TAUB CENTER
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The Ability to Work from Home Among Workers in Israel

Shavit Madhala and Benjamin Bental

Jerusalem, November 2020

Taub Center for Social Policy Studies in Israel

The Taub Center was established in 1982 under the leadership and vision of Herbert M. Singer, Henry Taub, and the American Jewish Joint Distribution Committee. The Center is funded by a permanent endowment created by the Henry and Marilyn Taub Foundation, the Herbert M. and Nell Singer Foundation, Jane and John Colman, the Kolker-Saxon-Hallock Family Foundation, the Milton A. and Roslyn Z. Wolf Family Foundation, and the American Jewish Joint Distribution Committee.

Translation: David Simmer
Editing and lay-out: Laura Schreiber

Center address: 15 Ha'ari Street, Jerusalem, Israel
Telephone: 02 5671818 Fax: 02 5671919
Email: info@taubcenter.org.il Website: www.taubcenter.org.il

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Abstract

This study seeks to examine which workers in Israel have characteristics that enable them to work from home and which do not. Based on the Programme for the International Assessment of Adult Competencies (PIAAC) survey carried out by the OECD in Israel in 2014 and 2015, we estimate the potential ability of workers in the Israeli labor market to work from home. The findings indicate that there are significant differences in the ability to work from home across different occupational groups, where workers in more prestigious occupations have a greater ability to work from home. In contrast, workers with a low ability to work from home tend to be the young (ages 16 to 25), those with less education, workers from the Arab Israeli sector, the self-employed, and those living in cities with low socioeconomic rankings and/or in the North.

The frequency of digital work is apparently the most relevant factor determining the ability to work from home. The findings indicate that workers in low-paying occupations use digital work to a lesser extent as well as workers ages 16 to 25 and women relative to men. The limited use of digital work is also characteristic of the Arab Israeli sector and even more so of the Haredi (ultra-Orthodox) sector. These findings emphasize the importance of assimilating the use of technology among these weaker groups and among populations that face barriers to integration into the labor market.

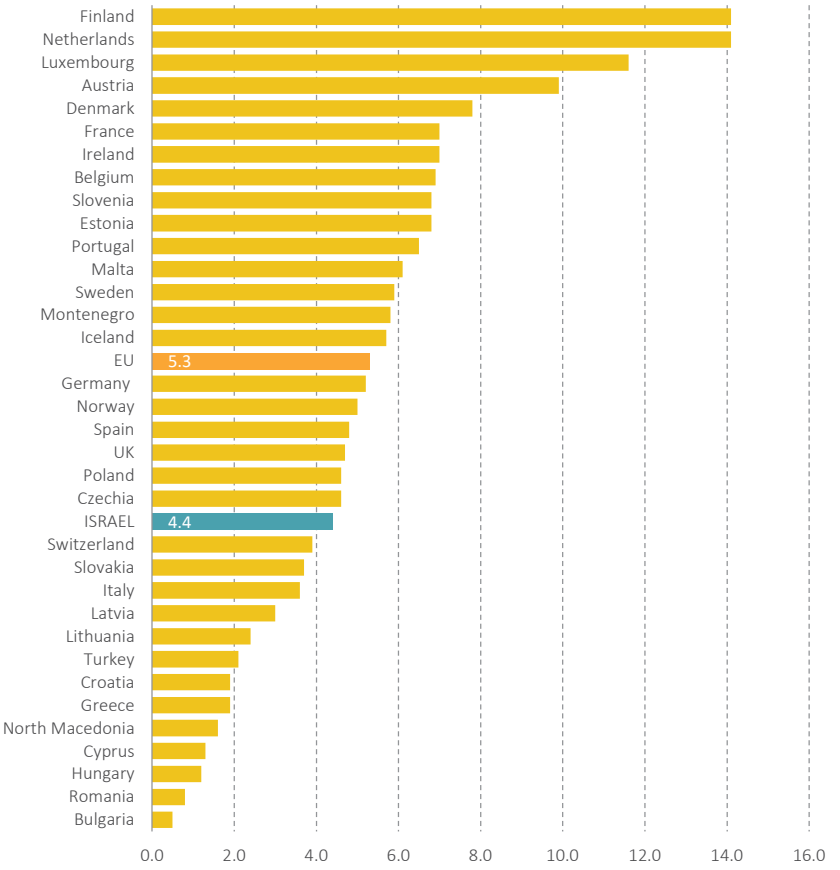
1 Shavit Madhala, Researcher, Taub Center for Social Policy Studies in Israel. Professor Benjamin Bental, Chair, Taub Center Economics Policy Program; Professor Emeritus, Department of Economics, University of Haifa. The authors wishes to thank Professor Avi Weiss, Professor Alex Weinreb, and Professor Gil Epstein for their enlightening comments.

Introduction

The spread of the coronavirus pandemic and the accompanying social distancing policy have had substantial effects on employment and its characteristics, both in Israel and worldwide. Many businesses have been forced to adopt employment models that enable working from home. This situation raises a number of questions regarding the ability of the economy to transition to such models. This study seeks to determine the identity of workers in the Israeli labor market whose employment characteristics are conducive to working from home and those with little chance of working from home.

The practice of working from home existed prior to the outbreak of the coronavirus epidemic, although its scope varied from country to country. Figure 1 presents the share of workers who, in general, worked from home in 2019. As can be seen, there are countries in which working from home is more common, such as the Netherlands and Finland, where the rate is about 14 percent of the workforce. In contrast, this practice is almost unknown in countries like Bulgaria and Romania where less than 1 percent of the workforce responded affirmatively to the question whether they generally work from home. In Israel, according to data from the Central Bureau of Statistics (CBS) Social Survey, in 2019, about 4.4 percent of workers responded that they work from home "most days of the week," which is less than the European average of about 5.3 percent.

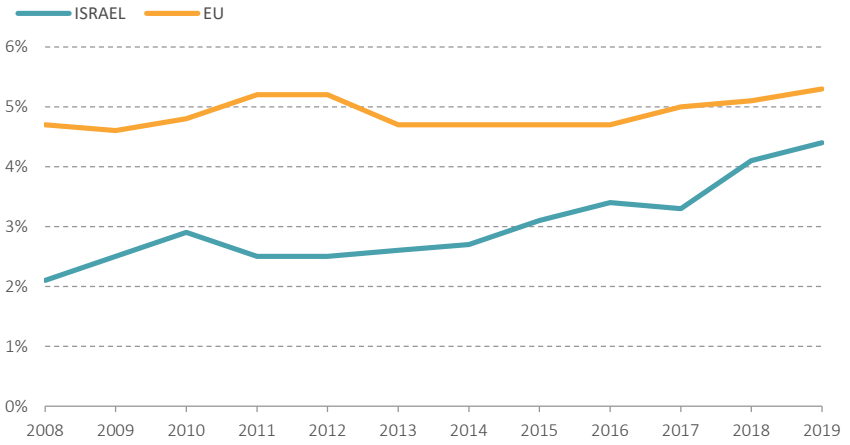
Figure 1. The share of workers who usually work from home, 2019



Source: Shavit Madhala and Benjamin Bental, Taub Center | Data: Eurostat; CBS Social Survey 2019

Even if the share of workers working from home during normal times was relatively low in Israel, there has been an upward trend during the last decade and with the share doubling from about 2 percent in 2008 to it 2019 level (Figure 2). A similar trend can be discerned in most of the EU, where in countries like the Netherlands and Finland, for example, the share of workers working from home rose to its 2019 level from about 10 percent and 9 percent, respectively in 2008. The share of workers working from home in the EU during the past decade has increased by about 13 percent on average.

Figure 2. The share of workers who generally work from home



Source: Shavit Madhala and Benjamin Bental, Taub Center | Data: Eurostat; CBS, Social Survey 2008–2019

These processes reflect the endogenous response of the labor market to gradual changes in information and communications technologies (ICT), which has expanded the possibilities of working from home. This expansion has had an effect on the supply of labor both at the intensive margins – an increase in work hours with workers' improved ability to adapt their work to their family needs – and, at the extensive margins – the entry into the labor market of those not previously working, since there is a reduced need to commute to the workplace. Nonetheless, the effect of this development on labor productivity is unclear. On the one hand, productivity may rise because working from home reduces the conflict between work demands and other uses of time. On the other hand, it is harder to monitor the activity of workers working from home and to prevent distractions. Accordingly, the effect of expanded possibilities of working from home on wages is also ambiguous. First, it is likely to increase the supply of suitable workers which allows employers to reduce the wage they offer. Second, if working from home is advantageous to workers, they are likely to settle for a lower wage. In contrast, if employers are interested in having workers working from home in order to reduce costs or in order to facilitate non-conventional work hours, then they may offer higher compensation to their workers.

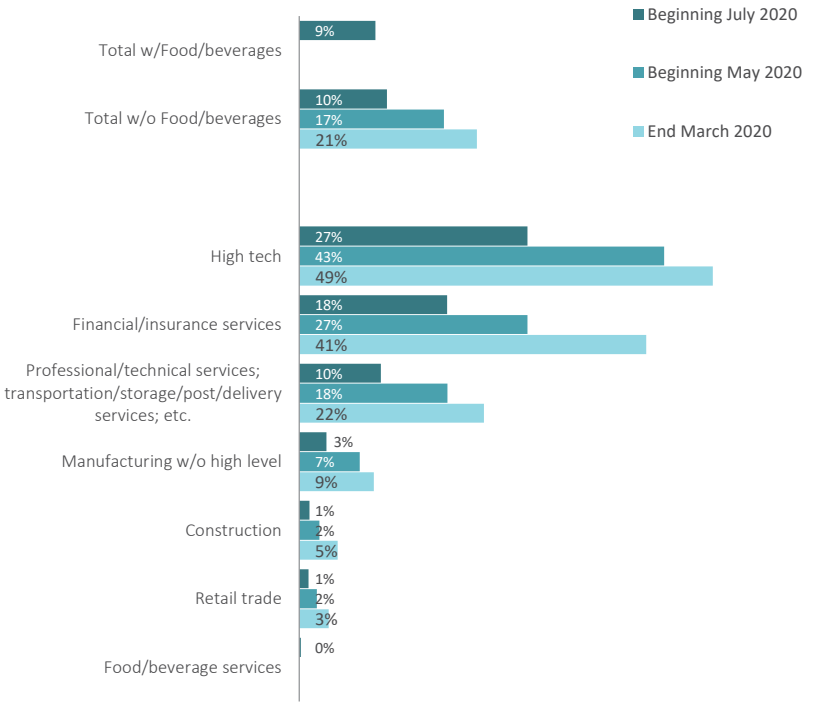
In a study published just prior to the outbreak of the coronavirus crisis, Arntz, Ben Vahmed and Belingieri (2019) examined these issues on the basis of the German Socioeconomic Survey (SOEP) which included, in a number of surveys starting from 1997, a question about the frequency of working from home (though it did not ask about number of hours worked at home). According to the results, up until the last survey in 2014, the share of men working from home in Germany rose from 5 percent to 9 percent while the share of women rose from 5 percent to 10 percent. Among women, the share of mothers with young children who work from home rose from 5 percent to 15 percent. Moreover, it was found that the birth of a first child has a large effect on the shift of women to working from home. With respect to wages, the study found that both male and female workers without young children chose to work from home primarily in order to increase their overtime hours without any change in their hourly wage. In the case of workers with young children, and women in particular, working from home was a way to increase both their contracted work hours as well as their hourly wage.

The coronavirus pandemic brought with it an exogenous shock to the labor market, particularly during the total lockdown where most workers were prevented from physically going into work. Even during relatively more relaxed periods, there is a fear of being exposed to the virus while commuting or at the workplace itself. As a result, there has been an acceleration in the shift toward working from home in many countries. The data for the US show that about 35 percent of the workforce are working from home (Bick, Blandin & Mertens, 2020) and in the Netherlands, about 50 percent of work hours are at home, as compared to about 12 percent prior to the pandemic (von Gaudecker, Holer, Janys, Siflinger & Zimpelmann, 2020). The data from a flash survey conducted by the CBS, which covered about a third of the economic activity in the Israeli economy showed that during the first lockdown (March 2020) about 21 percent of workers worked from home (Figure 3). In the high tech sector and financial services and insurance sector, a particularly high share of workers worked from home: 49 percent and 41 percent respectively, while in industries such as construction and retail commerce, very low rates of working from home have been seen.[1] With the loosening of restrictions, it appears that in

1 The survey data are for selected industries which make up about 30–34 percent of employees in the economy. The data are based on the response of employers to the following question: "How many of your workers are currently working from home?" The survey did not ask about the number of hours worked from home (CBS, 2020a).

many businesses there was a drop in the share of workers working from home. In May, the rate dropped in the industries surveyed to about 17 percent and at the start of July to only 9 percent (when including the food industry and about 10 percent without it). Despite the downward trend, it appears that the high tech industry has embraced the possibility of working from home and even after the end of the lockdown the rate of working from home in this industry remained relatively high, at about 27 percent. Furthermore, the survey data reveal that about 24 percent of businesses developed or enhanced their technological possibilities for working from home providing remote access to the companies' systems as part of the response to the crisis.

Figure 3. The share of workers working from home during the lockdown and following it in selected industries



Note: The food and beverage service industry did not participate in the first waves of the survey. The survey includes selected industries and businesses with five salaried employees or more.
Source: Shavit Madhala and Benjamin Bental, Taub Center | Data: CBS 2020a, Waves 1, 4, and 7

These trends naturally raise the question concerning the impact of the corona crisis on the increased share of workers working from home. Alipour, Fadinger and Schymik (2020) relate to this question in their study. Their starting point was a 2018 survey of workers carried out in Germany which also looked at the extent of working from home. According to this survey, prior to the coronavirus crisis, 9 percent of respondents frequently worked from home, 26 percent worked from home occasionally, and 56 percent reported that, in principle, they had the option of working from home. A survey of employers carried out in April 2020 in Germany showed that employers quickly adjusted by raising the share of employees working from home, both at the intensive margins (among those who were already working from home) and at the extensive margins. Moreover, employers who increased the share of their employees working from home participated less in the Kurzarbeit partial employment program, which supplements the wages of workers by the amount that their work hours have been reduced. The researchers also point to a health benefit to working at home: even prior to the imposition of the total lockdown in Germany there was a negative relationship between the share of workers working from home and the incidence of illness in the various districts of the country. These results highlight the economic and health benefits of working from home.

Estimating the potential of working from home

In view of all this, it is worthwhile estimating the ability of a given economy to make the shift to remote work. One of the pioneering studies on this issue is Dingel and Neiman (2020) which provides the basis for many subsequent studies. Their research is based on data gathered in the US on about 1,000 occupations using the Occupational Information Network (O*NET), an information source developed by the US Department of Labor to help jobseekers identify occupations that fit their abilities, and in particular young people in the process of choosing a profession. The occupations are characterized according to the required skills and knowledge, the personal traits required, experience and licensing, and a forecast of demand, including expected salary. The researchers used their best judgement to identify occupations which are unlikely to be performed from home. Belonging to this group are professions characterized for example by infrequent use of email, those involving frequent meetings with violent people, occupations that are physically demanding, or those using mechanical equipment. Based on this

classification, the researchers arrived at the conclusion that 37 percent of workers are in occupations that can be done from home, whereby the salaries of these workers account for 46 percent of the total wage bill in the US.

Bick et al. (2020) used the results of a survey carried out in May in the US among 2,000 workers who were asked about their commuting habits. The results indicate that 35.2 percent of respondents worked full-time from home in May, as opposed to only 8.2 percent in February. The increase was particularly large among the well-educated and high-earning white population. In contrast, most of the workers who had lost their jobs were members of minorities, had low skill levels, and were employed in industries where the work required physical contact with other people. However, it is worth mentioning that there is no major difference in the share of job loss between those who were working from home prior to the crisis and those who were not. What is unique about the coronavirus crisis is also manifested in the fact that in February there was no variation in the share of workers working from home across industries, while in May there was a high level of variation, which is also related to, among other things, the level of employment that has been maintained. In entertainment and leisure, accommodation and food, and retail there was a significant decline in total employment with only a few workers working from home, as compared to industries such as financial services and insurance, information services and professional and business services which lost far fewer jobs and experienced an increase in the share of workers working from home. Comparing their findings to Dingel and Neiman's, Bick et al. found that 71.7 percent of employees in those jobs that Dingel and Neiman identified as being potentially executable remotely were, in fact, working from home in May.

Dingel and Neiman's estimate is based on a-priori (without any empirical confirmation), though reasonable, categorizations of the characteristics of occupations that cannot be done from home. Nonetheless, the results of Bick et al. show that the intuition they used provides a reasonable prediction. However, Hatayama, Viollaz and Winkler (2020), in their critique of Dingel and Neiman's methodology, raise a number of concerns. First, they claim that the study relate only to the US and to the characteristics of occupations in the US labor market. Second, in addition to the differences between occupations across countries they claim that there is variation in the tasks assigned to workers in the same occupational category, even in the same country. Third, they claim that it is problematic to predetermine the list of characteristics that

prevent working from home, particularly in light of adjustments that have been made to tasks as a result of the lockdowns and the lack of information about those adjustments. In particular, Hatayama et al. claim that the more traits are defined as preventing working from home, the more occupations will be found to be inappropriate for working from home. As an alternative, they suggest focusing on workers rather than their occupations and on estimating the worker's ability to work from home rather than the share of workers who are able to work from home.

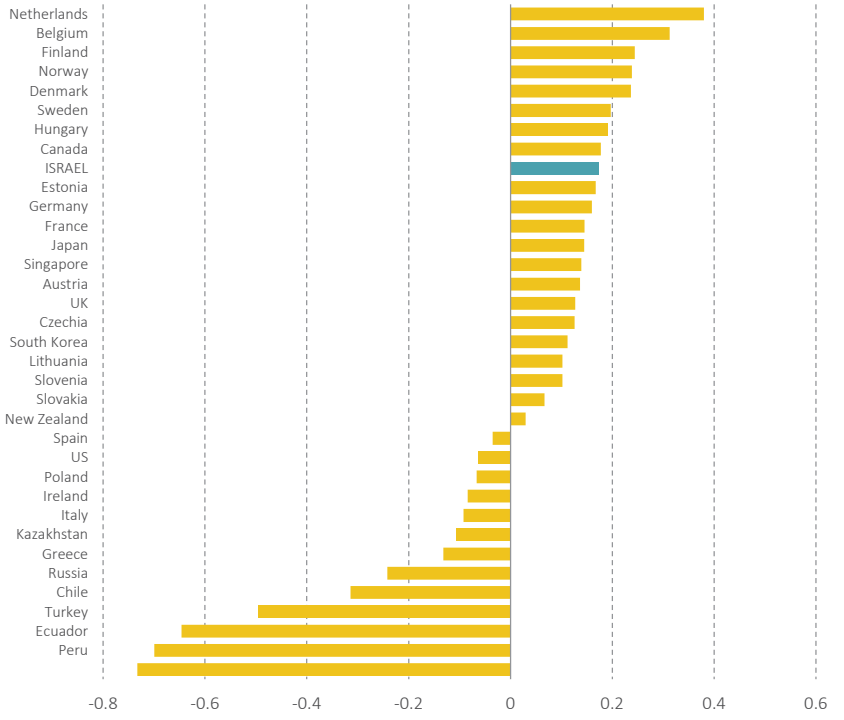
The estimation of the ability of a worker to work from home is carried out using the data gathered in the PIAAC survey. The survey data identify individual characteristics of each worker, such that workers with the same occupational classification can have different results according to their individual characteristics and those of their specific job. This kind of measurement makes it possible to take into consideration variation in required tasks, as well as gaps in use of technology between different individuals, even those belonging to the same occupational category.

Hatayama et al. focus on four groups of task characteristics in their survey, which apparently are related to the ability to work from home (see Appendix Table 1). The first group relates to the extent to which the tasks are physically demanding and require manual skills. It is assumed that the more the tasks require physical skills, the more difficult it will be to work from home. The second group is related to the requirement of face-to-face interactions. Here again, to the extent that the task requires such work, it will be more difficult for the worker to work from home. The third group relates to the use of digital technology at work while the fourth relates to the use of digital technology at home. It is assumed that a high index in the last two criteria raises the ability of the worker to carry out work tasks from home.

The researchers focused on an estimation of the relative ability of a worker in a specific job to work from home, where the measurement is relative to the average worker in the OECD, in terms of standard deviation units. This international comparison of the ability to work from home according to Hatayama et al.'s index is described in Figure 4. The graph indicates that, relative to other countries, the Israeli labor market is characterized by a somewhat higher than average ability to work from home, by 0.17 of a standard deviation relative to the average in the OECD countries.

Figure 4. The index of the ability to work from home in the OECD countries

According to Hatayama et al., in standard deviation units



Source: Hatayama et al., 2020

As stated above, in the current study we identify workers in the Israeli labor market who are employed in occupations whose characteristics allow them to work from home and those who are not able to do so. The goal is to highlight gaps in the relevant skills required to work from home and the barriers that widen them. A further goal is to create a basis of knowledge that can be used in the formulation of policy, particularly during this complicated period. To this end, we adopted Hatayama et al.'s approach and carried out an estimate of the potential ability of workers in the Israeli labor market to work from home, based on the PIAAC survey carried out in Israel between 2014 and 2015.

The ability to work from home in the Israeli labor market

As in the case of Hatayama et al., we use a list of relevant variables from the PIAAC survey, except for those variables representing the use of digital technology at home (Appendix Table 1).[2] However, unlike them, we chose the technique of factor analysis in order to categorize the underlying variables into identifiable factors. Intuitively, this technique divides variables into a number of categories, grouping variables which are highly correlated with one another while insuring low correlations with variables belonging to other groups. This method of analysis makes it possible to categorize the various variables into intuitive common hidden factors.

In our case, this method produced seven factors, three of which were found to be significant from a statistical standpoint. The meaning of these factors, interpreted according to the composition of the variables assigned to them, was found to be similar to the categories defined by Hatayama et al. (for further details about the composition of the variables assigned to the three factors, see Appendix Table 2). The first factor, which is composed primarily of variables describing physical and manual demands of the occupation, corresponds to the first group of tasks according to Hatayama et al. The second factor is composed primarily of variables such as teaching, sales and promotion which require social interaction (the face-to-face category in Hatayama et al.). The third factor is composed of variables related to the digital nature of the work, such as use of email and computer programs and participation in online conferences. This method confirms the intuitive division of variables determined by Hatayama et al., but at the same time fine-tunes it using statistical identification of the variables in each factor and of their respective weights, as opposed to the uniform weight given to variables by Hatayama et al.

After combining the three factors, we defined a summary index that represents the ability of each individual to work from home relative to the average worker (in standard deviation units).[3] Specifically, every individual receives a standardized score based on his employment characteristics as they appear in the PIAAC survey, and this score represents his relative ability to work from home. It should be mentioned that the study is based on data

2 Observations on the variables representing the use of digital technology at home were not available in full for a large share of the sample in Israel and therefore we did not use them in this study.

3 The index is created by adding up the three factors and normalizing the sum, such that the measurement is carried out in terms of standard deviations from the average.

gathered between 2014 and 2015; since then, there have been major changes in the use of digital technologies, which have accelerated during the last year due to the coronavirus pandemic. Nonetheless, the goal of the research is to identify the existing gaps and barriers among populations in Israel with the assumption that if they are found in the data, they will still be relevant today.

The results by occupation and industry

Figure 5, which shows the aforementioned index across occupational groups, indicates that in prestigious occupations, which are characterized by a high hourly wage, there is, on average, a greater potential for working from home. An exception is the group of managers, who are characterized by the highest average hourly wage but a low ability to work from home (standard deviation of about 0.18 from the average worker) relative to other prestigious occupations, namely academics and technicians (standard deviation of 0.47 and 0.40, respectively). In contrast, clerical occupations are characterized by a relatively low hourly wage but a high ability to work from home (standard deviation of about 0.46 from the average worker).

Figure 5. The index of ability to work from home by occupational group relative to the average worker

In standard deviation units

Note: Occupations are shown in descending order according to hourly wage.
Source: Shavit Madhala and Benjamin Bental, Taub Center| Data: PIAAC, 2015

Table 1 presents the results of the study at a higher level of detail. The table presents the occupations with the highest ability to work from home and those with the lowest.[4] At the top of the table are software developers and application analysts — occupations with a male majority — which had about 120,000 employees in 2018. Following that are clerical occupations, financial occupations, and writers, reporters, and linguists. In contrast, the occupations with the lowest ability to work from home include waiters and bartenders, workers in the food industry, the fitness industry, construction, and, as expected, salespeople in stores, a category which had 135,000 employees in 2018.

Table 1. Occupation according to the ability to work from home

Occupations with the *highest ability* to work from home			
	No. of employees in 2018 (1,000s)	Share of men in the field	Share of women
Computer programmers/app analysts	119.2	70%	30%
Data, database and network workers	9.8	17%	83%
Data input (numeric) workers	22.8	15%	85%
Finance professionals	50.3	58%	42%
Finance associated work/mathematicians	81.0	19%	81%
Writers/journalists/linguists	18.0	48%	52%
Occupations with the *least ability* to work from home			
	No. of employees in 2018 (1,000s)	Share of men in the field	Share of women
Waiters/Bartenders	56.2	49%	51%
Workers in food preparation	44.6	65%	35%
Cooks	23.1	68%	32%
Sports and fitness workers	21.0	44%	56%
Finishers in construction/similar work	38.8	100%	---
Salespeople	135.2	43%	57%

Note: Occupations at the level of secondary group (3 digits) with at least 5,000 employees in 2018.
Source: Shavit Madhala and Benjamin Bental, Taub Center | Data: PIAAC, 2015; CBS, 2020a

4 The full list of occupations with a ranking of ability to work from home is available from the researchers and can be requested by contacting the Taub Center.

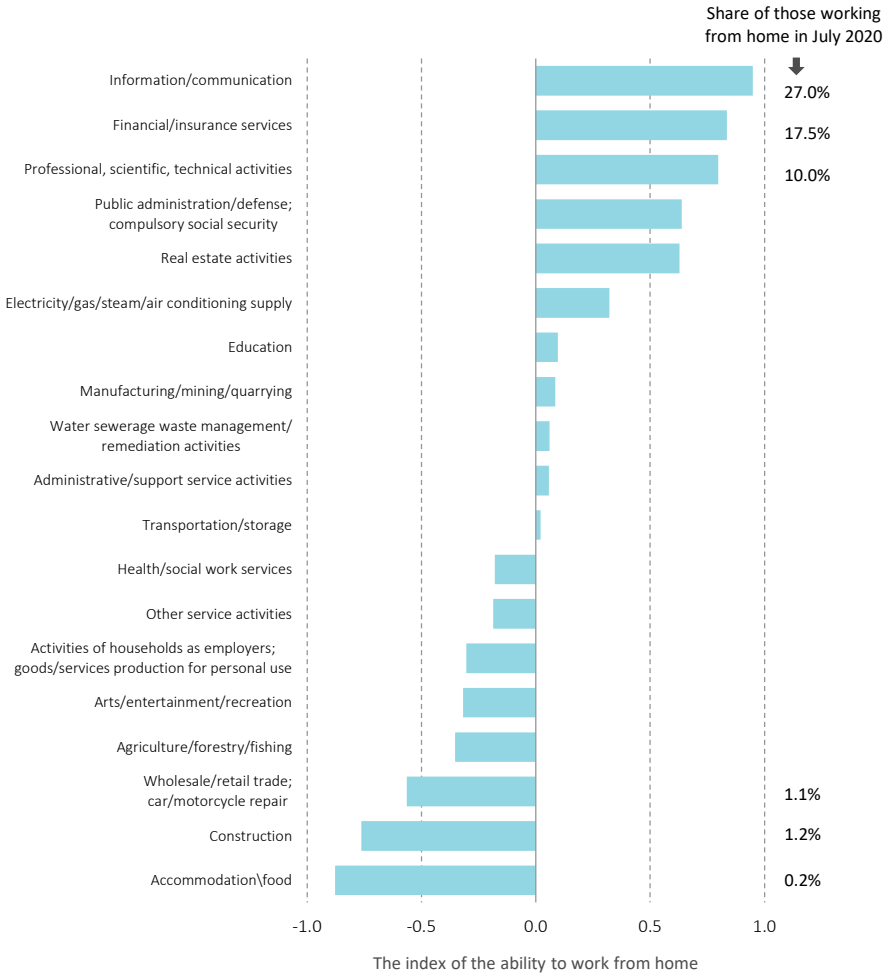
Figure 6 shows a comparison of the average index by industry. The figure shows that in information and communication, financial services and insurance, and professional, scientific and technical services there is the highest potential for working from home. The data of the CBS Survey of Businesses During the Coronavirus confirms this hypothesis: with respect to the number of workers who are able to work from home, in these three industries there is a relatively high share of workers that meet this criterion according to the survey data: 27 percent, 18 percent, and 10 percent, respectively.[5] In contrast, in wholesale and retail commerce, construction, and accommodation and food services, the potential ability to work from home as predicted by the model is particularly low. Here again, the CBS survey confirms this result and presents rates of about 1 percent for wholesale commerce and construction and a negligible rate for accommodation and food services.[6]

5 According to the results of the Survey of Businesses During the Coronavirus (Wave 7) carried out by the CBS in July 2020. See CBS (2020a).

6 ibid.

Figure 6. The index of ability to work from home by industry relative to the average worker

In standard deviation units



Source: Shavit Madhala and Benjamin Bental, Taub Center | Data: PIAAC, 2015; CBS, 2020a

The results by population group

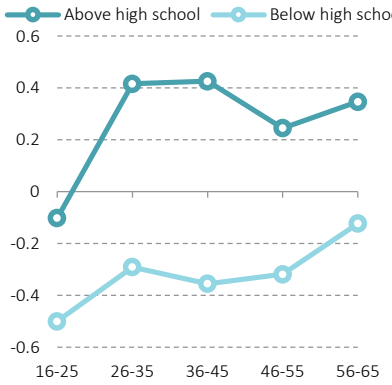
Having noted the differences in the ability to work from home by occupational group and industry, we now look at worker characteristics by population group. The main goal is to identify those groups characterized by a lower ability to work from home. In this context, it is worth noting that the results for the index of ability to work from home do not reflect only the differences in worker characteristics but other factors as well, and in particular, the initial choice of employment that allows working from home (see below).

Figure 7 looks at the ability to work from home among various population groups. The non-Haredi (non-ultra-Orthodox) Jewish population has the greatest ability to work from home, followed first by the Haredi population and then by the Arab Israeli population, which lags far behind the others. At least in part, this gap is likely the result of the fact that the distribution of occupations in the Arab Israeli population group clearly tends toward production and construction, which are physically demanding and rely on manual skills, with little ability to work from home. The findings also indicate that among the Jewish population in Israel there is a jump in ability to work from home after the age of 25, as is the case in the OECD countries; however, among workers in the Arab population, there is no such jump. A look at the ability to work from home by socioeconomic status, as measured by worker's education and hourly wage decile, shows that the higher a worker's socioeconomic status, the higher will be his ability to work from home. Another characteristic that was found in the literature to be linked to working from home (Alipour et al., 2020) is having young children, particularly in the case of mothers. The average of the index reflects the fact that in comparison to other men and women, mothers with children under the age of 6 have a greater ability to work from home. In general, it appears that women — with or without children — are employed in jobs with characteristics that are related to a higher ability to work from home, relative to men.

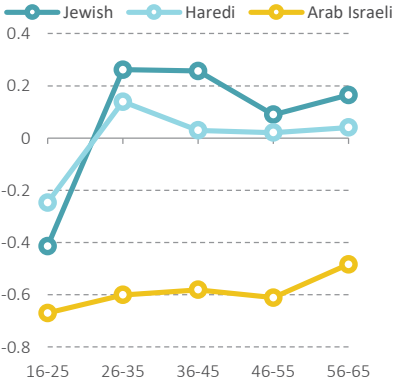
Figure 7. The index of the ability to work from home by sociodemographic variables relative to the average worker

In standard deviation units

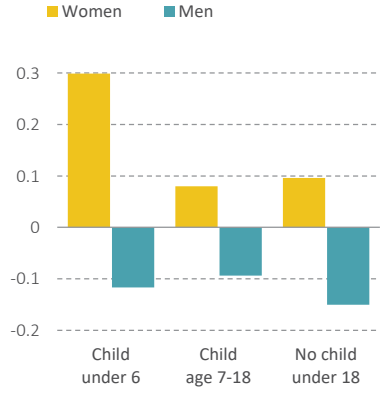
By education level and age group



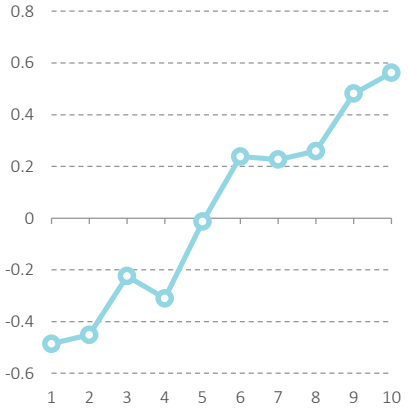
By population sector and age group



By gender and age of youngest child in the family



By wage per hour decile



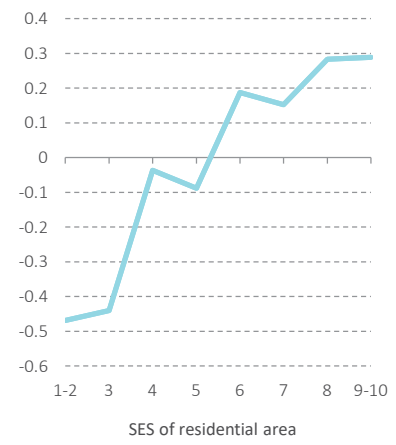
Source: Shavit Madhala and Benjamin Bental, Taub Center | Data: PIAAC, 2015

A look at the average index also shows that the ability to work from home rises with the socioeconomic ranking of the worker's residential locale (Figure 8a). Thus, for example, the ability to work from home for a worker living in a residential area with a socioeconomic ranking of 1–2 (the lowest) is lower by about 0.5 standard deviations relative to the average worker. In contrast, the ability to work from home for a worker living in a city with a ranking of 9–10 (the highest) is higher by about 0.3 standard deviations relative to the average worker. By breaking down the index into components (Figure 8b), it appears that in residential areas with a low socioeconomic ranking, the jobs are more physically demanding and use more manual skills, which make it more difficult to work from home, and as the socioeconomic ranking of the city rises, the use of physical and manual skills diminishes. In contrast, to the extent that a worker resides in an area with a higher socioeconomic ranking, there appears to be an increase in the use of social interaction skills and an even steeper rise in digital work, where the latter makes it easier to work from home.

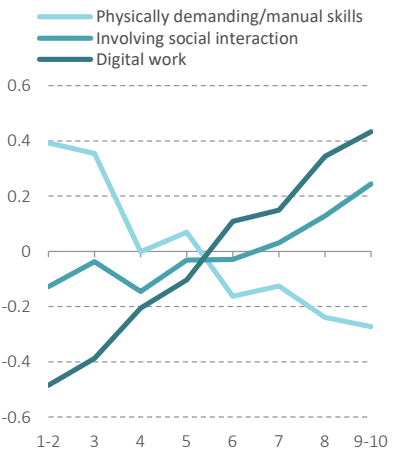
Figure 8. The index of the ability to work from home and its components by socioeconomic ranking of residential area relative to the average worker

In standard deviation units

a. Socioeconomic ranking of residential area



b. Index components



Source: Shavit Madhala and Benjamin Bental, Taub Center | Data: PIAAC, 2015

Multivariate analysis

In order to identify more precisely the characteristics of workers with low ability to work from home, we ran a linear regression to test for the effect of sociodemographic characteristics on the index of ability to work from home. The characteristics that were examined included gender, a woman with a child under the age of 6, age group, sector (non-Haredi Jews, Arab Israelis, and Haredim), residential area, education, commuting, type of employment (self-employed vs salaried employee), public vs private sector, occupational group, and industry. The results of this analysis are presented in Appendix Table 3.

The analysis shows that, in general, women have a greater ability to work from home, as do women with children under the age of 6. Arab Israelis were found to have less ability to work from home relative to non-Haredi Jews, and for Haredim, the differences were not statistically significant. With respect to age group, statistically significant differences were found only between workers in the 16–25 age group and those in the 56–65 age group, where the latter had a higher potential for working from home. The test for residential area found that workers living in the Center had a greater ability to work from home than those living in the North.

With respect to education, it appears that the ability to work from home increases with the level of a worker's education. Another finding shows that workers who work outside their residential area have a greater ability to work from home than those working close to home. This finding may provide evidence of a potential saving in traffic congestion and pollution as working from home becomes more widespread. Salaried workers were found to have a higher ability to work from home than the self-employed. As found in other studies (Adams-Prassl, Boneva, Golin & Rauh, 2020), the current research found that academics and technicians had a greater ability to work from home and that the difference is statistically significant. In contrast, workers in sales and services, skilled workers in manufacturing, construction, and agriculture, and workers in elementary occupations were found to have a low ability to work from home, with the latter group having the lowest ability among them. As for the industries, workers in the information and communication industry have the highest ability to work from home while those in accommodation and food services, arts, entertainment and leisure, wholesale and retail commerce, and health and welfare services have the lowest.

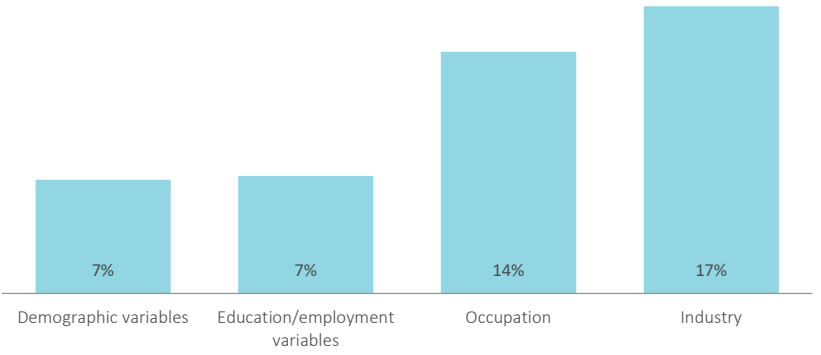
As noted, it is likely that the findings at least partially reflect workers' choices. In particular, it may be that the model's result that women (and in particular women with young children) have a greater ability to work from home is a result of their choice of employment which allows them to work from home. A similar assumption can be made with regard to the positive association between ability to work from home and commuting distance. In other words, for a worker with the ability to work from home, it is easier to choose a residential location that is farther away from his place of work.

In view of these findings, the question arises as to how much the variables contribute to explaining the variation in the ability to work from home. The model that includes all of the aforementioned variables explains 44 percent of the variation in the ability to work from home (see Appendix Table 3 for the R^2, the coefficient of determination). In order to measure the contribution, we divided the variables into four groups: demographic variables — gender, a woman with a child under 6, age group, sector and area of residence; education and employment variables — education, commuting, type of employment, and public sector vs private sector; occupation; and industry.

Using these groups, we employed a statistical procedure allowing quantification of the contribution of the variables to explaining the ability to work from home.[7] Figure 9 shows that the demographic variables and education and employment variables explain about 7 percentage points each while occupation and industry contribute 14 and 17 percentage points, respectively. In other words, occupation and industry have the largest weight in determining the ability of a worker to work from home and together they contribute about 70 percent of the explanatory power (R^2 with a value of 44 percent). The other components have a weight of about 30 percent in the explained variance of the ability to work from home.

7 The procedure for evaluating the contribution of the variables to explaining the variation was carried out using the Shapley decomposition.

Figure 9. The explanatory contribution of groups of variables to the ability to work from home



Source: Shavit Madhala and Benjamin Bental, Taub Center | Data: PIAAC, 2015

Decomposition of the index into its components

In order to identify the barriers to working from home and the source of the gaps among the groups, we estimated separate regressions for the three factors that comprise the index of ability to work from home: jobs that are physically demanding or use manual skills, those requiring social interaction, and jobs using digital technology. The results are presented in Appendix Table 4. They show that women have jobs requiring less physical and manual skills and carry out fewer tasks that require social interaction relative to men. However, they also make less use of digital technology in their work. Workers aged 26 to 45 use digital skills in their work more frequently than workers aged 16 to 25, and workers aged 56 to 65 carry out fewer tasks that are physically demanding or that require social interaction. It is interesting to note that relative to the non-Haredi Jewish sector, gaps in digital work exist also among workers in the Arab Israeli sector and among Haredim, although they are more pronounced among the Haredim. In contrast, jobs that are physically demanding and that require manual skills are more prevalent among the Arab Israeli population and less so among Haredim, with the differences being statistically significant. Education is positively correlated with digital work and negatively correlated with jobs requiring physical and manual skills while social interaction is required in particular from workers with a high level of education.

With respect to residential area, workers who work outside their residential area make greater use of digital work. It also appears that in the North and the South, there is more work requiring physical and manual skills relative to the Center. Additionally, social interaction at work is more common in the North than in the Center while in the Jerusalem region it is less so. Another interesting finding is that relative to the self-employed, salaried workers are characterized less by tasks that require social interaction or the use of physical and manual skills, but they also use digital skills to a lesser extent.

With respect to occupation, managers rely most heavily on digital work and that is also the case with respect to tasks that require social interaction. With respect to the use of physical and manual skills, it appears to be more common, relative to managers, among workers in service and sales, skilled workers in manufacturing and construction, and, in particular, among elementary occupations workers.

SPOTLIGHT

Estimating the share of workers who are able to work from home

Since the onset of the coronavirus crisis, the CBS has been carrying out surveys to look at businesses in the economy during the pandemic. As part of this survey, which is carried out in the main industries of the economy, employers are asked about the share of their workers who are working from home. For the purposes of the current research, we used the data on working from home that appear in the survey for the month of July (CBS, 2020a; Wave 7), when there was no lockdown. According to the distribution of employees by industry, we examined the index of ability to work from home that corresponds to the share of workers working from home according to the survey (see Table 2, Column 2).[8] Based on these scores and the weights of the industries, we calculated the average threshold score for the ability to work from home (1.49). Given this average, we examined the share of workers whose score is higher in each industry and weighted the result by the relative share of workers in that industry (Table 2, Column 3). We obtained the result that about 6 percent of workers are able to work from home in Israel.

This share reflects an averaging between the industries in which the ability to work from home is negligible, such as, accommodation and food services, and health and welfare services, and industries in which it is high, such as, information

8 In other words, we found the critical standardized score for which the share of those with a score exceeding that critical value is equal to the share of workers working from home according to the CBS survey.

and communication and financial services, in which the share of workers who can work from home is about 19 percent and 23 percent, respectively. These industries, and in particular information and communication, are particularly dominant with respect to both prestige and the possibility of working from home, although their weight in total employment is relatively low – only about 6 percent in information and communication and about 3 percent in financial services. Another industry which includes many of the workers in the public sector (public administration and defense and compulsory social security) accounts for about 10 percent of the workers in the economy, and is characterized by a substantial share of workers who can work from home (about 14 percent). In contrast, it is clear that wholesale commerce, education, health, and welfare services, which represent about one-third of the workers in the economy, are characterized by a very low share of workers who can work from home.[9]

The cumulative distribution function of the standardized scores in information and communication and financial services, in which there is a particularly high ability to work from home, and health and welfare services, in which there is a particularly low ability to work from home, captures the variation between the industries (Figure 10). Indeed the figure shows that the former two industries are very similar to one another and the share of workers in them who can work from home is higher throughout the distribution than in health and welfare services. In particular, it can be seen that at the average threshold standardized score (1.49), the cumulative distribution in information and communication and financial services is about 80 percent,

9 Recall that according to Figure 1, 4.4 percent of employees in Israel already worked from home in 2019. According to the findings of the Survey of Businesses in July (CBS, 2020a; wave 7), the figure stood at 9 percent, but as mentioned it covered only 30 percent of total employees and included industries in which the share of workers working from home is particularly high.

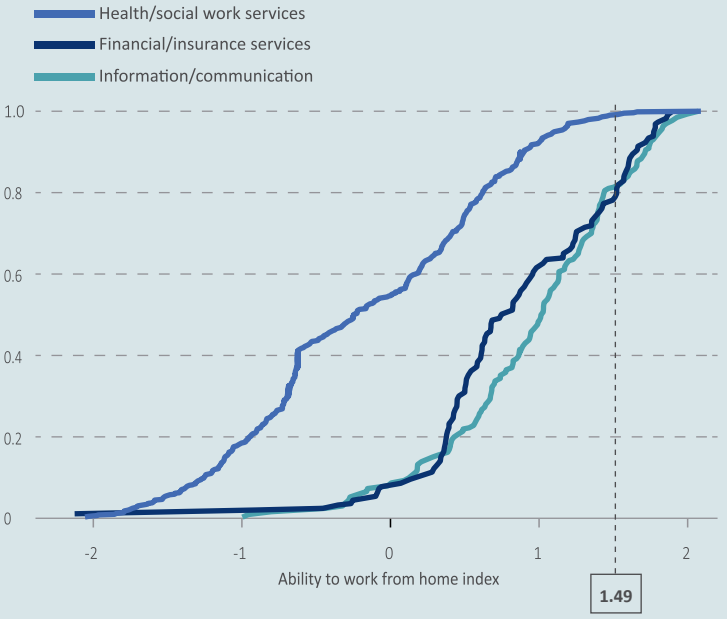
which means that the remaining approximately 20 percent of the workers are above this threshold and are defined as having the ability to work from home. In contrast, in health and welfare services only about 1 percent are above the threshold score at this point and are defined as being able to work from home.

Table 2. The share of workers who can work from home by industry

Industry	Share working from home (July)	Index score in intercept points	Share who can work from home	Employment share of industry (2019)
Agriculture, forestry, fishing			0%	1%
Manufacturing	3%	1.57	4%	10%
Electricity, gas, steam, air conditioning supply			8%	0%
Water, sewage, waste management			0%	0%
Construction	1%	1.40	1%	5%
Wholesale/retail trade, car/ motorcycle repair	1%	1.71	2%	11%
Accommodation/food services	0%	0.97	0%	4%
Information/communication	27%	1.39	19%	6%
Financial/insurance services	18%	1.57	23%	3%
Real estate activities			9%	1%
Professional, scientific, technical activities	10%	1.50	10%	12%
Administrative/support service activities			4%	4%
Public administration/defense, compulsory social security			14%	10%
Education			4%	12%
Health/social work services			1%	11%
Arts/entertainment/ recreation			2%	2%
Other services			3%	3%
Household employment			0%	1%
Total		**1.49**	**6%**	**100%**

Source Shavit Madhala and Benjamin Bental, Taub Center | Data: PIAAC, 2015; CBS 2020a, Wave 7

Figure 10. Cumulative distribution of scores for the ability to work from home by selected industries



Source: Shavit Madhala and Benjamin Bental, Taub Center | Data: PIAAC, 2015

One reservation concerning the estimates is based on two main limitations. First, as noted above, the PIAAC survey, which is the basis for the examination of all the industries of the economy, was carried out between 2014 and 2015 and reflects the situation of digital work five years ago. It is reasonable to assume that more up-to-date data of this type would produce results with a higher share of workers who are able to work from home. Second, as also noted previously, the ability to work from home is likely to be a consideration in choosing an occupation. This will result in selection bias and will affect the distribution of standardized scores in each industry.

Summary and conclusions

Advancements in digital work increased the possibilities for working remotely even before the outbreak of the coronavirus pandemic; however, with the spread of the pandemic, many businesses were forced to adopt this employment arrangement and to allow their workers to work from home. Apart from its economic importance and health considerations, the expanded opportunities to work from home have many advantages also in normal periods. These benefits are expected to have an impact on the economy and the labor market, both socially and economically, and include, among other things, a reduction in traffic congestion and pollution emissions, the narrowing of gender gaps, the expansion of employment opportunities in the periphery, the improvement of workers' welfare, an increase in labor productivity, and even a saving in the costs of employment for employers. The spread of the coronavirus, together with the many advantages of working from home naturally raise the question of whether to expand the use of this employment model. This study has examined the relative ability to work from home in the Israeli labor market and the findings can serve as a basis for policy to increase remote work and to reduce gaps in this ability between population groups.

The findings of the research reveal statistically significant differences in the ability to work from home among various occupational groups, where workers in more prestigious occupations have a greater ability to work from home. It appears that working from home is a bonus enjoyed primarily by workers with a high socioeconomic status, which provides them with a significant advantage in normal times and even more so during the current coronavirus crisis. The results of the analysis show that workers with a lower ability to work from home are the 16 to 25 age group relative to the 56 to 65 age group, those with a low level of education, those in the Arab Israeli sector, the self-employed, and those living in areas with a low socioeconomic ranking and/or in the North.

Measuring the contribution of various variables to explaining the variation in ability to work from home shows that the occupation and industry in which a worker is employed have a significant weight in determining the ability to work from home. It was found that together they are responsible for about 70 percent of the explained variation.

An examination of the three factors that determine the ability to work from home — high use of physical and manual skills, high levels of social interaction, and high amounts of digital work — makes it possible to identify accurately the source of the gaps between workers in the labor market. It appears that the

latter factor, namely the frequency of use of digital skills, is the most important one with respect to the ability to work from home. Moreover, the data indicate that workers employed in relatively low-earning occupations are also those who rely less on digital skills in their work. Two additional groups of workers who use digital work to a lesser extent are 16 to 25-year-olds relative to 26 to 46-year-olds and women relative to men. The gaps characterizing the younger age group are less of a concern since the workers in this group tend to be employed in temporary non-digital jobs. In contrast, the lower share of digital work by women is liable to exacerbate gender gaps in the labor market. A particularly notable finding is the lesser use of digital work in the Arab Israeli sector and the very low use among Haredi workers. In these groups, the technological gaps constituted a barrier to opportunities in the labor market even before the crisis. Currently, when there is a need to expand the ability to work from home and in light of our findings, the importance of encouraging the use of technology among weaker populations and among populations facing barriers to employment is even greater.

The examination we carried out to estimate the share of workers with a potential ability to work from home in various industries shows that about 6 percent of employees overall are able to work from home, with significant variation across industries. Due to reasons explained previously (see the Spotlight), it may be that this is an underestimate and that the share of workers able to work from home is larger.

In summary, the acceleration of the trend to work from home appears to be more important than ever at this point in time and the limited ability of weaker populations to work from home raises a real concern that gaps in the labor market, which existed even before the onset of the pandemic, will widen. During this period of uncertainty, and particularly in view of the restrictions on employment imposed on workers as part of lockdowns, weaker populations are more vulnerable than ever before.

The findings of this research can assist in the formulation of a differential policy to encourage the acquisition of skills enabling more individuals to work from home among various population groups and in assembling designated assistance packages that focus on the unique characteristics of each group. Apart from that, the government can adopt a number of policy measures that will help to expand the opportunities for working from home, including upgrading of internet infrastructure in economically depressed regions, the adoption of a model that facilitates working from home among public sector

workers, and the encouragement of businesses to adopt a model of working from home by means of economic incentives and grants for the assimilation of the relevant technology. This is an investment opportunity that will benefit the economy not only during the crisis but for many years after it has passed.

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Appendix

Appendix Table 1. Details of variables that comprise the index by Hatayama et al.

Task Index	Variables	Type of variable
Physical & Manual index	How often does your job usually involve working physically for a long period?	Frequency
	How often does your job usually involve using skill or accurancy with your hands or fingers?	Frequency
Face-to-face index	How often does your job usually involve sharing work-related information with co-workers?	Frequency
	How often does your job usually involve instructing, training or teaching people, individually or in groups?	Frequency
	How often does your job usually involve making speeches or giving presentations in front of five or more people?	Frequency
	How often does your job usually involve selling a product or selling a service?	Frequency
	How often does your job usually involve advising people?	Frequency
	How often does your job usually involve persuading or influencing people?	Frequency
	How often does your job usually involve negotiating with people either inside or outside your firm or organisation?	Frequency
Low ICT at work index	Do you use a computer in your job? This includes cell-phones and other hand-held electronic devised that are used to connect to the internet, check emails, etc.	Yes/No
	In your job, how often do you usually use email?	Frequency
	In your job, how often do you usually use the internet in order to better understand issues related to your work?	Frequency
	In your job, how often do you usually conduct transactions on the internet, for example buying or selling products or services, or banking?	Frequency
	In your job, how often do you usually use spreadsheet software, for example Excel?	Frequency
	In your job, how often do you usually use a word processor, for example Word?	Frequency
	In your job, how often do you usually use a programming language to program or write computer code?	Frequency
	In your job, how often do you usually participate in real-time discussions on the internet, for example online conferences, or chat groups?	Frequency

Appendix Table 1 (continued). Details of variables for the index by Hatayama et al.

Task Index	Variables	Type of variable
Low ICT at home index	In every day life, how often do you usually use email?	Frequency (all of them)
	In every day life, how often do you usually use the internet in order to better understand issues related to, for example your health or illnesses, financial matters, or environmental issues?	
	In every day life, how often do you usually conduct transactions on the inernet, for example buying or selling products or services, or banking?	
	In every day life, how often do you participate in real-time discussions on the internet, for example online conferences or chat groups?	
	In every day life, how often do you use spreadsheet software, for example Excel?	
	In every day life, how often do you use a word processor, for example Word?	
	In every day life, how often do you use a programming language to program or write computer code?	

Source: Hatayama et al., 2020

Appendix Table 2. Variable groupings according to Factor Analysis

Variable name	Factor 1	Factor 2	Factor 3
Physical work	0.9521		
Manual skills	0.9521		
Uses email			0.8663
Uses computer			0.7445
Uses the internet			0.8121
Conducts business online			0.3021
Uses Excel			0.7978
Uses Word			0.8725
Programming			0.3466
Participates in online conferencing			0.4506
Shares information			
Teaches people		0.3831	
Selling		0.5703	
Presenting			0.3562
Advising		0.7149	
Persuading		0.7864	
Negotiating		0.6857	

Source: Shavit Madhala and Benjamin Bental, Taub Center | Data: PIAAC, 2015

Appendix Table 3. Estimates of the ability to work from home

	Variable name	M[3] b
Gender relative to men	Woman	0.114**
Woman w/ young child relative to w/o young child	With a child under 6	0.117*
Age group relative to 16–25	26–35	0.068
	36–45	0.044
	46–55	0.033
	56–64	0.201***
Population sector relative to non-Haredi Jews	Arab Israelis	-0.278***
	Haredim	-0.068
Residential area relative to Center	North	-0.135**
	Haifa	-0.018
	Jerusalem	0.051
	Tel Aviv	-0.002
	South	-0.087
	Judea/Samaria	-0.118
Education level relative to less than high school	High school	0.055
	Above high school	0.207***

Appendix Table 3 (continued). Estimates of the ability to work from home

	Variable name	M[3] b
	BA degree	0.187***
	MA degree or higher	0.372***
Employment status relative to self-employed	Salaried employee	0.251***
Workplace relative to working in residential area	Commuting to work	0.072*
Employment sector relative to private/ non-profit	Public sector	-0.039
Occupation relative to managers	Professionals	0.139**
	Technicians and associate professionals	0.175**
	Clerical support	0.147
	Service and sales	-0.525***
	Skilled workers	-0.581***
	Elementary occupations	-0.669***
Industry relative to Agriculture	Manufacturing/mining/quarrying	-0.059
	Electricity/gas/steam/air conditioning supply	0.131
	Water sewerage waste management/ remediation activities	0.052
	Construction	-0.303
	Wholesale/retail trade; car/motorcycle repair	-0.528**
	Transportation/storage	0.094
	Accommodation/food	-0.688***
	Information/communication	0.490**
	Financial/insurance activities	0.256
	Real estate activities	0.232
	Professional, scientific, technical activities	0.315
	Administrative/support service activities	0.178
	Public administration, defense, compulsory social security	0.311
	Education	-0.306
	Human health/social work activities	-0.493**
	Arts/entertainment	-0.586**
	Other service activities	-0.215
	Household employment	-0.004
Constant		-0.13
R^2		0.437
Number of observations		3,286

Note: Significance levels: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.
Source: Shavit Madhala and Benjamin Bental, Taub Center | Data: PIAAC, 2015

Appendix Table 4. Estimates for occupations that are physically demanding or use manual skills, social interactions, or digital work

Variable name		Digital work	Social interaction	Physical/ manual skills
Gender relative to men	Woman	-0.060*	-0.091*	-0.152***
Woman w/ young child relative to w/o young child	With a child under 6	0.055	-0.033	-0.098
Age group relative to 16–25	26–35	0.140***	0.028	0.004
	36–45	0.124**	0.01	0.043
	46–55	0.009	-0.051	0.007
	56–64	-0.028	-0.165**	-0.186**
Population sector relative to non-Haredi Jews	Arab Israelis	-0.187***	0.038	0.219***
	Haredim	-0.303***	-0.078	-0.116*
Residential area relative to Center	North	-0.001	0.129**	0.086
	Haifa	0.001	0.018	0.012
	Jerusalem	0.05	-0.095	0.064
	Tel Aviv	-0.013	-0.055	0.046
	South	-0.019	0.018	0.101
	Judea/Samaria	-0.108	-0.023	0.103
Education level relative to less than high school	High school	0.215***	0.143**	-0.016
	Above high school	0.312***	0.129*	-0.149**
	BA degree	0.508***	0.333***	-0.124*
	MA degree or higher	0.620***	0.357***	-0.333***
Employment status relative to self-employed	Salaried employee	-0.083*	-0.371***	-0.115*
Workplace relative to working in residential area	Commuting to work	0.103***	0.032	-0.044
Employment sector relative to private/ non-profit	Public sector	0.022	0.026	0.058

Appendix Table 4 (continued). Estimates for occupations that are physically demanding or use manual skills, social interactions, or digital work

	Variable name	Digital work	Social interaction	Physical/ manual skills
Occupation relative to managers	Professionals	-0.113*	-0.330***	-0.005
	Technicians and associate professionals	-0.101*	-0.319***	-0.062
	Clerical support	-0.422***	-0.632***	-0.026
	Service and sales	-1.001***	-0.688***	0.527***
	Skilled workers	-1.125***	-0.957***	0.763***
	Elementary occupations	-1.313***	-1.352***	1.109***
Industry relative to Agriculture	Manufacturing/mining/quarrying	-0.123	-0.294*	0.265
	Electricity/gas/steam/air conditioning supply	0.267	-0.31	0.367
	Water sewerage waste management/remediation activities	0.053	-0.291	0.26
	Construction	-0.171	-0.111	0.426*
	Wholesale/retail trade; car/motorcycle repair	-0.191	0.328*	0.326
	Transportation/storage	-0.248	-0.317*	-0.081
	Accommodation/food	-0.325*	0.069	0.706***
	Information/communication	0.353**	-0.173	-0.259
	Financial/insurance activities	0.156	-0.03	-0.223
	Real estate activities	0.064	0.001	-0.307
	Professional, scientific, technical activities	0.081	-0.310*	-0.112
	Administrative/support service activities	0.011	-0.218	-0.057
	Public administration, defense, compulsory social security	0.098	-0.309	-0.091

Appendix Table 4 (continued). Estimates for occupations that are physically demanding or use manual skills, social interactions, or digital work

Variable name		Digital work	Social interaction	Physical/ manual skills
	Education	-0.186	-0.148	0.453*
	Human health/social work activities	-0.392**	-0.197	0.595**
	Arts/entertainment	-0.412**	-0.159	0.686**
	Other service activities	-0.099	-0.042	0.286
	Household employment	-0.470***	-0.734***	0.27
Constant		0.348*	0.831***	-0.274
R^2		0.592	0.27	0.352
Number of observations		3,286	3,286	3,286

Note: Significance levels: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.
Source: Shavit Madhala and Benjamin Bental, Taub Center | Data: PIAAC, 2015