasons for this result: The frequency of coordination activities and meetings increased, whereas the time for undisturbed work decreased significantly. Employees communicated with fewer persons and business divisions within the company and outside of the company. These

findings suggest that the drop in productivity during the Covid-induced WfH period is at least partially explained by increased coordination costs. These results of Gibbs et al. (2021) are in line with the results by Atkin et al. (2022) who show the importance of face-to-face interactions for knowledge spillovers innovations in Silicon Valley (cf. Section 3.1).

However, productivity effects of WfH may vary by experience level of the worker as a recent study on software engineers in a large US company by Emanuel et al. 2023 shows. Physical proximity to colleagues is important for developing skills especially for young colleagues. In the office, it is easier to spontaneously ask experienced colleagues for help or to imitate their work processes. However, this comes at a cost in terms of the seniors' time: They spend more time mentoring younger colleagues and less time programming. When the company switched to WfH during the Covid pandemic feedback on computer code between colleagues decreased. In the short run output especially by experienced developers increased. However, this is at the expense of long-run human capital development. This is in line with the results of a study by Atkin et al. (2023), in which newly recruited workers in an Indian IT firm were randomly assigned to work from home or in the office. The productivity of the new WfH workers was lower than of the new workers in the office in the beginning and relative productivity declined even further suggesting that workers learn more slowly when working from home.

Collaboration during Working from Home

Several studies addressed this issue of coordination and have looked in detail into how WfH has changed operational processes and collaboration between employees. DeFilippis et al. (2020) examined the impact of the Covid pandemic on digital communication in everyday work and the number of hours worked. To do so, they analysed anonymised data on online meetings and email use after lockdowns took effect in 16 major metropolitan regions in North America, Europe, and the Middle East. The results of the analysis show that, as a result of lockdown induced WfH, both the number of online meetings per person (+12.9%) and the average number of participants (+13.5%) increased. In contrast, the average length of meetings decreased by 20.1%. In the aggregate, this resulted in employees spending 11.5% less time in meetings each day. However, the average length of the workday increased significantly by 8.2% or 48.5 minutes daily. The number of e-mails also increased significantly as a result of the lockdown.

Also, Yang et al. (2021) studied how corporate collaboration and communication has changed as a result of WfH. The authors examined data on emails, calendars, instant messages, and video/audio calls from more than 60,000 Microsoft employees between December 2019 and June 2020. They find that companywide WfH has worsened employee connectivity and entrenched "silos" between different departments. While synchronous communication (instant messages, phone calls, online meetings) decreased significantly, asynchronous communication (emails) increased. The authors conclude that WfH makes it more difficult for employees to obtain and share information. A similar study by the same authors (Yang et al. 2020) finds that WfH reduced collaboration time (communication, teamwork) by an average of 2%, but increased focus time, i.e., time of concentrated, undisturbed work, by about 3.6%.

Productivity Effects of Working from Home Dependent on Type of Work

The aforementioned studies are indicative of different effects of WfH on productivity depending on the type of work that is done from home instead of in an office. Customer service via phone as it is usually performed in call centres seems to benefit in terms of productivity from a shift of work from the office to the employees' homes (Bloom et al. 2015, Emanuel and Harington 2021). This type of work is typically very standardised and rarely requires interaction with colleagues, coordination or collaboration. Thus, WfH does not mean a disadvantage regarding communication and cooperation with colleagues. The effect of a more pleasant work environment at home seems to dominate. The picture looks different, however, for types of work that require communication and cooperation and include innovative, cognitive or organisational tasks. This kind of work seems to lose in terms of productivity from a (complete) shift from the office to WfH.

This conclusion is supported is supported by a study on creative processes via video conferences. Using a laboratory study and a field experiment in five countries, Brucks and Levav (2022) show that videoconferencing impedes the generation of creative ideas. As video conferences transfer many of the same auditory and non-verbal information cues as in person interaction one might expect this technology to effectively replace in-person collaborative idea generation. The authors show that video conferencing narrows one's visual field by concentrating on the screen and filtering out peripheral visual stimuli. In line with previous neurological research results, the authors find that narrowing the visual scope to the shared environment of a screen goes along with narrowing the cognitive focus which again constrains the associative process underlying idea generation. However, this does not inhibit all collaborative activities: While videoconferencing groups tend to produce fewer creative ideas, they are not less effective at selecting ideas.

Current developments point to hybrid work organisation becoming dominant. Employees spend a part of their work time in the office with a focus on performing interactive tasks and communication with colleagues. The other part of their work time, employees work from home performing the less cooperative tasks. By 2023, 40% of US employees work remotely at least one day a week (Barrero et al. 2023). However, WfH is not possible in all occupations.

Estimations of the Working from Home Potential

During the Covid19 pandemic, two studies estimated WfH potentials using slightly different criteria to assess the feasibility of WfH across occupations. These estimations reflect the WfH potential, thus, the possibility of WfH in principle. They do not take into account the fact that restrictions may arise in practice e.g., due to a lack of technical equipment, insufficient living space or reservations on the part of the employer.

Dingel and Neiman (2020) classify occupations as compatible or incompatible with WfH on the basis of their work context and activity profile. For example, if an occupation is performed outdoors on a daily basis or requires protective or safety equipment that occupation is classified as incompatible with WfH. According to this approach, the total WfH potential corresponds to the share of employees with occupations to which none of these criteria apply i.e., it only includes jobs that could be performed entirely at home. Based on this approach, the authors

calculate a WfH potential of 41% for the USA and of 20-46% for European countries. They show a positive relationship between income levels and the shares of jobs that can be done from home.

However, there are many jobs in which certain activities can be done at home but a complete or permanent performance of all activities from home is not possible. This can be illustrated by the example of the occupational group "agriculture, animal husbandry and forestry occupations". According to the method of Dingel and Neiman, WfH is only possible for 5% of the employees in this group as most of them they work predominantly outdoors, which indicates an incompatibility with WfH. However, according to the 2018 BIBB/BAuA Employment Survey by the German Federal Institute for Vocational Education and Training (BIBB) and the German Federal Institute for Occupational Safety and Health (BAuA) for Germany half of the employees in this occupational group state that they frequently collect, research or document information; one in three frequently works sitting down for at least one hour without interruption. These are thus activities that can be done at home and, indeed, in the survey, about 15% of the employees in this occupational group report that they work from home at least occasionally and about 8% regularly. By focusing on the feasibility of performing a complete occupation at home, Dingel and Neiman do not consider the WfH potential of occupations that can be partly performed from home and their estimates thus represent a lower limit for the overall WfH potential. (Alipour et al. 2020a)

Alipour et al. (2023) calculated a WfH potential for Germany that also takes into account the possibility of partially performing activities of an occupation from home. They define the WfH potential of an occupation as the share of employees who work from home at least occasionally or do not rule out the possibility of WfH in their job in principle. Information from over 17,000 employees from the 2018 BIBB/BAuA Employment Survey was used for the calculations. The occupation-specific potentials were then merged with data from the German Federal Employment Agency on the frequency of individual occupations in the overall economy and aggregated. Based on this approach the authors find that 56% of employees in Germany could currently work from home at least partially. For the aforementioned agricultural, animal husbandry and forestry occupations, this method yields a WfH potential of 30%.

Can these estimates of the WfH potential also serve as proxies for the potential of platform work? As they basically give estimates of the share of jobs that do not require to be performed at a certain location or require special equipment, these occupations should also be possible to be performed by platform workers from anywhere. However, in the context of platform work, the estimates by Dingel and Neimann (2020) are more relevant. A central characteristic of platform work is independence of location and no employment status, thus, a hybrid work arrangement as included in the estimate of Alipour at al. (2020) is not feasible here. Again, these calculations are mere technical and organisational potentials and do not consider practical restrictions like a lack of technical equipment or the effects on productivity or work satisfaction.

Beyond the Pandemic: What Will be the New Normal in WfH?

The Covid pandemic was an exceptional time, in which at periods WfH was mandatory. Yet even during the coronavirus pandemic, it became clear that there would be no return to the level

of WfH from before the pandemic. Several studies already took a forward-looking approach allowing a glimpse of what to expect post-pandemic. And indeed, these forecasts were right as today we witness much higher levels of WfH than before the pandemic.

Surveys that ask employees and companies about their future expectations regarding WfH gave an indication regarding future developments of WfH. For example, a study by Erdsiek (2021) evaluated the results of an employer survey in Germany in which 1,700 managers were asked about their long-term expectations for WfH after the pandemic. Overall, the majority of German companies expected the pandemic to result in a consistent shift towards more WfH. The survey results also give an indication which aspects might contribute to the intensity of WfH after the pandemic. These include improved attitudes toward WfH, positive experiences in terms of productivity, investments in complementary technology and human capital, and a general push towards digitalisation.

The demand of employees also points towards a permanent shift to more use of WfH. A study by Frodermann et al. (2021) sheds light on the views of employees regarding the future use of WfH in Germany. According to their findings based on two online surveys, a majority of respondents were in favour of a regular use of WfH. More than one-third of respondents (37%) favour completely flexible use of WfH days, followed by the options of WfH two or three days per week (18% and 14%, respectively). The results of a study by Barrero et al. (2021a) for the USA are in line with the results for Germany. Based on a survey with 30,000 Americans over multiple waves the authors conclude that ca. 20% of working days are likely to be performed from home after the pandemic, compared with only 5% before the pandemic. The authors identify five reasons for this increase: better-than-expected WfH experiences, investments in physical and human capital that enable WfH, greatly diminished stigma associated with WfH, lingering concerns about crowds and contagion risks, and a pandemic-driven surge in technological innovations that support WfH. The authors also quantify the increase in preferences for WfH in monetary terms: Employees would, on average, be willing to give up about 7% of their salary to have the opportunity to work from home two or three days a week after the pandemic.

Further, Barrero et al. (2021b) addressed the question of the extent to which employee and employer attitudes towards WfH changed in the wake of the Covid pandemic. Using survey data for the United States, they found that approval of WfH increased significantly on both the employer and employee sides as a result of the Covid pandemic. For the post-Covid pandemic period, the authors predict that the option to work from home is likely to remain an important attribute in the decision to take or not take a job.

The studies above identify investments in technology that supports WfH as one of the reasons why WfH is expected be used more after the pandemic. Additionally, WfH technology has taken a big leap as a result of the pandemic. Bloom et al. (2021) analyse descriptions of US patent applications and identify patents that advance technologies in support of video conferencing, telecommuting and remote interactivity. The proportion of patent filings related to WfH technologies doubled between January 2020 and September 2020. Given the high rate of innovation in this area, the authors expect that quality and efficiency of WfH are likely to

increase as a result of new technical options and predict that this will intensify the shift to WfH also after the pandemic.

Besides surveys, an important and reliable method to look at current labour market developments and to even glimpse in the future is the analysis of online job ads. Adrjan et al. (2021) follow this approach and analyse online job ads in 20 OECD countries between 2019 and 2021. The results of the analysis show that the share of job ads in which WfH was advertised tripled in the wake of the Covid pandemic, from 2.5% in January 2020 to 8.5% in December 2021. The authors found the largest increase in job ads with a WfH option in knowledge-intensive industries. Alipour et al. (2021) take a similar approach with data on more than 35 million online job ads in Germany between 2014 and the first quarter of 2021: The share of job ads with a WfH option more than tripled between 2019 and 2021, reaching nearly 12% in early 2021. Occupations with high untapped WfH potential saw the largest increase in WfH job ads. The authors also documented that job ads reflected a change in skill needs due to the WfH. Competencies such as individual flexibility, the ability to work in a team, and digital competencies in general are becoming increasingly important.

The Prevalence of WfH in the Aftermath of the Covid Pandemic

The Global Survey of Working Arrangements (G-SWA) sheds light on the prevalence and organisation of WfH in an international perspective (Aksoy et al. 2023). The third wave of this online survey of full-time employees aged 20-64 who have completed secondary or tertiary education has been fielded in 34 countries in April-May 2023. The results show that with an average of 1.4 full paid days per week working from home, WfH levels are highest in the English-speaking countries. In comparison, the average WfH level is 0.9 days per week for four Latin American countries and South Africa, 0.8 in the European countries, and 0.7 in the seven Asian countries.[3] On international average, 67% of full-time employees work five days per week on business premises. 26% have hybrid arrangements, and 8% of full-time employees work entirely from home. There is a gap in every covered country between the number of WfH days per week employees would like to work from home and the number of WfH days per week employers plan (2,0 versus 1.1 days per week).

The Survey of Working Arrangements and Attitudes (SWAA) tracks the development of WfH in the USA since the Covid pandemic (Barrero et al. 2021a). The following results are based on the monthly waves until December 2023.[4] WfH increased from about 5% of working days in 2019 to a pandemic induced maximum of over 60% in May 2020 and stabilised around 28% in 2023. In 2023, 40% of US employees work remotely at least one day a week. US employees can be categorized in three groups of different use of WfH. Around 60% of employees never work from home mostly because they work in a job that cannot be done remotely. These include

[3] Countries covered by the G-SWA:
English-speaking countries: Australia, Canada, New Zealand, UK and USA
Latin America: Argentina, Brazil, Chile, Mexico
European countries: Austria, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Turkey
Asian countries: China, Israel, Japan, Malaysia, Singapore, South Korea, Taiwan

[4] https://wfhresearch.com/wp-content/uploads/2023/11/Evolution-of-Work-From-Home-Published.pdf

mainly lower-paid jobs in retail, manufacturing, transport, security, cleaning, and food services. Ca. 30% of employees use hybrid WfH arrangement and typically work from home two or three days each week. They are usually higher-paid college graduates that pursue managerial or professional positions, frequently in technology or business service industries. Finally, ca. 10% of employees work fully remotely. They typically work in supporting roles like payroll, call centres or IT-support and earn less than the average professional hybrid worker. The authors expect WfH to continue to grow as research and development of new technologies to improve remote working expands. The pandemic has therefore created both a one-off spike and a longer-term acceleration in the growth of WfH.

The monthly ifo Business Survey with 9.000 German firms includes questions regarding the use of WfH.[5] The proportion of employees working at least some of the time from home has stabilised at around 25%. In August 2023, German employees spent 17% of their working hours working from home. Not all jobs are compatible with working from home, but where working from home is possible, employees work from home on average 1.5 days a week. As of October 2023, the majority of German companies (84%) intend to maintain their current working from home policies.

Hybrid Work as Best of Both Worlds?

The numbers above show, that most employees, that can work from home in principle, divide their working time between the office and their home. Is this a sound way to combine benefits of WfH with avoiding a decrease in communication, cooperation and innovation? Indeed, three studies using randomised control trials find that employees working partly from home show higher work satisfaction and higher productivity than their colleagues working fully onsite.

Bloom et al. (2022) conducted a randomized control trial with engineers, marketing and finance employees of a large Chinese travel agency. A randomly chosen group of employees was allowed to work from home two days per week for six months while the rest worked full time in the office. Compared to the latter group, the WfH group showed lower attrition rates, higher self-reported work satisfaction scores, an increase of lines of code written and an increase of employees' self-assessed productivity.

A similar experiment was conducted by Angelici and Profeta (2020) in a large Italian company. Employees (white and blue collar workers) were randomly divided into a “smart-working” group, that one day per week for 9 months has no constraints on the place or time for work, and a group that keeps working the usual schedule fully on site. The comparison of the two groups shows that the flexibility of “smart-working” increased employees’ productivity (by objective measures and reported by employee or supervisor) and improved their well-being and work-life balance.

Another experiment in a large NGO in Bangladesh randomised the number of days that employees worked from the office during a transitional return-to-office period of 9 weeks (Choudhury et al. 2022). The authors find that an intermediate number of days in the office, i.e.

[5] https://www.ifo.de/en/survey-results

hybrid work, resulted in greater self-reported work-life balance and better performance ratings from managers.

Implications for Platform Work

What conclusions can be drawn from the WfH literature for platform work? The aforementioned studies provide several insights into characteristics and the development of WfH. The biggest drawback of WfH are increased communication and coordination costs. As a results, studies find different effects of WfH on productivity depending on the type of work that is done from home instead of in an office. Work that is very standardised and rarely requires interaction with colleagues, coordination or collaboration like customer service seems to benefit from a shift to WfH in terms of productivity. In contrast, work that requires communication and cooperation and includes innovative, cognitive or organisational tasks seems to lose in terms of productivity from a (complete) shift from the office to WfH. The latest trends in WfH suggest that hybrid work organisation will become the dominant form of WfH. Employees work partly in the office with a focus on interactive tasks and communication with colleagues and partly at home performing the less cooperative tasks that require concentration and focus.

What does this imply for platform work? Central characteristics of platform work are independence of location and no employment status. Thus, hybrid work arrangements as in WfH are not feasible in the context of platform work. Only work that consists solely of standardised tasks that do not require communication and coordination with colleagues and that do not require to be performed at a certain location or require special equipment can be performed by platform workers from anywhere. But even if for work that could theoretically be shifted to WfH or platform work obstacles may appear in practice like personal preferences for meeting colleagues or a lack of the required technical equipment. The latter has been reduced lately as, triggered by the Covid pandemic, significant investments to enable WfH and advances in technologies supporting WfH have been made. These developments facilitate the full exhaustion of WfH potentials and might also increase the scope of work suitable for platform work.

4 Conclusion

Platform work is still barely captured in administrative data and standard labour surveys. Several aspects tend to lead to an upward bias regarding numbers on the extent of platform work:

- Online surveys of platform workers: Online platform workers are more likely to come across these online surveys and are more likely to answer than someone who is not active in platform work.
- Differentiation of platform work is often not very strict in the surveys and even unclear to respondents e.g. they include jobs found via online job boards.
- Revenue numbers of delivery services and renting or selling activities include the value of the goods and not only of the labour.

Thus, when looking at numbers on platform work one should be careful of definitions and representativeness for the populations as a whole.

Conclusion

Methodologically convincing studies for the USA and Europe, that employ different and in part innovative approaches to measure the extent of platform work, all find very similar results: Platform work does not play an important role in labour markets and income generated via platform work is rather low and complementary to another main job.

As platform work has not yet been intensively studied, we took a look at what we can infer about platform work from selected studies in the literature on remote work and knowledge spillovers: the collaboration of software programmers in the online open source community GitHub and working from home. Platform work, collaboration via GitHub and working from home share core characteristics of how work is organised: decentralised and location-independent, digital infrastructure and digital communication are necessary, monitoring and supervision are more difficult.

In principle, requirements for software development can be rather well described and specified. Therefore, we would expect little need for personal meetings and communication in this field, which makes it a good candidate for organisation via platforms. However, the studies clearly show that even in such a technology-driven environment personal interactions still take place and increase the productivity of software development.

With the boom of working from home also research on the topic has taken off and knowledge about this form of work organisation has significantly increased in the last years. The productivity effects of working from home depend on the type of work that is done at home instead of in the office. Work that requires communication and cooperation and includes innovative, cognitive or organisational tasks loses in terms of productivity from a (complete) shift from the office to working from home. Only work that is very standardised and rarely requires interaction with colleagues, coordination or collaboration does not suffer from a shift to working from home. Thus, platform work will continue to remain limited.

Recent data shows that most employees, that can work from home in principle, divide their work time between the office and their home. This seems to have established as a sound way to combine the benefits of working from home with avoiding a decrease in communication, cooperation and innovation within the firms. This combination points to a crucial difference between working from home and platform work i.e., working from home is a work organisation within an employer-employee relationship while platform work means working self-employed for usually more than one client.

Remote work is mainly feasible in high skilled cognitive occupations. The content of such occupations cannot be fully codified in contracts and performance is difficult to measure. Therefore, the commitment of employees to the company is important in these occupations. Employees who work in hybrid working from home arrangements are still integrated in the company and benefit from a positive development of the company. As a result, coordination and communication costs or contracting frictions across firm boundaries continue to represent a major obstacle for shifting tasks from within a firm to platforms. Thus, it is unlikely that the level of working from home that we observe today will ever be reached for platform work.

Overall, it seems that the extent and importance of platform work in todays and future labour markets tends to get overestimated in the public debate. Income generated via platform work is

rather low and complementary to another main job. This means that most platform workers are included in the social security system of their home country via their main job. Nevertheless, clear rules that specify when an occupation qualifies as self-employment and what defines a dependent employment, as foreseen in the proposed EU Directive on Improving Working Conditions in Platform Work, is useful to establish legal clarity and to prevent the social insurance funds from missing out on contribution payments.

Although platform work will continue to play a minor role in the labour market, remote work keeps playing an important role with implications for location dependent platform work. With the possibility to work from home several days a week and thus commuting on less days, regional relocation of the place of residence from agglomeration areas to more peripheral areas has already happened and might further increase. This again has implications e.g., for the currently growing area of delivery services as these are only profitable in areas with a sufficient number of potential customers on the one side and shops, restaurants, etc. on the other side. A lot is in motion in the realm of organisation of work and remote work. These developments should be carefully observed, and regulatory interventions must be well justified.

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