I Z A Institute
of Labor Economics
Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 14530

Chutes and Ladders? Job Opportunities for Generation COVID

Erling Barth
Harald Dale-Olsen
Pål Schøne
Kjersti Misje Østbakken

JULY 2021

I Z A Institute
of Labor Economics

Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 14530

Chutes and Ladders? Job Opportunities for Generation COVID

Erling Barth
Institute for Social Research and IZA

Pål Schøne
Institute for Social Research and IZA

Harald Dale-Olsen
Institute for Social Research and IZA

Kjersti Misje Østbakken
Institute for Social Research

JULY 2021

ISSN: 2365-9793

IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

Chutes and Ladders? Job Opportunities for Generation COVID[1]

With a focus on jobs for youth, this paper analyses the development of job postings in Norway during the first and second wave of the COVID-19 pandemic in 2020. Jobs for youth are defined by the top 20 3-digit occupations for young workers. Job postings in these occupations took a larger hit than other jobs. We also identify the top 20 occupations for entrants right after completed highest education. Separate analyses by education reveal that entry jobs for young people with lower education declined the most during the pandemic. Using a difference in difference framework with 2018 and 2019 as reference years, we show that the decline started before "lock-down" policies were in place, but that the decline was even larger during the lock-down. Concurrent with re-opening phases in the economy, job posting rates improved, but did not reach the levels comparable to those in 2018 and 2019.

JEL Classification: J23, J6, J63

Keywords: coronavirus, labor demand shock, job postings, young workers, COVID-19

Corresponding author:
Erling Barth
Institute for social research
pb 3233 Elisenberg
0208 Oslo
Norway
E-mail: erling.barth@socialresearch.no

[1] This work was supported by the Research Council of Norway grant numbers 316599 "Labor Demand in Crisis and Recovery" and grant number 280307 «Changing health and skills requirements in the labor market». This paper has been presented at the NFR Truls Mohn seminar on "Insights to Medical Research and Economic Consequenses" in March 2021. Thanks to Victoria Sparrman and Inger Cathrine Kann for comments.

1. Introduction

Vacancies are crucial for entrants into the labor market. During the current COVID-19 crisis, numerous workers lost their jobs, either permanently or temporarily. With many workers on temporary leave, firms face a pool of workers from which they may re-hire, and the correspondence between job growth and new jobs offered in the labor market is weakened: While re-hires represent employment growth, they do not represent new job openings available for newcomers. To study the impact of the pandemic on job opportunities of the "Generation Covid"[2] who completed their education right before or during the COVID-19 pandemic, it is thus not sufficient to look at job growth, but rather to focus on the number of vacant jobs posted in the labor market. In this paper we study how the COVID-19 outbreak and the subsequent policy measures affected job postings in Norway, with specific focus on jobs for youth and new entrants.

The health crisis caused by the outbreak of the COVID-19 virus led to one of the largest economic crises in modern times. As the virus spread across countries and within communities, unemployment rates surged, and vacancy postings dropped. The exceptional circumstance of this economic crisis is that it follows from a global pandemic where non-pharmaceutical measures, such as administrative closures, social distancing, travel bans together with general hygiene advisories, are used to mitigate the spread of the virus. These measures also affect employment and the creation of new jobs. Even if the COVID-19 pandemic is expected to end within a reasonably short time, it will have deep and lasting effects on the labor market.

We add to a growing literature that show dramatic reductions in labor demand of the COVID-19 pandemic. Forsythe et al. (2020a, 2020b) use US job vacancy data collected in real time, as well as unemployment insurance (UI) initial claims and Bureau of Labor Statistics (BLS) employment data to analyse the impact of COVID-19 on the labor market. They find that job vacancies fell dramatically in the second half of March 2020. By late April, they had fallen by over 40%. The reduction was broad, hitting all U.S. states. Nearly all industries and occupations saw reductions in postings and increases in UI claims, irrespective of whether they were deemed essential and had work-from-home capability. Campello et al. (2020) use another source of data on job-vacancy postings to analyse the impact of COVID-19 on the U.S. job market. Results show that high-skill jobs were more severely hit than low-skill jobs, and the reductions were deeper in unionized industries and in non-tradable sector. Hensvik et al. (2021) study the job-search responses to the COVID-19 pandemic using real time data on vacancy postings and ad views on Sweden's largest online job board. Using a Difference-in-differences (DiD) approach, they compare the change in postings from a pre-Covid period (week 1-10), with a post-Covid period (week 11 through the end of July), in year 2020 compared to a control year; 2019. Their DiD result suggests a reduction by approximately 36% in the inflow of vacancies from January till July. They conclude that the negative labor demand shock in Sweden was almost as large as in the US. They also

[2] As labelled by Major et al. (2020).

find that COVID-19 affects industries and occupations heterogeneously. Finally, Holgersen et al., (2020); a Norwegian study using vacancy posting data to study the impact of Covid-19 crisis on labor demand in Norway, find that the postings from late February to the end of June in 2020 declined by around 27% relative to the same period in 2019. The reduction in labor demand is rather broad. Almost all industry and occupations experienced sizable drops, regardless of whether they are considered to be feasible to be performed remotely.

An important contribution of our paper is to provide analyses of impacts for groups of workers, in particular for young and low educated. Very few studies take this perspective. One recent exception, however, is Major et al (2020). Using UK survey data they find that the Generation Covid (aged 16-25) experienced worse labor market outcomes in terms of job loss, not working and earnings losses during and after the COVID lockdown. Those aged 16-25 were more than twice as likely as older workers to have experienced job loss, with more than one in ten losing their job. They do not, however, provide evidence on vacancies available for younger workers. Young workers are typically newcomers in the labor market. For youth, job creation and gross hires constitute the most important margin for the determination of future employment, and job postings that we study in this paper is a key indicator of what is available for newcomers.

Our focus on jobs for youths is pertinent. Earlier studies have shown that young workers face larger labor market losses than other workers in the aftermath of economic crises (see for instance Barth and von Simson, 2013). Young workers bear the consequences for a long period, affecting both their prospects in the labor market, in terms of higher risk of long-term unemployment, weaker wage growth and career prospects, and their health outcomes and well-being (Rothstein 2020, Kahn 2010, Oreopolous et al. 2012, Schwandt and von Wacter 2019, and Raaum and Røed 2006). Rothstein (2020) studies cohort patterns in the labor market outcomes of recent college graduates, examining changes around the Great Recession. Recession entrants have lower wages and employment compared to earlier cohorts. He relates these changes to "scarring" effects of initial conditions. “Scarring” effects imply that one becomes permanently market by lower wage growth and higher unemployment throughout the career (see for example Arulpalam, 2001).

Cohorts of young people entering in period with few job opportunities, will subsequently compete with both the cohort that enters the labor market in the following year and with those that lost their job during the crises. Rothstein (2020) shows that adverse early conditions permanently reduce new entrants’ employment probabilities. Similarly, Kahn (2010), and Oreopolous et al. (2012) both analyse short and long term effects of graduating from college when the economy is bad. Using US and Canadian data respectively, they find large, negative earnings effects of graduating in a worse economy, which persist over a long period of time. Schwandt and von Wacter (2019) analyse the persistent effects of entering the labor market in a recession on a broad range of socioeconomic outcomes for all young workers who entered the labor market in the United States from 1976 to 2015. They find persistent earnings and wage reductions. The effects are particularly large for two groups: non-whites and high

school dropouts. Similar effects are found in Norway as well. Røed and Raaum (2006) show that individuals who face particularly difficult local labor markets when they graduate from secondary education, experience relatively high rates of non-employment during their whole prime-age career.

The empirical analyses in this paper is based on the universe of job postings from the Norwegian Welfare Administration (NAV) (2018-2020). We combine these data with group-level information from administrative registers as well. Job postings data have several advantages over survey or administrative data when the situation requires high-frequency data on the labor market: they are fairly real-time, and easily accessible to the researcher. Given that hiring new workers and generating new jobs is a costly investments for employers, and their decision to curtail or accelerate hiring, job postings data also reflects expectations for the future in a firm and work as a proxy for hires in the future.

In these data, we define jobs for youth as the top 20 occupations in terms of their pre-pandemic employment shares among young workers (below age 26). These occupations comprise about 76 percent of all jobs held by young workers. We measure the number of job postings for youth as the number of job postings in these top 20 occupations, weighted by the share of youth employed in each. Furthermore, we distinguish between entry jobs and student jobs. An entry job is the first job after graduation from the highest level of education attained by that person, while a student job is a job occupied by a young person who is also registered as a student the same school year. This distinction is not important as seen from viewpoint of the labor market or the employer side, but it is highly important for the individual. While a student job matters a lot for the concurrent welfare of students, and may provide some useful experience on top of formal education, the entry job may be crucial for the future of a worker, providing relevant experience, contacts, and the first stepping stone for the future career. We define entry- and student jobs in the same manner as we define jobs for youth.

Our results show a dramatic decline in postings immediately after the COVID-19 outbreak and a slow but not full recovery after the reopening. The average overall DiD-results compared to 2019 and 2018, conditioning on moving holidays and weekly occupational job-posting patterns, show a reduction in job postings of about 40 percent during the first lock-down period in April 2020, with a slow recovery of job postings to about 10 to 8 percent below pre-pandemic levels by the end of the year. Occupations for youth were much more volatile. The decline during the first two periods of the pandemic was considerably larger for youth compared to all occupations, 63 versus 40 and 45 versus 30 percent during the first two lock-down periods, and furthermore, the bounce back during the summer was larger. During the second and third lock-down periods, occupations for youth again responded with a larger cut-back than for all occupations, and postings for youth reached a shortage of 23 percent during the last weeks of 2020. Occupations most prevalent for students took a middle position during the decline and remained at a not significant level of around 15 percent shortage throughout the fall.

The overall size of the relative fall in job postings are almost on par with recent international evidence from the US and Sweden (Hensvik at el., 2021, Forsythe et al., 2020a). We find that jobs for younger workers were hit harder than other jobs. Entry jobs for youth with lower education, typically

the first job after completed education, were hit the hardest. Entry jobs for youth with higher education experienced a smaller decline than lower skilled jobs. Jobs for prime age workers were less affected by COVID, again with an educational difference, with jobs for prime age workers with higher education being the type of jobs that experience the smallest decline.

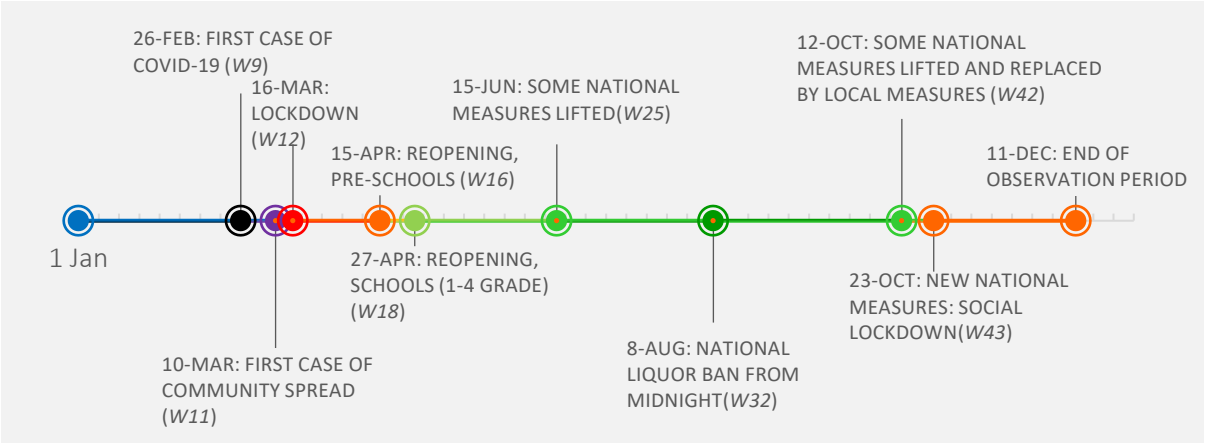
The paper proceeds as follows: We describe background information on COVID-19 rates and mobility in section 2. In section 3, we present descriptive evidence on jobs, hires, separations, and vacancies. In section 4, we present the data and methods used. Section 5 presents results for job posting by different group of workers, section 6 presents job postings for young workers and entry-level occupations, and section 7 presents job postings for prime age workers. Finally, section 8 concludes.

2. Background: COVID-19 infection rates and mobility

The first case of COVID-19 was confirmed February 26th 2020 in the city of Tromsø. As shown in the timeline in figure 1, the first case of community spread was detected March 10th and the government immediately ordered businesses to facilitate remote work and the population to maintain social distance. March 12th, the Norwegian government announced drastic measures of social distancing and administrative closings of establishments: Schools and universities closed, cultural and sporting events were prohibited, gyms and pools, hairdressers and other personal and beauty salons closed. Bars, cafes and restaurants were ordered to close unless they were able to maintain the required distance between their guests.

At the same time, the Norwegian government took several measures to protect workers and jobs. On the firm side, they reduced the period from announcement to furlough from 14 to two days, reduced the days where employers have to pay wages to their furloughed workers from 15 to two, in addition to delays of several tax payments and direct cash benefits to firms. On the worker side, they extended unemployment insurance coverage and increase benefit levels. The drop in employment after the lockdown took effect in week 12 was dramatic. Four weeks after the lockdown, nearly 310 000 *new* individuals filed unemployment benefit claims (Gjerde et al 2020; Alstadsæter et al 2020). In mid-April, reopening of the society started. At first, in week 16 and 17, pre-schools and 1st to 4th grade of elementary schools reopened with somewhat limited opening hours, smaller groups sizes and strict hygiene regimes. In May 2020, some restrictions were lifted: By week 20 all schools from pre-school to high-school were open, and by week 25 (June 15th) most of the businesses that were forced to close was open, some with social distance restrictions, for instance bars and restaurants, pools and sport arenas.

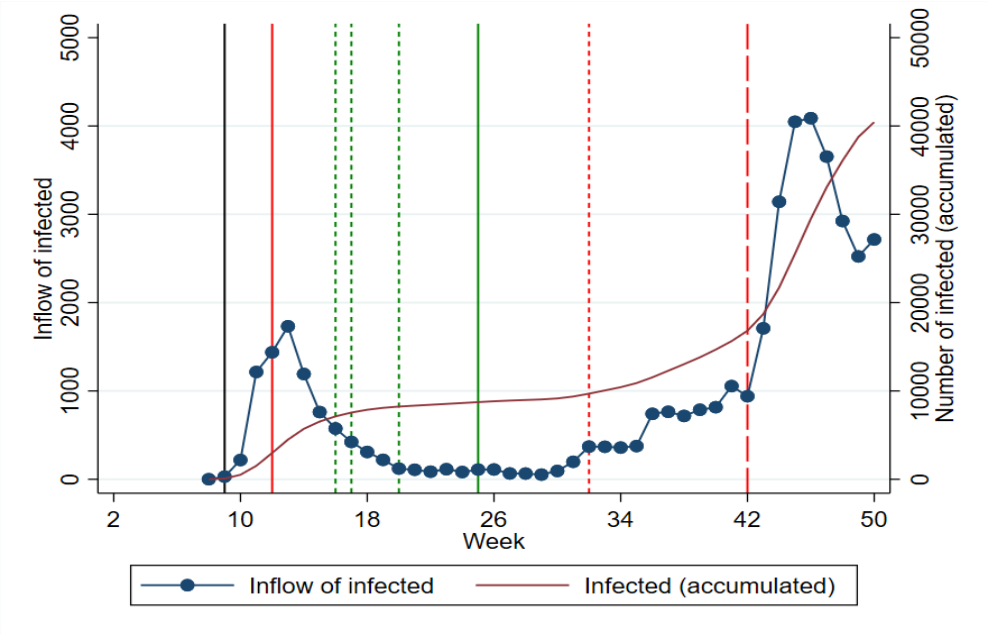
Figure 1. Timeline of COVID-19 policy responses in 2020



The COVID-19 outbreak, measured by the inflow of new infections, has been moderate in Norway overall compared to both Sweden and Denmark. But infections has been concentrated in certain regions and communities, and the variation in infection rates within and across municipalities has been substantial. After the outbreak in week 9-10, the number of registered infected grew fast until week 15, after which the curve flattened until week 31. As for many other countries, in the initial phase, a smaller share of the infected were in fact tested and registered which makes comparison across time less informative. Additionally, vulnerable groups were exposed, such as elderly homes, and the rate of hospitalized and intensive care patients grew fast. The initial lock-down after week 12 was successful in containing the virus, as is seen in Figure 2, but in line with the development in other European countries, infection rates increased after the summer holiday. Throughout the autumn, infection rates rose to the same level and even higher than April 2020. Opposite to the situation in April though, hospitalizations and deaths at the outset of the second wave was not increasing at the same rate as infections (shown in figure A1 in the appendix). The total number of COVID-related deaths was 274 by week 39, corresponding to 50.7 per million inhabitants. In comparison, Sweden had 574.8 COVID-deaths per million, Denmark 111.8, UK 630 and the US 622.2 deaths per million inhabitants.[3] Following this surge in infections, new restrictions were put in place in week 33 when a national liquor ban was implemented, prohibiting sale of alcohol in bars and restaurants after midnight. In week 42 and 43 a social lock down was announced, with strong advice to work from home and strict restrictions on social mobility.

[3] https://www.fhi.no/contentassets/8a971e7b0a3c4a06bdbf381ab52e6157/vedlegg/andre-halvar-2020/2020.09.30-ukerapport-39-covid-19.pdf

Figure 2. Number of confirmed infected individuals in Norway by week of testing (2020).



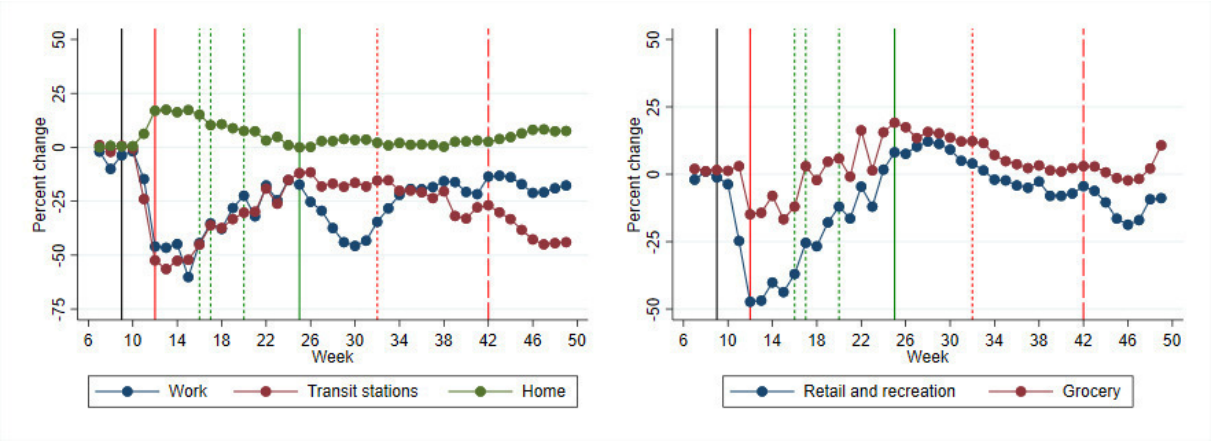
Note: Each vertical line corresponds to the policy changes in figure 1

The first lock-down and the following reopening is also easily seen in the mobility trends in Figure 3. There is a clear drop in mobility to work and transit stations, as well as to places of retail and recreation, and grocery-stores. As the society opened again after week 16, mobility increased. These trends also reflect some seasonality. The summer holiday affect mobility to work, retail and grocery stores, between weeks 26-33. However, time spent at work is not back to the same level as in January 2020, neither the mobility to transit stations.[4]

Although we cannot distinguish the seasonality from the COVID-19-related reduction in mobility we note that these trends coincide in time with the policy changes and number of registered COVID-19 infections, presented in figure 1 and 2. We treat the period after week 8 as our post COVID-19 period based on the fact that week 9 marks the first confirmed case and that there were an increase in the population's awareness of the virus, illustrated by the Google Trends analytics in Figure A4 in Appendix A1.

[4] Percent change in the time spent at work, transit stations, in retail, grocery, parks, and at home in Norway, by region, is presented in Figure A2 and A3 in Appendix.

Figure 3. Percent change in the time spent at work, transit stations, home, retail and recreation, and grocery stores in Norway.



Note: The data is provided by Google's COVID-19 Community Mobility Report and include users who have opted-in to Location History for their Google Account. Baseline is the median value for the corresponding day of the week during the period January 3rd - February 6th. These figures show mobility trends as an average of each day of the week for (1) work, (2) transit stations, like subway-, bus-, and train stations, and (3) place of residence (4) places of retail and recreation, such as shopping centers, museums, libraries, theatres, movie theatres, bars, cafes and restaurants, (5) grocery stores, food warehouses, food markets and specialty food shops and pharmacies. More information can be found at: https://www.google.com/covid19/mobility/ (Uploaded 21-01-2021). Each vertical line corresponds to the policy changes in figure 1.

3. Jobs, hires, separations, and vacancies

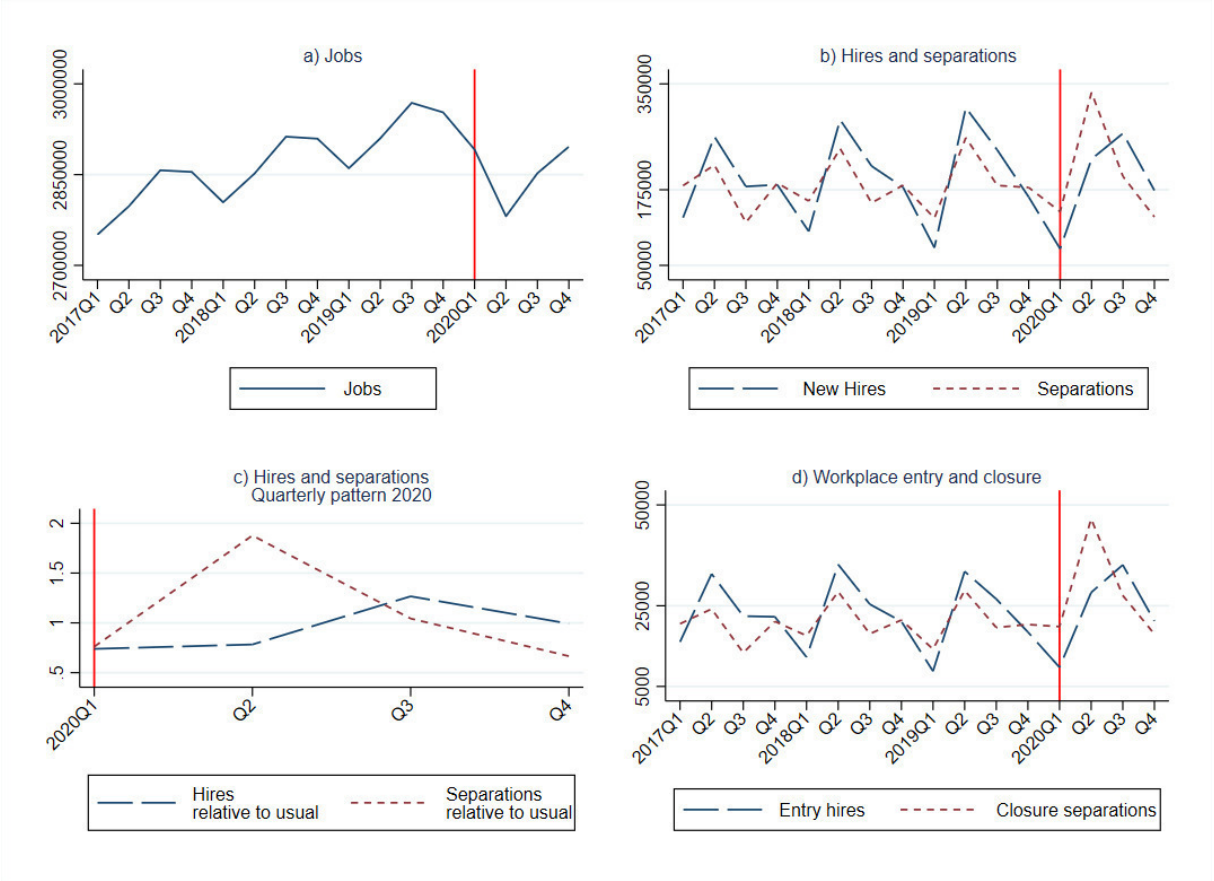
The outbreak of COVID-19 in week 9 and the lockdown that took effect in week 12, had an immediate effect on the labor market: There was a dramatic drop in in the number of jobs, hires and posted vacancies. In 2017, 2018 and 2019, the number of jobs in the economy grew in the first and second quarters, but there was a slight reduction from the fourth quarter to the first quarter the next year.[5] As shown in Figure 4 panel a), this pattern was broken in 2020. The number of jobs kept on falling in the second quarter, and the increase from the second to the third quarter appear to have been smaller than that of previous years. In panel b) we see the underlying process: the number of exits surged during the first half of 2020, while at the same time the number of hires dropped. In panel c) we examine these changes in 2020 relative to the previous years' average quarterly pattern. What really stands out is the massive increase in separations in the second quarter.

In panel d) we see that the pattern of hires and separations associated with workplace entry and exit are strongly reminiscent of the pattern of all hires and separations. Comparing panel b) and d) shows that in terms of the level of separations, workplace closures represent around 15 percent of all closures. However, if we focus on the growth in separations from workplace closures from second quarter 2019 to second quarter 2020 and compare this to the similar second quarter growth for all separations, we see that the former was more than 30% larger than the latter in relative terms. In contrast, the decline from

[5] The number of jobs is larger than the number of employees in the economy since many workers may hold multiple jobs.

second quarter 2019 to second quarter 2020 for all hires relative to the decline for hires related to workplace entry was much larger for the former than the latter. Thus, relatively speaking the pandemic yielded the strongest impulses to separations following from workplace closures and to hires following job openings at existing workplaces. Some of this might be explained by workers on furlough, which do not change jobs.

Figure 4. Jobs, hires and separations during 2017-2020.

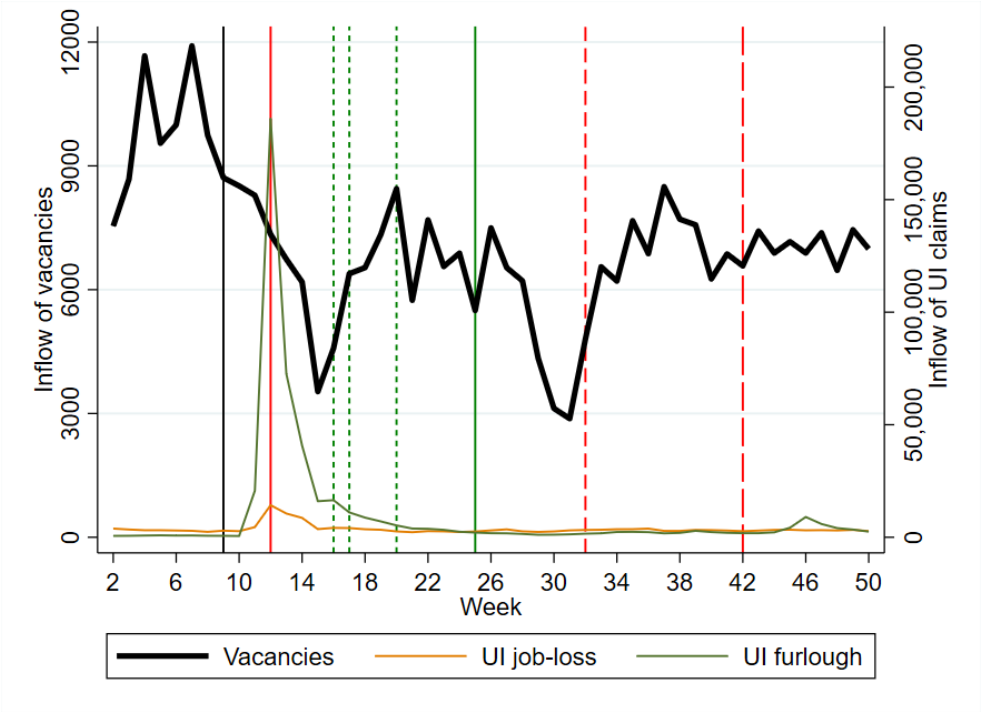


Note: The figure reports the number of jobs (panel a)), the number of hires and separations (panel b)) and the number of hires and separations related to workplace entry and exit (panel d)) for quarters in 2017-2020. Panel c) reports the 2020 quarterly hires and separations relative the quarterly average of the previous three years. Source: Statistics Norway's table 12316 and 12820 supplied aggregated quarterly Employment register figures for hires and separations in 2016. Each vertical line corresponds to the start of the lockdown in March 2020, see timeline in Figure 1.

In this paper we analyse the process *preceding* the number of hires: the number of job postings that the firm advertise to fill their vacancies. Immediately after the COVID-outbreak, we had a massive drop in vacancy postings coupled with an historic increase in the inflow in unemployment insurance claims (both job-loss and furlough). In week 12, when the first lock-down was ordered, there were 26 000 new unemployment insurance claims on average each day, also counting weekends. This corresponds to an average of 18 registered claims per minute. The magnitude of the labor market shock is visualised in

figure 5 by the weekly inflow of new vacancy postings in 2020 (left y-axis) and weekly daily inflow of new unemployment insurance claims (right y-axis).

Figure 5. Inflow of job postings and unemployment insurance claims per week.



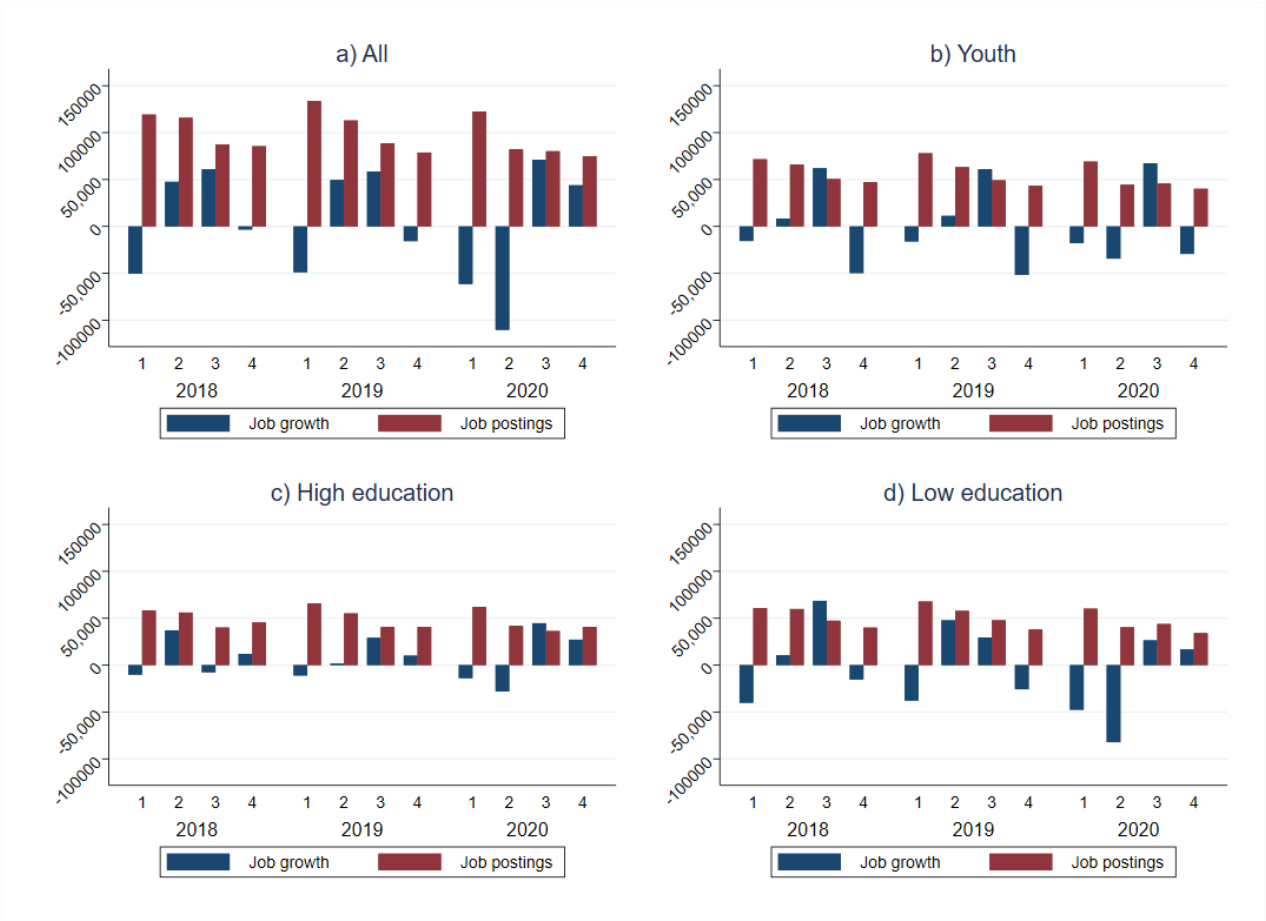
Note: This figure plots the weekly inflow of vacancies and the weekly inflows of unemployment benefit claims per week in 2020. Each vertical line corresponds to the policy changes in Figure 1.

Other economies experienced similar vacancy-drops at the outset of the pandemic. Forsythe et al. (2020b) study the US labor market in the early phase of the pandemic and the find a 44 percent decline in postings from the week of March 15 to the week of April 26. This is in the same range as Sweden, where postings dropped by 40 percent from week 9 to week 17 (Hensvik et al. 2021). The comparable drop in Norway, from week 9 to week 17, was 27 percent. Similar to what is shown in the US in Forsythe et al (2020b:28), the Norwegian economy experienced initially a massive hike in non-employment caused by furloughs, which diminished over time. As seen in Figure 5, the Norwegian inflow to regular unemployment in general was not very enlarged. This is suggestive evidence that the Norwegian labor market coped fairly well during the first phase of the pandemic, compared to the US and Swedish labor markets. We undertake a somewhat more rigorous comparison with the Swedish labor market, reported in Appendix A.4 that shows results consistent with this conclusion.

Vacancy postings reflect the combination of two processes: the demand for labor in new jobs and the demand for replacement hires. These processes vary over time (across quarters), between groups of occupations, and between industries. In figure 6, we compare job growth with postings each quarter of each year for four groups in the labor market: job growth and posting in the entire labor market, job

growth among young individuals (under 25 years) and postings in occupations for youth[6], job growth among low- and high-skilled individuals and postings in low- and high-skilled occupations. Job growth is defined as the quarterly employment-level changes.

Figure 6. Job growth and job postings, per quarter and year.



Note: The figure reports the number of new jobs and new job postings for groups of workers and occupations. Quarterly job growth is defined as changes in job levels from the previous quarter to this quarter. Source: Own calculations on data from Statistics Norway's table 12820: Jobs, by sex, age and educational level (for job growth), and from Arbeidsplassen.no (arbeidsplassen.nav.no) owned by the Norwegian Welfare Administration (for job postings).

In general, the quarterly patterns of vacancy postings within a year corresponds with a lag of one quarter to the quarterly job growth pattern: high intensity of job posting the two first quarters in a year correspond to positive job growths 2nd and particularly 3rd quarter, the lower intensity of vacancy postings in the two last quarters correspond to job declines in quarter 4 and quarter 1. This seasonal pattern, shown in panel a) in figure 6, is clearly more evident for the low educated workers (panel d)), and not present when it comes to employment changes for the high educated workers (panel c)). The trend in vacancy postings corresponds well to overall job growth for most groups pre COVID-19, except

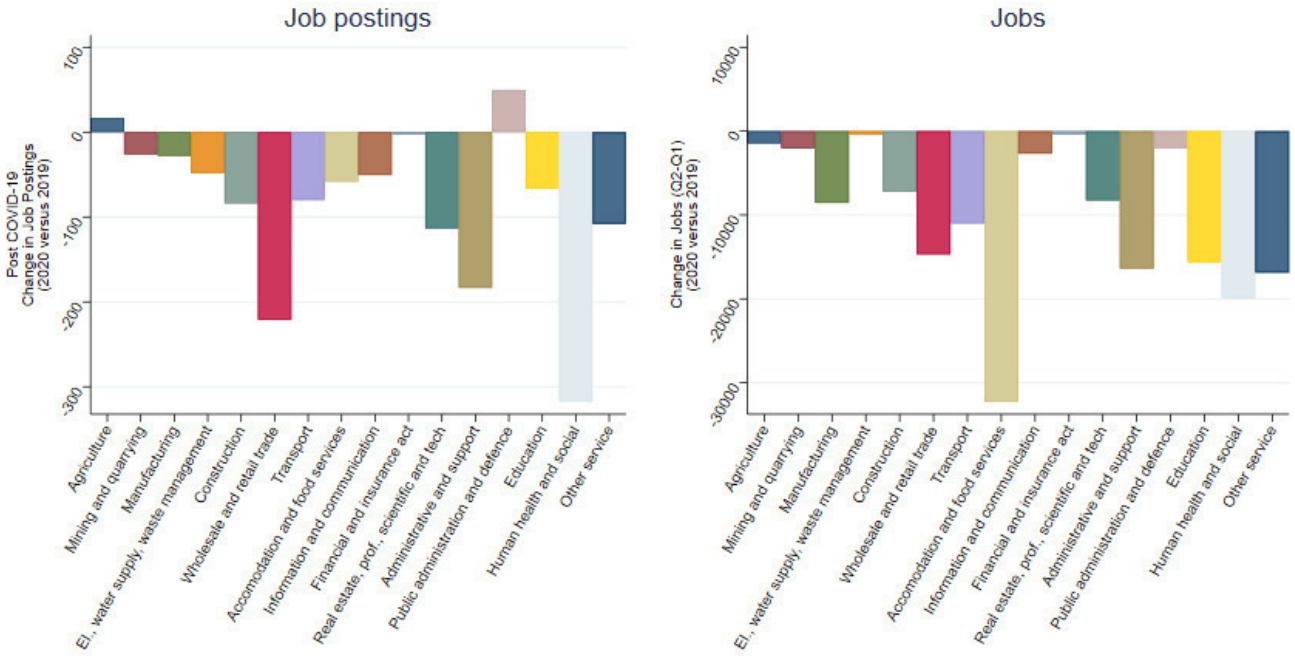
[6] jobs for youth is defined as the top 20 occupations in terms of pre-pandemic employment rates among young workers (below age 26)

among high skilled. In this group, most hires and separations are job-to-job pre COVID-19, and it is more likely that quitters in this group leave productive jobs that remain open for replacement hires. This indicates that job postings are more likely to be replacements rather than creation of new jobs per se.

Among low skilled, diminishing employment levels and posting intensity drops are strongly related, thus it is more likely that a separation is in fact a destruction of a job, and that a hire is creation of a new job, rather than being reallocation in this group of workers. Therefore, it seems reasonable to view the change in vacancy postings post COVID-19 as a good proxy for labor market demand and future employment possibilities. While the first quarter of 2020 follows the standard pattern, COVID-19 hits the Norwegian labor market massively in the second quarter of 2020, with an enlarged drop in second quarter vacancy postings and a massive and unusual employment drop. This reflected both a hike in dismissals and layoffs as well as a fall in the need for replacement hires. In the third and fourth quarter, with nearly a normalised economy as COVID-19 levels was mostly low until the end of 2020, vacancy postings revealed a normal pattern and levels, while employment levels bounced back.

As shown above, the post COVID-19 change in postings follows the post COVID-19 decline in jobs. We provide a closer inspection of this relationship in figure 7, where we compare the post COVID-19 change in vacancy postings by industry to number of jobs in these industries using data from Statistics Norway's quarterly employment statistic on jobs. The results come from a simple difference-in-difference (DiD) estimation, comparing the change from pre-period (week 2-8) to a post-period (week 9-50), in 2020 versus 2019. The pandemic has affected postings and employment in all industries, some more than others. Accommodation and food services are hit particularly hard in terms of employment, although the drop in postings is modest. Overall, figure 7 indicates that the effect of the pandemic on job postings is a good indication of how the labor market is affected in somewhat real-time, and it reflects expectations for employment in the near future.

Figure 7. Industry distribution of Post COVID-19 declines in job postings and jobs.



Note: The figure reports difference- in- differences estimates. In the specification with vacancy postings, the post-period is defined as week 9-50. As the job data is only available on quarterly basis, we define the post period as the second quarter onwards, but as postings are a predecessor of actual new jobs, the comparison is reasonable despite the small discrepancy in timing. Source: own calculations on data from Statistics Norway table 12316: Jobs, job growth, by industry.

4. Data and methods

The data used in this analysis consists of all posted job listings in Norway.[7] Job postings are collected from Arbeidsplassen.no (arbeidsplassen.nav.no), which is a digital self-service portal for employers and job-seekers, owned by the Norwegian Welfare Administration. Postings in Norway are collected in this portal from all large private and public job boards in Norway, in addition to postings that are registered at NAV directly, announced in newspapers and journals etc. Firms can post vacancies and screen applicants, while job seekers can search and view ads and apply to posted vacancies through the portal.

Our vacancy data comprise the universe of postings in 2018, 2019 and 2020 up through week 50. We aggregate the data on weekly basis and include full weeks only, meaning that we leave out week 1). We restrict our attention to postings of jobs located in Norway. Our working dataset contains a total of 650 000 postings in 2018, 2019 and 2020.

We have a wide range of information on each posting, such as geographical location, occupation (4 digit ISCO-08) and industry (NACE 07), number of positions posted, the date of publication, which is the first day the public can view the ad. We do not have information on wages or skill requirements

[7] These data are posted as a public-use file on the National Welfare Administration's portal.

from the vacancies, as they normally are not posted. Therefore, we assign occupation specific information from other data sources. We collect employment shares in 2019 for each 3-digit occupation by demographic groups using administrative employer-employee register data from Statistics Norway, combined with administrative data on demographics and education. From the Labor Force Survey (LFS) we identify entry-level jobs, and we use information from O*NET to identify the required skill-level/level of preparation in occupations.[8] We also use O*NET to identify remote/telework occupations. Additionally, we compare our job posting data with aggregate data on jobs, hires and separations. These data are extracted from official statistics from Statistics Norway, specifically *Table 12316*: Jobs, job decreases, and job increases, by industry division, and *Table 12820*: Jobs, hirings and terminated hirings, by sex, age and educational level.[9]

Methodologically, we apply a combination of simple descriptive analyses and regression analyses. More specifically, we apply variants of difference-in-differences (DiD) analyses. In the most elaborated DiD-analysis, we analyse the effects of the pandemic on occupations relevant for different groups of workers. The unit of observation is occupation times week, and the number of job postings per occupation and week is the key variable we study.

The number of job postings directed towards a particular group, for instance youth, is defined as the weighted sum of job postings for the top 20 occupations for youth in terms of their share of employment among youth. The occupation's share of employment among youth is defined as $s_{y\omega}=n_{y\omega}/N_y$ where $n_{y\omega}$ is the number of youth in occupation ω, and N_y the total number of employed youth, both measured in May 2019. The weights are defined as the share of employees in each occupation who are youth, $\alpha_{y\omega}= n_{y\omega}/N_\omega$, where N_ω is the total number of employees in occupation ω. In general, for each group g (youth, students, entrants and so on) the inflow of job postings during week t is calculated as $JP_{gt} = \sum_{\omega \in g20} \alpha_{g\omega} JP_{\omega t}$ where $JP_{\omega t}$ is the number of job postings in occupation ω and g20 is the set of occupations with the highest employment share, $s_{g\omega}$, among the members of the group.

Our key descriptive statistics is the *vacancy ratio* for each week t=9,…50 after the onset of the pandemic in 2020, relative to the average levels in the same week of 2018 and 2019, normalized by the average level of job postings in the pre-pandemic weeks 2-8 the same year:

$$VR_{gt} = \frac{JP_{gt}^{2020}}{(JP_{gt}^{2020} + JP_{gt}^{2020})/2} \frac{\overline{JP}_{gt\in 1:8}^{2018-2019}}{\overline{JP}_{gt\in 1:8}^{2020}}$$

$\overline{JP}_{weeks}^{years}$ is the average number of job postings of the pre pandemic weeks each year. The vacancy ratio is depicted graphically for all and for each group of occupations below.

In our difference in difference analyses, job postings in 2020 represent the treatment group and year 2018 and 2019 are the control groups. The specification of post-periods, denoted $\tau = 1,2,3,4,5,6,$ are as follows: 1) week 9-11, which is the period after the first COVID19 case appeared in Norway

[8] O*NET: https://www.onetonline.org/
[9] https://www.ssb.no/en/statbank/list/arblonn/

until the lock down took effect in week 11; 2), week 12-16, which is the period of the first lock-down; 3), week 17-24, which is the first reopening phase when pre-schools and elementary schools reopened; 4), week 25-32, which was the reopening phase 2 when all schools and most of society opened again, including the summer holiday in July and beginning of August, which was a pretty open period with more domestic and international mobility; 5), week 33-42, which was the period where the government announced a halt in the reopening, and finally 6), week 43-50, a period where "social lock-downs" were introduced. The pre-period is week 2-8.

In section 6 and 7, where we present our main results. We estimate the following equation for each sample included in group g:

$$(1) \qquad \ln(jp_{\omega t}) = \sum_{\tau=1}^{6} \theta_\tau Treat \times \tau + \gamma_y Treat + \gamma_{w\omega} + \gamma_m + u_{\omega t}, \quad \omega \in g$$

Where $jp_{\omega t}$=ln($JP_{\omega t}$) and *Treat* is year 2020. The unit of observation is occupation times week, the samples are limited to occupations within group g, and all regressions are estimated using the group's share of employees in each occupation, $\alpha_{g\omega}$ as weights. The coefficients of main interest are θ_τ, which are the DiD-coefficients measuring the difference in posting from weeks 2-8, to the 6 post-periods in 2020, compared to the same differences in 2018 and 2019. Since the post-periods encompass all weeks after week 8, γ_y captures the difference in the pre-pandemic period in 2020 relative to the same period (the first 8 weeks) of the reference years. $\gamma_{w\tau}$ represents occupation dummies that may vary each week, allowing for occupation specific job posting patterns over the year, and γ_m represents moving holiday effects, where we distinguish between the Easter-week and other single moving holidays.

Our main variable of interest is new vacancy postings. It measures total number of new posted vacancies in a given week. Additionally, we are interested in the dynamics of vacancy postings within and across specific groups based on industry and occupation, age group, educational level and skill requirements.

We define essential occupations and industries as closely as possible to the definitions used by the Norwegian government at the outset of the pandemic. These include: health- and social services, defense, justice and juridical activities, public order and safety, fire service activities, ICT- provision and security, environmental emergency preparedness including meteorological services, supply of essential commodities, electricity and water, and financial services (The Norwegian Directorate for Civil Protection 2017).

Whether an occupation is classified as a remote/telework work occupation – meaning that workers can perform the job from a home office – is based on the recent classification from Dingel and Neiman (2020). They use a range of criteria from O*NET to classify occupations where telework is very likely or not possible. We use their definition and apply them to our data using a crosswalk on occupational codes from SOC to STYRK08 (the Norwegian standard of occupational classification).

Furthermore, we categorize occupations by their educational- and skills requirements. Firstly, we use the first digit in the occupational code to classify whether occupations require education from

college/university or higher (1-3) or high school or less (4-9). Secondly, we group occupations into categories based on their skill requirements. We use job-zones from O*NET who group occupations into five categories based on the level of education, experience and training necessary to perform the job. We collapse the two lowest categories "Little or no preparation needed" and "Some preparation needed" and use four different categories: i) Few or no skill requirements, ii) Medium skill requirements, iii) Substantial skill requirements, and iv) Extensive skill requirements.

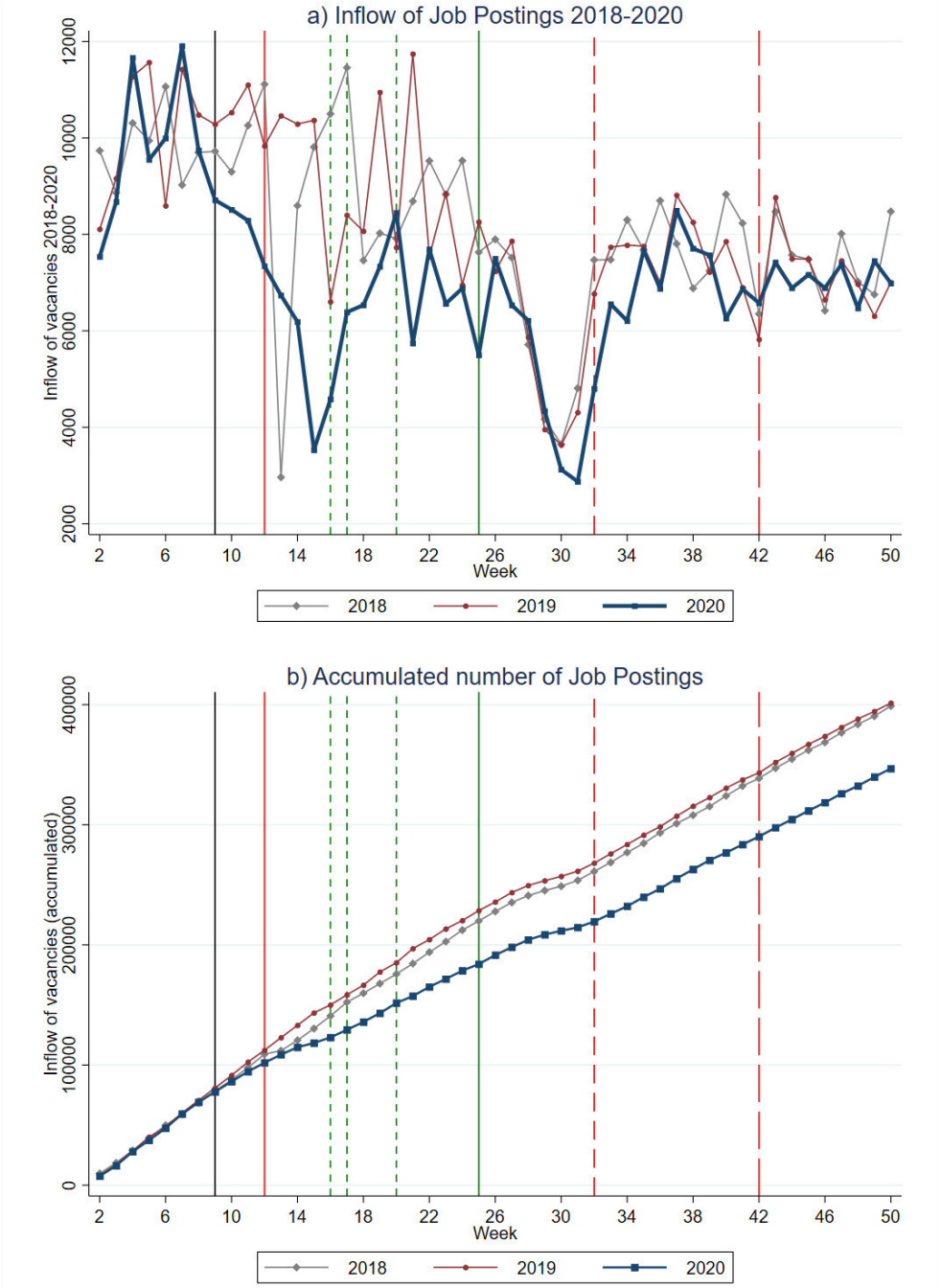
Finally, we define entry-level occupations as the 20 largest and most common occupations among young employees (aged 16-25 years) using the Labor Force Survey and the employer- employee register in 2019. These 20 occupations account for more than 70 percent of the employed in this age-group.[10]

5. Job Posting Dynamics by Group

The drop in vacancies after the outbreak of the pandemic in 2020 was a distinct break in the trend of vacancy postings, as shown in figure 8 panel a), where we present inflows of postings by week. The accumulated vacancies per week in 2018, 2019 and 2020 are presented in the lower panel b). In April 2020, we had 14 000 fewer postings than in April 2019, which is nearly half of normal inflow. The accumulated inflow of vacancies in 2020 follow previous years close until week 10, before it flattens out. The gap between accumulated inflow of vacancies in 2019 and 2020 is increasing post COVID-19, and there is no sign of a rebound in terms of accumulated postings in our period of observation.

[10] According to the Labor Force survey of 2019, the 20 largest occupations among 16-25 year olds are: Shops salesperson (522), Personal care workers (532), Child care workers and teachers (531), Waiters and bartenders (513), Electrical and electronics equipment trade workers (741), Nursing and midwifery professionals (222), Building and related trades workers (711), Domestic, hotel and office cleaners (911), Machinery mechanics and repairers (723), Sport and fitness workers (342), Primary school and early childhood teachers (234), Other sales workers (524), Mobile plant operators (834), Material recording and transport clerks (432), Client information workers (422), Protective service workers (541), Cooks (512), Physical and engineering science technicians (311), Software and applications developers and analyst (251), General office clerks (411).

Figure 8. Job Posting Dynamics and accumulated vacancies.



Note: This figure plots the weekly inflow of vacancies and accumulated inflow of vacancies per week in 2018, 2019 and 2020. Each vertical line corresponds to the policy changes in Figure 1.

The pandemic affected local labor markets differently. Some were impacted directly by lockdown, which reduced product and service demand – and thus labor demand – for that specific period, while others have been impacted by travel bans and the prevailing social distancing guidelines and still face restrictions in their production of goods and services (restaurants and bars, entertainment and amusement parks, for instance). More indirect effects of the pandemic work through the overall global economic uncertainty, disrupted supply chains and shifts in consumption, for instance among suppliers to industries that are directly affected or as exporters to economies more heavily affected by the

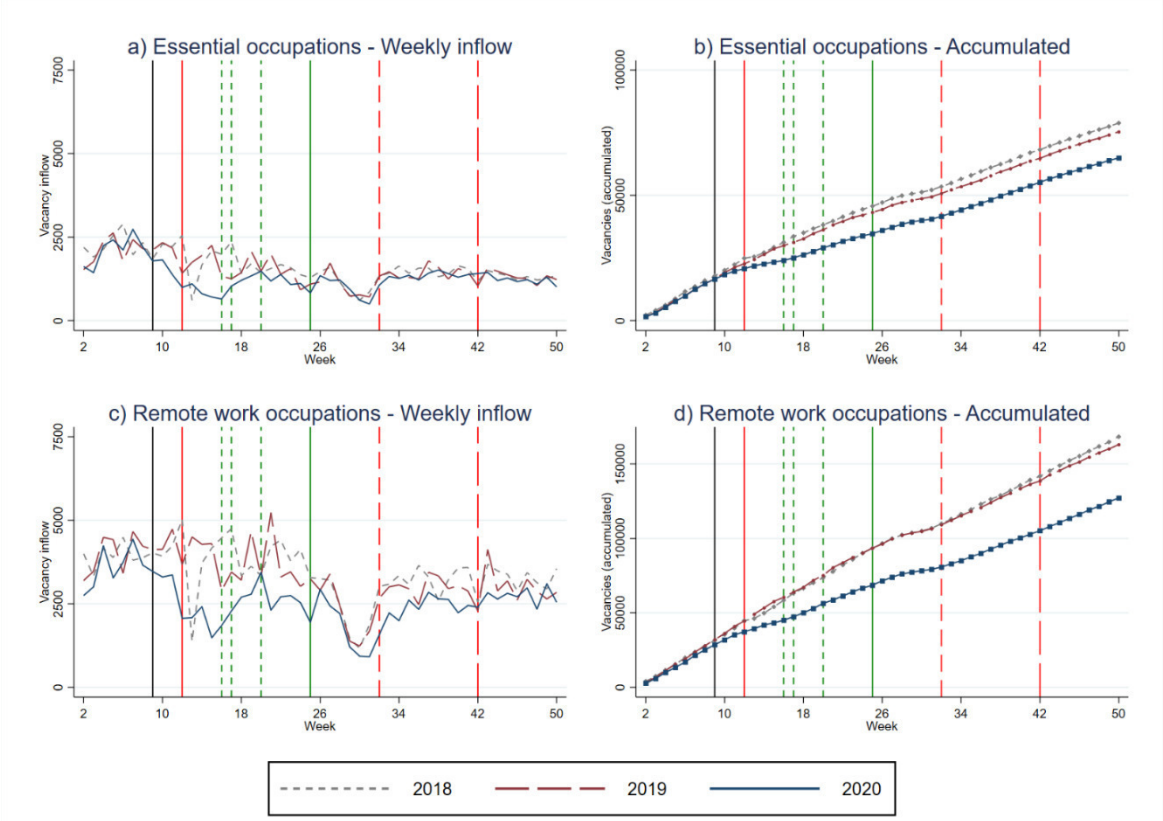
pandemic. Additionally, oil production and the supply industry were affected by the economic crisis, the instability in the global economy and declining oil price.

Most industries experienced a decline in number of postings post COVID-19, as shown in figure 7 above. Travel bans, social distancing and the lockdown hit businesses such as hotels, restaurants and bars, arts and entertainment, and recreation hard. As reported in Table A1 in the Appendix, the Accommodation industry had nearly 75 percent decline in job postings after COVID-19, while Travel agencies and tour operators had 76 percent decline. These were among the most vulnerable industries post COVID, together with Activities of membership organizations and Land transport. Furthermore, among the most vulnerable occupations we find Travel attendant, Waiters and bartenders. These faced a 65-75 percent decline in vacancy postings post COVID. The most resilient occupations are Painters, Building- and Metal workers, Teachers and health associate professionals. These report an increase in vacancies in the range of 10-70 percent. In terms of absolute number of vacancies, employment agencies is among the industries with the largest decline.[11] This may be related to travel bans and a more or less complete stop in immigration, but as jobs in employment agencies may be a stepping-stone into employment among young and vulnerable groups of workers (von Simson 2016), the decline in this sector will likely affect these groups in particular too.

We showcase this heterogeneity and investigate job posting dynamics by certain occupational characteristics. Firstly, certain occupations were deemed essential by the government and others could perform their jobs form home (Dingel and Neiman 2020). Both groups were more protected from a reduction in activity post COVID-19. Figure 9 reports the weekly inflow of job postings in weeks 2-50 in 2018, 2019 and 2020 and the accumulated inflow of job postings in the same period for essential occupations and remote work occupations respectively. Both groups faced a reduction in the inflow of vacancies post COVID-19 and an increase in job postings after the reopening. Remote work occupations remained below the level of job postings in 2018 and 2019, but essential occupations recovered to nearly the same level as in 2018 and 2019. However, the accumulated numbers reveal that vacancy postings have did not rebound in 2020: we had 8 000 fewer postings in essential occupations post COVID-19 in 2020 compared to the same period in 2019, while remote work had 23 000 fewer job postings over the same period. Although remote work occupations to some extent are less exposed to the consequences of the pandemic, a fall in labor demand due to reduced activity level of the firm, for instance due to an increase in uncertainty, affects these occupations as well.

[11] This fall is particularly large among construction workers, who already have a decline in vacancies of nearly 50 percent.

Figure 9. Job Posting Dynamics by Essential and Remote occupations. Weekly inflow and accumulated vacancies.

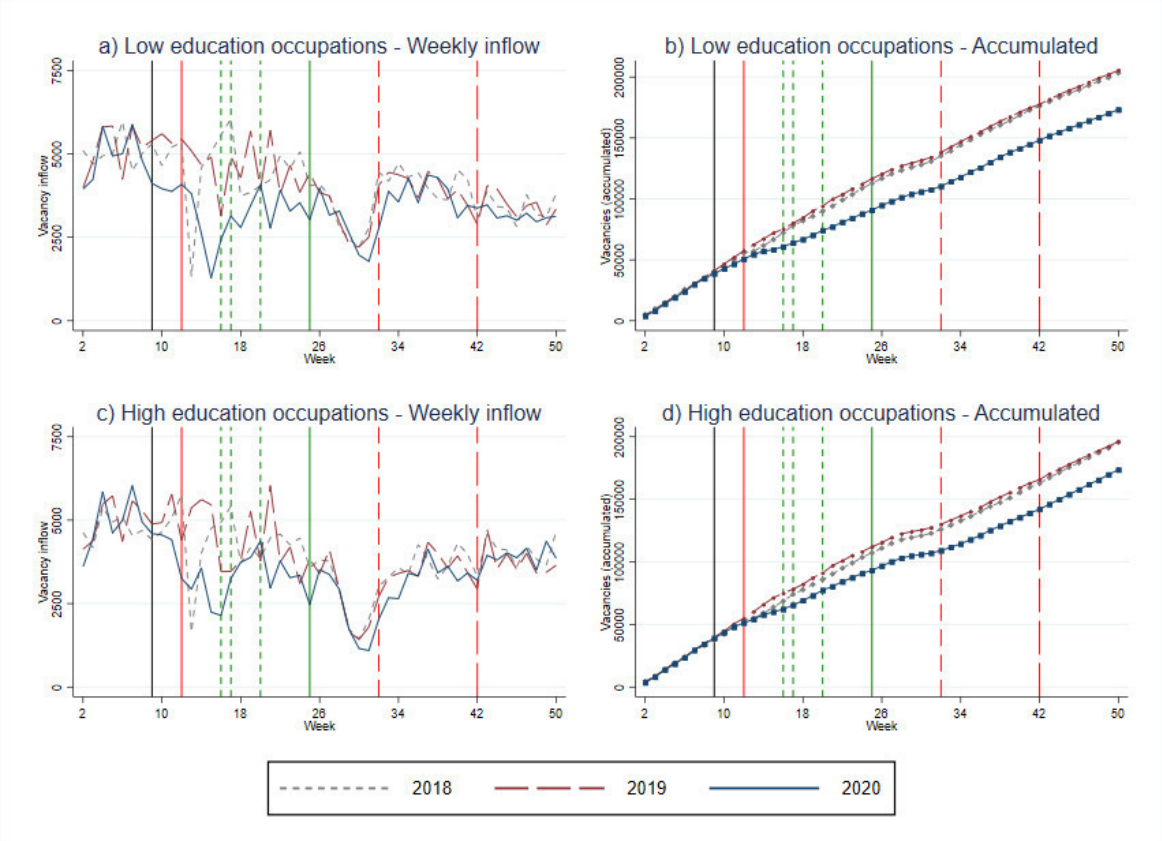


Note: The figure reports weekly inflow of posting and accumulated job postings for essential occupations defined by the announcement made by the government at the outset of the pandemic, and remote work occupations as defined by Dingel and Neuman (2020). Each vertical line corresponds to the policy changes in figure 1.

In figure 10 we split the sample by education. The two upper panels show vacancy posting dynamics for occupations that require education below college level, and the two lower panels for occupations requiring college or higher. Already from the pre-lockdown period we see that vacancies for occupations with lower educational requirements declined much more that the vacancies for occupations requiring higher education. It is also clear that postings for low educated workers declined more during the lockdown period, than postings for higher education. These differences are clearly visible in the graphs displaying accumulated job postings over the whole time period.

Occupations that require lower educational levels had a larger decline in vacancy postings than occupations that require higher education. However, level of education does not necessarily provide us with the information needed in terms of skills and training needed to do the jobs. Following Costa Dias, Keiller, Postel-Vinay and Xu (2020), we use O*NETs classification of job zones as an index of the amount of training a person would need to switch into that occupation. The level of skill requirement on job postings provides us with information on the barriers of employment in the short run for a random unemployed person.

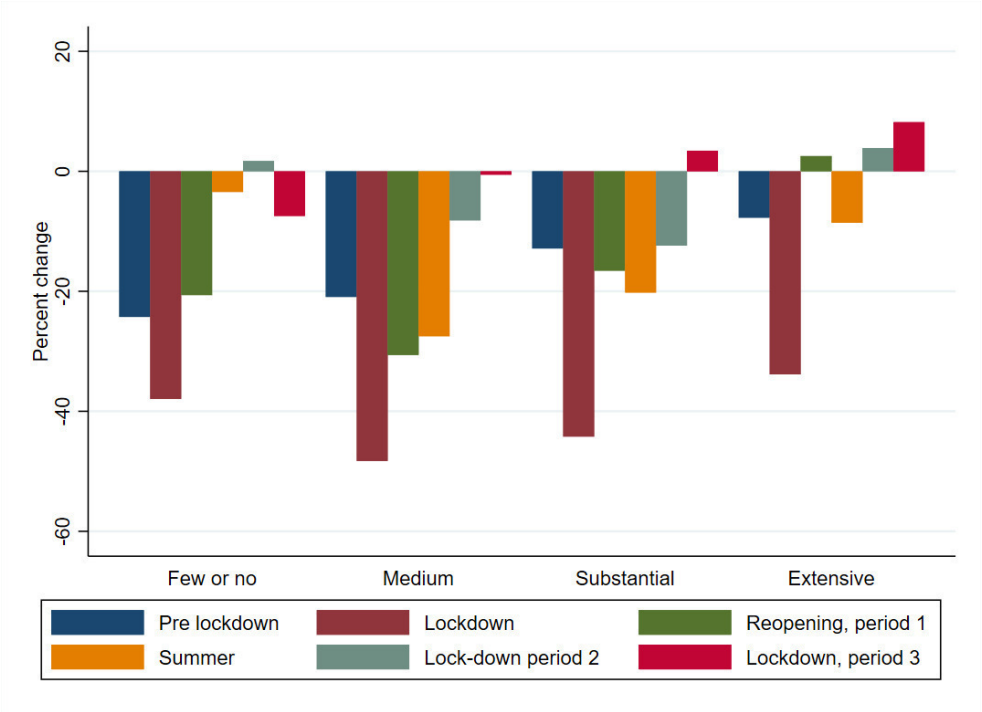
Figure 10. Vacancy posting dynamics by educational Level. Weekly inflow and accumulated vacancies.



Note: The figure reports weekly inflow of posting and accumulated job postings for occupations requiring less than college or college or more, based on the first digit of the occupational code (Low= 4-9, High= 1-3). Each vertical line corresponds to the policy changes in figure 1.

As seen in figure 11, three distinct patterns arise following the outbreak of COVID-19. First, occupations with lower or medium skill requirements experienced the sharpest decline in job postings after COVID-19. Second, the initial decline is clearly lower in occupations that require substantial or extensive skills, such Teachers or Database- and network professionals or Nurses and Medical Doctors. Third, the drop in vacancy postings is concentrated in the weeks of the first lockdown, but in the following phases of the pandemic, low and medium skilled had a sharper decline in postings. In fact, occupations requiring extensive skills experience an increase in postings (although not significant in this model), which suggests that part of the decline in vacancy postings during the lockdown was in fact postponed and put out on the market after reopening. Our results correspond to evidence from the UK (Costa Dias et al. 2020).

Figure 11. The consequences of the pandemic on the daily inflow of vacancies by skill requirement.



Note: Pre lockdown: week 9-11, Lockdown 12-16, Reopening period 1: 17-24, Summer: 25-32, Lockdown period 2: 33-42, Lock-down period 3: 43-50.

This descriptive evidence point to a heterogeneous impact of COVID-19 on labor demand, where low-educated, low-skilled and young workers and new entrants are facing a less favourable labor market conditions, which also may have long-run consequences on labor market careers. The next section focuses on the consequences of the COVID-19 pandemic on job opportunities for young workers and workers at entry-level.

6. Job postings for young workers and entry-level occupations

The drop on job postings is expected to affect the labor market prospects of young workers in particular. In this section we analyse the development in vacancies for young workers in terms of occupations for youth, student jobs and entry-level jobs. These groups of occupations represent labor market opportunities for different types of young workers and a drop in vacancies in these occupations represent potentially different consequences and future challenges for the young generation.

6.1 Jobs for youth and student-jobs

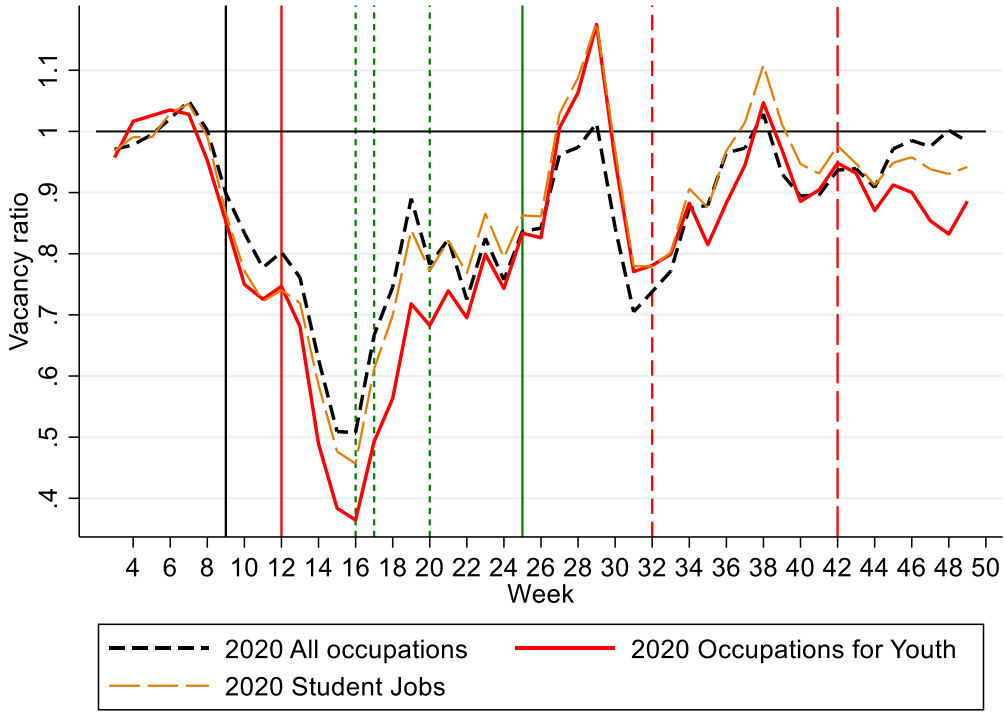
Table A3 in the appendix describes the 20 top occupations for workers below 26 years of age, measured in May 2019. The table shows both how important each occupation is for youth employment (the occupation's share of youth employment), and how important young workers are for each occupation (the share of youth in occupation). 76 percent of workers below 26 years of age are employed in these 20 occupations (3-digit level). The largest groups are Shop salespersons, with 23 percent employment share among youth, Health care assistants (11 percent), Pre-school assistants (6 percent), and Waiters and bartenders (4 percent). Young workers comprise 28 percent of Shop salespersons and Other sales, and 27 percent of all Waiters and bartenders.

We illustrate the development of vacancies for young workers by adding up the vacancies in the 20 top occupations for youth, *multiplied with the share of young workers in each occupation in 2019*, and calculate weekly number of vacancies directed towards young workers as the 3 weeks moving average of the weighted sum. Next, we calculate the ratio of these vacancies in 2020 compared to the average levels of 2018 and 2019 in the same week.

Figure 12 shows the vacancy ratio for the jobs for youth (red solid line) compared to the vacancy ratio for all occupations (black dashed line). The vacancy ratio is normalized for both groups to the same average pre-pandemic level (weeks 2-8) for 2020 as in the same weeks in 2018 and 2019.

The decline in the vacancy ratio from week 8 through week 16 is dramatic. For youth, the ratio drops below 40 percent in week 16. Between 16 and week 19 it bounces back and seems to level off at a ration around 75 percent compared to 2018 and 2019 from week 20 onwards. During the summer, the vacancy ratio increases, and for a couple of weeks even surpasses the level of the summer of 2018 and 2019. There was a new drop in late summer, a new bounce back, and then a levelling off for the remainder of the fall at about 90 percent. For youth, the bad news is a much stronger decline, while the good news is a stronger bounce back in periods of diminishing COVID-19 infection rates.

Figure 12. Vacancy ratios. 2020 over the average for 2018 and 2019. Jobs for youth, students and all occupations.



Note: The ratio of weekly vacancies (3 weeks moving average) in 2020 over the average weekly number of vacancies in 2018 and 2019. Normalized by average ratio in weeks 2-8 (pre-pandemic). Occupations for Youth are the top 20 occupations in terms employment share among youth. Vacancies for youth are calculated as the job postings for the top 20 youth multiplied with the share of youth in each occupation. Each vertical line corresponds to the policy changes in figure 1.

In Norway, as in the other Nordic countries, the share of youth who are students is high, and it is very common for students to work. Figure 13 shows this pattern for young people between 18 and 34 years of age, measured in May of 2019, a year before the pandemic. The solid red line shows the share of each age group who are registered as students; we label these students. [12] The share of students declines from almost 1 at 18 years of age to about 10 percent at age 34. The dashed yellow line shows the share of each age group who holds a job in May 2019. The share of employees grows fast to above 70 percent at 20 years of age, and levels off at about 90 percent from 28 years of age onwards.

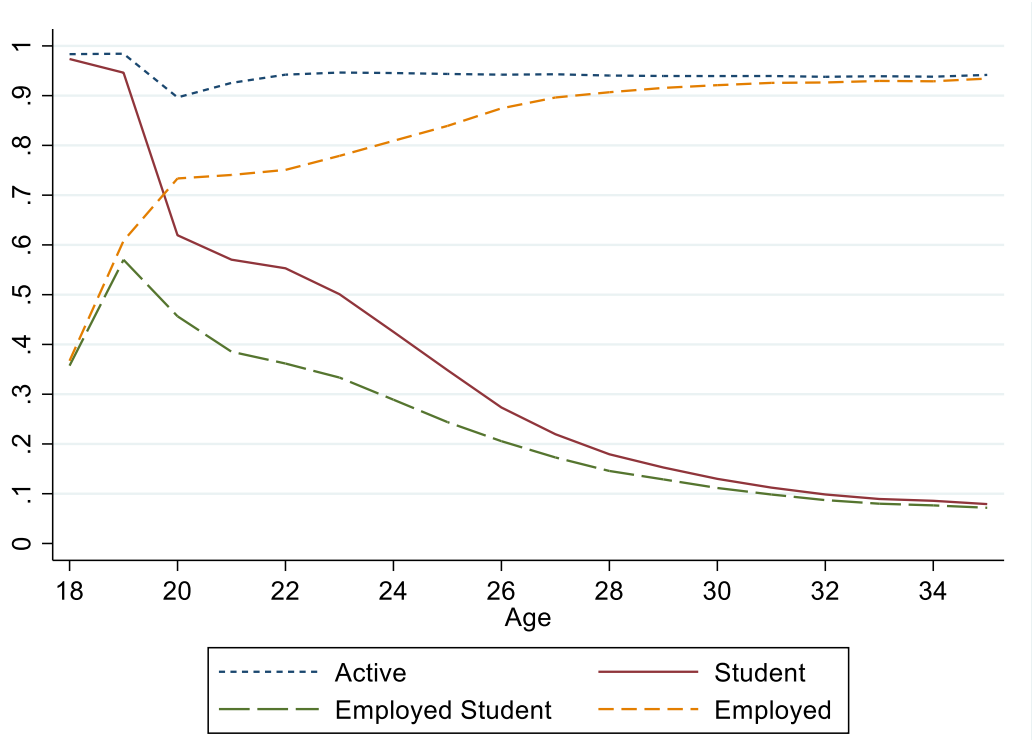
The short-dashed blue line shows the share of each age group who are either students or employed, we label this the activity rate. The activity rate has a drop after 19 years of age, most likely due to the prevalence of a "gap-year", but stays otherwise in the vicinity of 90 percent or higher. The implied NEET rate is in the range of what is reported other places (for an overview for different

[12] Date of registry is October 2018, so the number of students may include some drop outs between then and May 2019.

countries, see e.g., OECD, 2018), but may be somewhat exaggerated since it records drop-outs from school between October and May still as students in May.

The long-dashed green line shows the share of each age group who are both students and employed. At 20 years of age, about 60 percent are students, and 45 percent are both students and employed, implying that about three quarters of the 20 year old students are also employed. Above 28 years of age almost all students are also employed.

Figure 13. Employment ratios, students, and employed students by age.



Note: Employment is registered employment during May 2019, while student status is registered status as a student per the 10th of October 2018. Calculated on register data.

Table A4 provides a list of the top 20 occupations for students, the employment share among students as well as the share of students in each occupation. In this group of occupations, we find shop salespersons at the top, with an employment share of 27 percent among all employed students. The next large group is health care assistants, with 14 percent of the employed students, followed by pre-school assistants, other sales, waiters and bartenders, and building frame workers, which each employs 3-5 percent of the students. Students comprise a large share of these occupations, with university teachers (typically teaching assistants) on top (29 percent), waiters and bartenders with 22 percent students, followed by shop salespersons with 21 percent.

Table 1 shows the DiD estimates of the job postings for all, and for youths and student occupations in different periods of 2020 compared to the same weeks in 2018 and 2019. The estimated model is presented in equation (1), in Section 4. The models include a dummy for each week by

occupation, allowing the occupational effects to vary freely across all weeks of the year, and indicators for moving vacation weeks across years.

Consider all occupations first. The decline in job-postings clearly started before the lock-down. During weeks 9 to 11 job postings were 10 percent below pre-pandemic levels. During the first lock-down period, they dropped to 40 percent below pre-pandemic levels. During the re-opening period, the difference was about 30 percent, and during the summer about 20 percent. During the fall, the difference was 10 percent, and reached about 8 percent, not significantly different from zero during the last weeks of 2020.

Results in the second column show that occupations for youth were much more volatile. The decline during the first two periods of the pandemic was considerably larger for youth compared to all occupations, 63 versus 40 and 45 versus 30 percent during the first two lock-down periods, and furthermore, the bounce back during the summer was larger. During the second and third lock-down periods occupations for youth again responded with a larger cut-back than all occupations, and postings for youth reaches a shortage of 23 percent during the last weeks of 2020. The last column shows that occupations most prevalent for students took a middle position during the decline and remained at a not significant level of around 15 percent shortage throughout the fall.

Table 1. Job postings during 2020. Difference in difference estimates for youth and student jobs

	All	Youth	Student
Pre lock-down (weeks 9-11)	-0.109**	-0.234**	-0.168*
	(0.054)	(0.085)	(0.090)
Lock-down (weeks 12-16)	-0.521***	-1.031***	-0.810**
	(0.079)	(0.286)	(0.290)
Re-opening period 1 (weeks 17-24)	-0.368***	-0.596***	-0.472***
	(0.058)	(0.110)	(0.138)
Summer (weeks 25-32)	-0.225***	-0.177	-0.176
	(0.049)	(0.106)	(0.104)
Lock-down period 2 (weeks 33-42)	-0.119**	-0.171*	-0.138
	(0.046)	(0.091)	(0.101)
Lock-down period 3 (weeks 43-50)	-0.089	-0.267*	-0.187
	(0.054)	(0.132)	(0.135)
Easter vacation	-0.720***	-1.054***	-0.914***
	(0.054)	(0.128)	(0.120)
Moving Holidays	-0.276***	-0.192***	-0.197***
	(0.027)	(0.046)	(0.040)
Year 2020 (Pre-pandemic)	0.031	-0.071	-0.012
	(0.040)	(0.056)	(0.077)
Observations	16418	2939	2932

Note: The unit of observation is occupation times week. We add up the inflow of new job postings per occupation and week. The models also include a dummy for each week by occupation. Student and Youth are defined as top 20 occupations for each group, weighted by the share of each group in each occupation. Standard errors clustered by occupation. Significance *** p<0.01, ** p<0.05, * p<0.1

6.2 Entry-level jobs

While student jobs are important for the welfare of students, the first job after completed highest level of education is in addition a potential important stepping-stone for their future career. To sort out the impact of the pandemic on entry jobs after completing education, we pick the top 20 most prevalent occupations among the first jobs after graduation from the highest level of education attained. Their entry job is defined as *the main job in May 2019 for those who graduated in 2018*. We split the sample into individuals with and without a college degree (or higher) as their highest attained level. Table A5 (without college) and A6 (with college) in Appendix provides a list of the occupations for each level of education and some key statistics.

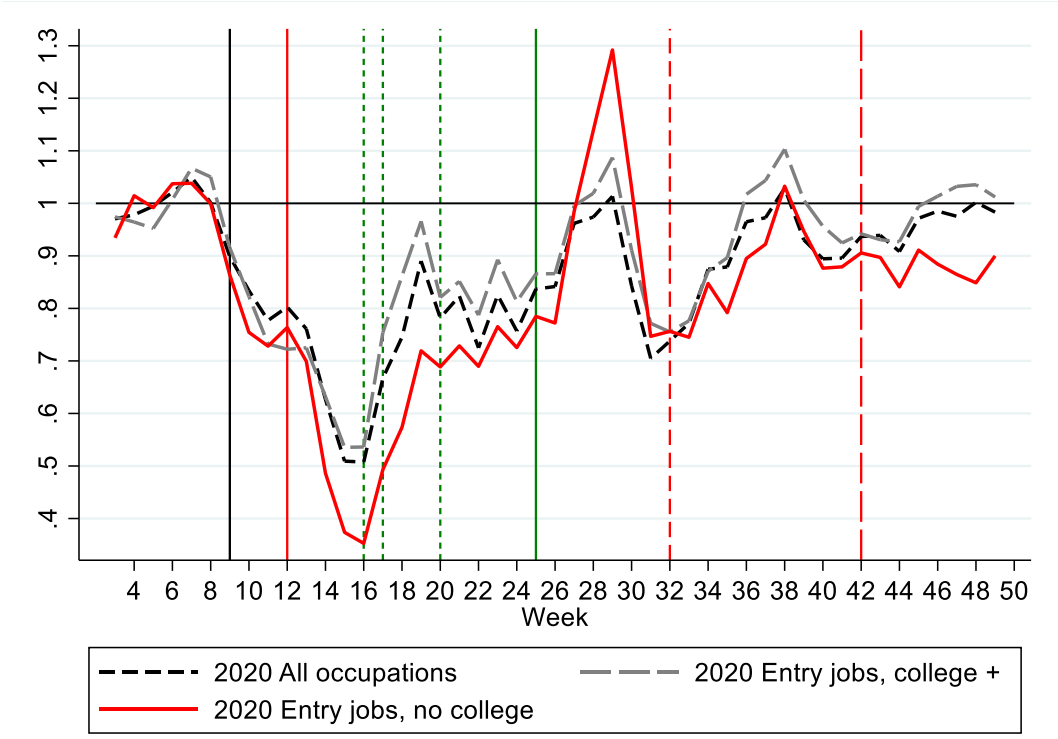
Consider first individuals without a college degree. Individuals without a college degree distinguish themselves from youth in general by having a smaller share in shop salesperson and health care assistant occupations, and a larger share in crafts such as building frame workers, electrical

equipment installer and mechanics (Table A5). The table shows that 15 percent of the first jobs after graduation are as shop salespersons, 8 percent both for health care workers and for building frame workers. Entrants with lower education comprise a much smaller part of the workforce than students or youth in general. Top occupations are other sales and shop salesperson, with only 5-6 percent new entrants.

Entrants *with a college degree* or more are in a different set of occupations. The largest occupations in terms of employment share are primary school teachers and nurses (both 11 percent), plus the two large groups for all youth: shop sales persons and health care assistants (7 and 6 percent). Entry jobs for college graduates include professionals, technicians, medical doctors, and software developers. Entrants comprise 29 percent of the workforce among university teachers, but also 22 percent of shop salespersons and waiters and bartenders.

Figure 14 shows the vacancy posting ratio during the pandemic for three types of occupations: i) all occupations, ii) entry jobs for non-college, and iii) entry-jobs for college- and university graduates.

Figure 14. Vacancy ratios for Entry Jobs (first job after graduation). For all, and with and without college or university degree



Note: The ratio of weekly vacancies (3 weeks moving average) in 2020 over the average weekly number of vacancies in 2018 and 2019. Normalized by average ratio in weeks 2-8 (pre-pandemic). Student occupations are the top 20 occupations in May 2019 for those who were registered as student in October 2018. Entry jobs are the top 20 occupations in terms employment share among the first job after graduation for individuals in 2019 who graduated in 2018. Each vertical line corresponds to the policy changes in figure 1.

The picture is clear. Entrants without a college degree (red solid line) were hit hardest, while entry jobs for graduates from college or university (grey long dashed line) were less affected than the average job

posting in the economy (black dashed line). After week 14 entry jobs for college graduates consistently do better than all jobs. Our DiD estimates reported in Table 2, confirm this picture. We report regression estimates for all, for entry jobs without college or university degree (column 2), and entry jobs with college or university degree (columns 3).

Table 2. Vacancy postings during 2020. DiD estimates for entry jobs (first job after graduation), by level of education.

	All	Without college or university	With college or university
Pre lock-down (weeks 9-11)	-0.109**	-0.243***	-0.162***
	(0.054)	(0.061)	(0.036)
Lock-down (weeks 12-16)	-0.521***	-0.959***	-0.691***
	(0.079)	(0.275)	(0.197)
Re-opening period 1 (weeks 17-24)	-0.368***	-0.500***	-0.343***
	(0.058)	(0.113)	(0.102)
Summer (weeks 25-32)	-0.225***	-0.172	-0.208***
	(0.049)	(0.104)	(0.067)
Lock-down period 2 (weeks 33-42)	-0.119**	-0.155*	-0.090
	(0.046)	(0.087)	(0.066)
Lock-down period 3 (weeks 43-50)	-0.089	-0.189	-0.080
	(0.054)	(0.123)	(0.090)
Easter vacation	-0.720***	-1.054***	-0.740***
	(0.054)	(0.125)	(0.045)
Moving Holidays	-0.276***	-0.220***	-0.275***
	(0.027)	(0.049)	(0.041)
Year 2020 (Pre-pandemic)	0.031	-0.098*	-0.022
	(0.040)	(0.053)	(0.047)
Observations	16418	2939	2940

Note: The models also include a dummy for each week by occupation. Entry jobs are defined as top 20 occupations for each group, weighted by the share of each group in each occupation. Standard errors clustered by occupation. Significance *** p<0.01, ** p<0.05, * p<0.1

Postings of entry jobs for non-college graduates declined by 21 and 62 percent during the two first periods of the pandemic. For college educated postings of entry jobs declined by 15 and 50 percent over the same periods. In the fall, the number of postings for entry jobs for college graduates declined by a not significant 8 percent and no more than the decline for all occupations.

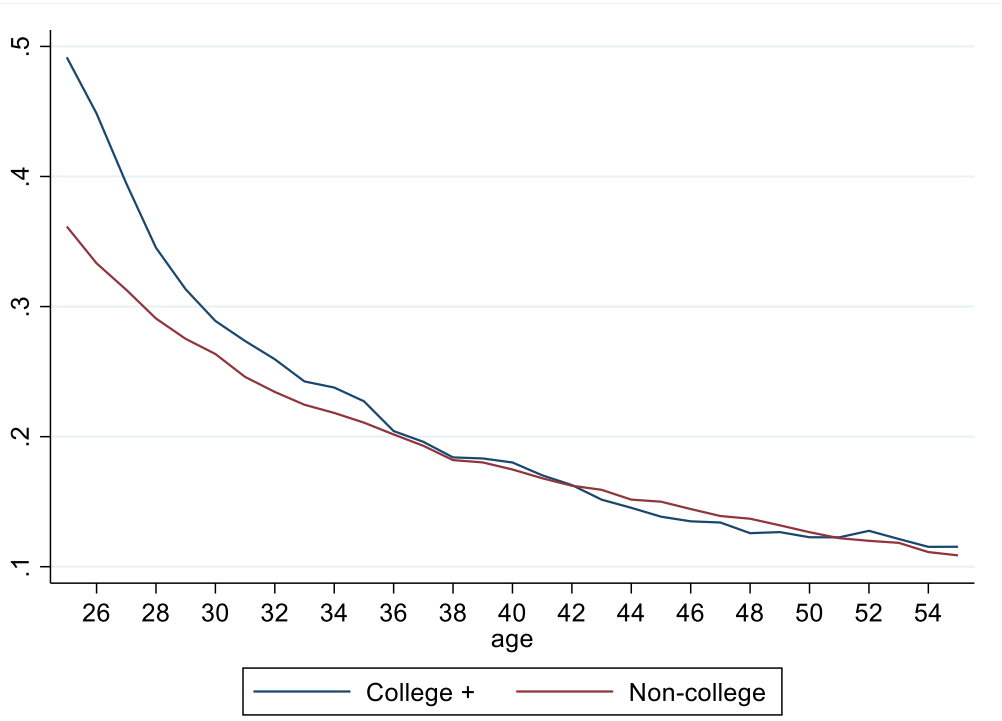
7. Job postings for prime age workers

Consider next prime age workers (age 25-54). Again we split the population in two by highest attained level of education: Those with college or university education versus those without. Table A7 in Appendix shows top 20 occupations for prime age workers with less than college education. Also for this group, health care assistants, shop salespersons, and pre-school assistants are at the very top, but for prime age workers they comprise only 7, 6 and 5 percent of employment. Prime age workers are more dispersed across occupations, and while the top 20 occupations for youth covers 76 percent of all youth employment, the top 20 occupations for prime age workers with lower education covers 58 percent of total employment. Since the prime age covers a large part of all workers, they also cover a large share of employment within in each occupation, above 50 percent for most occupations.

The top 20 occupations for prime age workers with higher education is presented in Table A8 in Appendix A3. The top three are primary school teachers, nurses, and administration professionals, covering 9, 9, and 7 percent of all jobs. The top 20 occupations cover 68 percent of total employment.

Prime age workers have more stable jobs and do less job-to-job transitions than younger workers. They are thus less vulnerable to variations in demand in the labor market. Figure 15 shows the share of prime age workers who got a new job between 2018 and 2019, measured as workers in May 2019 who were not employed with the same employer in May 2018.

Figure 15. New Hires by age and education

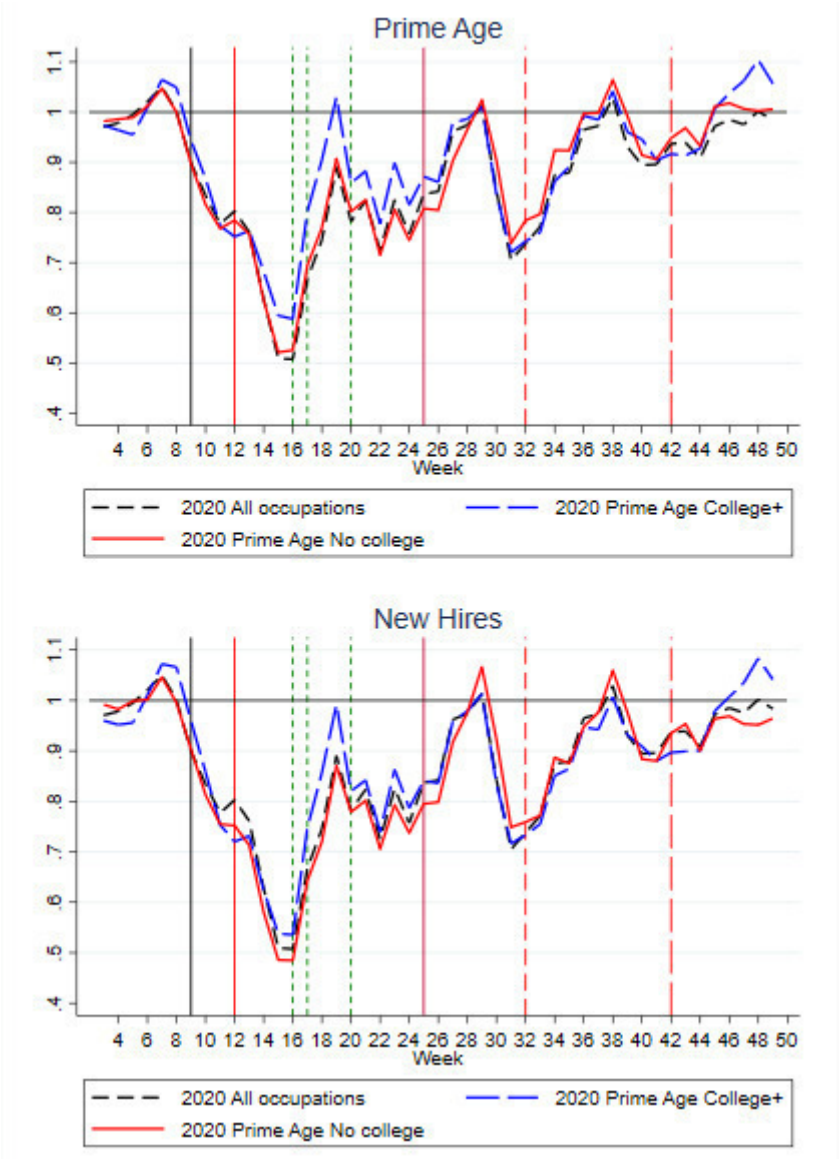


Note: Share of employees in May 2019 not employed by the same employer in May 2018.

The share of workers who are in a new job declines dramatically between 25 and 35 years of age. Until the age of 35 the share new hires are higher among the group with college or university degree. After that, the difference in shares is small. Table A7 and A8 shows the share of workers in the top prime age occupations who are new hires.

Figure 16 shows the vacancy posting ratios for the top 20 occupations for all prime age workers by education (upper panel), and for the top 20 occupations for new hires among prime age workers (lower panel), also by education.

Figure 16. Jobs for Prime Age Workers. All Prime Age and New Hires by Education.



Note: Vacancy ratios in 2020 for the top 20 occupations for Prime Age workers (25-54) and top 20 for prime age workers not employed with the same employer one year before. Occupations for prime age workers are the top 20 occupations in terms employment share among prime age workers. Vacancies are calculated as the job postings for the top 20 primary jobs multiplied with the share of prime age workers in each occupation. New jobs are defined as jobs in May 2019 for prime age workers who were not employed by the same employer in 2018, and top 20 occupations and vacancy postings are calculated in the same manner as for prime age workers. Each vertical line corresponds to the policy changes in figure 1.

Two observations stand out. First, jobs for prime age workers were less hit than the average workers, in particular the high educated workers saw a smaller decline. This observation is consistent with the previous observation that young workers were harder hit. Second, jobs for new hires among prime age workers saw a somewhat poorer development in postings than job postings for all prime age workers.

Finally, Table 3 provides the DiD-regression results. Vacancy postings for prime age workers have been hit less than vacancy postings for youth, and more in line with the average vacancy postings for all occupations. However, vacancy postings for prime age workers with low education has been hit harder than vacancy postings for prime age workers with high education. The large drop during the first lock-down period was 43 percent for prime age workers with low education and 32 percent for prime age workers with high education. After the summer, postings for prime age workers in 2020 were not significantly lower than job postings in 2018 and 2019.

Table 3. Job postings during 2020. DiD-estimates for top 20 occupations for prime age workers and new hires by education.

		Prime age workers			
		Without college or university		With college or university	
	All		New hires		New hires
Pre lock-down (weeks 9-11)	-0.109**	-0.174***	-0.176***	-0.139**	-0.138**
	(0.054)	(0.052)	(0.052)	(0.055)	(0.051)
Lock-down (weeks 12-16)	-0.521***	-0.572***	-0.645***	-0.381***	-0.465***
	(0.079)	(0.107)	(0.160)	(0.104)	(0.084)
Re-opening period 1 (weeks 17-24)	-0.368***	-0.364***	-0.414***	-0.188**	-0.221**
	(0.058)	(0.106)	(0.109)	(0.086)	(0.085)
Summer (weeks 25-32)	-0.225***	-0.241***	-0.266***	-0.162**	-0.168*
	(0.049)	(0.083)	(0.085)	(0.076)	(0.081)
Lock-down period 2 (weeks 33-42)	-0.119**	-0.074	-0.109	-0.047	-0.077
	(0.046)	(0.078)	(0.083)	(0.084)	(0.083)
Lock-down period 3 (weeks 43-50)	-0.089	-0.018	-0.089	0.039	0.015
	(0.054)	(0.073)	(0.093)	(0.062)	(0.061)
Easter vacation	-0.720***	-0.781***	-0.794***	-0.642***	-0.662***
	(0.054)	(0.061)	(0.056)	(0.050)	(0.052)
Moving Holidays	-0.276***	-0.263***	-0.268***	-0.325***	-0.312***
	(0.027)	(0.041)	(0.043)	(0.025)	(0.027)
Year 2020 (Pre-pandemic)	0.031	-0.071	-0.031	-0.069	-0.018
	(0.040)	(0.055)	(0.065)	(0.082)	(0.071)
Observations	16418	2940	2940	2940	2940

Note: The models also include a dummy for each week by occupation. Standard errors clustered by occupation. Significance *** p<0.01, ** p<0.05, * p<0.1

8. Conclusion

The number of job postings in Norway fell dramatically after the authorities ordered a lock-down on March 12th. The number of job postings declined by 40 percent during the first lock-down period from week 12 to week 16, compared to the number of job postings in the pre-pandemic period (weeks 2-8). However, there were strong signs of a decline starting already once the virus reached Norway, with a decline of 11 percent in weeks 9-11 compared to the pre-pandemic period. During the two re-opening phases in the spring of 2020, the number of job postings remained at -22 and -15 percent of the pre-pandemic level.

A decline in new jobs means fewer opportunities for unemployed workers and newcomers to the labor market. In addition, it means less opportunities for job-to-job changes and most likely lower levels of reallocation of workers across firms, hampering an important channel of productivity growth. Fewer opportunities and bleaker prospects may induce more caution in consumer spending and aggregate demand.

While the number of vacancies is the numerator in the standard measure of labor market tightness, (v/u), it is important to note that during the current pandemic, the relevant denominator has been strongly affected as well (see Forsythe et al 2020c). The high number of furloughs and temporary layoffs have affected the number of effective job searchers among the total number of unemployed. Instead of searching for a new job, furloughed workers typically wait for their old job to re-open. Thus, our analysis does not extend to a treatment of the full effect of the pandemic on the tightness of the labor market, but is focused on the effects on jobs posted in the open labor market.

The massive hike in furloughs during early stages of lock-down may also be one of the factors behind the drop in vacant jobs during this crisis. Under normal circumstances some of the furloughed workers would be moving to new jobs or into education, leaving employers with permanent vacant positions to fill. More generally, reductions in job-to-job mobility during the pandemic are likely to have weakened the vacancy chain.

The number of job postings declined even in essential occupations during the lock down period, but the essential occupations eventually reached a level close to its pre-pandemic level during the reopening phases. Remote work occupations, on the other hand, were hit more severely, and did not recover during the re-opening phases. Even if remote work occupations are less exposed to the consequences of the pandemic, they will also be affected by a drop in demand and bleaker prospect facing the firms.

Even if the decline in job postings affected both occupations requiring higher and lower levels of education, the decline was much more dramatic among occupations that do not require higher education. Also, jobs with fewer qualification and trainings requirements were hit harder than jobs with higher qualification and training requirements. The observation that jobs with lower barriers to entry

saw a bigger decline means fewer job opportunities for young newcomers, and especially for young people with lower education.

Our main analysis confirms this concern. A key result in this study is that jobs for the young were hit harder than other jobs, and that entry jobs for non-college educated worker were hit the hardest. This is particularly unfortunate since the well-established "scarring effect" implies that youth entering the labor market under less fortunate conditions may face negative consequences in the labor market also in the long run. During the lockdown period, the decline in job postings for youth was 45 percent higher than for all occupations (58 versus 40 percent of pre-pandemic levels) for all occupations, and during the reopening phases it was 39 (50 vs. 36) and 32 (29 vs. 22) percent higher. The accumulated number of vacancies lost remains high.

Entry jobs for low education graduates took the largest hit. During the pre-lockdown period, job postings in these occupations dropped by 21 percent, and during the lockdown period the decline was 56 percent, while during re-opening phase 1 it was 49 percent. For entry jobs for college or university graduates, the pre-lock down decline was 17 percent and in the following two pandemic periods it was 54 and 38 percent respectively.

The fact that low-skilled jobs and new jobs take a higher toll, tends to increase inequality. Unfortunately, since jobs for young people, and in particular entry jobs after graduation for youth with lower education, takes the highest toll, the COVID-19 pandemic may have long lasting effects for the Generation Covid. How detrimental this eventually turns out to be, depends on the longevity and severity of this crisis going forward.

Even though job postings declined dramatically during the first phase of the pandemic, a simple comparison suggests that the Norwegian labor market was not hit as hard as the labor markets in Sweden and US. While Sweden and the US saw declines in job postings around 40 percent during the first weeks of the pandemic, (see Forsythe et al 2020b and Hensvik et al 2021) the decline during comparable weeks in Norway was closer to 30 percent. However, these comparisons are not statistically significant and not sufficiently comparable to provide strong conclusions, and a more rigorous comparisons between countries are clearly called for.

References

Alstadsæter, A., B. Bratsberg G Eielsen, W Kopczuk, S Markussen, O Raaum, Knut Røed (2020), "The first weeks of the corona virus crises: Who got hit, when and why? Evidence from Norway." National Bureau of Economic Research. Working Paper 27131.

Arulampalam, W. (2001). "Is Unemployment Really Scarring? Effects of Unemployment Experiences on Wages." *The Economic Journal*, 111:585-606.

Barth, E., and K von Simson (2013), "Ulike veier gjennom videregående: Hva skjer de neste ti årene?» *Søkelys på arbeidslivet*. *30*(4), s 313- 333.

Campello, M., Kankanhalli, G., and P. Muthukrishnan (2020), "Corporate hiring under COVID-19: labor market concentration, downskilling, and income inequality." National Bureau of Economic Research. Working Paper 27208.

Costa, M. D., Keiller, A.N., Postel-Vinay, F. and X. Xu (2020), «*Job vacancies during the Covid-19 pandemic."* IFS Briefing Note BN 289. The Institute for Fiscal Studies.

Dingel, J.I. and B. Neiman (2020), "How Many Jobs Can be Done at Home? *Journal of Public Economics."* doi: https://doi.org/10.1016/j.jpubeco.2020.104235.

Forsythe, E., Kahn, L.B., Lange, F., and D. Wiczer (2020a), "Labor demand in the time of COVID-19: Evidence from vacancy postings and UI claims." *Journal of Public Economics.* doi: https://doi.org/10.1016/j.jpubeco.2020.104238.

Forsythe, E., L.B. Kahn, F., Lange and D. G. Wiczer (2020b), "Searching, Recalls, and tightness: An Interim Report on the Covid Labor Market." NBER Working Paper No. 28083.

Forsythe, E., L. B. Kahn, F. Lange, and D. G. Wiczer (2020c), "Searching, Recalls, and Tightness: An Interim Report on the COVID Labor Market." NBER Working Paper No. 28083.

Gjerde, A., M Engel Jensen, J Sørbø (2020), «Den store nedstengningen. Arbeidsmarkedet gjennom koronakrisen og scenarier for utviklingen fremover.» *Arbeid og velferd* nr.2-2020

Hensvik, L., Barbanchon, T. L. and L. Rathelot (2020). *"Job Search during the COVID-19 Crisis." Journal of Public Economics*. https://doi.org/10.1016/j.jpubeco.2020.104349

Holgersen, H., Jia, Z, and Svenkerud, S. (2020). *Labor Demand During the COVID-19 Crisis in Norway: Evidence From Vacancy Posting Data* (Working Paper, July 29, 2020). Tilgjengelig på SSRN: https://ssrn.com/abstract=3663479 or http://dx.doi.org/10.2139/ssrn.3663479

Kahn, L B (2010), "The Long-term Labor Market Consequences of Graduating from College in a Bad Economy", *Labor Economics* 17: 303-316.

Major, L. E., A Eyles, S Machin (2020), "Generation COVID: Emerging work and education inequalities." Centre for Economic performance, Working Paper No.011.

OECD (2018), *Investing in Youth: Norway*, OECD Publishing, Paris.

Oreopoulos, P, T von Wachter, and A Heisz (2012), "The Short-and Long-term Career Effects of Graduating in a Recession", *American Economic Journal: Applied Economics* 4: 1-29.

Raaum, O., and K Røed (2006), "Do Business Cycle Conditions at the Time of Labor Market Entry Affect Future Employment Prospects?" *The Review of Economics and Statistic*s 88: 193-210.

Rothstein, (2020), "The lost generation? Labor market outcomes for post great recession entrants." National Bureau of Economic Research. Working Paper 2716.

Schwandt, H., and T von Wachtel (2019), "Unlucky Cohorts: Estimating the Long-Term Effects of Entering the Labor Market in a Recession in Large Cross-Sectional Data Sets." *Journal of Labor Economics*, 37: S162-S198.

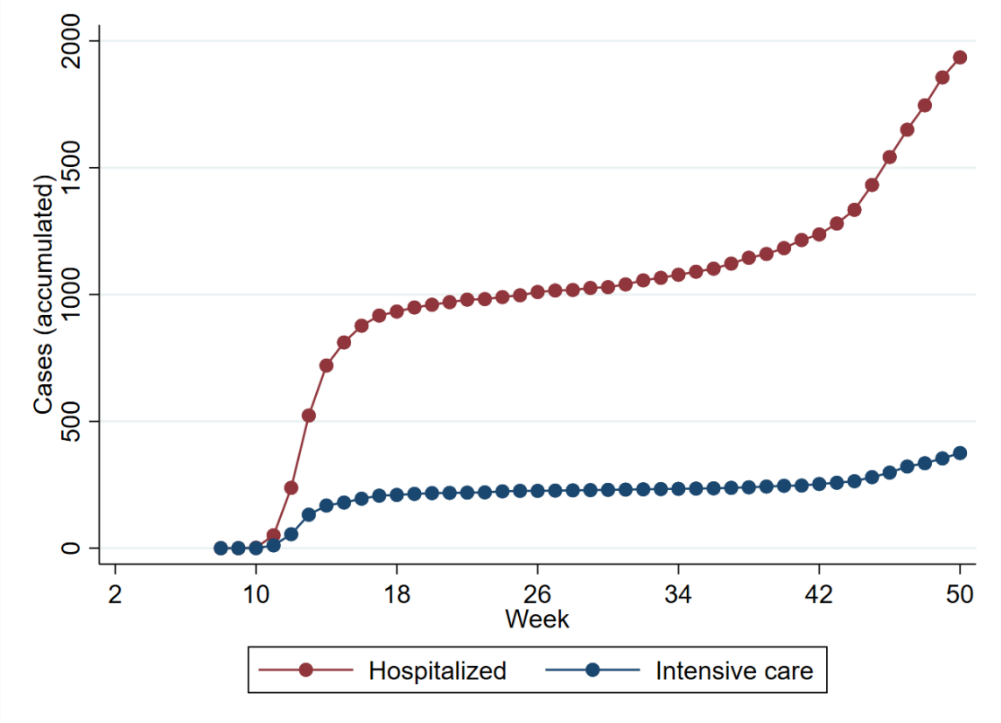
The Norwegian Directorate for Civil Protection (2017). *Vital functions in society*.https://www.dsb.no/rapporter-og-evalueringer/vital-functions-in-society/

von Simson, K. (2016). Effekten av arbeidsmarkedstiltak og vikarbyråarbeid på overgang til jobb og utdanning for arbeidsledig ungdom uten fullført videregående skole. *Søkelys på arbeidslivet*. *33:* 247- 268.

Appendix

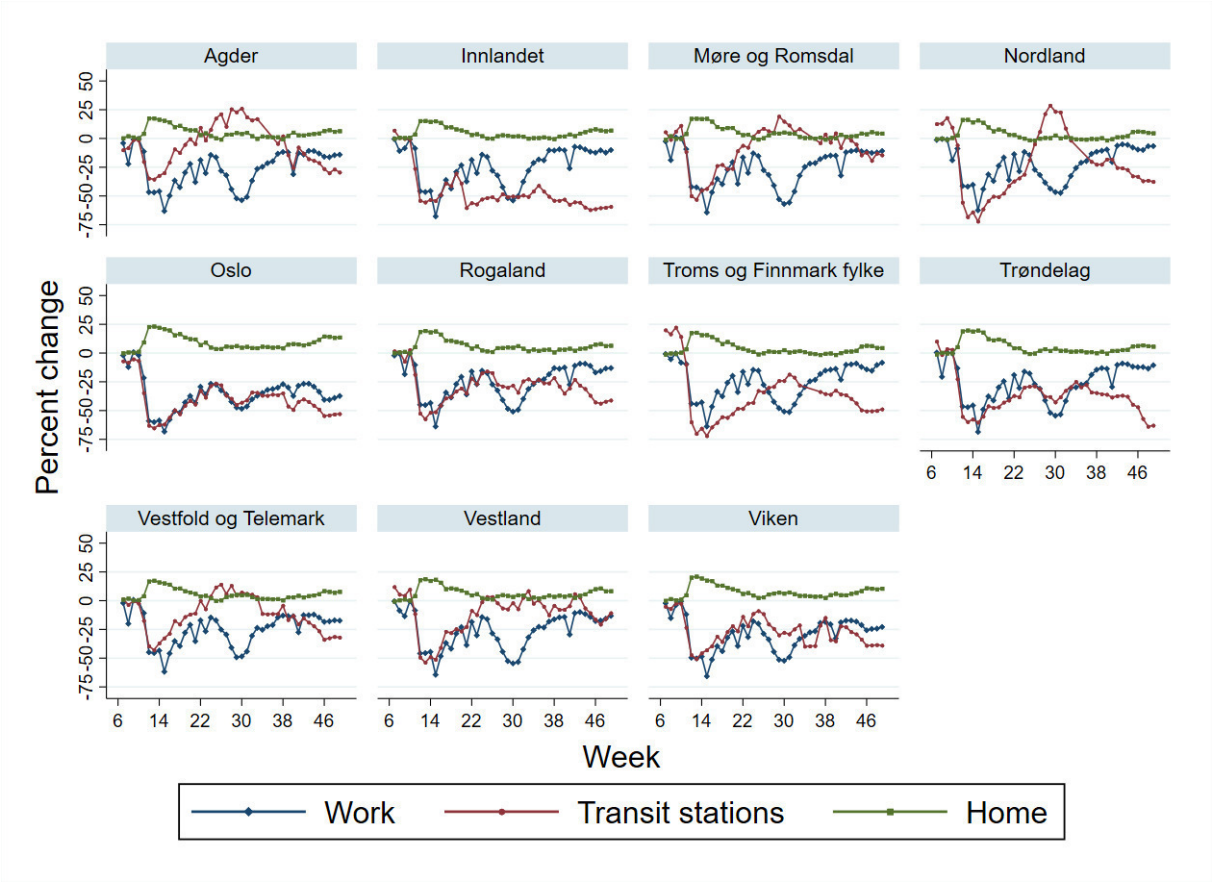
A.1. COVID-19 infection rates, mobility, jobs and job postings.

Figure A1. Number of hospitalizations and intensive care patients in Norway by week of testing (2020).



Note The first confirmed case of COVID-19 was tested in week 8 and announced February 26th (week 9). On March 12th the government launched their strict social distancing measures (= Week 11: March 9th-15th) which took effect in week 12 (March 16th-March 22nd). The Easter holiday was in week 15 in 2020, in week 16 pre-schools reopened, in week 17 1-4th grade of elementary schools opened, in week 20 school opened for all students. By week 25 most of the society was open, with group size limitations, hygiene and distance restrictions to limit the spread of the virus. Schools started summer break in week 26, which marks the start of summer holidays in Norway. In week 32, the government announced a halt in the reopening of society. The new school year started in week 34.

Figure A2. Percent change in the time spent at work, transit stations and home in Norway, by region.

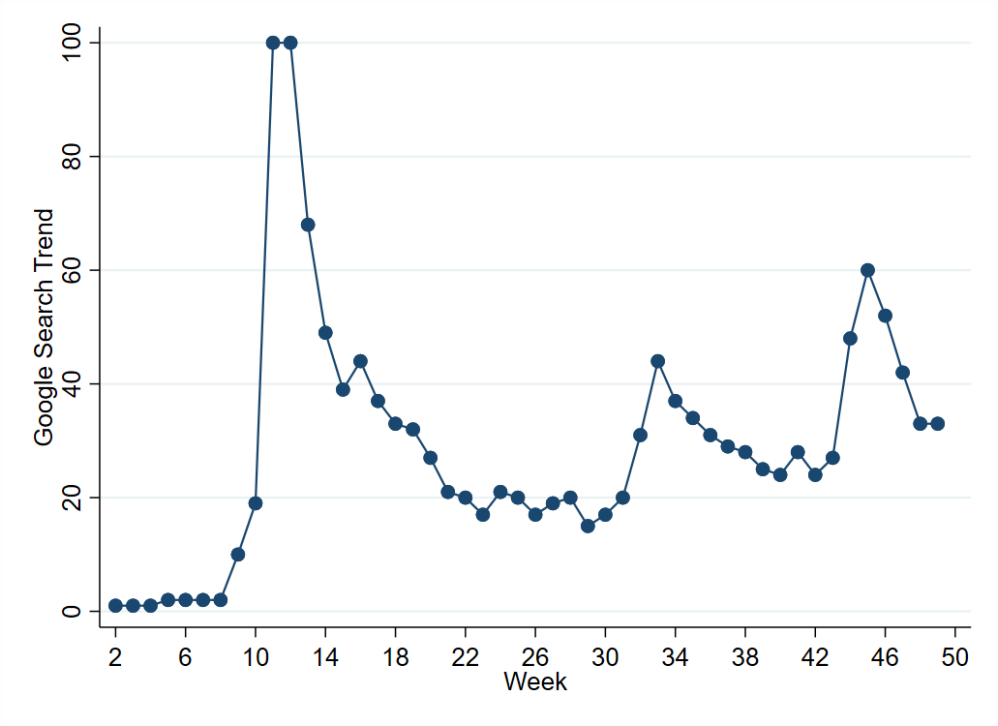


Note: The data is provided by Google's COVID-19 Community Mobility Report. The data includes users who have opted-in to Location History for their Google Account. Baseline is the median value for the corresponding day of the week suring the period January 3rd – February 6th. These figures show mobility trends as an average of each day of the week for (1) work, (2) transit stations, like subway-, bus-, and train stations, and (3) place of residence (4) places of retail and recreation, such as shopping centers, museums, libraries, theatres, movie theatres, bars, cafes and restaurants, (5) grocery stores, food warehouses, food markets and specialty food shops and pharmacies, and (6) parks, like local parks, national parks, public beaches and gardens. More information can be found at: https://www.google.com/covid19/mobility/

Figure A3. Percent change in the time spent in retail and recreation and grocery stores in Norway, by region.

Note: The data is provided by Google's COVID-19 Community Mobility Report. The data includes users who have opted-in to Location History for their Google Account. Baseline is the median value for the corresponding day of the week during the period Januar 3rd – February 6th. These figures show mobility trends as an average of each day of the week for (1) work, (2) transit stations, like subway-, bus-, and train stations, and (3) place of residence (4) places of retail and recreation, such as shopping centers, museums, libraries, theatres, movie theatres, bars, cafes and restaurants, (5) grocery stores, food warehouses, food markets and specialty food shops and pharmacies. More information can be found at: https://www.google.com/covid19/mobility/

Figure A4. Google search trend for "Korona (Corona)" in Norway 2020,



A.1. Job posting activity: labor demand drop in local labor markets.

Table A1. Top 5 most resilient and most vulnerable industries and occupations (Difference -in-difference estimates and share of job postings in parenthesis)

Top five most resilient		**Top five most vulnerable**	
Industries		***Industries***	
Manufacture of basic metals	0.1228 [0.3 %]	Activities of membership organizations	-1.4571*** [0.4 %]
Activities auxiliary to financial services and insurance activities	0.0112 [0.2 %]	Travel agency, tour operator and related activities	-1.4406** [0.3%]
Services to buildings and landscape activities	-0.0302 [0.9 %]	Public administration and defence	-1.4391** [8.5 %]
Office administrative, office support and other activities	-0.0365 [1.1 %]	Accommodation	-1.3637*** [0.8%]
Postal and courier activities	-0.0696 [0.3 %]	Land transport and transport via pipelines	-1.3476*** [0.09%]
Occupations		***Occupations***	
Painters, building structure and related trades workers	0.6290* [0.8%]	Travel attendants, conductors and guides	-1.3956* [0.3 %]
Building frame and related workers	0.4081* [3.3 %]	Waiters and bartenders	-0.9337* [1.7 %]
Sheet and structural metal workers, moulders and welders etc	0.4026 [1.2 %]	Education specialists, inspectors and other teaching professionals	-0.8112* [1 %]
Other health associate professionals	0.2507 [0.7 %]	Hairdressers, beauticians	-0.7356* [0.4 %]
Secondary education teachers	0.1102 [0.4 %]	Mining- and mineral processing plant operators	-0.7154 [0.3 %]

Note: The table presents coefficients from separate difference in differences regression by 2-digit industries and 3-digit occupation. Treatment year is 2020, control year 2019, post period is after week 9. In order to make the rank meaningful, we exclude industries or occupations with a job posting share less than 0.002 in 2019.

A.2 Top 20 occupations for different groups

To identify occupations for youth, we sample all employed persons below 26 years of age in 2019 and record the occupation of their highest paid job during May 2019. The occupations are then sorted by the employment share among youth, and the top 20 occupations are kept. As recorded in column 2 in Table A3 a total of 76 percent of all jobs for youth were within one of these occupations.

To identify typical student-jobs, we sample all persons of 28 and 33 years of age in 2019, and sample the years between 2003 and 2018 during which they were enrolled in education in October, and pick the occupation of the highest paying job that year.[13]

Table A3. Jobs for Youth 2019. Top 20 occupations

Occupation (3 digit ISCO 08)	Employment share among youth	Accumulated employment share	Youth share of employment	Students share of youth
Shop salesperson	0.231	0.231	0.276	0.547
Health care assistant	0.112	0.343	0.133	0.617
Pre-school assistant	0.063	0.406	0.113	0.377
Waiters and bartenders	0.035	0.441	0.266	0.508
Electrical equipment installers	0.032	0.473	0.244	0.626
Other sales	0.032	0.505	0.282	0.496
Building frame workers	0.028	0.534	0.126	0.501
Mechanics	0.024	0.557	0.169	0.478
Food preparation assistants	0.023	0.580	0.143	0.549
Sports and Fitness workers	0.022	0.602	0.194	0.530
Receptionists	0.021	0.623	0.125	0.523
Office clerks	0.021	0.645	0.052	0.571
Cleaners	0.021	0.666	0.029	0.437
Warehouse and transport	0.021	0.687	0.090	0.399
Mining and constr. labourers	0.017	0.704	0.180	0.461
Teachers, primary school	0.014	0.717	0.022	0.363
Cooks	0.013	0.731	0.170	0.562
Security personnel	0.011	0.742	0.117	0.419
Sales and purchasing agents	0.010	0.752	0.031	0.358
Building finishers	0.009	0.761	0.118	0.535

Note: Data from administrative registers of all employment 16-74 of age in May 2019 with valid non-military occupational code and earnings above NOK 8300 per month (1G/12).

[13] Because of a change in the administrative records from 2015 onwards ("A-ordningen"), we record the main job as the highest paid job during the year for the years between 2004-2014, and the highest paid job registered May for the years after 2014.

Table A4. Jobs for students 2019. Top 20 occupations.

Occupation (3 digit ISCO 08)	Employment share of students	Accumulated employment share	Students share of employment
Shop salesperson	0.267	0.267	0.207
Health care assistant	0.139	0.406	0.172
Pre-school assistant	0.047	0.453	0.104
Other sales	0.036	0.489	0.195
Waiters and bartenders	0.030	0.520	0.223
Building frame workers	0.029	0.549	0.085
Electrical equipment installers	0.029	0.578	0.196
Cleaners	0.025	0.603	0.038
Office clerks	0.025	0.628	0.076
Receptionists	0.021	0.649	0.123
Food preparation assistants	0.020	0.669	0.131
Warehouse and transport	0.019	0.688	0.063
Teachers, primary school	0.018	0.706	0.145
Mechanics	0.014	0.720	0.096
Other elementary workers	0.013	0.733	0.111
Security personnel	0.013	0.745	0.127
Cooks	0.011	0.756	0.127
Nursing and midwife	0.010	0.766	0.088
University teachers	0.010	0.776	0.289
Manufacturing laborers	0.009	0.786	0.118

Note: Data from administrative registers of all employment 16-74 of age in May 2019 with valid non-military occupational code and earnings above NOK 8300 per month (1G/12).

To identify typical entry-jobs (the first job after graduation), we sample all persons of 27 and 30 years of age in 2020, observe the year of graduation from their highest level of attained education (2003-2018), split the sample by level of education (non-college and college+) and pick the occupation of the highest paying job during the first year following graduation.[14]

[14] Because of a change in the administrative records from 2015 onwards ("A-ordningen"), we record the main job as the highest paid job during the year for the years between 2004-2014, and the highest paid job registered May for the years after 2014.

Table A5. Entry jobs after completed education, less than college education

Occupation (3 digit ISCO 08)	Employment share of entrants	Accumulated employment share	Entry jobs share of employment
Shop salesperson	0.151	0.151	0.053
Health care assistant	0.083	0.234	0.036
Building frame workers	0.077	0.311	0.021
Electrical equipment installers	0.063	0.374	0.048
Pre-school assistant	0.060	0.434	0.035
Mechanics	0.051	0.486	0.032
Other sales	0.031	0.517	0.057
Hairdressers and beauticians	0.026	0.542	0.032
Building finishers	0.026	0.568	0.023
Cleaners	0.023	0.592	0.015
Warehouse and transport	0.023	0.615	0.018
Cooks	0.021	0.636	0.034
Waiters and bartenders	0.020	0.655	0.046
Mobile plant operators	0.017	0.673	0.022
Office clerks	0.017	0.689	0.010
Engineering technicians	0.016	0.706	0.007
Metal workers	0.016	0.722	0.023
Mining and construction laborers	0.015	0.737	0.024
Food preparation assistants	0.014	0.751	0.034
Receptionists	0.014	0.765	0.019

Table A6 Entry jobs after completed education, college +

Occupation (3 digit ISCO 08)	Employment share of entrants	Accumulated employment share	Entry jobs share of employment
Teachers, primary school	0.108	0.108	0.145
Nursing and midwife	0.107	0.215	0.088
Shop salesperson	0.065	0.279	0.207
Health care assistant	0.055	0.334	0.172
Engineering technicians	0.048	0.382	0.037
Pre-school assistant	0.039	0.421	0.104
Office clerks	0.028	0.449	0.076
Administration professionals	0.026	0.476	0.064
Medical and pharma. technicians	0.026	0.502	0.061
Engineering professionals	0.025	0.526	0.032
Software analysts and developers	0.024	0.551	0.043
Medical doctors	0.024	0.574	0.067
Sales and purchasing agents	0.023	0.597	0.037
University teachers	0.022	0.619	0.289
Finance professionals	0.021	0.640	0.042
Numerical clerks	0.019	0.659	0.060
Business service agents	0.018	0.678	0.092
Other health professionals	0.017	0.695	0.072
Receptionists	0.017	0.712	0.123
Waiters and bartenders	0.015	0.727	0.223

Table A7. Top 20 Occupations. Prime Age Workers, No College.

Occupation (3 digit ISCO 08)	Employment share	Accumulated employment share	Prime-Age No-College share of employment	New Hires share of employment
Health care assistant	0.074	0.074	0.532	0.211
Shop salesperson	0.060	0.134	0.515	0.234
Pre school assisant	0.050	0.184	0.598	0.242
Teachers, primary school	0.040	0.224	0.437	0.176
Engineering technicians	0.035	0.259	0.523	0.187
Nursing and midwife	0.033	0.292	0.389	0.145
Administration professionals	0.029	0.320	0.395	0.222
Sales and purchasing agents	0.028	0.348	0.595	0.223
Office clerks	0.026	0.375	0.535	0.229
Building frame workers	0.026	0.401	0.524	0.228
Warehouse and transport	0.023	0.424	0.600	0.182
Cleaners	0.020	0.444	0.452	0.244
Mechanics	0.020	0.464	0.606	0.180
Electrical equipment installers	0.019	0.483	0.581	0.170
Truck and Bus Drivers	0.018	0.500	0.544	0.258
Manufacturing managers	0.017	0.517	0.527	0.169
Retail and wh.sale manageres	0.017	0.534	0.680	0.161
Software analysts and developers	0.017	0.551	0.474	0.246
Engineering professionals	0.015	0.567	0.418	0.184
Managing directors	0.015	0.581	0.453	0.204

Note: To identify occupations for prime age workers, we sample all employed persons between 25 and 54 years of age in 2019 and record the occupation of their highest paid job during May 2019. To identify new hires, we record only jobs for persons who were not employed by the same employer in May 2018.

Table A8. Top 20 Occupations. Prime Age College +.

Occupation (3 digit ISCO 08)	Employment share	Accumulated employment share	Prime-Age No-College share of employment	New Hires share of employment
Teachers, primary school	0.093	0.093	0.370	0.144
Nursing and midwife	0.092	0.185	0.393	0.131
Administration professionals	0.066	0.250	0.328	0.208
Engineering technicians	0.043	0.293	0.230	0.209
Software analysts and developers	0.033	0.326	0.338	0.246
Engineering professionals	0.033	0.359	0.323	0.159
Finance professionals	0.029	0.388	0.337	0.249
Health care assistant	0.029	0.417	0.070	0.275
University teachers	0.028	0.445	0.450	0.201
Professional service managers	0.027	0.472	0.313	0.115
Medical doctors	0.026	0.498	0.495	0.247
Business administration managers	0.025	0.523	0.275	0.212
Secondary education teachers	0.022	0.545	0.369	0.125
Sales and purchasing agents	0.021	0.567	0.164	0.226
Pre school assisant	0.021	0.588	0.087	0.324
Medical and pharma technicians	0.021	0.608	0.242	0.230
Shop salesperson	0.019	0.627	0.054	0.282
Government associate professionals	0.019	0.646	0.297	0.238
Social Professionals	0.018	0.664	0.430	0.195
Office clerks	0.017	0.681	0.122	0.297

Note: To identify occupations for prime age workers, we sample all employed persons between 25 and 54 years of age in 2019 and record the occupation of their highest paid job during May 2019. To identify new hires, we record only jobs for persons who were not employed by the same employer in May 2018.

A.3. Difference in differences (DiD) estimates between Norway and Sweden compared

As a simple comparative exercise, we have estimated the same DiD model as Hensvik et al. (2021). They use week as their unit of observation and compare the development in vacancies from a pre-Covid period (week 1-10), with a post-Covid period (week 11 through the end of July), in year 2020 compared to a control year 2019. The dependent variable is log of average daily inflow of new vacancies per week. In addition to the core variables, year- and week fixed effects are included in the estimation.

Table A.9. The consequences of the pandemic on the daily inflow of vacancies. Difference- in differences estimates. Treatment week 11 through July 2020. Norway (column 1) and Sweden (column 2). Dependent variable: Ln (average daily inflow of new job postings per week)

	Our estimate	Hensvik et al. (2021)	Difference
DiD estimate	-0.2146**	-0.3545***	-0.1399
	(0.0966)	(0.0299)	(0.1011)
N	60	60	
R^2	0.85	0.97	

Note: Both models include year- and week fixed effects. Significance:* p<0.1 **p<0.05 ***p<0.01

In the second column in Table A.9 we report the DiD-coefficient from Hensvik et al. 2021 (taken from column 2 in Table B1 in Appendix). The DiD-coefficient equals -35 log points or 30 per cent. In the first column in Table A.9 we report the DiD-coefficient from running the same model on Norwegian data. It equals -0.22. This suggests a reduction in average daily postings of 22 log points, or approximately 20 percent. This comparative exercise suggests a larger reduction in the inflow of vacancies in Sweden, compared to Norway, during the first months of the pandemic. Still, the difference is not statistically significant (reported in the third column), so results should be interpreted with caution.