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

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ABSTRACT

Focusing on jobs for youth, this study analyzes the development of job postings in Norway during the first and second waves of the COVID-19 pandemic in 2020. Jobs for youth are defined by the top 20 three-digit occupations for young workers, and postings for these occupations took a heavier hit than other jobs during the pandemic. We also identify the top 20 occupations for entrants immediately after completing their highest education to reveal that, during the pandemic, entry jobs for young people with lower education declined the most. Using 2018 and 2019 as reference years, we show that the decline started before 'lockdown' policies were in place but worsened during the lockdown. As the economy reopened, job posting rates improved but did not reach the 2018 and 2019 levels.

KEYWORDS

Coronavirus / job postings / labor demand shock / young workers

1. Introduction

The COVID-19 pandemic was a major health crisis that led to one of the largest global market disruptions in modern times, obstructing work, education, and family and social life. However, not all people were affected equally. In this study, we investigate how the pandemic impacted job opportunities for young individuals who completed their education immediately before or during the pandemic— 'Generation Covid'.[1] Using data on all job postings in Norway, we investigate how the pandemic affected labor demand, with a particular focus on firms' creation of jobs that provide young individuals with new job opportunities. We show an overall reduction in job postings of 39% during the first lockdown period in April 2020, with a slow recovery of

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job postings by the end of the year. The decline in job opportunities for young workers was 40% stronger than for other occupations. To our knowledge, this is the first study to provide evidence on new jobs available for younger workers during the pandemic. Young workers are typically newcomers to the labor market who have recently finished their formal education. For these workers looking for a first foothold in the market, job creation and gross hires constitute an important margin for determining future employment. Job postings, as studied in this study, are a key indicator of job opportunities for newcomers.

Our focus on youth is pertinent. At the onset of the pandemic, joblessness among youth surged, driven by a higher risk of job loss on the one hand and fewer vacancies and, therefore, limited opportunities for hire for young and entrant workers on the other (OECD 2021). As a result, the share of young individuals not in employment, education, or training (NEET) increased and broke the declining pattern of the last decade. Although the health consequences of COVID-19 were milder for younger than older individuals, the voluntary and policy-induced efforts to contain the virus strongly affected young individuals. School closings and severe restrictions on social interactions interfered with young individuals' social lives and, most likely, outlook for the future. We know from previous studies that younger individuals are vulnerable and bear long-term consequences of labor demand declines in economic downturns. Youth unemployment varies more over the economic downturn cycle (Pastore 2015), and wage growth and employment are more affected (Kahn 2010; Oreopoulos et al. 2012; Schwandt & von Wachtel 2019; Raaum & Røed 2006; Rothstein 2023) and may be of a more permanent character than for other workers. In the literature, these characteristics are known as 'scarring' effects (Arulampalam 2001). As the COVID-19 pandemic was both a health crisis and an economic crisis, youth bore a double burden.

From labor demand theory, we know that youths will, on average, have less general and firm-specific human capital as well as shorter work experience than other workers. This makes them more vulnerable to being displaced when firms need to downsize if unions practice a type of seniority rule or if the firm has a last-in first-out (LIFO) practice [on LIFO, see Nyström et al. (2020) and Dodini et al. (2023)].

The immediate negative employment effects of previous recessions have often occurred in cyclical industries, such as construction and manufacturing and the financial sector, with spillover effects in the service industry in later stages of the recession. The COVID-19 crisis had a direct and immediate effect on service sectors characterized by close personal contact between people, such as hotels and restaurants, retail trade, and personal services. This means that we cannot directly apply the experiences of previous recessions and that these somewhat unique features of the COVID-19 crisis offer a novel opportunity to analyze how the labor market reacts for different groups when society is hit by a major pandemic. As sectors characterized by close personal contact provide a large share of all job opportunities for young workers, lockdowns closed an important employment channel for them.

In addition, in the COVID-19 crisis, numerous workers lost their jobs, either permanently or temporarily. With many workers on temporary leave, firms faced a pool of workers from which they could rehire, and the correspondence between job growth and new jobs offered in the labor market was weakened. That is, while rehires represent employment growth, they do not represent new job openings available for newcomers. Lower job-to-job mobility also reduces the need for replacement hires.

Our analysis is based on the universe of posted job vacancies in Norway (2018–2020). The data are collected from all private and public job posting websites, newspapers, and journals, as well as vacancies reported directly to the Norwegian Labor and Welfare Administration. As vacancies are not directed at age groups, we define job opportunities for Generation Covid as job postings in the 20 most prevalent occupations for youth pre-pandemic. We compare the change in these postings during the pandemic to that in the remaining occupations.

COVID-19 affected everyone, so there is no untreated group post-outbreak to use as a counterfactual. Our main empirical strategy is to first compare the pattern of weekly job postings before and after the COVID-19 outbreak in 2020 and then compare this pattern to that of job postings before and after the same weeks in 2018 and 2019, controlling for occupation, moving holidays, and year fixed effects. Without a counterfactual group from the same period, we are reluctant to give the results a causal interpretation. Next, we assess the extent to which job opportunities were hit harder by COVID-19 for Generation Covid than for other groups. Separating out the most important jobs for youth and entrants to the labor market, we analyze the extent to which postings for these jobs declined more post-outbreak than other jobs by using a two-way fixed-effects (FE) model with interaction terms and FE models controlling for occupation, week-of-the-year, and year fixed effects. The comparison between the two groups pre- and post-outbreak relies on weaker assumptions, which we discuss below. The results show that job postings for youth declined more than for other jobs and that the relative decline in job postings during the pandemic aligns reasonably closely with periods of different policy interventions. Overall, job postings fell by 39% in the first lockdown in 2020; in that same period, the decline in job postings for youth was 40% stronger than for other occupations.

The study proceeds as follows: In Section 2, we provide background information on COVID-19 infection rates and jobs. In Section 3, we present the data and descriptive analyzes. In Section 4, we present the results from our analyzes on how job postings during the pandemic differ from postings during the two previous years. In Section 5, we offer further analyzes focusing on how effects vary across groups of workers, with particular attention to youth and entry-level occupations. Section 6 concludes.

2. Background: COVID-19 and jobs

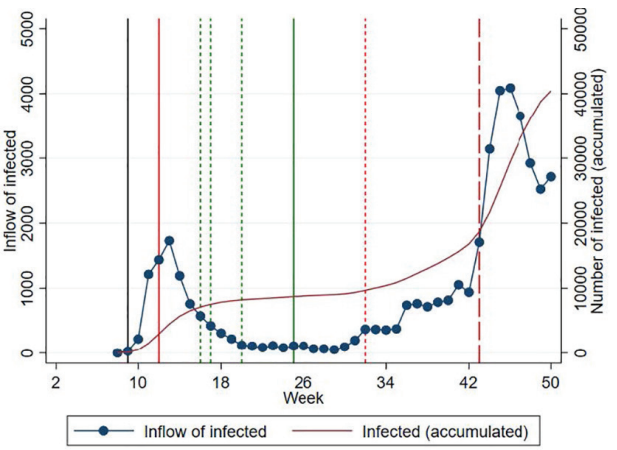
The first case of COVID-19 in Norway was confirmed on 26 February 2020, in the city of Tromsø, while the first case of community spread was detected on 10 March. The government immediately ordered businesses to facilitate remote work and the population to maintain social distance. On 12 March, the Norwegian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

The COVID-19 outbreak, measured by the inflow of new infections, was moderate in Norway overall compared to Sweden and Denmark. Infections were concentrated in certain regions and communities, and the variation in infection rates within and across

municipalities was substantial. As shown in Figure 1, the number of registered infected grew rapidly after the outbreak in Weeks 9–10 until Week 15, after which it declined and stabilized until Week 31. As in many other countries, a smaller share of the infected were tested and registered in the initial phases than in the later ones, which makes comparison across time unreliable. Additionally, vulnerable groups were exposed, such as elderly homes, and the rate of hospitalized and intensive care patients quickly increased.

The first lockdown was successful in containing the virus, and in mid-April, a slow reopening of society started. At first, in Weeks 16 and 17, preschools and the 1st to 4th grades of elementary schools reopened with limited hours, smaller group sizes, and strict hygiene regimes. In May 2020, some restrictions were lifted; by Week 20, all schools, from preschool to high school, were open, and by Week 25 (15 June), most businesses that had been forced to close were open, some with social distance restrictions, such as bars, restaurants, pools, and sport arenas. In line with developments in other European countries, infection rates increased after the summer holiday. Throughout the fall, infection rates rose to the same level and surpassed those of April 2020. Following this surge in infections, new restrictions were put in place in Week 32, when a national liquor ban was implemented, prohibiting the sale of alcohol in bars and restaurants after midnight. In Week 43, the government announced a social lockdown, strongly advising work from home and implementing severe restrictions on social mobility.

Figure 1 Number of confirmed infected individuals in Norway by week of testing (2020).



Note: Each vertical line corresponds to policy changes: Week 9 (black line), the first registered positive COVID-19 case; Week 12 (red solid line), the first lockdown; Week 16 (dotted green line), preschools reopened; Week 17 (green dotted line), 1st–4th grades of elementary schools opened; Week 20 (green dotted line), school opened for all students; Week 25 (green solid line), most of society opened with social distance restrictions; Week 32 (red dotted line), liquor ban; Week 43 (red dashed line), social lockdown.

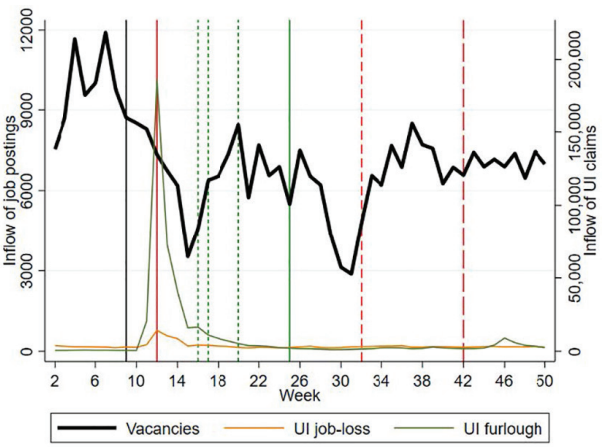
The health crisis caused by the COVID-19 outbreak led to one of the largest economic crises in modern times. As the virus spread across countries and within communities, unemployment rates surged. The exceptional circumstance of this economic crisis was that it followed from a global pandemic for which nonpharmaceutical measures, such as administrative closures, social distancing, and travel bans, together with general hygiene

advisories, were used to mitigate the spread of the virus. These measures also affected employment and the creation of new jobs. While past recessions have been mainly driven by economic or financial shocks, the cause of the COVID-19 crisis was outside the economic system. Fear of infection, public guidelines and lockdowns, and considerable uncertainty led to a sharp decline in economic activity and disrupted global value chains, which, in turn, resulted in a widespread shock to the labor market. In contrast to previous crises, the service sector, including hotels and restaurants, air transport, and travel agencies, was affected from the beginning of the crisis, mainly due to the social distancing restrictions.

The public support programs were massive and directed toward supporting affected individuals and firms. They were intended to help individuals and firms 'weather out' the 'COVID lockdown' of the economy. In Norway, the government implemented several measures to protect workers and jobs. On the firm side, they reduced the period from announcement to furlough from 14 to 2 days, reduced the days by which employers must pay wages to their furloughed workers from 15 to 2, and implemented delays for several tax payments and access to direct cash benefits. On the worker side, they extended unemployment insurance coverage and increased benefit levels.

The magnitude of the labor market shock is visualized in Figure 2 by the weekly inflow of new vacancy postings in 2020 (left *y* axis) and the weekly daily inflow of new unemployment insurance claims (right *y* axis). The outbreak of COVID-19 in Week 9 and the subsequent lockdown in Week 12 had immediate effects on the labor market; the number of posted vacancies dropped dramatically, and the inflow in unemployment insurance claims (both job loss and furlough) increased to historic levels. Four weeks after the lockdown, nearly 310,000 *new* individuals filed unemployment benefit claims (Alstadsæter et al. 2020; Gjerde et al. 2020).

Figure 2 Inflow of job postings and unemployment insurance claims per week.



Note: UI, unemployment insurance. Each vertical line corresponds to policy changes: Week 9 (black line), the first registered positive COVID-19 case; Week 12 (red solid line), the first lockdown; Week 16 (dotted green line), preschools reopened; Week 17 (green dotted line), 1st–4th grades of elementary schools opened; Week 20 (green dotted line), school opened for all students; Week 25 (green solid line), most of society opened with social distance restrictions; Week 32 (red dotted line), liquor ban; Week 43 (red dashed line), social lockdown.

The labor demand decline was similar across countries, despite very different strategies to mitigate the spread of the virus and support workers and firms (Bamieh & Ziegler 2020; Bartik et al. 2020; Cajner et al. 2020). Job vacancies fell by over 40% in the United States from the second half of March to late April 2020 (Forsythe et al. 2020a). The reduction was broad across all US states and nearly all industries and occupations, but Campello et al. (2020) show that high-skill jobs were more severely hit than low-skill jobs. In Sweden, the inflow of vacancies dropped by approximately 36% from January to July 2020 (Hensvik et al. 2021). These studies use changes in job postings as a good proxy for labor demand and future employment possibilities. We add to this literature by focusing on job postings directed at a generation affected by both the policy responses and lockdowns in 2020 *and* the exceptional decline in labor demand in the service sector—namely, young workers, students, and entrants to the labor market.

3. Data and descriptive analyzes

Our data, consisting of all posted job vacancies in Norway, were collected by the Norwegian Labor and Welfare Administration (NAV), which is the public welfare and employment agency. NAV records all vacancies posted on private and public job posting websites in Norway, including those reported to NAV directly and those announced in newspapers and journals. All the collected postings are published on a webpage that also functions as a self-service digital portal for jobseekers and employers (arbeidsplassen.nav.no).

The job posting data encompass new job postings in 2018, 2019, and 2020 up to Week 50, totaling 650,000 postings and aggregated on a weekly basis. We restrict our attention to postings of jobs located in Norway. The data do not include vacancies posted in informal channels, such as a firm's webpage, on posters, or through family and friends.[2]

Each new job posting contains information on the geographical location of the vacancy, occupation (4-digit ISCO-08), industry (NACE 07), number of positions posted, and date of publication. As we do not have information on wages or skill requirements for the vacancies, which are typically not posted, we assign occupation-specific information from other data sources. We collect employment shares in 2019 for each three-digit occupation by demographic group using administrative employer–employee register data from Statistics Norway, combined with administrative data on demographics and education.

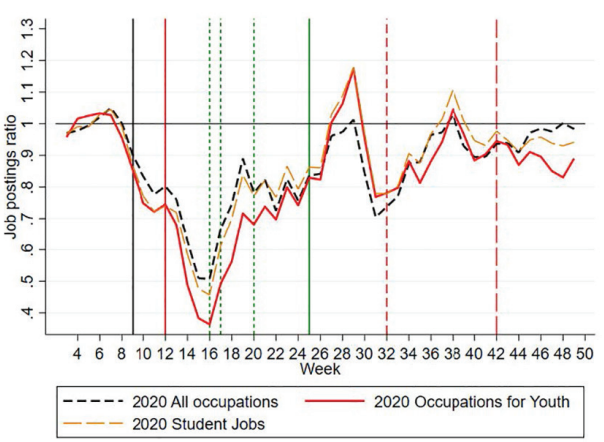
Our main variable of interest is new job postings, which measures total number of new posted vacancies each week. We are interested in the dynamics of vacancy postings for specific groups. First, we define jobs for youth as the 20 largest and most common occupations among young employees (aged 16–25 years) using the employer–employee register for 2019. Second, we define student jobs as the top 20 occupations of persons enrolled in education per October (see Appendix for a precise definition). Finally, we define entry jobs as the top 20 most prevalent occupations among the first jobs people obtain after graduating from their highest level of education. We distinguish between jobs for individuals who completed college or more and those who completed high school or lower as their highest educational level. The number of job postings directed toward a particular group, such as 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, measured in May 2019. Furthermore, we split the time period into separate policy intervals based on the phases of the COVID-19 pandemic and the policy response in 2020, as described in Table 1.

Table 1 Timeline and policy intervals in 2020

Weeks	Policy response
2–8	Pre-COVID-19; before the first case was identified in Norway
9–11	The outbreak period after the first COVID-19 case appeared in Norway until the lockdown took effect
12–20	The first lockdown until all schools were open to students
20–31	Reopening phase when most of society reopened, with some restrictions on social distance etc.
32–43	Halt in the reopening of society and implementation of the liquor ban
43–50	Social lockdown

First, we take a descriptive look at the data and investigate the development of vacancies. Starting with job postings directed at young workers, Figure 3 shows the vacancy ratio for the jobs for (i) all occupations, (ii) youth (red solid line), and (iii) students (yellow line). The decline in the vacancy ratio from Week 8 to Week 16 is dramatic for all youth and student jobs. For youth, the ratio drops below 40% in Week 16. Between Weeks 16 and 19, it bounces back and seems to level off at a ratio around 75% 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 summers of 2018 and 2019. In late summer, a new drop occurs, followed by a new rebound, and then a leveling off for the remainder of the fall at about 90%. 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. Student jobs faced a somewhat smaller decline than youth jobs after

Figure 3 Job posting ratios for youth, students, and all: 2020 over the average for 2018 and 2019**.**



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 of employment share among youth. Student jobs are the top 20 occupations in terms of employment share among students. Vacancies for youth (students) are calculated as the job postings for the top 20 youth (students) multiplied by the share of youth (students) in each occupation. Each vertical line corresponds to the policy intervals in Table 1.

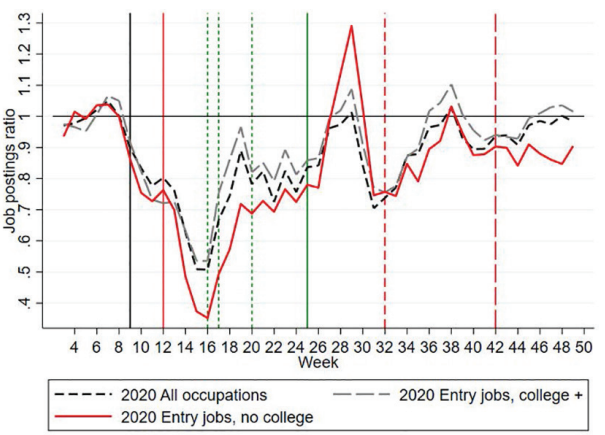
the lockdown in week 12, and vacancy ratios fared better among students than among youth and, in certain periods, better than the overall labor market.

In 2019, the top 20 occupations for youth employ 76% of workers below 26 years of age, while the top 20 occupations for students employed 79% of employed students (see Appendix Tables A1 and A2 for details). Job postings in these occupations thus account for a considerable share of job opportunities for the younger generation of workers. As shown in Appendix Tables A1 and A2, the top occupations for youth and students, such as shop salespersons, healthcare assistants, preschool teachers, waiters, and bartenders, account for around 40% of employment in these groups. These jobs typically require social contact and are performed onsite, meaning they were particularly affected by the pandemic restrictions.

While student jobs are important for the welfare of students, an individual's first job after completing their highest level of education is often an important steppingstone for their future career. To understand the pandemic's impact on such entry jobs, we select jobs directed at entrants into the labor market. We split the sample into individuals with and without a college degree (or higher) as their highest attained educational level.

Figure 4 shows the vacancy posting ratio during the pandemic for three types of occupations: (i) all occupations, (ii) entry jobs for non-college graduates, and (iii) entry jobs for college and university graduates. The results show clearly that entry jobs for individuals without a college degree (red solid line) declined most severely, while entry jobs for graduates from college or university (gray 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 other jobs.[3]

Figure 4 Job posting ratios for entry jobs (first job after graduation), for all and with and without college or university degrees.



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). Entry jobs are the top 20 occupations in terms of employment share among the first job after graduation for individuals in 2019 who graduated in 2018. Vacancies for entry jobs are calculated as the job postings for the top 20 entry jobs multiplied by the share of entrants in each occupation. Each vertical line corresponds to the policy intervals in Table 1.

Again, these 20 top occupations account for a substantial share of jobs among entrants, employing 76% of entrants without a college degree and 73% of entrants with a college degree (see Tables A3 and A4 in the Appendix for details). These two groups faced different consequences of the pandemic regarding job opportunities due to the heavy concentration of low-educated entrants in occupations such as shop salespersons, healthcare and preschool assistants, building and construction workers, mechanics, and cooks. Entrants *with a college degree* or higher are employed in a different set of occupations, such as primary school teachers, nurses, professionals, technicians, medical doctors, and software developers.

These descriptive results show that job vacancies for youth, and especially for youth with lower education levels, declined more than job vacancies for any other groups during the pandemic. In the next section, we analyze how vacancy postings evolved in the period after the COVID-19 outbreak compared to pre-COVID years and explain how the effect differs between groups.

4. Job postings during the COVID-19 pandemic

To explore how job postings during the pandemic differ from those during the two previous years, we estimate the following model of ln (Job postings):

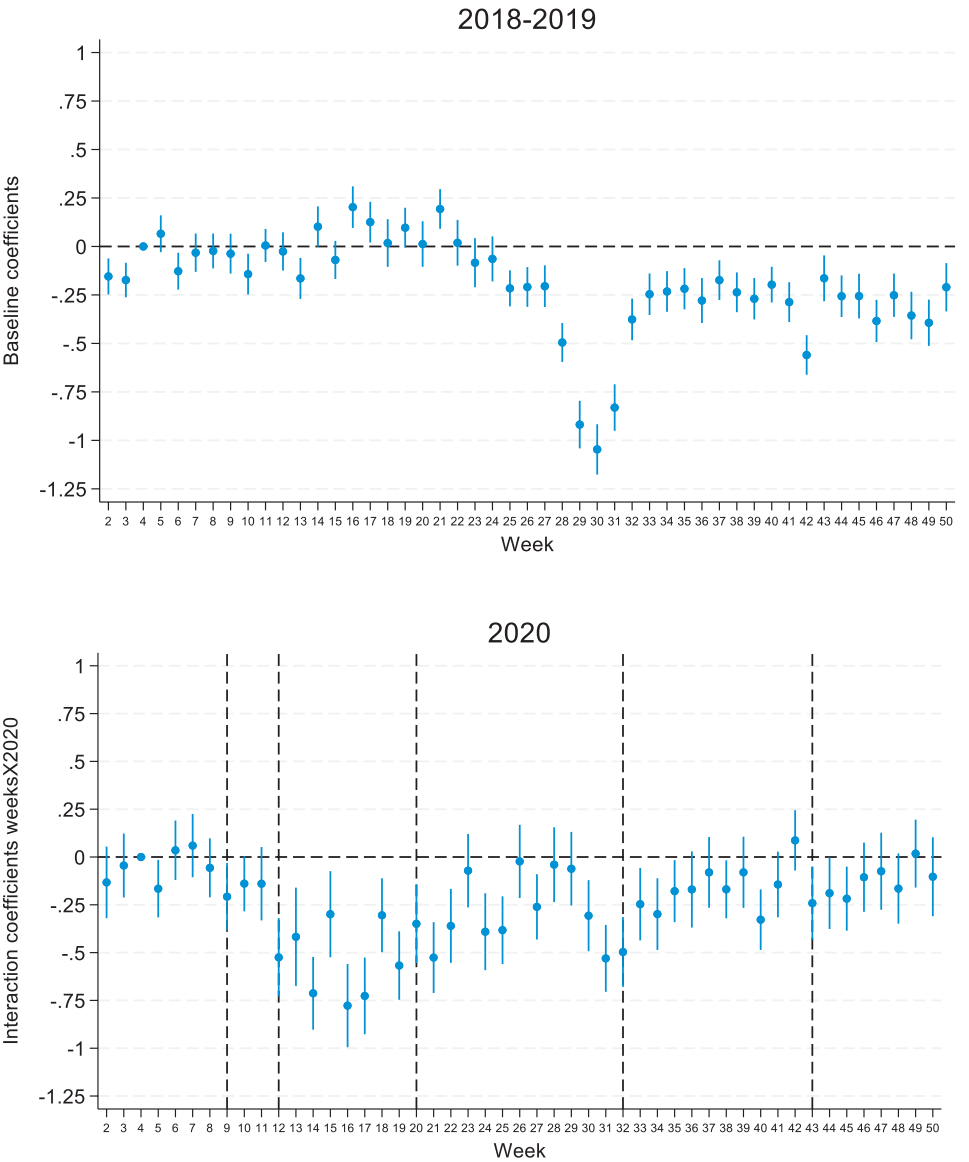
$$lnV_{o,w,y} = \alpha_o + \omega_{w\neq 4} + \delta_{w\neq 4} \times I_{y=2020} + \gamma_y + \mu_m + \boldsymbol{u}_{o,w,y} \quad (1)$$

The unit of observation is occupation by week in the years 2018, 2019, and 2020. Subscript o indexes occupation, w indexes weeks from 2 to 50, y indexes year, and m indexes moving holidays (one dummy for Easter vacation and one dummy for other moving holidays). $I_{y=2020}$ is an indicator for the year 2020. α, ω, γ, μ represent fixed effects for occupation, week, year, and moving holidays, and $\boldsymbol{u}$ is an error term assumed to be orthogonal to the other variables in the model. Week 4—five weeks before the first cases of COVID-19 appeared in Norway—is set to be the reference week, implying that both ω and δ measure the difference of any week to the job posting level of Week 4 and that the year dummies measure the difference between the pre-pandemic reference Week 4 across years. ω measures the baseline pattern of job postings during a year (difference from Week 4) as identified from job postings in 2018 and 2019. δ— the key parameter vector—measures how the pattern of job postings in 2020 differs from the patterns in 2018 and 2019.

The $\delta_{w>8}$ coefficients measure how the pattern of job postings during the pandemic differs from the baseline pattern of job postings estimated for 2018 and 2019. A causal interpretation of these estimators must rely on the assumption that the pattern of job postings after Week 8 in 2020 (post-COVID) would follow the pattern of job postings in 2018 and 2019 for the same weeks *in the hypothetical absence of COVID-19 in 2020*, conditional on occupation and moving holidays. The $\delta_{w<9}$ coefficients measure how the pattern of pre-COVID weeks of 2020 differs from the two previous years, but we have no way of formally testing the parallel trend assumption for the post-pandemic period. One should thus interpret the different patterns of job postings post-COVID as an effect of the pandemic with appropriate caution.

The upper panel of Figure 5 shows the estimated ω vector, measuring the difference between each week's job postings and those of Week 4 in the same year. These parameters

Figure 5 Job posting pattern 2018–2019 (upper panel) and difference in pattern in 2020 (lower panel).



Note: Dependent variable: ln (Vacancy postings) per week. Results from the same regression model, including fixed occupation and week effects. The upper panel shows the parameter vector of the fixed-week effects, representing the differences between Week 4 in 2018 and 2019. The lower panel shows the parameter vector for the interaction term of the week effects in 2020, representing the difference in weekly job posting between the reference Week 4 in 2020 and the postings in 2018–2019. The model includes year dummies and indicators for Easter vacation and other moving holidays. Standard errors clustered by occupation.

are identified from observations in 2018 and 2019. Apart from a significant drop during the summer vacation period (Weeks 28–32 in Norway) and a generally lower level of job postings in the second half of the year, there is no visible pattern of postings across weeks during the year.

The lower panel shows the δ vector, which measures the difference between the pattern of job postings in 2020 and that of the two previous years. The first COVID-19 case appeared in Norway in Week 9, and the first lockdown period started in Week 12. We illustrate the different policy intervals using vertical lines in the graph. Visual inspection suggests that the pattern of postings during the pre-pandemic weeks of 2020 does not differ significantly from the early weeks of the previous two years, which is reassuring. The figure shows, however, a possible drop in job postings after the first cases appeared in Week 9, followed by a dramatic drop in postings during the first lockdown period from Weeks 12 to 19. After the schools reopened in Week 20, the difference between 2020 and the two previous years is reduced. The pause in the reopening of society in Week 32 after the summer appears to occur concurrently with a drop in postings, followed by a gradual recovery, as does the lockdown of Week 43.

To get around the high uncertainty associated with each single coefficient and to assess the statistical significance of the drop in vacancies in each policy interval, we ran the model with the same controls—that is, fixed effects for week, occupation, moving holidays, and year—but with dummies for each policy interval after the outbreak of COVID-19 in 2020 instead of the interaction terms by week displayed in the lower panel of Figure 5. Graphically, this means drawing different horizontal lines between each vertical line in Figure 5 and comparing the different policy intervals to the pre-pandemic Week 4 of 2020. The results are presented in Table 2. The drop in postings during Weeks 9–11 is estimated to a significant decline of 11 log points. During the first lockdown

Table 2 Job postings in 2020 by policy intervals

	All occupations
Outbreak	–0.109***
(Weeks 9–11)	(0.0415)
Lockdown	–0.488***
(Weeks 12–19)	(0.0554)
Reopening of schools	–0.219***
(weeks 20–31)	(0.0344)
Pause in reopening	–0.138***
(Weeks 32–42)	(0.0267)
Lockdown II	–0.0829**
(Weeks 43–50)	(0.0352)
Adjusted R^2	0.856
N	16418

Note: Dependent variable: ln (Vacancy postings) per week. Unit of observation: occupation × week. The model also includes fixed occupation, week, year, and moving holiday effects. Reference Week 4. Standard errors, clustered by occupation, in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

period from Week 12 to Week 19, we find a significant drop in job posting rates of 49 log points compared to the job postings during the same weeks in 2018 and 2019. After the opening of schools in Week 20, the gap in job postings relative to the previous years decreases to 22 log points. It improves gradually during the fall but remains significantly lower than in the previous years when evaluated by each policy interval.

Note that we cannot interpret these results as causal effects of the policy instruments even if we accept the parallel trend assumptions discussed above. The policy interventions are highly correlated with the development of COVID-19 cases, which is omitted from the equation. The spread of the virus may affect labor demand both by inducing lockdown behavior by firms or customers and through increased uncertainty. Therefore, what we observe may be a response to the number of cases rather than to the policy instruments or, most likely, a mix of both. Thus far, we may conclude that there was a dramatic drop in job postings during the spring of 2020, following the outbreak of COVID-19, and that the pattern closely follows the different policy responses to the pandemic. We return to a discussion of this issue in the concluding section.

5. Job postings for Generation Covid

Next, we consider job postings for Generation Covid. Figure 3 suggests that the 20 top jobs for youth were hit harder than other jobs during the pandemic. In this section, we investigate this issue by using interaction terms between and post-COVID observations. We first run a two-way fixed effects (TWFE) model, including the interactions:

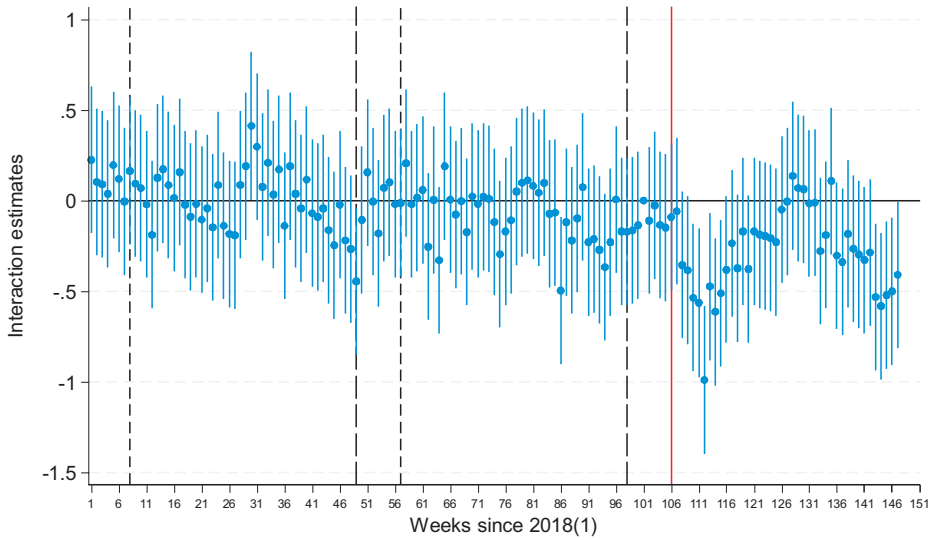
$$lnV_{o,\tau} = \gamma_\tau + \alpha_o + (\gamma_\tau^g I_{Pre-Covid} + \delta_\tau I_{Post-Covid})\, I_g + \upsilon_{o,\tau} \quad (2)$$

In this model, τ indicates weeks since Week 1 of 2018 in our observation window; $I_{Pre-Covid}$ and $I_{Post-Covid}$ are dummy variables representing periods pre-COVID ($\tau < 106$) and post-COVID ($\tau > 105$), respectively; and I_g is a dummy variable representing occupations for youth.

γ_τ measures how occupations other than those commonly occupied by youth fare in week τ relative to the base week. γ_τ^g measures the difference between youth occupations and other occupations in pre-COVID weeks, $\tau < 106$, and δ_τ measure the difference between youth occupations and other occupations by week from the first COVID outbreak Week 9 of 2020, $\tau > 105$ (the TWFE estimates). In the estimation, we use $\tau = 101$ as the base week[4], implying that the $\gamma_\tau, \gamma_\tau^g$, *and* δ_τ coefficients estimate the difference from Week 4 in 2020, 5 weeks before the outbreak of the pandemic. α_o is an occupation fixed effect. Figure 6 shows the estimated TWFE estimates:

We make three observations. First, there seem to be no significant coefficients pre-COVID, suggesting that the other occupations may represent a reasonable counterfactual. Second, youth occupations see a larger drop after Week 4 of 2020 than other occupations; this is particularly true in the first two months after the outbreak and, to a lesser extent, during the last weeks of 2020. Third, there appears to be a clear pattern in the coefficients *in all three years,* in which youth occupations drop in Easter vacation, increase in summer, and drop during the fall every year toward the end of the year. These weekly patterns, even though they are not significant, suggest that a seasonal pattern exists in the difference in job postings between youth and other occupations.

Figure 6 Job postings for youth occupations relative to other occupations by week, 2018–2020: Two-way fixed-effects specification



Note: Coefficients and 95% interval for the interaction term between youth occupations and Weeks 2–50 from 2018. Dependent variable: ln(Job Postings) by occupation (three-digit) and week. Base week is Week 4 of 2020, four weeks prior to the outbreak of the pandemic in Norway. Week 50 of 2018 and 2019 are marked with long-dashed vertical lines, Week 9 each year with dashed lines, and the week of the outbreak, Week 9 of 2020, with a solid red line.

To explore how the post-COVID year differs from the pre-COVID years, it seems reasonable to take these seasonal differences into account and check how each week of the post-COVID year compares to the *same week* of the pre-COVID period. We thus turn to a specification with which we can compare more directly job postings for youth and other occupations in a given week of the year post-COVID (in 2020) to those in the same weeks of 2018 and 2019 and add an indicator for moving holidays. This may be done by augmenting specification (1) above with an interaction term for youth occupations:

$$\begin{aligned} lnV_{o,w,y} &= \alpha_o + \omega_{w\neq 4} + \delta_{w\neq 4} \times I_{y=2020} + \gamma_y + \mu_m + \\ &(\omega^g{}_{w\neq 4} + \delta^g{}_{w\neq 4} \times I_{y=2020} + \gamma^g{}_y + \mu^g{}_m) \times I_g + u_{o,w,t} \end{aligned} \tag{3}$$

Here, I_g is again a dummy variable for occupations included in the top 20 occupations for group g, such as young workers. Using interaction terms for the baseline variables ensures that a group is compared in 2020 to the weekly pattern of that group in 2018 and 2019, adjusted for group-specific moving holiday and year controls. Note that the fixed occupation effects α already encompass both the top 20 and remaining occupations.

Jobs for youth is equated with the 20 top three-digit occupations that employ most young workers (75%). The baseline δ coefficients provide the difference in estimates for the 2020 postings for the remaining (non-top 20) occupations, and the δ^g coefficient estimates how the top 20 occupations differ from the remaining occupations.

We compare the job postings of a given week in 2020 to those of the same week in 2018 and 2019 under the assumption that the seasonal patterns across weeks were the same in 2018 and 2019. Equation (3) is our preferred specification as it provides a direct test week-by-week.

The upper panel of Figure 7 shows the coefficients for the interaction terms, δ^g, which reflect the difference between jobs for youth (top 20) and jobs in the remaining occupations (not among the top 20). We find a declining level of job postings directed toward youth in the spring of 2020, after the pandemic outbreak, compared to other jobs, and a clear drop one week after lockdown measures were introduced in Week 12. The difference is large, hovering between 50 and 75 log points below the level of other jobs during Weeks 13–18. The differential impact on jobs for youths appears strong in the spring of 2020 but less substantial in the subsequent weeks. For us to give the coefficients a causal interpretation, the difference in the seasonal weekly pattern between youth and other occupations would need to be the same in 2020 as in 2018 and 2019, without the presence of the COVID-19 pandemic. This is a stretch, of course, but it appears to be a weaker assumption than that the seasonal pattern for each occupational group was identical in the counterfactual case.

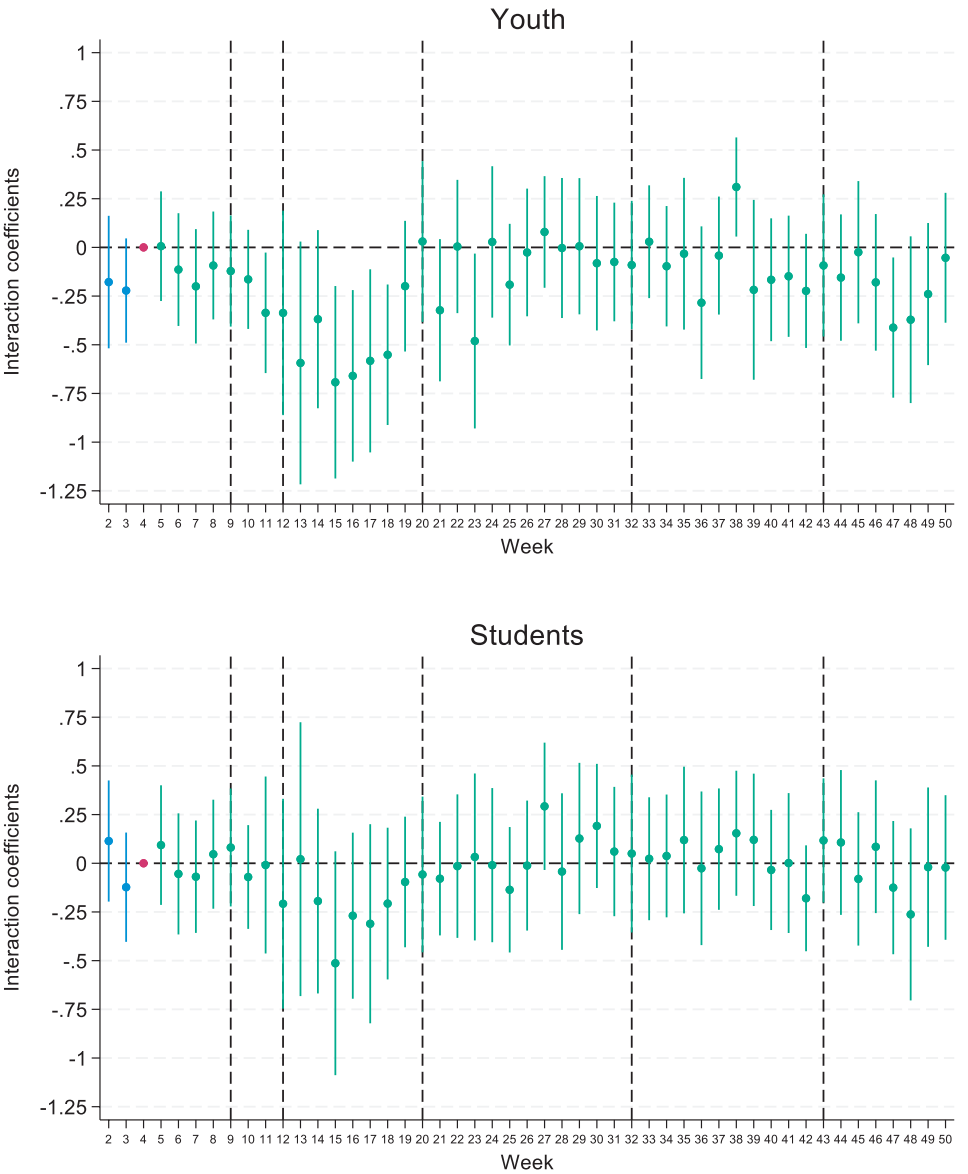
Compared to the TWFE results shown in Figure 6, the very large TWFE coefficient for Week 15 of 2020 is attenuated once we control for moving holidays, and the significant decline during the fall of 2020 is attenuated due to the implicit control for the declining pattern observed during the fall of 2018 and 2019.

In Table 3, we provide summary measures with significance tests for the first lockdown period, which show a significantly lower level of job postings from Weeks 12 to 19. The graph shows that job postings for youth recovered substantially 1 week before the schools were open to all students (Week 20).

Students, who often work part-time alongside their main activity of studying, constitute a substantial share of young employees in Norway. To investigate whether student jobs were hit harder than jobs for youth who have completed their education, we rank occupations based on their importance for students. The ranking is based on individuals registered as both employees and students in 2019. The top 20 occupations are listed in Appendix Table A2. There is a large but not complete overlap between student jobs and jobs for youth in general. Nursing and university teaching are among the top 20 occupations for students but not for youth in total. Figure 6 shows that the decline in job opportunities for students during the spring of 2020 was smaller than that for jobs for youth in general. As shown in Table 3, the overall decline for the first lockdown period was not significantly larger for student jobs than for other job types.

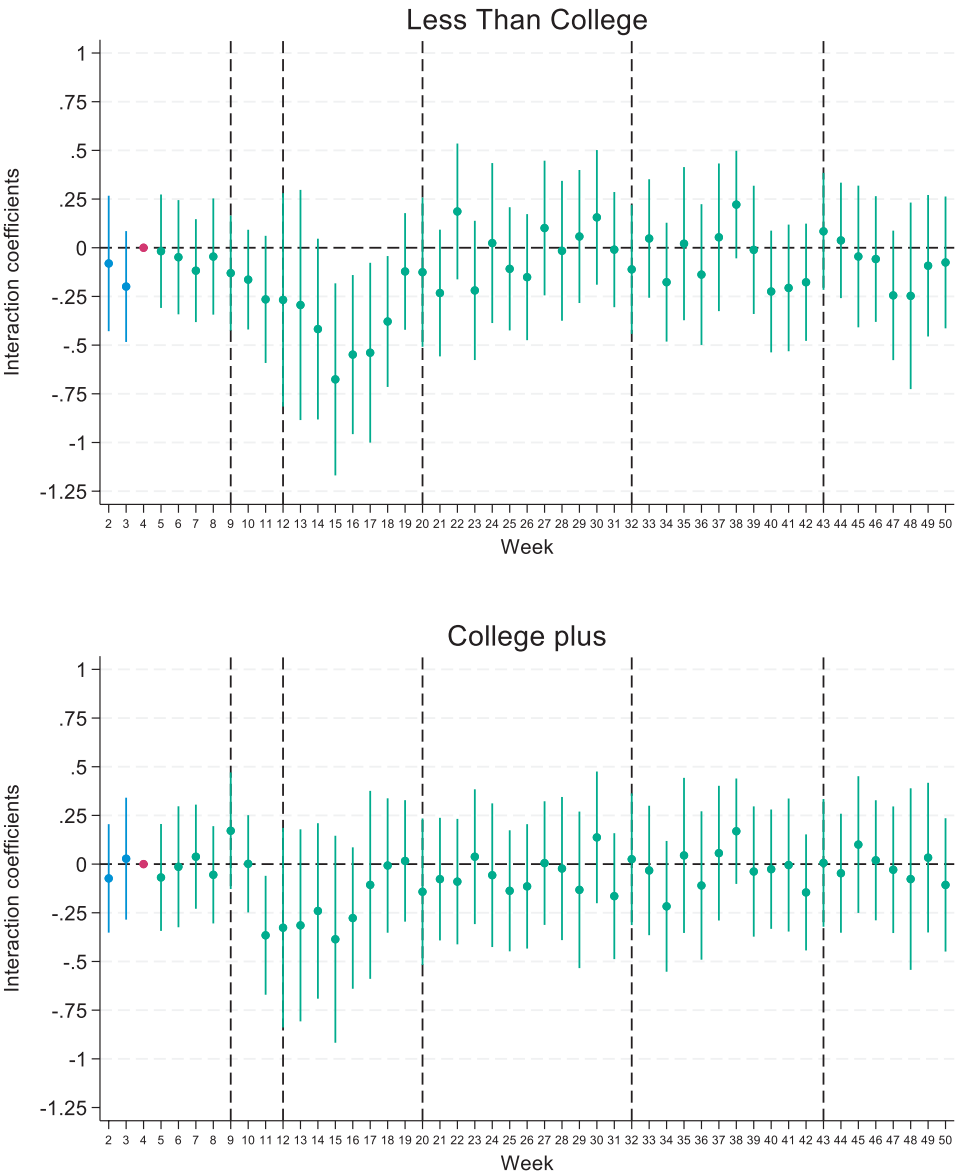
Regarding entry jobs into the labor market immediately after an individual's final education, we focus on individuals who were 30 years old in 2019 (and thus presumably had completed their highest level of education) and record their main occupation in the year succeeding their graduation. We distinguish between those who completed high school or lower as their highest educational attainment and those who completed college or more. Regarding jobs for youth, we define the top 20 occupations based on their importance for each educational group. While several occupations popular with individuals with a high education level are also popular with those with a lower education level, the top 20 entry occupations for higher education typically require more training, such as teachers, nurses, and other professional occupations.

Figure 7 Job postings 2020: Top 20 youth and student occupations versus remaining occupations.



Note: Dependent variable: ln (Job postings) per week. Results from models including fixed occupation and week effects. The upper panel shows the results from a regression including interactions with the top 20 youth occupations, while the lower panel includes interactions with the top 20 student occupations. The models include year dummies and indicators for Easter vacation and other moving holidays. All variables are interacted with the group indicator. Standard errors are clustered by occupation, 95% CI.

Figure 8 Job posting patterns: Top-20 entry jobs versus remaining occupations by highest completed level of education.



Note: Dependent variable: ln (Job postings). Results from models including fixed occupation and week effects. The upper panel shows results from a regression including interactions with the top 20 entry occupations for lower education, while the lower panel includes interactions with the top 20 entry occupations for higher education. The models include year dummies and indicators for Easter vacation and other moving holidays. All variables are interacted with the group indicator. Standard errors are clustered by occupation, 95% CI.

The upper graph of Figure 8, depicting the results for entry jobs for youth with lower education, reveals a similar pattern to that of youth in total, with a declining pattern after the outbreak in Weeks 9–11 and a large and significant decline during the first lockdown period. The lower graph shows a similar pattern, but the decline during the first lockdown period is smaller and not significantly different from zero in any single week.

In Table 3, we report the results for each group of jobs for young workers. Since all the graphs for different top 20 groups show a decline during the first 8 weeks after the first lockdown and there are no indications of significant differences in other periods, we provide the results for this period only. The table is calculated from regressions such as Equation (2), but in which the interaction terms after the start of the pandemic are replaced with dummy variables representing each policy period (Weeks 9–11, 12–19, 20–31, and so on), as reported in Table 2. For the first lockdown period (Weeks 12–17), we found an average decline in job postings of 49 log points (Table 2).

The first line (Top 20 Occupations) of Table 3 provides the corresponding results for the top 20 groups, calculated as the sum of the baseline results and the interaction terms of model (2). Jobs for Youth saw a significant decline of 95 log points during the first 8 weeks of lockdown compared to the same weeks in 2018 and 2019. Entry jobs for youth with lower education declined by 87 log points, while entry jobs for youth with higher education and student jobs declined by 71 and 72 log points, respectively.

The next line shows the corresponding results for the remaining occupations for each group, and the bottom line shows the difference in decline between the top 20 groups and the remaining occupations. The difference is significantly different from zero for the jobs for youth and entry jobs for youth with lower education, at –50 and –41 log points, respectively. However, there is no significant difference for the other top 20 groups of occupations.

To explore the robustness of the results with respect to group size, defined as the top 20 occupations (comprising 76% of jobs for youth), we conducted an experiment in which jobs for youth are defined by both the 15 (70% of jobs for youth) and the 25 (81%) highest ranked occupations for youth. The difference is estimated to –0.576

Table 3 Job postings for Generation Covid during the first lockdown period: Weeks 12–17 (Reference week = 4)

	Jobs for youth	Student jobs	Entry jobs low education	Entry jobs high education
Top 20 Occupations	–0.952***	–0.722***	–0.874***	–0.707***
2020 vs. 2018–2019	(0.166)	(0.174)	(0.160)	(0.161)
Remaining Occupations	–0.449***	–0.500***	–0.465***	–0.503***
2020 vs. 2018–2019	(0.088)	(0.090)	(0.090)	(0.091)
Top 20 – Remaining Occ	–0.503**	–0.221	–0.408**	–0.204
	(0.188)	(0.196)	(0.184)	(0.185)

Note: Dependent variable: ln(Job postings). Summary of results from a model in which each policy interval is represented by a dummy variable. The model includes baseline week, occupation, year, and moving holiday fixed effects. All variables are interacted with the group indicator. The first line shows the sum of the baseline and the interaction effect for the first lockdown period (Weeks 12–19) for each group, reflecting the difference for group g during that period to postings in 2018–2019 in the same weeks and group. The next line shows the main effect estimator for the remaining occupations. The bottom line shows the interaction terms for the top 20 occupations for each group (youth, students, entry jobs with high and low education). This is the triple difference estimator. Each column presents estimates from separate regressions, including interactions for one group only. Standard errors are clustered by occupation. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

(0.010) for the top 15 and –0.326 (0.074) for the top 25, compared to –0.503 (0.012) for the top 20 as reported in Table 3 (*p*-values in parentheses). These findings show that the larger decline in job postings for youth is not an artifact of the particular cut-off we have chosen but rather suggests that the more important jobs for youth were hit harder than the less important jobs.[5]

6. Conclusion

In this study, we analyze the development of job postings in Norway during the first and second waves of the COVID-19 pandemic in 2020, with a special focus on jobs for youth. We show that the number of job postings in Norway fell dramatically after the authorities ordered a lockdown on 12 March 2020. Comparing the number of job postings during Week 12 to Week 19 of 2020 to the number of job postings in Week 4 in 2018, 2019, and 2020, we find that job postings were 39% lower[6] during the first lockdown period in 2020 than in the same weeks in 2018 and 2019. Even before this period, there were strong signs of a decrease starting once the virus reached Norway, with a decline of almost 10% in Weeks 9–11 compared to the pre-pandemic period. During the two reopening phases in the spring of 2020, the number of job postings remained –20% and –13% lower, respectively, than the pre-pandemic levels.

The estimated decline in job postings may be interpreted as an effect of the pandemic but only under the assumption that 2020 postings would follow the same pattern as 2018–2019 postings in the hypothetical case that COVID-19 did not occur. Two observations point in the direction of such an interpretation: First, the standard errors for the 2018 and 2019 weekly observations are rather small and do not suggest a large variation within weeks across those years. Second, the observed pattern during the pre-pandemic weeks of 2020 (Weeks 2–8) does not display significant deviation from the same weeks in 2018–2019. Still, we cannot know what would have happened in those post-pandemic weeks in the counterfactual case, and appropriate caution must be applied to the interpretation.

A decline in new jobs means fewer opportunities for the unemployed and newcomers to the labor market. It also means fewer opportunities for job-to-job mobility and, most likely, lower levels of reallocation of workers across firms, hampering an important channel of productivity growth. The massive hike in furloughs during the early stages of lockdown may also be a factor behind the drop in vacancies during this crisis. Under normal circumstances, some furloughed workers would move to new jobs or 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.

A key result of this study is that jobs for young people were hit harder than other jobs, with entry jobs for non-college-educated workers hit the hardest. This is particularly unfortunate because youth were already strongly affected by school closings and restrictions on social interactions. While the labor market might not be the key destination for most youths, available jobs are crucial for those leaving education. The well-established 'scarring effect' suggests that youth entering the labor market under less fortunate conditions are likely to face negative consequences in the market in the long run. During the first lockdown period, the decline in job postings for youth was 40% stronger than for other occupations. The accumulated number of vacancies lost remains high. Among the entry jobs for youth, those available to graduates with low education

levels took the largest hit, with a decline of 34% during the lockdown period. Both entry jobs for individuals with higher education and jobs for students display lower rates of job postings after the pandemic outbreak, but the difference between these occupations and other occupations is not significant.

The patterns of job postings appear to align with the periods of policy intervention. However, even if we accept the assumption necessary to interpret the drop in postings as a causal effect of the pandemic, we cannot apply a causal interpretation of the effects of the policy interventions. The policy interventions are intertwined with the intensity of the disease's spread, and we would expect both interventions and spread of the disease to influence economic behavior. Therefore, we do not apply a causal interpretation of the policy interventions. More analysis must be done to clarify the interrelation and separate influence of these two factors.

The fact that low-skilled jobs and new jobs were influenced more by the pandemic than high-skilled jobs tends to increase inequality. Unfortunately, since jobs for young people, particularly entry jobs for youth with lower education, were hit the hardest, the COVID-19 pandemic may have especially long-lasting effects for those groups. Cohorts of young people entering the labor market in periods with few job opportunities will subsequently compete with both the cohort entering the labor market the following year and those who lost their jobs during the crisis. Even if employment is currently surging in a tight labor market, the long-term consequences for Generation Covid remain an open question.

Acknowledgments

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Notes

[1]As labeled by Major et al. (2020).

[2]A rough estimate of the share of job postings collected by NAV compared to Statistics Norway's survey on vacancies (including formal and informal job postings) show that formal job postings account for around 70% of all vacancies (SSB 2023). This share is relatively consistent in our observation period.

[3]Barth, Dale-Olsen, Schøne, and Østbakken (2022) analyze the tightness of the Norwegian labor market during and toward the end of the COVID pandemic. The results show that occupations heavily affected by the pandemic were typically in retail, sales, and service, as well as tourism and transport. Hiring almost completely stopped during the first lockdown. Toward the second quarter of 2021, the authors find that the labor market tightened, especially in tourism and transport, which experienced a tighter labor market than before the pandemic. For employers looking for new hires, potential hires are, to a greater extent, found among employees in other firms and not the unemployed.

[4]In Week 2 of 2018, τ takes the value 1; in Week 9 of 2020, $\tau = 101$; and in Week 50 of 2020, $\tau = 147$ since each year in our data consists only of the 47 weeks 2–50.

[5]Experiments with interaction terms including the share of youth in the occupation, not reported here, gave significantly negative coefficients for the same weeks, supporting this interpretation. As our main research question concerns job opportunities for youth, we have chosen to focus on the main jobs for youth rather than on the gradient with respect to the share of youth in occupations.

[6]The coefficient of –0.488 in Table 2 implies a relative decline of 38.6%.

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

Appendix

A1. 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 % of all jobs for youth were within one of these occupations.

To identify typical student jobs, we sample all persons between 28 and 33 years of age in 2019, 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.[7]

Table A1. Jobs for youth in 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
Healthcare assistant	0.112	0.343	0.133	0.617
Preschool assistant	0.063	0.406	0.113	0.377
Waiter and bartender	0.035	0.441	0.266	0.508
Electrical equipment installer	0.032	0.473	0.244	0.626
Other sales	0.032	0.505	0.282	0.496
Building frame worker	0.028	0.534	0.126	0.501
Mechanic	0.024	0.557	0.169	0.478
Food preparation assistant	0.023	0.580	0.143	0.549
Sports and fitness worker	0.022	0.602	0.194	0.530
Receptionist	0.021	0.623	0.125	0.523
Office clerk	0.021	0.645	0.052	0.571
Cleaner	0.021	0.666	0.029	0.437
Warehouse and transport	0.021	0.687	0.090	0.399
Mining and construction laborer	0.017	0.704	0.180	0.461
Teachers, primary school	0.014	0.717	0.022	0.363
Cook	0.013	0.731	0.170	0.562
Security personnel	0.011	0.742	0.117	0.419
Sales and purchasing agent	0.010	0.752	0.031	0.358
Building finisher	0.009	0.761	0.118	0.535

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

Table A2 Jobs for students in 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
Healthcare assistant	0.139	0.406	0.172
Preschool assistant	0.047	0.453	0.104
Other sale	0.036	0.489	0.195
Waiter and bartender	0.030	0.520	0.223
Building frame worker	0.029	0.549	0.085
Electrical equipment installer	0.029	0.578	0.196
Cleaner	0.025	0.603	0.038
Office clerk	0.025	0.628	0.076
Receptionist	0.021	0.649	0.123
Food preparation assistant	0.020	0.669	0.131
Warehouse and transport	0.019	0.688	0.063
Teacher, primary school	0.018	0.706	0.145
Mechanic	0.014	0.720	0.096
Elementary worker in other field	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 teacher	0.010	0.776	0.289
Manufacturing laborer	0.009	0.786	0.118

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

To identify typical entry-level jobs (the first job after graduation), we sample all persons between 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 education level (non-college and college+), and pick the occupation of the highest-paying job during the first year following graduation (see footnote iii).

Table A3 Entry jobs after completed education, less than college

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
Healthcare assistant	0.083	0.234	0.036
Building frame worker	0.077	0.311	0.021
Electrical equipment installer	0.063	0.374	0.048
Preschool assistant	0.060	0.434	0.035
Mechanic	0.051	0.486	0.032
Other sales	0.031	0.517	0.057
Hairdresser and beautician	0.026	0.542	0.032
Building finisher	0.026	0.568	0.023
Cleaner	0.023	0.592	0.015
Warehouse and transport	0.023	0.615	0.018
Cook	0.021	0.636	0.034
Waiter and bartender	0.020	0.655	0.046
Mobile plant operator	0.017	0.673	0.022
Office clerk	0.017	0.689	0.010
Engineering technician	0.016	0.706	0.007
Metal worker	0.016	0.722	0.023
Mining and construction laborer	0.015	0.737	0.024
Food preparation assistant	0.014	0.751	0.034
Receptionist	0.014	0.765	0.019

Table A4 Entry jobs after completed education, college and further

Occupation (3-digit ISCO 08)	Employment share of entrants	Accumulated employment share	Entry jobs share of employment
Teacher, 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
Healthcare assistant	0.055	0.334	0.172
Engineering technician	0.048	0.382	0.037
Preschool assistant	0.039	0.421	0.104
Office clerk	0.028	0.449	0.076
Administration professional	0.026	0.476	0.064
Medical and pharma. technician	0.026	0.502	0.061
Engineering professional	0.025	0.526	0.032
Software analyst and developer	0.024	0.551	0.043
Medical doctor	0.024	0.574	0.067
Sales and purchasing agent	0.023	0.597	0.037
University teacher	0.022	0.619	0.289
Finance professional	0.021	0.640	0.042
Numerical clerk	0.019	0.659	0.060
Business service agent	0.018	0.678	0.092
Other health professional	0.017	0.695	0.072
Receptionist	0.017	0.712	0.123
Waiter and bartender	0.015	0.727	0.223