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Who can log in? The
importance of skills
for the feasibility
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across OECD countries

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**Who can log in? The importance of skills for the feasibility of teleworking arrangements
across OECD countries**

By Ricardo Espinoza and Laura Reznikova, OECD Centre for Skills

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Table of Contents

OECD Social, Employment and Migration Working Papers.....	2
Acknowledgements.....	3
Abstract.....	5
Acronyms and abbreviations.....	6
1. Introduction.....	7
2. Data and methodology.....	9
3. Results.....	10
4. Conclusion.....	16
Annex A. List of Countries.....	19
Annex B. Methodological details.....	20
Annex C. Additional Results.....	21
Annex D. PIAAC Proficiency Levels.....	24

Figures

Figure 3.1. Feasibility of teleworking.....	11
Figure 3.2. Feasibility of teleworking by educational attainment.....	12
Figure 3.3. Feasibility of teleworking by level of literacy skills.....	13
Figure 3.4. Average feasibility of teleworking by occupation (2-digit level) (OECD average).....	14
Figure 3.5. Correlation between skills and feasibility of teleworking.....	15
Figure 3.6. Feasibility of teleworking by income.....	15
Figure 3.7. Predicted probabilities of teleworking by skill level.....	16

Abstract

COVID-19 lockdowns have radically changed the working arrangements for millions of workers. But who are the workers best positioned to work from home? Drawing on data from the OECD Survey of Adult Skills (PIAAC), we show that workers possessing higher levels of skills are significantly more likely to telework in OECD countries. We show that while 30% of workers could telework across the OECD, the likelihood decreases for workers without tertiary education and with lower levels of numeracy and literacy skills. The findings raise important questions with respect to the extent to which the pandemic could exacerbate existing labour market inequalities, and the extent to which these inequalities could further worsen amidst intensified technology adoption in the pandemic's aftermath.

Résumé

Les fermetures de COVID-19 ont radicalement changé les conditions de travail de millions de travailleurs. Mais quels sont les travailleurs les mieux placés pour télétravailler? En nous servant des données de l'enquête de l'OCDE sur les compétences des adultes (PIAAC), nous montrons que les travailleurs possédant des niveaux de compétences plus élevés sont nettement plus susceptibles de télétravailler dans les pays de l'OCDE. Nous montrons que si 30 % des travailleurs peuvent télétravailler dans les pays de l'OCDE, la probabilité diminue pour les travailleurs n'ayant pas fait d'études supérieures et ayant un niveau de compétences en calcul et en lecture plus faible. Ces résultats soulèvent des questions importantes quant à la mesure dans laquelle la pandémie pourrait exacerber les inégalités existantes sur le marché du travail, et la mesure dans laquelle ces inégalités pourraient encore s'aggraver dans le contexte d'une intensification de l'adoption des technologies au lendemain de la pandémie.

Acronyms and abbreviations

ICT	Information and communications technology
ISCO	International Standard Classification of Occupations
ISIC	International Standard Industrial Classification of All Economic Activities
OECD	Organisation for Economic Co-operation and Development
O*NET	Occupational Information Network
PIAAC	Programme for the International Assessment of Adult Competencies

1. Introduction

1. Lockdowns associated with the spread of COVID-19 have impacted the economic activity in countries around the world. An important factor in determining the vulnerability of economies to shutdowns has been the share of jobs that can (not) be performed from home. But what are the characteristics of workers who are better or worse positioned to take advantage of working from home, or “teleworking”?¹

2. Drawing on evidence on 38 countries from the OECD Survey of Adult Skills, a product of the Programme for the International Assessment of Adult Competencies (PIAAC), we derive task-based estimates of the share of workers that could telework in OECD countries. Apart from showing, in line with our expectations, that workers possessing higher levels of skills are significantly more likely to be able to work from home, we also demonstrate how large the differences between higher- and lower-skilled individuals tend to be. This evidence therefore underlines that in the short term, support for targeted measures directed at specific groups of vulnerable workers (OECD, 2020_[1]) will be crucial. For instance, Criscuolo et al. (2020_[2]) argue that in order to improve the gains from more widespread teleworking for productivity and innovation, policy makers can promote the diffusion of managerial best practices, self-management and information and communication technology (ICT) skills, investments in home offices, and fast and reliable broadband across the country. On the other hand, we highlight that in the long run, developing relevant skills over the life course becomes key. Therefore, apart from being a vital response mechanism to the changing skills demands in the context of globalisation or digitalisation (OECD, 2019_[3]), skills development in the form of lifelong learning becomes equally key in the context of unforeseen socio-economic shocks.

3. It is important to underline that rather than exploring the *choice* to telework or not, an equally pertinent question possibly driven by personal preferences or family constraints, we look at the *feasibility* of working from home instead, or in other words the ability of teleworking *in theory*. In this vein, the paper follows several recently published analyses which have already contributed important insights into the characteristics of jobs more or less compatible with teleworking. An analysis by the Resolution Foundation (2020_[4]) highlights that higher-paid United Kingdom (UK) employees are more likely to be able to work from home than their lower-paid counterparts. Similarly to Boeri, Caiumi and Paccagnella (2020_[5]) who focus on six European countries, Dingel and Neiman (2020_[6]) also rely on the occupation-specific classification in two (Occupational Information Network) O*NET surveys, to estimate that the share of United States (US) jobs which could be potentially performed from home, while noting a positive relationship between the share of jobs which can be performed from home and income levels (gross domestic product [GDP] per capita). Taking a different geographical focus, Saltiel (2020_[7]) focuses on ten developing countries, and estimates the share of jobs which could be done from home by drawing on worker-level data in the Skills Toward Employability and Productivity (STEP) occupational survey. In his sample, he also finds that the ability to work from home is positively associated with working in a high-paying occupation, as well as with household wealth, formal employment or educational attainment. Finally, OECD (2020_[8]) draws on O*NET and various labour force surveys to estimate the regional

¹ Despite some suggested differences in meaning between “telework” and “working from home”, the terms are used interchangeably in this paper.

capacity of 27 EU countries, Switzerland, Turkey and the United States to transition to working from home, showing that the share of potential remote working increases with skill-levels in the region.

4. These findings related to the feasibility of teleworking are also generally aligned with those of the European Working Conditions Survey, showing that the adoption (rather than the feasibility) of working from home is dependent on the occupation (and hence the skills and the education level) of workers (Eurofound, 2017^[9]), as well as the findings of the Office for National Statistics (ONS) (2020^[10]) in the UK. ONS uses the Annual Population Survey to show that the likelihood of UK workers who *actually did* telework in 2019 was larger for those employed in higher-skilled occupations. Similarly, Brynjolfsson et al. (2020^[11]) report that according to a survey ran on a nationally-representative sample of the US population during April and May, 2020, about half of those employed pre-COVID-19 were now in practice working from home. They also show that states with a higher share of employment in information work were more likely to adopt teleworking practices.

5. Moreover, instead of judging the feasibility of teleworking arrangements at the level of individual occupations, we take advantage of PIAAC data to estimate whether a particular respondent could work from home, based on the tasks (and their frequency) that each participant reported to perform. Moreover, unlike studies using O*NET, the classification used here is non-country-specific, as the tasks performed by different occupations can vary from country to country. In a similar context, PIAAC data has already been used by Boeri, Caiumi and Paccagnella (2020^[5]), however, with the aim of estimating the impacts of the work reorganisation on productivity in the aftermath of the COVID-19 crisis.

6. In order to determine whether a particular job can be performed from home, we select 12 PIAAC questions across three skills domains (physical skills; job flexibility; and intensity of use of ICT, reading and writing skills in workplaces) with the potential to inform the feasibility of teleworking arrangements. Responses to the questions are used to construct a variable called “telework” that takes the value 1 if the job is judged to be compatible with telework and 0 otherwise.

7. We find that the ability to work from home varies significantly across OECD countries and that, as anticipated, substantial inequalities exist with respect to the feasibility of teleworking between high and low skilled workers. More precisely, we show that while 31% of workers could work from home across the OECD, the figure hides disparities between workers with tertiary education (54%) and those without (18%); and between workers whose levels of skills (PIAAC proficiency levels) are higher (57% for Levels 4 and above) compared to those with lower levels of skills (28% for Levels 3 and below). The findings are further substantiated by showing that workers with higher incomes are more likely to telework than those with lower income levels. The relationship between level of skills and the feasibility of teleworking can be explained to a large extent by the fact that higher levels of skills seem to be required for most occupations in which tasks can be more easily performed remotely. Our results demonstrate a strong correlation ($r=0.89$) between the feasibility of teleworking and skill levels of workers at 2-digit level (International Standard Classification of Occupations 2008, ISCO 2008) occupations, whereby workers possessing higher levels of skills also tend to be employed in occupations that are more telework-compatible. Finally, even when controlling for workers’ and jobs (observed) characteristics, we find that workers with higher levels of skills are roughly twice as likely to telework as those with lower levels of

skills. Therefore, and despite the demonstrated positive performance-related impacts of teleworking arrangements (Bloom et al., 2015^[12]), we re-affirm that not all groups of workers across the OECD are equally positioned to take advantage of such arrangements, while quantifying the gaps in their respective theoretical abilities to do so.

8. The findings raise important questions with respect to the large numbers of workers for whom telework is not possible at all, and who could find themselves jobless as a consequence of the pandemic. The workers hardest hit will be those at the lower end of the skill spectrum with lower education levels, further exacerbating the current labour market inequalities. Finally, in the aftermath of the pandemic, as employers are likely to turn to more intensive technology adoption and increased substitution of human for physical capital to enhance their resilience, these inequalities might become even further aggravated.

9. This paper is structured as follows: the next section provides a more detailed overview of the data and methodology used. Section 3 describes the main results, showcasing the share of workers across OECD countries who are able to telework, by level of education, skills (PIAAC literacy proficiency level), and income. Section 4 concludes.

2. Data and methodology

10. In this paper, we use data from the OECD Survey of Adult Skills (PIAAC), an international survey conducted in almost 40 countries. PIAAC directly measures key cognitive skills in three domains: literacy and numeracy skills, and the ability to solve problems in technology-rich environments. In addition to measuring these skills, the survey collects information about how the skills are used at work and in non-working environments. A background questionnaire also collects rich information about individuals' socio-economic background, education and training, employment status, income, among others.

11. The PIAAC survey is administered every 10 years to around 5 000 individuals in each participating country. In this paper, we use data from individuals aged 18-64 from the first PIAAC cycle, the data for which was collected in three rounds between 2011 and 2017. Annex A shows the list of countries included in the sample and the year they participated in the survey.

12. Our methodology relies on the respondents' assessment of the type of tasks that are required to be performed in their workplaces and on the skills needed to fulfil these tasks successfully. Specifically, we assess the feasibility of teleworking based on the responses in three key domains. The first domain relates to the frequency of performing job-related tasks that require physical skills. Jobs that do not require regular use of physical skills are classified as having the potential to be performed from home. Similarly, although relying on O*NET, Dingel and Neiman (2020^[6]) include carrying out tasks requiring physical activity or working outdoors to inform their measures of feasibility to telework, while Saltiel (2020^[7]) has incorporated questions related to different forms of physical activity as well. The second domain relates to job flexibility, as in comparison to other methodologies, questions related to this domain were part of PIAAC. Jobs in which

workers have large degrees of flexibility to decide how, when, and at what pace to complete tasks, as well as to choose their own schedule and to plan their own activities are determined to be more compatible with teleworking. While PIAAC allows us to capture the job flexibility dimension, our telework variable does not involve questions related to people interactions, which Boeri, Caiumi and Paccagnella (2020_[5]), Dingel and Neiman (2020_[6]) and Saltiel (2020_[7]) are able to capture, each in slightly different ways. Boeri, Caiumi and Paccagnella (2020_[5]) further include questions related to on-the-job mobility. Finally, our third domain relates to the intensity of the use of ICT, reading and writing skills in workplaces. For example, jobs requiring intensive use of email, word processing and spreadsheets, are classified as being compatible with teleworking. Similarly, using ICT devices is used to estimate the feasibility of teleworking by Boeri, Caiumi and Paccagnella (2020_[5]), while Dingel and Neiman (2020_[6]) and Saltiel (2020_[7]) rely on the use of email and computer respectively.²

13. We combine the responses in our three skills domains to determine whether the job performed by an individual respondent can be performed remotely. Annex B provides a detailed description of the questions included in each domain, as well as details on how the binary “telework variable” is constructed. To check the robustness of our methodology we construct upper and lower bounds of our estimates using alternative criteria to determine whether jobs can be performed remotely (see Annex B).

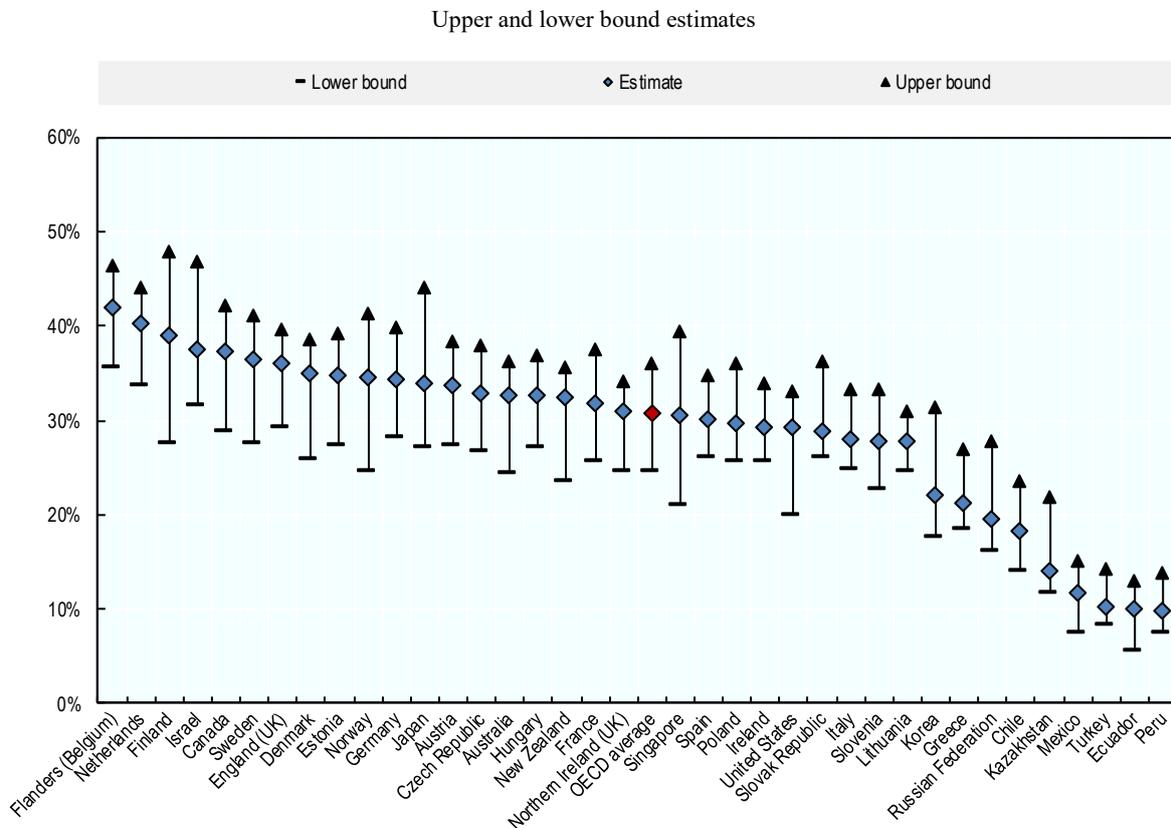
14. Finally, given that the majority of PIAAC data we use was collected in 2011-12, with several of the dataset’s questions used here relating to the frequency of using ICT technology which has presumably intensified in the meantime, our estimates represent the “lower bound” of the actual share of jobs that could be performed from home. Overcoming this limitation by updating the study with more recent information on adults’ skills might provide a valuable avenue for research in the future.

3. Results

15. Figure 3.1 shows the share of workers with jobs that are telework-compatible across OECD countries. The figure also shows lower and upper bound estimates based on more and less restrictive specifications, respectively. Our main estimates show that on average, 31% of OECD workers could in theory work from home. The individual country estimates, for instance France (32%), Germany (34%) or Spain (30%), are by and large well-aligned with the results of a recent Eurofound survey, reporting that roughly 37%, 36% and 30% of workers in these countries respectively started to work from home as a result of the COVID-19 situation (Eurofound, 2020_[13]).

² Although not explicitly focusing on estimating the feasibility of working from home, Barrot, Grassi and Sauvagnat (2020_[17]) also estimate the likelihood of teleworking by drawing on the European Community survey data related to the use of ICT and electronic commerce in businesses, in order to complement their analysis of sectoral effects of social distancing.

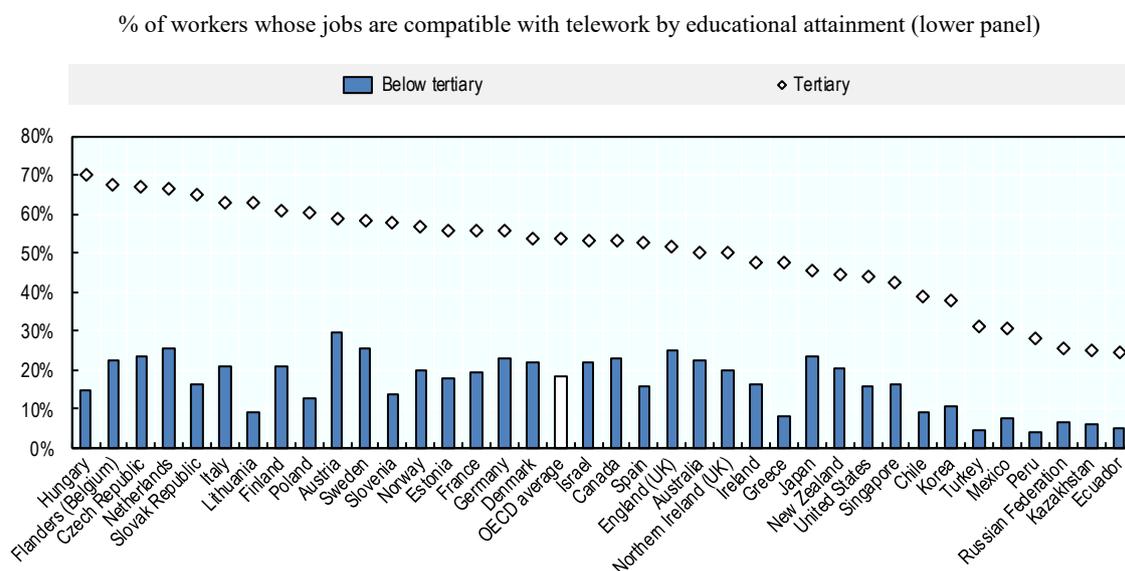
Figure 3.1. Feasibility of teleworking



Note: The sample for the Russian Federation does not include the population of the Moscow municipal area. The data published, therefore, do not represent the entire resident population aged 16-65 in the Russian Federation but rather the population of the Russian Federation excluding the population residing in the Moscow municipal area.

Source: OECD (2017^[14]) *OECD Skills Surveys: Survey of Adult Skills (PIAAC)* (database), <https://www.oecd.org/skills/piaac/> (accessed on 20 April 2020).

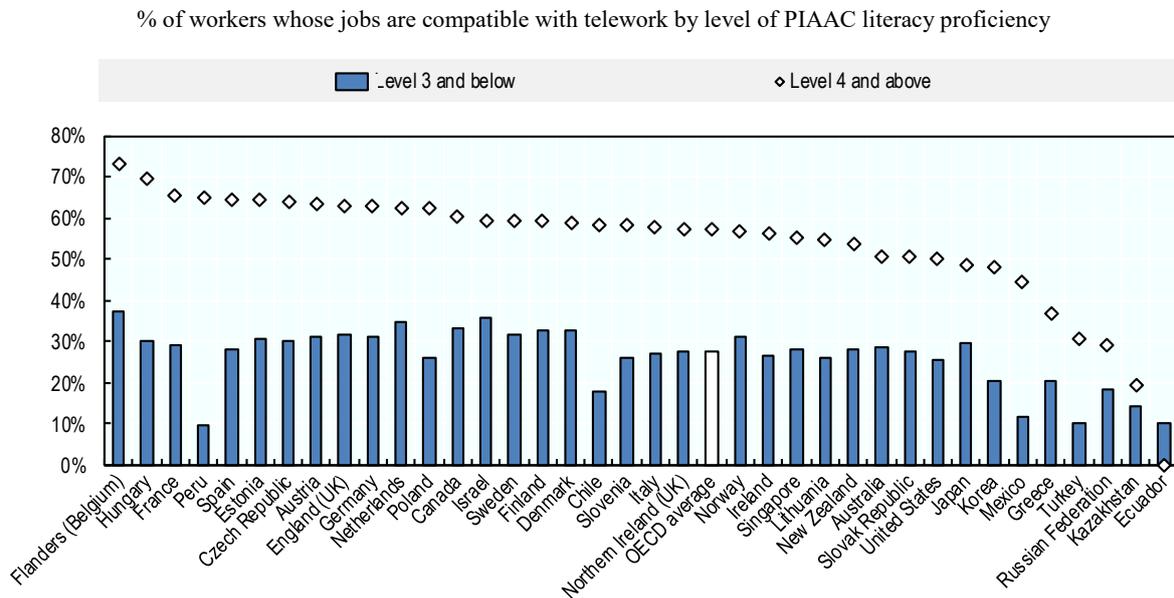
16. However, these estimates hide large within-country disparities. Firstly, echoing our expectations, differences with respect to the feasibility of teleworking arrangements exist depending on the level of education attained, and skills possessed by workers. Figure 3.2 presents our estimates of the share of workers who could work from home in OECD countries by educational attainment. In more concrete terms, it shows that while 54% of tertiary educated workers would be able to work from home, the share is only 18% for workers who have not acquired tertiary education. Notable differences exist in Hungary or Lithuania, where the share of tertiary educated workers able to work from home is higher than the share of those who have not acquired tertiary education by 55 and almost 54 percentage points respectively (Figure 3.2).

Figure 3.2. Feasibility of teleworking by educational attainment

Source: OECD (2017^[14]) *OECD Skills Surveys: Survey of Adult Skills (PIAAC)* (database), <https://www.oecd.org/skills/piaac/> (accessed on 20 April 2020).

17. Analysing PIAAC proficiency levels in literacy shows a similar trend, indicating a clear advantage for workers with higher skill levels with respect to their ability to work from home (Figure 3.3). While 28% of workers with a low skill level (Level 3 or below) in literacy are able to telework across the OECD on average, the share stands at almost 57% for those with a higher skill level (Levels 4 and 5).³ Almost identical numbers can be observed with respect to PIAAC proficiency numeracy levels (see Annex C). It is interesting to note that compared to other countries, Flanders (Belgium) has the largest share of jobs that can be performed remotely for both high and lower skilled workers. In terms of the ability to telework by low skilled workers, Flanders is closely followed by Israel and the Netherlands.

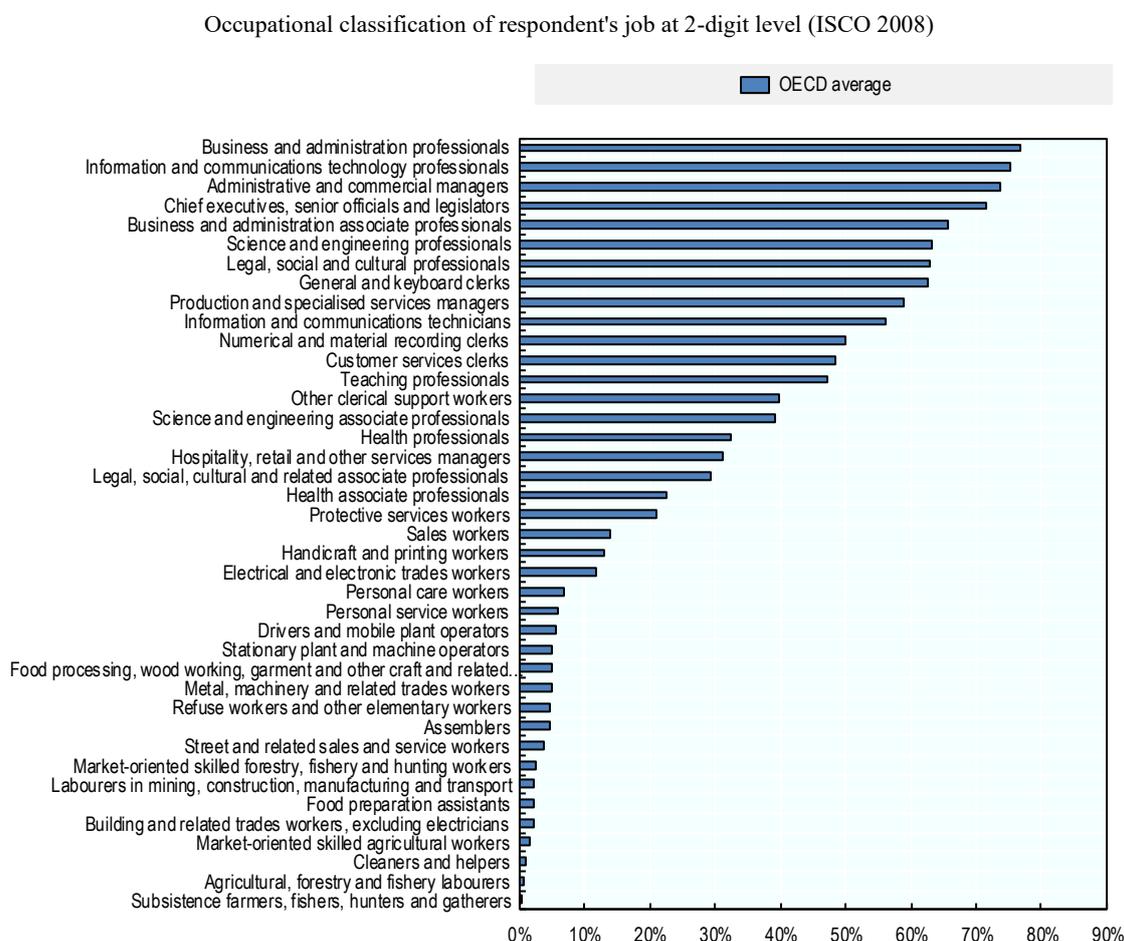
³ See Annex D for a detailed description of competences at each PIAAC proficiency level.

Figure 3.3. Feasibility of teleworking by level of literacy skills

Source: OECD (2017^[14]) *OECD Skills Surveys: Survey of Adult Skills (PIAAC)* (database), <https://www.oecd.org/skills/piaac/> (accessed on 20 April 2020).

18. Furthermore, results disaggregated at the at 2-digit level (ISCO 2008) show that business and administration professionals (77%); information and communications technology professionals (75%) and administrative and commercial managers (74%) are best positioned to work from home (Figure 3.4). Additional results of the shares of workers able to telework by industry and by occupations at 1-digit occupations level are shown in Annex C.⁴

⁴ Our occupation categories do not include a special joint category for “essential workers.” However, such category could be constructed for approximation purposes, for instance by relying on the list of essential occupations defined by the European Union (EU) (European Union, 2020^[18]), which follows the European Skills, Competences, Qualifications and Occupations (ESCO) classification, that in turn maps back onto ISCO 2008.

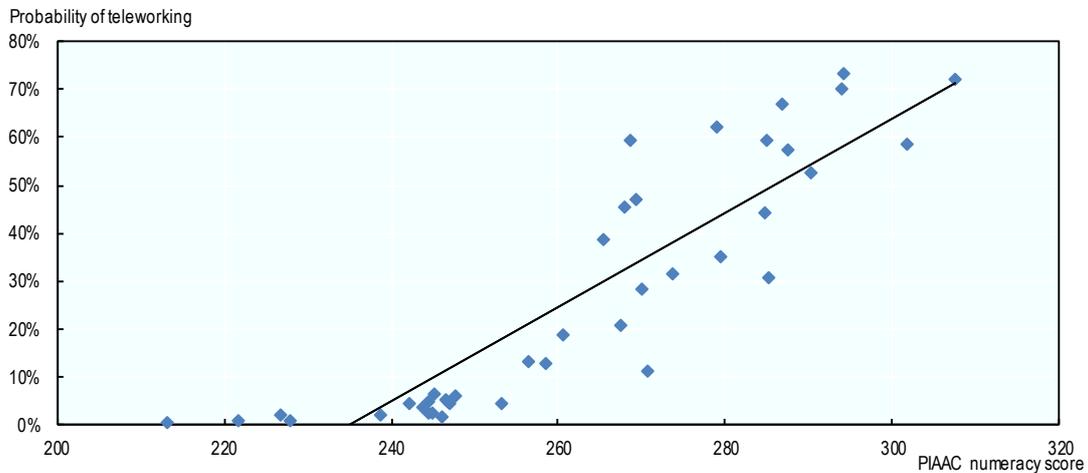
Figure 3.4. Average feasibility of teleworking by occupation (2-digit level) (OECD average)

Source: OECD (2017^[14]) *OECD Skills Surveys: Survey of Adult Skills (PIAAC)* (database), <https://www.oecd.org/skills/piaac/> (accessed on 20 April 2020).

19. Moreover, as shown in Figure 3.5, there is a strong correlation ($r=0.89$) between the feasibility of teleworking and PIAAC scores of workers at 2-digit level (ISCO 2008) occupations. This suggests that in OECD countries, workers possessing higher levels of skills tend to be employed in occupations that are more telework-compatible, which is also highlighted by Criscuolo et al. (2020^[2]) within their country sample. For instance, while “cleaners and helpers” score on average less than 222 in PIAAC (level 1) showcasing a low skill level, and with the feasibility of teleworking of only roughly 1%, “information and communications technology professionals” score more than 307 (level 3) and have a much higher feasibility of working from home of roughly 72%. Possibly, this correlation could be simply driven by the fact that skills proficiency tend to be strongly correlated with the use of ICT skills at work, which is one of the components of our telework variable. However, and as shown in Annex C, workers with higher levels of skills are more likely be employed in occupations that are more telework-compatible even if we omit the “use of ICT” skills dimension from our telework variable.

Figure 3.5. Correlation between skills and feasibility of teleworking

Average PIAAC numeracy score and % of workers who can telework by 2-digit occupations level



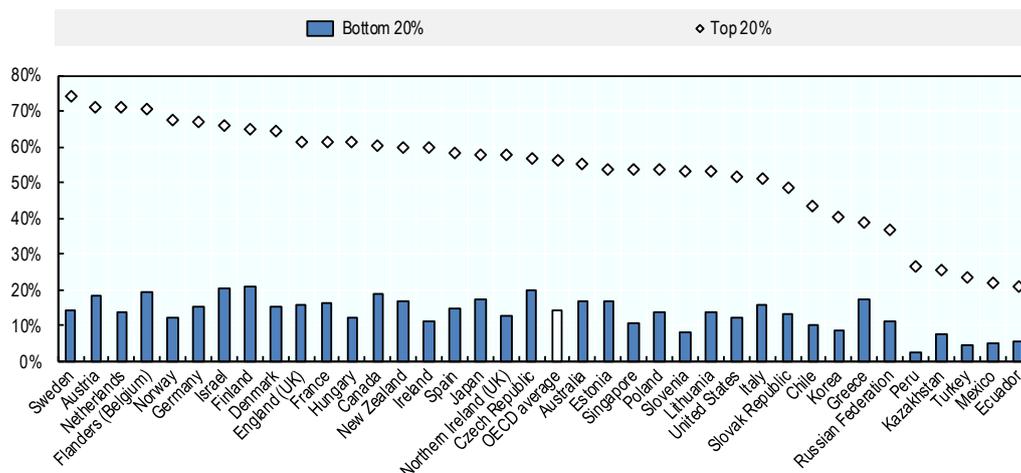
Note: Each point corresponds to the average values across OECD countries for each occupation at the 2-digit level (ISCO 2008).

Source: OECD (2017^[14]) *OECD Skills Surveys: Survey of Adult Skills (PIAAC)* (database), <https://www.oecd.org/skills/piaac/> (accessed on 20 April 2020).

20. In light of the above, is therefore not surprising that workers with higher levels of income are also more likely to be able to telework than those who are worse off (Figure 3.6). In this respect, our findings echo those of Dingel and Neiman (2020^[6]) or Saltiel (2020^[7]). For instance, while an average of 56% of OECD workers in the top 20% of the income distribution are able to telework, the share stands at only 14% for those in the bottom 20%. This difference is even larger in Sweden, where a difference of 60 percentage points exists between the ability to telework between those in the top and bottom 20%. Figure 3.6 also shows that low income workers fare best in terms of their ability to telework in Finland (roughly 21% could in theory telework).

Figure 3.6. Feasibility of teleworking by income

% of workers whose jobs are compatible with telework in the top and bottom quintiles

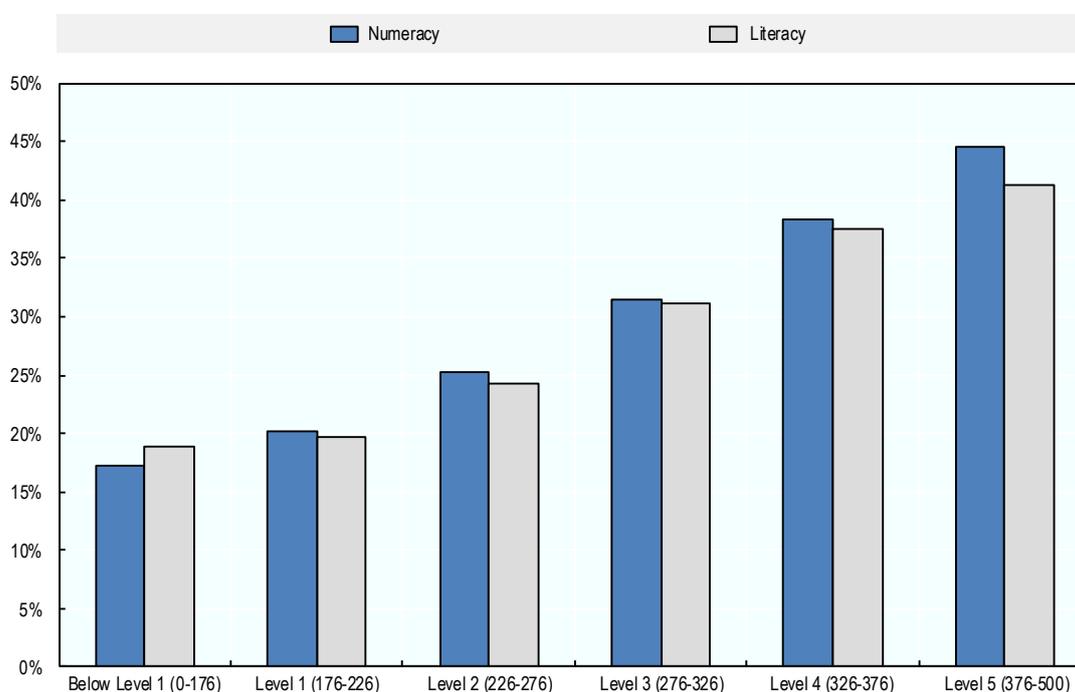


Source: OECD (2017^[14]) *OECD Skills Surveys: Survey of Adult Skills (PIAAC)* (database), <https://www.oecd.org/skills/piaac/> (accessed on 20 April 2020).

21. Finally, in order to better capture the correlation between skills and the feasibility of teleworking, we carry out an individual-level probit regression where the dependent variable is the binary “telework variable”. We include controls for PIAAC scores, age, gender, and an indicator variable for self-employment industry- and country fixed-effects. The model is run using PIAAC numeracy and literacy scores separately. The resulting regression coefficients are reported in Annex C. Using the estimated coefficients, the average predicted probabilities of teleworking by skill level are shown in Figure 3.7. The figure shows that even when controlling for workers’ and jobs’ (observed) characteristics, workers with higher levels of skills are roughly twice as likely to telework than those with lower levels of skills (Levels 4 and above compared to Levels 1 and below).

Figure 3.7. Predicted probabilities of teleworking by skill level

Probabilities of teleworking by aggregated PIAAC numeracy and literacy scores



Note: Predicted probability estimated using probit regressions. The dependent variable is the dummy variable telework. Control variables include PIAAC scores, age, gender, and a dummy variable for self-employment, industry fixed-effect and country fixed-effects.

Source: OECD (2017^[14]) *OECD Skills Surveys: Survey of Adult Skills (PIAAC)* (database), <https://www.oecd.org/skills/piaac/> (accessed on 20 April 2020).

4. Conclusion

22. COVID-19 developments, accompanied by social distancing measures, have brought abrupt changes to the daily routines of millions of workers. In the midst of the crisis, teleworking arrangements hold the potential to mirror “normal times” work routines. However, this paper has shown that the likelihood of being able to telework

among OECD countries is importantly influenced by people's level of skills. Drawing on a tasks-based classification of evidence from the OECD Survey of Adult Skills (PIAAC), we show that across OECD countries, better educated workers with higher levels of skills are better positioned to telework. With their lesser skilled counterparts left at a significant disadvantage, our results further underscore the fact that the threat of unemployment potentially resulting from the inability to telework will affect these workers disproportionately. Once the current crisis passes, and as employers are likely to start looking for more technology-intensive solutions to bolster their capabilities of withstanding similar shocks, it will again be the low skilled whose jobs as such might become automated first. Our findings therefore join the line of research seeking to point out the specific groups of workers who are losing the most out of the COVID-19 crisis (Causa, Cavalleri and Johansson, 2020^[15]). Overall, we highlight the importance of targeted support measures for the most vulnerable workers (OECD, 2020^[1]) in the short term, as well as the importance of a lifelong perspective on developing skills (OECD, 2019^[3]) in the long run.

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Annex A. List of Countries

Table A A.1. Countries included in the sample

First PIAAC cycle, by rounds

	Participating Countries
Round 1 (2011-12)	Australia, Austria, Belgium (Flanders), Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Ireland, Italy, Japan, Korea, Netherlands, Norway, Poland, Russian Federation, Slovak Republic, Spain, Sweden, United Kingdom (England and Northern Ireland), United States
Round 2 (2014-15)	Chile, Greece, Indonesia, Israel, Lithuania, New Zealand, Singapore, Slovenia, Turkey
Round 3 (2017)	Ecuador, Hungary, Kazakhstan, Mexico, Peru, United States

Note: For the United States, we use data from the 2017 round.

Annex B. Methodological details

We construct a variable called “telework” that takes the value 1 if the job is judged to be compatible with telework and 0 otherwise. This binary variable is based on the answers to questions related to the use of skills in the workplace in three domains: physical skills, job flexibility and use of ICT, as shown in Table A B.1.

We define a job as being compatible with teleworking if at least one of the answers within each domain indicates that the job is compatible with teleworking.

The column “main estimate” in Table A B.1 shows the answers that are needed in order for jobs to be classified as compatible with teleworking following the method outlined above. Adjacent columns, “lower bound” and “upper bound” show the answers that are needed in order for jobs to be classified as compatible with teleworking under more and less restrictive conditions, respectively.

Table A B.1. PIAAC questions used to derive the feasibility of teleworking

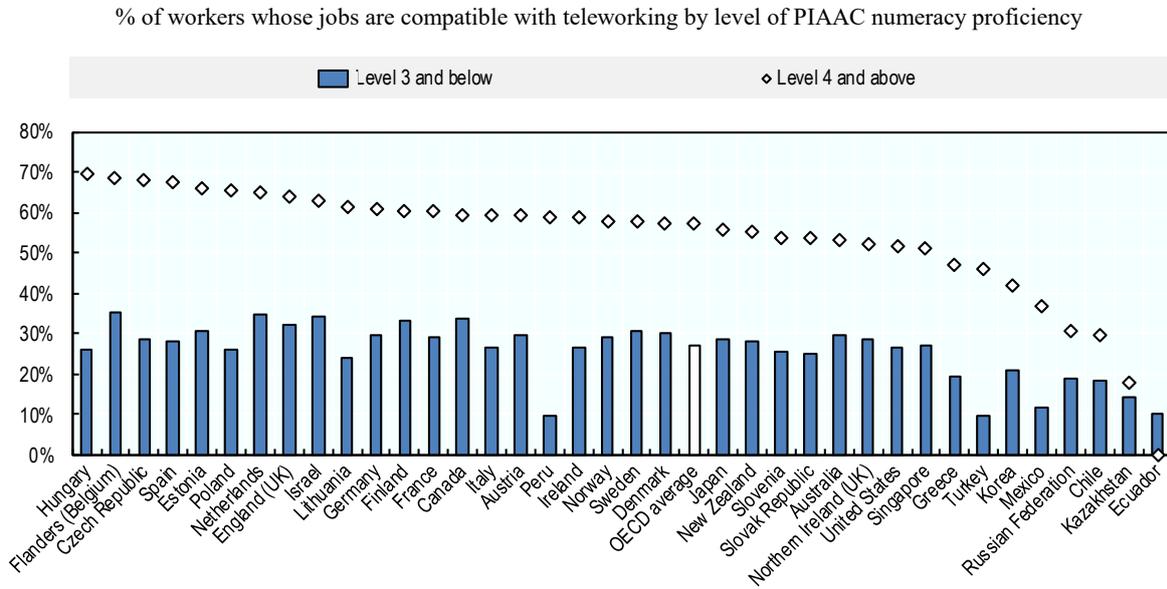
	Question in PIAAC	Domain	Compatible with teleworking if answer is:		
			Lower bound	Main estimate	Upper bound
1	How often does your job usually involve working physically for a long period?)	Physical Skills	Never	Never or less than once a month	Never or less than once a month
2	To what extent can you choose or change the sequence of your tasks?	Job Flexibility	To a very high extent	To a very high extent	To a high or to a very high extent
3	To what extent can you choose or change how you do your work?	Job Flexibility	To a very high extent	To a very high extent	To a high or to a very high extent
4	To what extent can you choose or change the speed or rate at which you work?	Job Flexibility	To a very high extent	To a very high extent	To a high or to a very high extent
5	To what extent can you choose or change your working hours	Job Flexibility	To a very high extent	To a very high extent	To a high or to a very high extent
6	How often does your job usually involve planning your own activities?	Job Flexibility	To a very high extent	To a very high extent	At least once a week or every day
7	How often does your job usually involve organising your own time?	Job Flexibility	To a very high extent	To a very high extent	At least once a week or every day
8	In your job, how often do you usually read letters, memos or e-mails?	Use of ICT	Every day	Every day	At least once a week or every day
9	In your job, how often do you usually write letters, memos or e-mails?	Use of ICT	Every day	Every day	At least once a week or every day
10	In your job do you usually use email?	Use of ICT	Every day	Every day	At least once a week or every day
11	In your job do you usually use spreadsheet software, for example Excel??	Use of ICT	Every day	Every day	At least once a week or every day
12	In your job do you usually use a word processor, for example Word	Use of ICT	Every day	Every day	At least once a week or every day

Note: * This includes cell-phones and other hand-held electronic devices that are used to connect to the internet, check e-mails, etc.

Source: OECD (2017^[14]) *OECD Skills Surveys: Survey of Adult Skills (PIAAC)* (database), <https://www.oecd.org/skills/piaac/> (accessed on 20 April 2020).

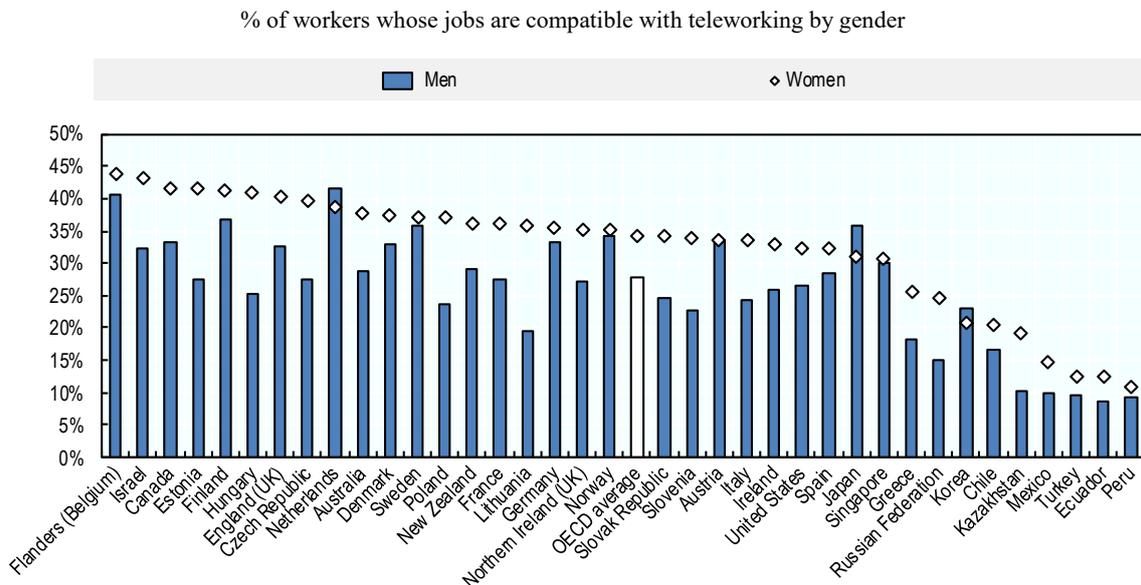
Annex C. Additional Results

Figure A C.1. Feasibility of teleworking by level of numeracy skills



Source: OECD (2017^[14]) *OECD Skills Surveys: Survey of Adult Skills (PIAAC)* (database), <https://www.oecd.org/skills/piaac/> (accessed on 20 April 2020).

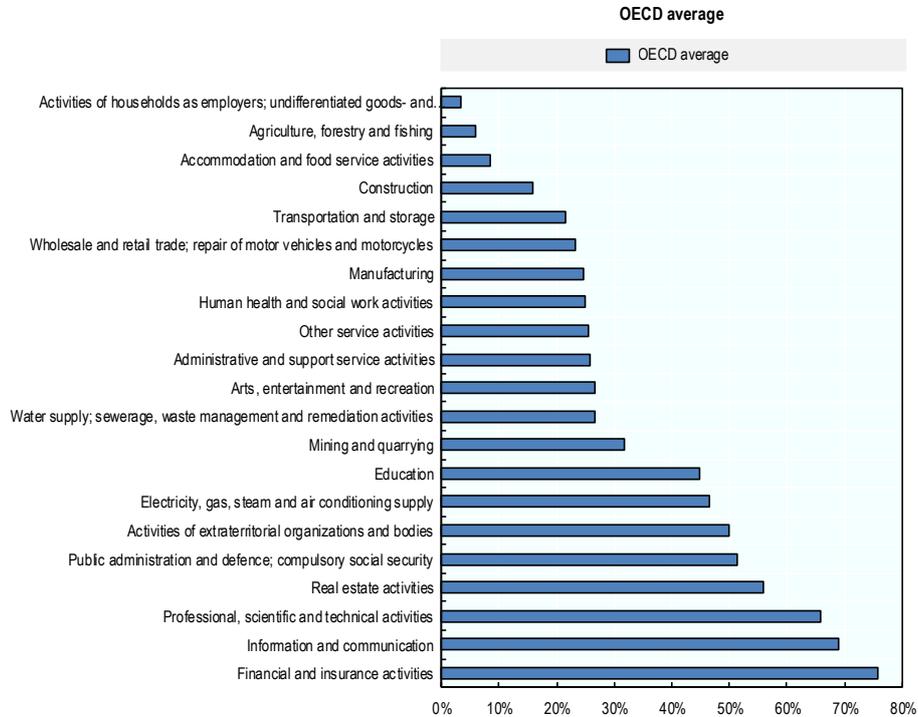
Figure A C.2. Feasibility of teleworking by gender



Source: OECD (2017^[14]) *OECD Skills Surveys: Survey of Adult Skills (PIAAC)* (database), <https://www.oecd.org/skills/piaac/> (accessed on 20 April 2020).

Figure A C.3. Feasibility of teleworking by industry (OECD average)

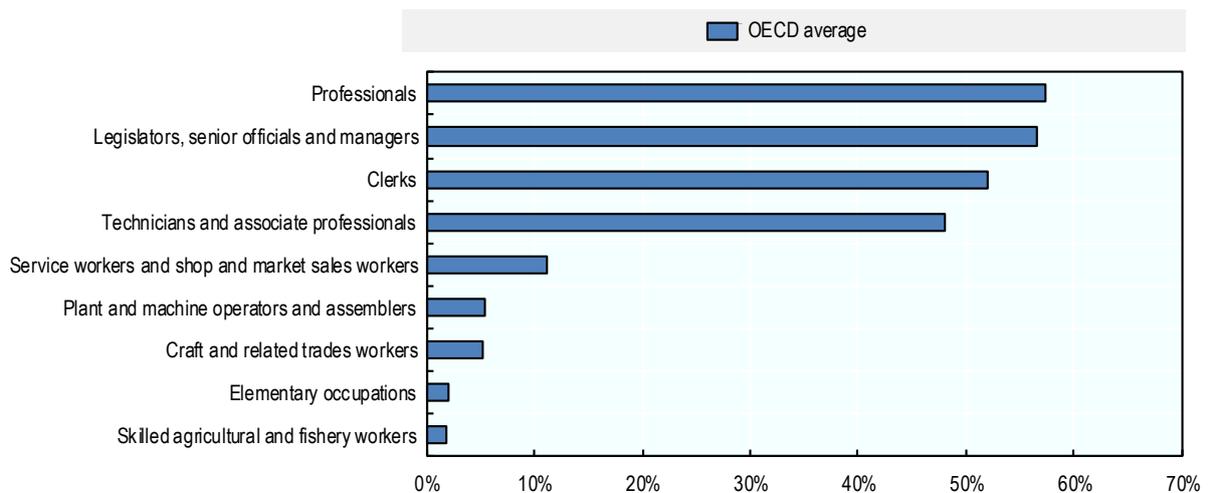
Industry classification of respondent's job at 1-digit level (International Standard Industrial Classification of All Economic Activities Revision 4, ISIC Rev 4)



Source: OECD (2017^[14]) *OECD Skills Surveys: Survey of Adult Skills (PIAAC)* (database), <https://www.oecd.org/skills/piaac/> (accessed on 20 April 2020).

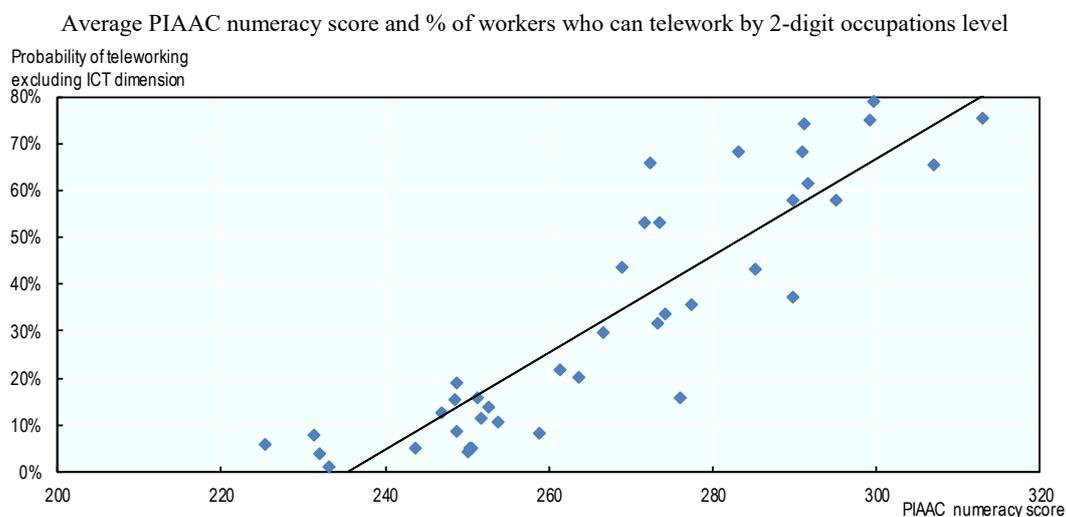
Figure A C.4. Average feasibility of teleworking by occupation (OECD average)

Occupational classification of respondent's job at 1-digit level (ISCO 2008)



Source: OECD (2017^[14]) *OECD Skills Surveys: Survey of Adult Skills (PIAAC)* (database), <https://www.oecd.org/skills/piaac/> (accessed on 20 April 2020).

**Figure A C.5. Correlation between skills and feasibility of teleworking
(excluding the use of ICT)**



Note: The telework variable is constructed using only the physical skills and job flexibility dimensions. The use of ICT dimension was omitted. Each point corresponds to the average values across OECD countries for each occupation at the 2-digit level (ISCO 2008)

Source: OECD (2017^[14]) *OECD Skills Surveys: Survey of Adult Skills (PIAAC)* (database), <https://www.oecd.org/skills/piaac/> (accessed on 20 April 2020).

Table A C.1. Probit regression results: Feasibility of teleworking

	Dependent variable: telework	
	Numeracy	Literacy
Level 1	0.149 (0.095)	0.042 (0.119)
Level 2	0.373*** (0.090)	0.250** (0.115)
Level 3	0.631*** (0.091)	0.533*** (0.116)
Level 4	0.888*** (0.097)	0.780*** (0.122)
Level 5	1.110*** (0.174)	0.916*** (0.240)
Age	0.008*** (0.001)	0.009*** (0.001)
Female	0.143*** (0.027)	0.096*** (0.027)
Self employed	-0.132*** (0.033)	-0.127*** (0.033)
Constant	-1.375*** (0.286)	-1.332*** (0.295)
Occupation dummies	YES	YES
Country dummies	YES	YES
N	130,947	130,947

Note: Standard errors in parentheses. Omitted skill category: Below Level 1.

*** p<0.01, ** p<0.05, * p<0.1

The dependent variable is the dummy variable telework. Control variables include PIAAC scores (categorical), age, gender, and a dummy variable for self-employment, occupation fixed-effects and country fixed-effects.

Source: OECD (2017^[14]) *OECD Skills Surveys: Survey of Adult Skills (PIAAC)* (database), <https://www.oecd.org/skills/piaac/> (accessed on 20 April 2020).

Annex D. PIAAC Proficiency Levels

Table A D.1. Proficiency levels: literacy and numeracy (1/2)

	Literacy	Numeracy
Below Level 1	The tasks at this level require the respondent to read brief texts on familiar topics to locate a single piece of specific information. There is seldom any competing information in the text and the requested information is identical in form to information in the question or directive. The respondent may be required to locate information in short continuous texts. However, in this case, the information can be located as if the text was non-continuous in format. Only basic vocabulary knowledge is required, and the reader is not required to understand the structure of sentences or paragraphs or make use of other text features. Tasks below Level 1 do not make use of any features specific to digital texts.)	Tasks at this level require the respondents to carry out simple processes such as counting, sorting, performing basic arithmetic operations with whole numbers or money, or recognising common spatial representations in concrete, familiar contexts where the mathematical content is explicit with little or no text or distractors
Level 1	Most of the tasks at this level require the respondent to read relatively short digital or print continuous, non-continuous, or mixed texts to locate a single piece of information that is identical to or synonymous with the information given in the question or directive. Some tasks, such as those involving non-continuous texts, may require the respondent to enter personal information onto a document. Little, if any, competing information is present. Some tasks may require simple cycling through more than one piece of information. Knowledge and skill in recognising basic vocabulary determining the meaning of sentences, and reading paragraphs of text is expected	Tasks at this level require the respondent to carry out basic mathematical processes in common, concrete contexts where the mathematical content is explicit with little text and minimal distractors. Tasks usually require one-step or simple processes involving counting; sorting; performing basic arithmetic operations; understanding simple percentages such as 50%; and locating and identifying elements of simple or common graphical or spatial representations.
Level 2	At this level, the medium of texts may be digital or printed, and texts may comprise continuous, non-continuous, or mixed types. Tasks at this level require respondents to make matches between the text and information, and may require paraphrasing or low-level inferences. Some competing pieces of information may be present. Some tasks require the respondent to • cycle through or integrate two or more pieces of information based on criteria; • compare and contrast or reason about information requested in the question; or • navigate within digital texts to access-and-identify information from various parts of a document.	Tasks at this level require the respondent to identify and act on mathematical information and ideas embedded in a range of common contexts where the mathematical content is fairly explicit or visual with relatively few distractors. Tasks tend to require the application of two or more steps or processes involving calculation with whole numbers and common decimals, percentages and fractions; simple measurement and spatial representation; estimation; and interpretation of relatively simple data and statistics in texts, tables and graphs.
Level 3	Texts at this level are often dense or lengthy, and include continuous, non-continuous, mixed, or multiple pages of text. Understanding text and rhetorical structures become more central to successfully completing tasks, especially navigating complex digital texts. Tasks require the respondent to identify, interpret, or evaluate one or more pieces of information, and often require varying levels of inference. Many tasks require the respondent to construct meaning across larger chunks of text or perform multi-step operations in order to identify and formulate responses. Often tasks also demand that the respondent disregard irrelevant or inappropriate content to answer accurately. Competing information is often present, but it is not more prominent than the correct information	Tasks at this level require the respondent to understand mathematical information that may be less explicit, embedded in contexts that are not always familiar and represented in more complex ways. Tasks require several steps and may involve the choice of problem-solving strategies and relevant processes. Tasks tend to require the application of number sense and spatial sense; recognising and working with mathematical relationships, patterns, and proportions expressed in verbal or numerical form; and interpretation and basic analysis of data and statistics in texts, tables and graphs.

Source: OECD (2013^[16]), *The Survey of Adult Skills: Reader's Companion*.
<http://dx.doi.org/10.1787/9789264204027-en>.

Table A D.2. Proficiency levels: literacy and numeracy (2/2)

	Literacy	Numeracy
Level 4	Tasks at this level often require respondents to perform multiple-step operations to integrate, interpret, or synthesise information from complex or lengthy continuous, non-continuous, mixed, or multiple type texts. Complex inferences and application of background knowledge may be needed to perform the task successfully. Many tasks require identifying and understanding one or more specific, non-central idea(s) in the text in order to interpret or evaluate subtle evidence claims or persuasive discourse relationships. Conditional information is frequently present in tasks at this level and must be taken into consideration by the respondent. Competing information is present and sometimes seemingly as prominent as correct information.	Tasks at this level require the respondent to understand a broad range of mathematical information that may be complex, abstract or embedded in unfamiliar contexts. These tasks involve undertaking multiple steps and choosing relevant problem-solving strategies and processes. Tasks tend to require analysis and more complex reasoning about quantities and data; statistics and chance; spatial relationships; and change, proportions and formulas. Tasks at this level may also require understanding arguments or communicating well-reasoned explanations for answers or choices.
Level 5	At this level, tasks may require the respondent to search for and integrate information across multiple, dense texts; construct syntheses of similar and contrasting ideas or points of view; or evaluate evidence based arguments. Application and evaluation of logical and conceptual models of ideas may be required to accomplish tasks. Evaluating reliability of evidentiary sources and selecting key information is frequently a requirement. Tasks often require respondents to be aware of subtle, rhetorical cues and to make high-level inferences or use specialised background knowledge.	Tasks at this level require the respondent to understand complex representations and abstract and formal mathematical and statistical ideas, possibly embedded in complex texts. Respondents may have to integrate multiple types of mathematical information where considerable translation or interpretation is required; draw inferences; develop or work with mathematical arguments or models; and justify, evaluate and critically reflect upon solutions or choices.

Source: OECD (2013^[16]), *The Survey of Adult Skills: Reader's Companion*.
<http://dx.doi.org/10.1787/9789264204027-en>.