An assessment of the impact of COVID-19 on job and skills demand using online job vacancy data

9 April 2021

This policy brief uses online job vacancy postings as a partial indicator of the impact of COVID-19 on skills demand in five OECD countries (Australia, Canada, New Zealand, the United Kingdom and the United States) between January and November 2020. The pandemic, as well as containment and mitigation measures designed to halt its spread, had a large but heterogeneous impact on the demand for skills. By early May, the total volume of online job vacancies had fallen by over 50% in all the countries analysed with respect to the beginning of the year, with even larger declines in some sectors. However, the demand for specific skills in the healthcare sector and in logistics increased. There is also evidence of an increase in vacancies involving remote-working arrangements. The brief also shows that the crisis affected differently individuals with different levels of educational qualifications and that such effect differed across the countries analysed.

Key findings

- The volume of online job postings dropped significantly since the start of the pandemic and the introduction of COVID-19 related containment measures. In the second half of March 2020, job vacancies advertised on line in Australia, Canada, New Zealand, the United Kingdom and the United States declined sharply and by early May, the volume of online job vacancies had fallen by over 50% in all five countries compared to the beginning of the year. Data show that the drop was widespread, affecting almost all sectors and occupations in the five economies. By the end of December, the drop in online job postings was still very evident in the United States and the United Kingdom.
- The changing nature of work due to COVID-19 containment measures led to an increase in the share of job postings advertising "working from home" as a required condition. This result is consistent with the widespread use of remote working practices in the five countries examined, in the effort to sustain economic activity and overcome limitations to operations due to sheltering-in-place orders or recommendations.
- The COVID-19 crisis has had more adverse impacts on the demand for jobs requiring lower qualifications, but not in all countries. For example, by the end of April in Australia and the United Kingdom the volume of job postings requiring low levels of education (secondary or lower) fell by around 40% whereas those for high skilled workers (Master or Doctorate degrees) by around 25%. In the United States and Canada, however, differences across educational levels are less marked.
- Demand for workers in 'front-line' sectors, or in those involved in the management of the COVID-19 pandemic, was very strong as demonstrated by either a growing number of jobs advertised or a less steep decline in postings relative to other sectors. For example, in all five countries analysed, online job postings in the healthcare sector and other "essential" sectors such as retail trade, grew above their levels in January and February 2020. Conversely, vacancies published on line declined substantially in sectors that had to shut down due to government-imposed social distancing restrictions, such as leisure and hospitality.
- When looking at the underlying skills mentioned in job postings, evidence from all countries analysed show a strong increase in the demand for technical competencies in the healthcare sector, such as "emergency and intensive care" or "basic patient care", relative to the pre-crisis period. transversal skills, such as "communication skills" or "team work" also remain in strong demand among the top most frequently advertised positions in the labour market.
- In the short-term, it is therefore key for governments to support the development of skills that foster individuals' resilience by meeting the demand from labour markets. In the medium run, labour market and social policies will need to adapt to a rapidly changing landscape and policy interventions will need to be adjusted in line with the evolution of the spread of the virus and be tailored to each country's institutional and economic structure. Finally, in order to ensure a longer-term recovery governments must address pre-existing structural challenges that are likely to accelerate and become more urgent in the aftermath of the COVID-19 crisis. Among these, the provision of adequate support to low-skilled and vulnerable workers through effective retraining and upskilling policies.

Introduction

The COVID-19 health crisis is an unprecedented shock that is transforming the lives and livelihoods of individuals around the globe. Its effects are likely to extend beyond the short term into the medium and long term as well. The severe health impacts have been matched by sharp declines in economic activity and upheavals of labour markets. Preliminary evidence shows that the COVID-19 crisis is considerably more profound than the 2008 Global Financial Crisis (see, for instance OECD (2020[1])).

The combination of fear of infection, public guidelines and great uncertainty produced a sharp contraction in economic activity and disrupted global value chains with a deep and widespread shock to the labour market. In addition, state-imposed lockdowns and firms' closures have had very significant impacts, with millions of workers across many countries experiencing a reduction in, or the complete loss of, their livelihoods. As industries were forced to cease operations in order to protect the health of workers and promote compliance with mitigation and containment policies, many countries adopted widespread job retention schemes and/or income support schemes designed to support workers. Whenever possible, employers reorganised their operations to enable remote working arrangements.

Many workers were able to continue working through remote working arrangements. For example, according to real-time survey data, by mid-April, a large share of workers – from 29% in Canada to 60% in New Zealand -- shifted to working from home (Foucault and Galasso, 2020[2]). The health crisis has also created shortages of workers in many countries in specific occupations, mostly in the healthcare and public safety sectors.

In such context of unprecedented uncertainty, information systems providing timely information on the impact of the crisis on the economy, jobs and labour markets become key to designing targeted polices to support individuals and businesses alike. With this objective in mind, this policy brief leverages information contained in job vacancies published on line, which has the virtue of being collected with high frequency, to monitor in a timely way the evolution of job postings.

Online vacancy data allow for the analysis of labour market and skills demand information with a level of granularity that is difficult to achieve using traditional data sources. These data can be used to investigate the impact of the COVID-19 crisis and related containment measures implemented by many countries to halt the spread of the pandemic. Analyses reported in this policy brief focus on five countries for which data are available between January and November 2020: Australia, Canada, New Zealand, the United Kingdom and the United States.[1]

Caveats apply when interpreting the results. As it is often the case with *big data*, information on online job postings was made available for research purposes but was collected for different purposes. Therefore data quality and representativeness needs to be carefully evaluated before such data are used to guide policy making. In particular, given concerns about the potential representativeness of such data, particularly for vacancies of some low-skilled occupations which may not be widely advertised on line (see Box 1 for more details), estimates presented in this policy brief may provide a lower bound of the real effect of COVID-19, especially in low-skilled occupations and in low-tech industries and occupations. Despite these limitations, the timeliness and granularity provided by the analysis of online vacancies is key to track the rapid evolution of the COVID-19 crisis and to provide policy makers with crucial up to date indicators, as these are needed to plan policies that can effectively promote recovery.

[1] Sample sizes differ greatly across countries. In particular, for the period between 1 January and 28 November, the full sample for Australia comprises 3 466 780 job postings; Canada comprises 7 519 644 job postings; New Zealand 928 024; the United Kingdom 26 760 364; and the United States 171 027 748. For information on the different representativeness of the data see Box 1.

Box 1. Real-time data on job vacancy postings

Burning Glass Technologies

Burning Glass Technologies (BGT) is an analytics software company that collects, scrapes and analyses job postings from thousands of online sources and job portals. BGT uses text mining to extract and code information from each job description such as experience, qualifications, and skills that employers are seeking. BGT then removes duplicate postings across sites and assigns attributes including geographic locations, required educational qualifications, and industry. BGT data allow for tracking of job vacancy postings, which reflect hiring dynamics, and skills demand at disaggregated level by geography and by detailed occupation and industry.

Richness, timeliness and granularity are among the many advantages of information contained in online job postings over traditional labour market statistics such as employers or labour force surveys. A main disadvantage is the fact that these data only cover jobs posted on line and, therefore, may not be representative of the overall vacancies being advertised. However, in the case of the United States, it was estimated that, as of 2014, between 60% and 70% of all job postings could be found on line (Carnevale, Jayasundera and Repnikov, 2014[3]). In addition, vacancies appearing on line can be somewhat skewed towards certain occupational categories (Hershbein and Kahn, 2018[4]). For instance, for the years 2007 and 2010-2015, jobs in health care, social assistance, finance, insurance and education over-represented the overall online job postings in the United States, whereas accommodation and food services, public administration/government, and construction were under-represented. However, most differences are small in magnitude. On the other hand, low-skilled jobs are significantly under-represented in the BGT data. In the United States, in June 2013, around 80-90% of postings requiring at least a Bachelor's degree could be found on line, whereas only 40-60% of job postings requiring a high school diploma were advertised on line (Carnevale, Jayasundera and Repnikov, 2014[3]).

In addition, a recent OECD working paper has assessed the statistical properties and distributional characteristics of online job posting data from BGT and how these changed over time (Cammeerat and Squicciarini, 2020[5]). This work suggests that most countries display sufficiently good overall representativeness when one considers only those years for which no breaks in time series are observed. However, the study shows that occupational categories such as "managers", "professionals" and "technicians and associated professionals" are relatively more represented in BGT data as compared to other occupational categories and using BGT data at face value may lead to identifying skill and labour trends that are disproportionally based on these – mostly high-skilled – occupations, and may therefore be less relevant for other – mostly low-skilled – occupations. Depending on the aim of the study, re-weighting of the sample may be necessary. Moreover, the study also shows that representativeness concerns exist for Australia and New Zealand's data. Shen and Taska (2020[6]) propose a reweighting-estimation-transformation (RWET) approach to estimate the impacts of COVID-19 on job postings in Australia to overcome the small sample size problem. Given the nature of the data and the scarce availability of traditional statistics with similar frequencies, the re-weighting of the data can be difficult and, as such, results in this policy brief need to be interpreted carefully, especially for those job categories where information is relatively scarcer.

Despite these limitations, online job postings contain useful information because the shocks induced by major crises such as COVID-19 are large relative to plausible biases due to non-representative sampling, as shown by e.g., (Aladangady et al., 2019[7]), (Dunn et al., 2020[8]) and (Chetty et al., 2020[9]). Moreover, Hershbein and Kahn (2018[4]), Forsythe et al. (2020[10]) and Dalton, Kahn and Mueller (2020[11]), have linked BGT data in the United States to the U.S. Job Openings and Labour Turnover Survey at the establishment level and find a high degree of consistency between the two datasets. Knutsson, Tsvetkova and Lembcke (forthcoming[12]) further show that the regional distribution of BGT data for Australia, Canada and the United States are generally well aligned with official data for the most recent years.

Online job postings reveal the worsening labour market conditions after March 2020

As COVID-19 started spreading, virtually all countries around the world put in place containment and mitigation strategies involving restrictions to movement and travel of individuals, the closure of schools and other educational institutions, the closure of non-essential activities, and the postponement of non-essential medical procedures.[2] Although the exact nature, timing, scope and intensity of responses varied substantially across countries and, in certain cases, also within countries (Hale et al., 2020[13]), these measures had, inevitably, a profound impact on labour markets.

Figure 1 presents the change in the number of job postings published on line for the period between January and November 2020 together with a measure of the stringency of governments' policies designed to halt the spread of COVID-19. When focusing on job postings (continuous line, left axis), values above 0 indicate increases in the number of job advertisements relative to the pre-crisis benchmark (from 19 January to 29 February 2020). In contrast, values below 0 represent declines in the volume of job postings.[3] The Stringency Index (dashed line, right axis) presented in Figure 1 is a composite measure ranging between 0 and 100 of the number and the strictness of government policies (with 100 indicating highest strictness) including school closures, limitations to the size of public gatherings, limitations to freedom of movement within a country in terms of timing and distance travelled, workplace closures, and travel bans, in the different countries analysed.[4]

[2] These ranged from stronger efforts to detect cases early on and trace contact with other people to severe physical-distancing measures, including full national lockdowns and the shutdown of the economy, except for a number of "essential activities". Common measures include school closings, travel restrictions, bans on public gatherings, emergency investments in healthcare facilities, new forms of social welfare provision, contact tracing and other interventions to contain the spread of the virus, augment health systems, and manage the economic consequences of these actions (Hale et al., 2020[13]).

[3] In order to benchmark the evolution of job postings, values are expressed using the following formula [-(1- the ratio of the number of job postings observed in a particular week to the number of job postings observed in a pre-crisis period (January and February, 2020)]. To reduce noise, the pre-crisis period corresponds to the average of the weeks starting from 19 January to 29 February, 2020. Robustness checks comparing the evolution in job postings in 2020 to the previous year show that these fluctuations are not the result of seasonality in hiring. Result are not shown but are available upon request.

[4] The Stringency Index is taken from the Oxford COVID-19 Government Response Tracker (OxCGRT), a systematic way to track government responses to COVID-19 across countries and sub-national jurisdictions over time. The project tracks governments' policies and interventions across a standardized series of indicators and creates a suite of composites indices to measure the extent of these responses. In particular, the *Stringency Index* contains information

With the exception of New Zealand, few measures had been implemented before March in all the countries examined, so the Stringency Index remained close to zero. During the second half of March, however, all countries saw a sharp increase in the stringency of responses to halt the spread of the virus which coincided with a steep and steady decline in the number of vacancies posted on line. By the beginning of May, the number of new job adverts posted on line had dropped by more than 50% relative to the level at the beginning of the year in all the five countries considered.

Between March and May 2020, the governments of the countries analysed started implementing containment measures limiting individuals' mobility and shutting down (or considerably reducing) economic activities that require people to leave their residence and work in physical proximity with co-workers or the general public (Bai et al., 2020[14]).

Figure 1 shows a clear association between the sharp increase in policy stringency (corresponding to the implementation of lockdowns around March) and the decline in the volume of online job postings. In later months, however, volatility in the Stringency Index and its association with changes in the number of vacancies being advertised on line decline. There are different (and in some cases competing) factors that could explain a weaker correlation between policy stringency and the evolution of online vacancies beyond the initial phase of the pandemic.

First, some businesses may have ceased operations permanently during government-imposed restrictions and thus, when containment measures were eased they did not hire any new workers. Second, the relaxation of some regulations was accompanied by a generalised awareness that new measures could be imposed if and when viral transmission increased and posed a generalised health threat. In such uncertain landscape, many employers may have preferred to defer new hiring. Third, aggregate economic demand, a key driver of labour demand, may have not increased as soon as restrictions were eased because of the reluctance of some consumers returning to pre-crisis spending levels immediately due to uncertainty or loss of income during generalised closures.

The magnitude of the association between policy stringency and the decline in job postings also varies across countries, reflecting differences across countries in the implementation of 'crisis-mitigating' policy measures. For instance, the dynamics of vacancies being advertised on line when containment measures were implemented and when they were eased could reflect the implementation of job retention schemes OECD (2020[15]) and Andrieu et al. (2020[16]). Such schemes determined if vacancies were advertised when businesses re-opened after regulations were eased or if, by contrast, no vacancies were created because workers never lost their job. Job retention schemes also provided income support for workers and reduced uncertainty, thus influencing aggregate demand and job creation.

In the United Kingdom, a steep decline in the volume of job postings started before the lockdown was actually implemented (23 March). This suggests that employers may have anticipated those measures and reduced hiring even before lockdowns were enacted and that cautionary behaviours and disruption of supply chains may have had a substantial impact even before mandatory lockdowns. Moreover, only weak signs of recovery can be observed once mandatory restrictions were lifted in early July 2020 – which coincided with a slight decline in the Stringency Index – suggesting that employers may be postponing hiring in such uncertain and rapidly changing context.

A gradual recovery in the number of job vacancy postings is observed in September, but this faded out in October, together with the introduction of new restrictions developed to respond to a new surge in cases. Similarly, in the United States, the drop in job postings tracked well the increase in the average stringency of restrictions imposed on the population and businesses. Signs of an early recovery can be seen as soon

on containment and closure policies, such as school closures and restrictions in movement. It records the number and strictness of government policies, and should not be interpreted as 'scoring' the appropriateness or effectiveness of a country's response. See for more information: https://www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker

as restrictions begun to be lifted in some states at the end of May and until mid-June when the decline in online vacancies reached 15% with respect to the beginning of the year. However, the volume of online job postings continued to decline and worsened from mid-June until the end of July when the fall relative to the pre-crisis period was larger than 70%, despite the partial re-opening of the economic activities in several American states. Such decrease remained constant until the end of September when the number of job openings dropped even more, falling by 87% relative to the beginning of the year (January 19-February 29), then stabilised in November at around minus 70%.

In New Zealand, a substantial rebound in the number of job vacancy postings was observed from the end of May as the restrictions imposed began to ease. The recovery in the number of online job postings seemed to continue and went hand in hand with a further relaxation of the containment and confinement measures from September onwards, a period during which other countries were implementing new measures to prevent the spread of the virus.

The share of online job openings requiring 'work from home' increased markedly from mid-March onwards

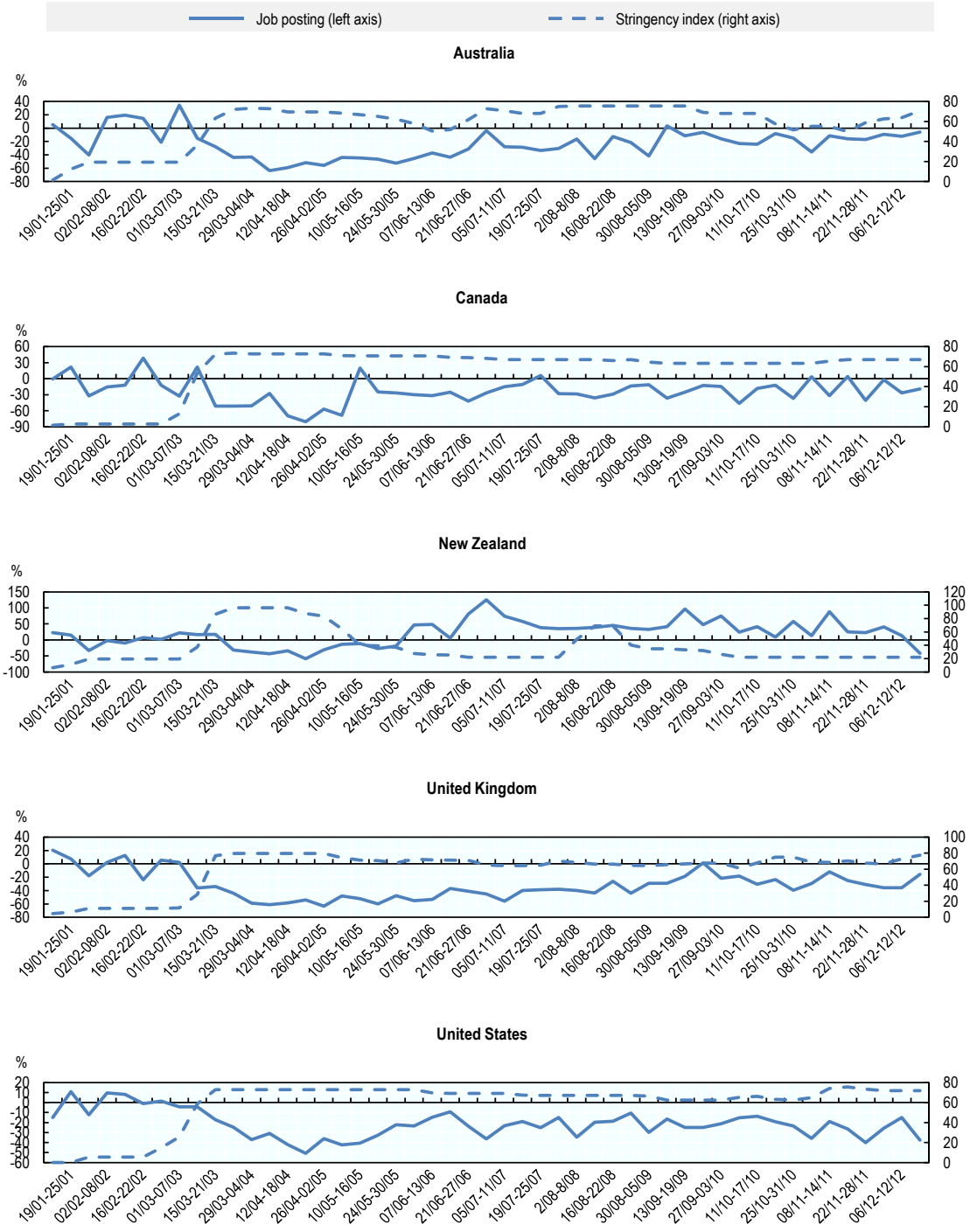
Some studies have tried to provide an estimate of the jobs that can be performed directly from home (see among many, Dingel and Neiman, (2020[17]) and Espinoza and Reznikova (2020[18]), indicating that around 30% of workers across the OECD can easily perform their job-related tasks remotely (Espinoza and Reznikova, 2020[18]). The possibility of working remotely is, however, lower among workers without tertiary education and among workers with lower levels of numeracy and literacy skills, a reflection of differences in the tasks performed and the level of familiarity with information and communication technologies of workers (Espinoza and Reznikova, 2020[18]).

Previous studies examining 'working from home' arrangements did so by indirectly inferring the degree to which broad occupational groups can be performed remotely (Dingel and Neiman, 2020[17]). Such studies typically analyse tasks performed by workers in various occupations before the crisis, and consider if such tasks can be performed remotely or not. By contrast, the analyses presented in this policy brief refer to whether the individual vacancies posted on line require the person who will fill such vacancy to work from home. Therefore the analyses do not look at the growth or contraction in the number of online postings for occupations in which remote working is possible but, rather, the evolution of online postings in which working from home is required and expressly indicated in the vacancy, at least in the short and medium term.

The analyses of online vacancies presented in this brief confirm that, amidst the COVID-19 health crisis, "working from home" arrangements were widespread, in line with evidence from Foucault and Galasso (2020[2]) and OECD (2020[1]). Remote working arrangements helped maintain a degree of economic activity in all sectors and occupations in which operations could be reorganised to comply with 'sheltering in place' regulations or guidelines on social distancing.

In Australia and Canada the increase in the number of vacancies being posted online mentioning 'work from home' arrangements was especially strong, with an increase of around 67% and 100%, respectively, relative to the volume of vacancies advertised just before the pandemic hit (Figure 2). In the United Kingdom, the volume of job postings contracted more markedly than in Canada and Australia, but the decline in vacancies advertising jobs requiring remote working practices decreased considerably less than the rest and actually increased overtime up to 94% in the period September-November, relative to the beginning of the year. Using data from the online LABOR INSIGHT tool on the online vacancies requiring working from home, it emerges that also in the United States there has been an increase in the number of vacancies requiring working from home: from 15.4% increase in March-April relative to the beginning of the year, to 82% increase in August-October, relative to the beginning of the year.

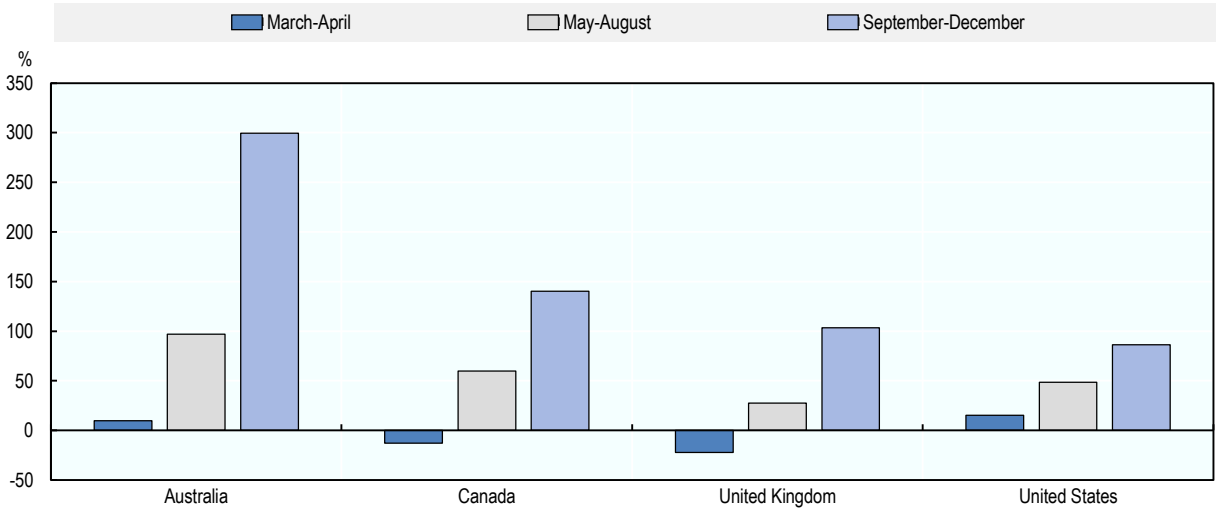
Figure 1. Evolution of job vacancy postings



Note: The figure shows the percentage change in the number of new vacancies each week (left axis) relative to the average weekly postings in January 19-February 29, 2020, recorded in the Burning Glass Technologies' online postings database. Stringency Index (right axis) records the number and the strictness of government policies. It is a composite measure based on nine response indicators including school closures, workplace closures, and travel bans, rescaled to a value from 0 to 100 (100=strictest). If policies vary at the subnational level, it shows the level of the strictest sub-region.

Source: OECD calculations based on data from Burning Glass Technologies, December 2020 for data on job postings. For data on Stringency Index, Hale et al. (2020[13]), Variation in government responses to COVID-19, https://www.bsg.ox.ac.uk/research/research-projects/covid-19-government-response-tracker.

Figure 2. Evolution of job postings by working from home requirement



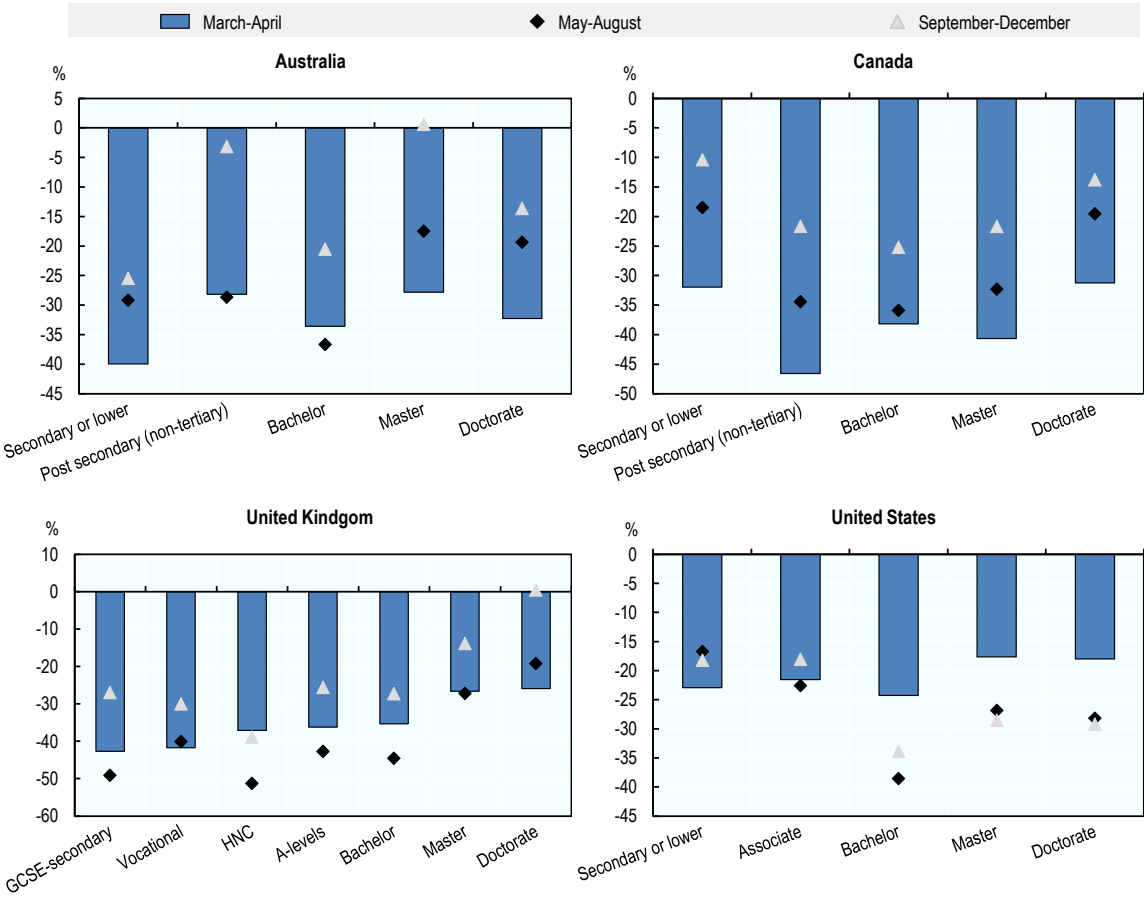
Note: The figure shows the percentage change in the number of job postings (weekly averages) with respect to the beginning of the year by working-from-home requirements. Postings are divided by group-specific average from January 19-February 29, 2020. New Zealand has been dropped due to a very small size sample. Data for United States come from LABOR INSIGHT online tool and are averaged monthly. For the United States only, the latest period covers the months from September to November.
Source: OECD calculations based on data from Burning Glass Technologies, December 2020.

The impact of the COVID-19 crisis on the number of online vacancies varies by educational level, particularly in some countries

The analysis of online vacancies shows that many low-paid, often low-educated, workers have been particularly affected during the initial phase of the COVID-19 crisis. Many of the sectors that had to cease their operations when policy measures to reduce social mixing were most stringent, such as the retail and recreation industry, employed high shares of workers with low levels of educational qualifications. At the same time, many low-educated workers were employed in sectors such as agriculture, food processing or other essential services sectors that continued operations physically and, as a result, were potentially exposed to the virus.

Low-educated workers are less likely to work in jobs that allow remote working arrangements, and are less likely to possess sufficient digital skills to be able to take advantage of such arrangements when these are available (Dingel and Neiman, 2020[17]; Fana et al., 2020[19]; Sostero et al., 2020[20]).

Figure 3. Evolution of job postings by educational level



Note: The figure shows the percentage change in the number of job postings (weekly averages) with respect to the beginning of the year by minimum level of education required are divided by group-specific average from January 19-February 29, 2020. Postings missing information on education requirements were discarded. New Zealand has been dropped due to a very small size sample.
Source: OECD calculations based on data from Burning Glass Technologies, December 2020.

Results indicate that the contraction in online job postings was widespread and in some cases it was slightly more marked for vacancies requiring only low-levels of educational qualifications, but important differences arise across countries. Figure 3 shows that, in the United Kingdom,[5] the difference across postings requiring different educational qualifications is especially noticeable: by the end of April, the volume of job postings requiring only low levels of education fell by around 40% whereas those for high skilled workers (Master or Doctorate) by around 30%. In Canada and Australia differences across educational levels are less marked while in the United States results seem to indicate that jobs requiring higher education level have been hit harder during the crisis.[6]

[5] GCSE is General Certificate of Secondary Education. It a qualification for secondary level students obtained after multiple rounds of standardized examinations, which usually ends at the age 16. HNC indicates Higher National Certificates, a professional-oriented higher education. A-levels (or Advanced Levels) is a non-compulsory subject-based qualification required to enter universities, certifying the completion of 2-year course starting the age 16.

[6] Because not all job postings explicitly state minimum educational requirements and online vacancies capture a smaller share of overall vacancies for jobs in low-skilled occupations these estimates should be applied only to the

When interpreting the results, it should be noted that low-skilled occupations may not be widely advertised on line and therefore, may be under-reported in this analysis. It is possible that estimates presented in this brief may provide a lower bound of the real effect of COVID-19 on low educated workers and that the decline may have been even more substantial compared to job postings for high-skilled workers.

Online job postings declined in some sectors more than others

While the volume of online job postings has declined overall, there is significant heterogeneity across sectors and occupations. Certain industries and sectors of the economy, in fact, maintained most of their operations, and in some limited cases even experienced a surge in demand, while others had to reduce or halt operations.[7]

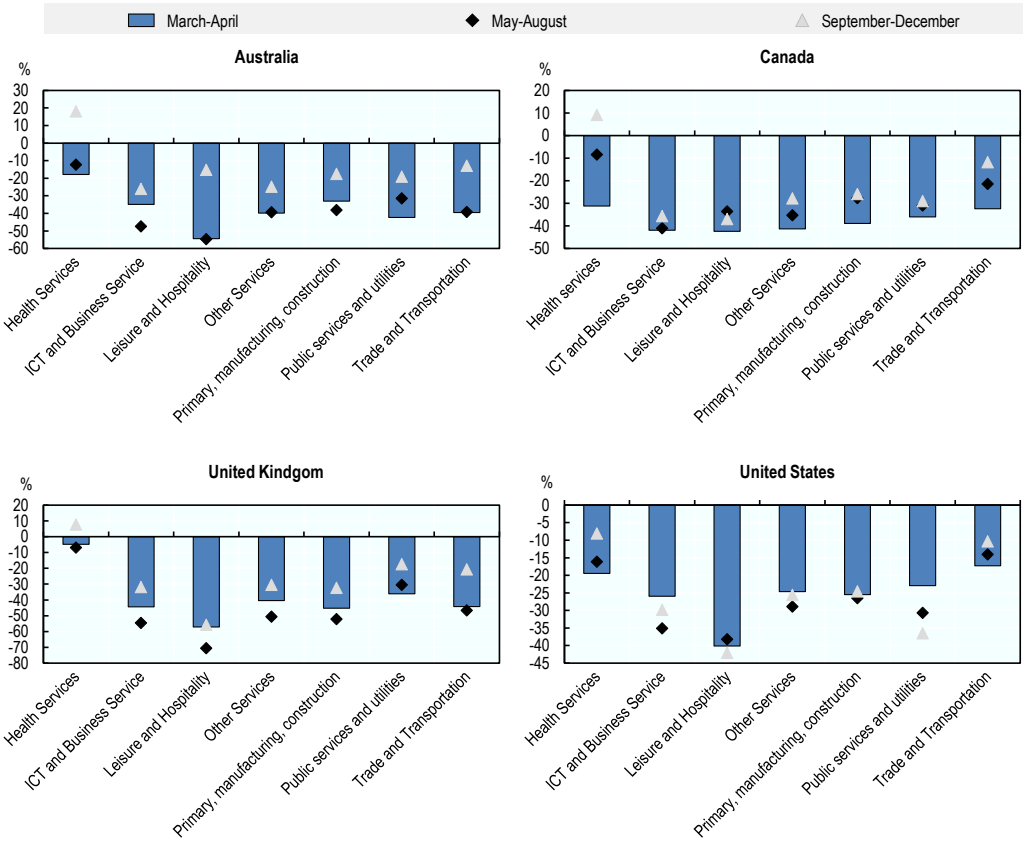
Figure 4 shows that, in all the countries analysed, the Healthcare and Social Assistance sectors experienced a weaker change in the volume of job postings being advertised between March-April or May-August (relative to the beginning of the year) and that, in comparison to other sectors, the contraction was relatively modest. With the only exception of the United States, in all countries analysed the number of job postings in the Health Services sector slightly increased (between 2 and 5%) between September and December, relative to the beginning of the year. Similarly, results indicate that the Retail Trade sector experienced minor declines in the United States and Canada, particularly in the immediate onset of the pandemic (i.e. March and April). This evidence could be explained by the fact that essential retailers like grocery stores and pharmacies continued to hire workers to meet the surge in demand due to "panic buying" induced by lockdowns and stay-home policies as well as the stark increase in e-commerce. In fact, evidence shows that, despite persistent cross-country differences, the COVID-19 crisis has enhanced dynamism and expanded the scope of the e-commerce sector across countries, including through the creation of new businesses reaching new consumer segments (e.g. elderly) and products (e.g. groceries) (OECD, 2020[21]).

Most sectors were, however, more severely impacted. Across the countries analysed, the steepest decline in job postings is observed in the Leisure and Hospitality sectors and in particular in the "Accommodation and Food services", "Arts, Entrainment and Recreation" and other non-essential retail activities. Results show that between March and April, the volume of job postings being advertised on line in these sectors was between 50% and 40% lower relative to the volume registered at the beginning of the year, before the pandemic hit. In May and August the situation further deteriorated and the volume of online vacancies in these sectors were between 60% and 80% lower than its pre-crisis levels. These results also suggest that the COVID-19 crisis is likely to have an asymmetric effect across different groups of workers. The fact that these Leisure and Hospitality sectors are often characterised by low wages and precarious employment conditions and tend to have a higher concentration of women and young workers, suggests that they may be disproportionately bearing the brunt of the crisis.

sample considered rather than as broad indications of labour market dynamics. In particular, the sample for Australia is 32.3% of the full sample, for Canada is 38% of the full sample, for the United Kingdom is 25.6% and for the United States is 60.5%.

[7] Information about the sector of job postings is not always available. In particular, the sample for Australia is 54.7% of the full sample, for Canada is 70% of the full sample, for the United Kingdom is 54.1% and for the United States is 75.6%.

Figure 4. Evolution of job postings by sector



Note: The figure shows the percentage change in the number of job postings in the months following the introduction of the lockdown measures with respect to the beginning of the year by sector. Postings from March, to November (weekly average) are divided by the industry group-specific average from January 19–February 29, 2020. Categories are mutually exclusive and exhaustive. Primary activities refer to agriculture and mining. Postings missing information on the sector of affiliation were discarded. Results for New Zealand are not reported because 54% of vacancies have missing data on the specific industry of the job posting.
Source: OECD calculations based on data from Burning Glass Technologies, December 2020.

The volume of job openings has declined in many occupations, but has risen in essential service occupations

In line with previous OECD work (OECD, 2020[22]) examining the first months of the pandemic, the results in this policy brief show that COVID-19 pandemic has also had a heterogeneous impact on the volume of job openings advertised on line across occupations. In particular, the number of online job openings for essential workers, such as hospital workers, employees of food retailers and warehouse personnel remained the same or increased even as policy makers in many countries severely limited economic activities and freedom of movement.

Table 1 identifies, for each of the four countries with available data, the ten occupations that experienced the highest growth in online job postings, as well as the ten occupations that experienced the largest decline in online job postings for the period March to November 2020.

In all countries, at least three out of the ten occupations that experienced the highest growth (or the smallest decline) are in health-related professions. Professionals such as physicians, nurses, pharmacists, epidemiologists, care assistants or technicians have seen a particularly strong increase in demand.

In Canada, the volume of online openings advertising vacancies for Epidemiologists and for Magnetic Resonance Imaging Technologists (often working with intensive care units), also saw a substantial increase, by more than 150% and 60%, respectively in the period between March and September relative to the beginning of the year. Similarly, in the United Kingdom, the number of Emergency Medical Technicians and Paramedics increased by 34% and the number of online openings for Medical Equipment Repairers increased by 114%. In the United States, the number of online vacancies for Physical Scientists increased by 10% and those for Epidemiologists and for Community Health workers stayed stable, relative to the beginning of the year. Data for Australia also show that occupations with the greatest increase in the volume of job openings advertised on line were concentrated in the healthcare sector. The volume of online job openings for general practitioners and nurses has increased by around 150% and 30%, respectively, with respect to the months of January and February 2020.

Along with professionals in the healthcare sector, other specific occupations also saw an increase in openings in sectors that were not (or only marginally) affected by containment measures and mandatory physical closures. These jobs are predominantly found in the logistics and distribution sectors. In Austria, the United Kingdom and the United States, for instance, the volume of online vacancies for jobs in order processing and packaging increased by nearly 50% relative to the beginning of the year, reflecting the significant growth in online shopping and the associated delivery of goods directly to the customers as a consequence of social distancing measures and the fear of contract the virus when leaving home.

Closures and the various containment measures encouraging individuals to remain home and reduce social interactions decreased the volume of online vacancies for jobs that involve face-to-face interactions, such as Tourism and Leisure sectors. For example, job openings posted on line for bell persons or baggage attendants experienced a large decline in both the United Kingdom and the United States (Table 1).

Similarly, online vacancies for Meeting, Convention, and Event Planners, dropped in Australia (by 68% compared to the beginning of the year), Canada (by 67%) the United Kingdom (by 83%) and the United States (by 79%). The volume of online vacancies for baristas, bussers and bartenders contracted by 72% in the United Kingdom. In the United States, Canada and the United Kingdom the volume of online job postings seeking travel agents, tour guides or flight attendants dropped by around 70% and 90% in the period between March and November compared to the beginning of the year.

Table 1. Growth and decline in online job openings by occupation

Australia	Canada	United Kingdom	United States
Top 10 occupations			
Family and General Practitioners	**Epidemiologists**	**Medical Equipment Repairers**	Packers and Packagers, Hand
Pharmacy Aides	**Dental Assistants**	Floral Designers	Slaughterers and Meat Packers
Medical Secretaries	Sewing Machine Operators	New Accounts Clerks	**Hearing Aid Specialists**
Packers and Packagers, Hand	Teacher Assistants	**Phlebotomists**	Floor Layers, Except Carpet, Wood, and Hard Tiles
Hairdressers, Hairstylists, and Cosmetologists	Chiropractors	Packers and Packagers, Hand	**Physical Scientists, All Other**
Gaming Surveillance Officers and Gaming Investigators	Proofreaders and Copy Markers	**Nurse Midwives**	Carpet Installers
Licensed Practical and Licensed Vocational Nurses	**Magnetic Resonance Imaging Technologists**	**Emergency Medical Technicians and Paramedics**	Laborers and Freight, Stock, and Material Movers, Hand
Nursing Assistants	**Phlebotomists**	Soil and Plant Scientists	Glaziers
Medical Assistants	Floor Layers, Except Carpet, Wood, and Hard Tiles	**Ophthalmic Medical Technicians**	**Community Health Workers**
Medical and Clinical Laboratory Technicians	Glaziers	**Speech-Language Pathologists**	**Epidemiologists**

Australia	Canada	United Kingdom	United States
Bottom 10 occupations			
Meeting, Convention, and Event Planners	Tax Preparers	Travel Agents	Interpreters and Translators
Concierges	Air Traffic Controllers	Bakers	Baggage Porters and Bellhops
Legal Secretaries	Medical Transcriptionists	Reservation and Transportation Ticket Agents and Travel Clerks	Meeting, Convention, and Event Planners
Librarians	Lawyers	Meeting, Convention, and Event Planners	Travel Agents
Zoologists and Wildlife Biologists	Travel Guides	Lifeguards, Ski Patrol, and Other Recreational Protective Service Workers	Office Machine Operators, Except Computer
Paralegals and Legal Assistants	Lifeguards, Ski Patrol, and Other Recreational Protective Service Workers	Dining Room and Cafeteria Attendants and Bartender Helpers	Computer Operators
Postsecondary Teachers, All Other	Hydrologists	Interior Designers	Reservation and Transportation Ticket Agents and Travel Clerks
Lodging Managers	Gaming Supervisors	Bailiffs	Sewers, Hand
Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	Broadcast News Analysts	Skincare Specialists	Parking Enforcement Workers
Architects, Except Landscape and Naval	Purchasing Agents, Except Wholesale, Retail, and Farm Products	Bartenders	Legal Support Workers, All Other

Note: The table shows the top ten and bottom ten occupations by change in posted vacancies from March to November with respect to the beginning of the year. Postings from March to September (weekly average) are divided by the occupation group-specific average from January 19–February 29, 2020. The results are based on using crosswalks in the occupational categories, thus allowing data to be comparable and to classify them into SOC (Standard Occupational Classification) categories. Health-related occupations are highlighted in dark blue. Postings missing information on the occupation of affiliation were discarded. New Zealand has been dropped due to a very small size sample. Occupations with less than 1 000 observations in the observed period are not considered.
Source: OECD calculations based on data from Burning Glass Technologies, December 2020.

Demand has been increasing for medical skills as well as certain transversal skills

Although trends in online vacancies detailed in previous sections largely reflect an unprecedented shock rather than 'structural' trends like those reflecting changes in skill demands due to technological progress, the shock induced by COVID-19 crisis may still have long-term structural consequences, particularly if employers decide to restructure production by, for instance, increasing automation or the use of digital technologies. Table 2 shows the top 20 skills mentioned in occupations that experienced an increase in online postings between March and November 2020. Analysis of the skill profile of the most-in-demand jobs at the peak of the COVID-19 crisis reveals two interesting trends: the most-in-demand skills are technical (medical) skills and transversal skills.[8]

First, technical medical skills, such as Emergency and Intensive care, Medical support, Basic Patient Care, Radiology, Paediatrics, Obstetrics and Gynaecology, Infectious disease or Mental and Behavioural health specialties are featured in many of the postings that saw a strong positive demand between March and November 2020. This is not surprising as the increase in the demand for these skills is driven by the increase of the demand for health-related occupations.

[8] Transversal skills are identified through Natural Language Processing algorithms that calculate the *number* (degree) and the *importance* (centrality) of connections of each skill with the rest of skills in the network, that is, in this case, the universe of online job postings analysed (Hansen et al., 2020[24]).

Second, along with technical skills, transversal skills like “communication skills” are prominent among the attributes mentioned in most-in-demand jobs posted on line (or among those with small declines). Being able to communicate effectively is key, especially in situations of emergency, when individuals may need to provide and receive precise instructions under pressure or may need to use new tools to communicate without physical interactions. ‘Communication skills’ feature notably in jobs in high-demand but other transversal skills such as being able to work in teams (teamwork), Basic Customer Service (being able to attend effectively to clients and possibly patients) or Detail-Oriented (paying close attention to all particulars when working on a task or project) are other transversal skills widely mentioned in jobs that were in high-demand during the first peak of the crisis, in April and March 2020, but also later. These results seems to suggest that the COVID-19 pandemic favouring individuals who possess both technical and non-cognitive skills.

Table 2. Skills most required by growing (or least declining) occupations

Top 20 Skills

Australia	Canada	United Kingdom	United States
Communication Skills	**Dental Care**	**Emergency and Intensive Care**	Material Handling
Infectious Diseases	**Communication Skills**	**Communication Skills**	Physical Abilities
Basic Patient Care	Teaching	**Blood Collection**	General Administrative and Clerical Tasks
Administrative Support	English	**Ear, Nose, and Throat**	English
Obstetrics and Gynecology (OBGYN)	**Radiology**	**Obstetrics and Gynaecology (OBGYN)**	**Basic Customer Service**
Basic Customer Service	**Teamwork / Collaboration**	Teaching	General Shipping and Receiving
Medical Support	Budget Management	**Basic Patient Care**	Scheduling
Teamwork / Collaboration	**Organizational Skills**	**Rehab Therapy**	Packaging and Labeling
Detail-Orientated	**Medical Support**	**Mental and Behavioral Health Specialties**	Recruitment
General Administrative and Clerical Tasks	**Detail-Oriented**	**Teamwork / Collaboration**	**Detail-Oriented**
Computer Literacy	Writing	**General Medicine**	**Communication Skills**
Time Management	**Basic Patient Care**	**Pediatrics**	**Organizational Skills**
Organisational Skills	Physical Abilities	**Mental Health Diseases and Disorders**	**Teamwork / Collaboration**
Mental and Behavioral Health Specialties	Administrative Support	English	Inventory Management
Problem Solving	Repair	Research	Cleaning
Basic Living Activities Support	Machinery	**Medical Support**	Work Area Maintenance
Pathology	**Basic Customer Service**	Planning	Inventory Management
Microsoft Office and Productivity Tools	Tailoring and Sewing	**Organisational Skills**	General Sales
Written Communication	**Energetic**	**Speech Language Pathology**	Underwriting
General Medicine	**Multi-Tasking**	**Rehabilitation**	Cleaning

Note: The table lists the twenty most demanded skills by the 10 most growing occupations by change in posted vacancies in March - November, with respect to the beginning of the year. New Zealand has been dropped due to a very limited sample. Health-related skills are highlighted in bold. Transversal skills are highlighted in dark blue.
Source: OECD calculations based on data from Burning Glass Technologies, December 2020.

Policy implications

As a whole, the analyses presented in this policy brief as well as evidence on unemployment claims (see for instance, (OECD, 2020[1]) and (Forsythe et al., 2020[10]) demonstrate that a reorganisation is taking place in the labour market due to simultaneous shocks to supply and demand arising from the COVID-19 pandemic. Policy responses to the crisis should continue responding to public health needs, but also providing economic support to both individuals and businesses to ensure that what originated as a health crisis is not to become a long-lasting economic crisis. OECD countries have responded with unprecedented speed, breadth and depth, to contain the social and economic effects of COVID-19, supporting workers, their families and companies (see OECD (2020[1]; 2020[22]) for an overview of the measures that have been taken at the onset of the crisis).

The crisis is still ongoing and a complete recovery will only happen once the virus is under control and businesses are able to restart operations, customers regain confidence and global (national) value chains are restored. It is therefore important for governments to adapt their labour market and social policies in this challenging and rapidly changing landscape. Certainly, the relevant mix of economy-wide and targeted measures needs to consider national circumstances, including the structure of the economy, existing inequalities, and labour market institutions that can best deliver policies. These measures include:

- Effective active labour market and social policies are key tools that policy makers can use to alleviate the impact of job displacement on individuals and to allow workers to return to work as quickly as possible (OECD, 2018[23]). Typically, this requires effective activation strategies, but also early intervention measures during the notice period. At the same time, income-support policies are key to alleviate the costs of job displacement during unemployment but potentially also during re-employment through the use of wage insurance schemes.
- As prospects of quickly finding new work will remain difficult for many, some countries should extend unemployment benefit durations to prevent jobseekers from sliding too quickly into much less generous minimum-income benefits (OECD, 2020[1]). The capacity of Public Employment Services (PES) will also need to be scaled up to ensure that sufficient support is provided to job seekers also in terms of career advice and counselling.
- To aid recovery progress in the short, medium and long-term it is crucial to ensure that skills shortages are minimised and, even more importantly, that effective upskilling and reskilling efforts are put in place to ensure that those who left the labour market are able to re-join with adequate skills to operate in high-quality jobs. To this end, it is crucial to promptly and efficiently identify not only skill needs but also in which industries and sectors similar skills are used, to facilitate career moves to align retraining efforts with labour market needs. At the same time, career guidance can be a helpful tool to help adults make informed decisions and regain employment or train, perhaps in new emerging sectors (OECD, 2020[22]).
- Job retention schemes or short-time work (STW) programmes can play an important role in maintaining viable jobs in firms experiencing temporarily reduced demand. As these programmes encourage work-sharing they also provide income support to workers whose hours are reduced. In the current situation, for job retention schemes or STW to be more effective take-up should be made conditional on the obligation for firms to retain their workers. Training can help workers improve the viability of their current job or improve the prospect of finding a new job. This would allow to support workers in jobs at risk, rather that jobs (OECD, 2020[15]).
- Teleworking remains, for many, an effective way to work while limiting risks of contracting the virus and evidence presented in this brief confirms its surge in use. Public investment should be targeted to improving digital infrastructures, which remain a necessary but not sufficient condition for large-scale remote working, and the digital skills of the population, to ensure that businesses and individuals can reap the full benefits of digitalisation. This will not only support the recovery from the current crisis but address structural challenges linked to the ongoing digital transformation.

- Many firms weathering the crisis have already announced plans to increase productivity by investing in automation technologies and accelerating the effects of technology megatrends, all of which will pose additional challenges to workers who were already vulnerable, for instance low-skilled, women, new entrants in the labour market and migrants In particular, the evidence presented in this brief suggests that the low-skilled may be particularly at risk of suffering the negative effects of the COVID-19 crisis, as they are more exposed to layoffs and to higher risks associated with automation. Upskilling and retraining are solutions to boost skill development and retraining of vulnerable workers, allowing them to re-enter the labour market in high-quality jobs and with an effective skill set. Retraining and upskilling, however, takes time and income support will be needed during the transition to a restored economic activity.

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