

Bauer, Anja; Hartl, Tobias; Hutter, Christian; Weber, Enzo

Article

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Anja Bauer, Tobias Hartl, Christian Hutter and Enzo Weber

Search Processes on the Labor Market during the Covid-19 Pandemic*

INTRODUCTION

Economies around the world are suffering from the effects of measures to contain the coronavirus. Particularly, the labor markets were hit hard. Unemployment has been rising, and the stock of vacancies has declined. To understand the impact of the coronavirus crisis on the functioning of the labor market, it is important to not only look at unemployment and the stock of open vacancies, but also at the search behavior of employees and employers. Relatedly, this article sheds light on search processes from various perspectives. We take a closer look at search intensity, placement processes and on changes in the search behavior across industries.

Studies analyze the labor market effects of the coronavirus crisis from various perspectives. For instance, Coibion et al. (2020) use a US household survey to document several facts on unemployment and participation. They find that the job loss in the US was massive, but that people who lost their jobs were not actively searching. Furthermore, they point out that the participation rate declined much more than in the Great Recession. Campello et al. (2020) rather focus on the firms' perspective and explore changes in vacancy posting behavior in the US. Their paper shows that the pandemic leads to down-skilling because fewer high-skilled positions are posted, and that hiring is also hampered. Bauer and Weber (2020) assess the impact of the pandemic on labor market flows between employment and unemployment for Germany. The results indicate reduced hiring dynamics. The findings of these papers imply that the main challenge in the light of the pandemic is to strengthen the recovery by boosting hiring.

However, little is known so far about how the coronavirus crisis has changed search processes and behavior in the labor market. To provide insight on these topics, we analyze big data for Germany. We evaluate how often the job exchange website of the German Federal Employment Agency (FEA) and its placement platform have been accessed for search or placement activities. We find that both search intensities and placement activity significantly explain job findings. With LinkedIn data we assess whether the Covid-19-crisis changes the allocation of matches by having a look at the changes across industry sectors in applications (see Bauer et al. 2020 for more information). Such sectoral imbalances can cause

rising aggregate unemployment (Lucas and Prescott 1974, Lilien 1982). In this respect, the data can give indication whether the natural rate of unemployment could rise in the aftermath of the crisis.

Further, we are able to observe whether workers apply for jobs at the same seniority level¹ as before the crisis or whether the workers are willing to make concessions that might hamper their career progress. That can be linked to the questions whether match quality rises or declines in recessions, i.e. if the recent recession is cleansing or sully-ing (see, for instance, Foster et al. 2016).

SEARCH AND PLACEMENT DURING THE CORONAVIRUS PANDEMIC

Data Basis

The FEA, as the central placement agency for the unemployed in Germany, operates an **online job exchange platform**, where job seekers (JS) search and apply for jobs or offer their labor, and firms (F) can find suitable workers or place job offers. Once job seekers or companies visit this job exchange platform, the aggregate online traffic is saved. This allows us to measure the respective search intensities (I^{JS} and I^F).

In addition to job seekers and firms, there is a third key actor in the matching process: the FEA's employment agents (EA). They screen the supply and

¹ Job Seniority describes the rank and is determined by a member's job title. The categories are as follows (ranked high to low seniority): Owner, Partner, CXO, Vice President, Director, Manager, Senior Individual, Contributor, Entry, Training, and Unpaid.



Anja Bauer

is Senior Researcher at the Department "Forecasts and Macroeconomic Analyses" at the Institute for Employment Research (IAB).



Tobias Hartl

is Researcher at the Department "Forecasts and Macroeconomic Analyses" at the Institute for Employment Research (IAB) and Doctoral Researcher at the Chair of Econometrics at the University of Regensburg.



Christian Hutter

is Senior Researcher at the Department "Forecasts and Macroeconomic Analyses" at the Institute for Employment Research (IAB).



Enzo Weber

is Head of the Research Area "Forecasts and Macroeconomic Analyses" at the Institute for Employment Research (IAB) and holds the Chair of Empirical Economics at University of Regensburg.

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demand side of the labor market via the placement software VerBIS to identify and propose potential jobs to jobseekers or suitable candidates for vacant positions. By measuring the placement intensity of employment agents (I^{EA}), we are breaking new ground in data collection.

Throughout this analysis, we use “activated visits,” which means that we count online activities where a visitor engages beyond merely opening the website. Activated visits thus represent qualified traffic in the online job exchange. Furthermore, this procedure helps to exclude unwanted online traffic, e.g., by bots.

In terms of quality, our measures for online activity are based on a high number of observations. Moreover, with just one day of processing, data are available almost immediately. This makes them particularly valuable in times of severe economic crisis, especially during the Covid-19 pandemic. In contrast, standard labor market data is usually available on a monthly or quarterly basis and often with significant delays. In summary, the data introduces a range of possibilities, both for research and for forecasting. It is an opportunity for faster political consultation allowing quicker responses.

Results

For each of the three labor market actors described above (job seekers, firms, employment agents) we calculate two activity measures:

- daily online visits, which indicate the respective (qualified) overall activity on the corresponding websites.
- search *intensities*. To do so, we divide total activity by the seasonally adjusted number of unemployed (in case of I^{JS}), of vacancies (in case of I^F), or by the sum of both (in case of I^{EA}).

Figures 1 to 3 show the results for the period between 5 January and 13 July 2020. This covers the period before, during and after the extensive contain-

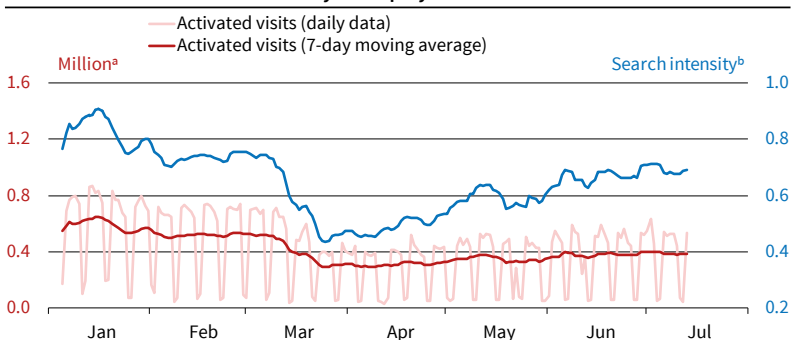
ment measures of the first lockdown. The light-grey lines show total online activities, which are subject to strong weekday-related fluctuations. To eliminate these weekday effects we also show the 7-day moving average (solid black lines). The dotted lines show the respective search or placement *intensities*.

Based on the 7-day moving average, the level of employer search activities in the weeks before the strong containment measures was just over 0.5 million visits per day. After 7 March (0.52 million), average search activity collapsed until it reached a low point at 0.29 million on 25 March, 2020, a decline of 44 percent. In the last week of April, a recovery was noticeable due to a loosening of containment measures; by July 13, online search activity by employers had risen by 33 percent to around 0.39 million visits per day. However, this still left a difference of 25 percent compared to pre-crisis levels. Taking into account that the number of vacancies fell significantly over the same period, the picture is similar concerning the drop: between March 7 and 25, search intensity by employers fell by 42 percent (from 0.745 to 0.434 daily views per vacancy). During the subsequent phase of recovery, search intensity increased more sharply: by 13 July, with 0.689 daily visits per vacancy, 92.5 percent of the pre-crisis level had been reached again. The results also confirm previous studies that find pro-cyclical search behavior for companies (e.g., Davis et al. 2013).

Job seeker search patterns show a more complex picture. The number of activated visits initially also fell sharply from 4.44 million on 6 March to 2.40 million on 17 March, but then rose rapidly within a few days to 5.57 million on 29 March, only to settle below pre-crisis levels between 2.8 and 4.3 million visits.

Search *intensity*, controlling for the significant increase in unemployment over the same period, shows a similar pattern, although no recovery effects are apparent. By the end of the sample period, 1.04 daily visits per unemployed were recorded, practically unchanged from the low-point of 17 March (1.03). Several effects could play a role in the observed development of search intensity. Theoretically, two mechanisms are conceivable. First, lower job prospects in bad economic times could discourage job seekers (DeLoach and Kurt 2013). Second, intensified searches could compensate for the threat of a reduction in household prosperity (ibid.) or lower probabilities of meeting and matching (Mortensen 1987). We argue that, especially in the initial days after the lockdown, intensifying job searches was not a top priority and therefore search intensity initially decreased. Subsequently, the compensatory effect seems to have been dominant until the end of March, whereas discouragement may have rapidly become more relevant from April onward due to the severity of the crisis.

Figure 1
Activated Visits and Search Intensity of Employers 2020



^a Activated visits from employers on the FEA's job exchange.

^b Search intensity of employers (activated visits divided by the number of vacancies).

Source: FEA (Netmind); authors' calculations.

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The number of activated visits on VerBIS by employment agents also show clear coronavirus effects. Placement-related visits fell from 1.53 million per day on March 5 to 1.00 million per day on March 17, corresponding to a decline of 35 percent. By July 13, this figure had recovered by 28 percent to 1.28 million, thus making up for around half of the decline. Placement *intensity* also suffered a sharp initial decline of 35 percent, whereas the subsequent recovery was slower. By the end of the observation period, only 71 percent of the pre-crisis level had been reached. The sharp drop in placement intensity is likely due to prioritizing the processing of short-term work applications. Consequently, agents had less capacity for genuine placement activities.

The observed declines in search and placement activities are relevant for labor market flows, especially for outflows from unemployment into employment (matches). In April and May 2020, these fell by 48 percent, while vacancies only fell by 16 percent. According to a typical labor market matching function, which explains matches by the number of unemployed and vacancies, this should not be the case: The elasticity of matches with respect to vacancies is usually around 0.3 (not 3) so that matches should actually react much less strongly than vacancies. By measuring the search activities, our study provides a crucial piece to explaining this puzzle: Matching efficiency, which includes search and placement intensities, has decreased significantly throughout the Covid-19 pandemic.

IMBALANCES ACROSS INDUSTRY AND EXPERIENCE LEVEL

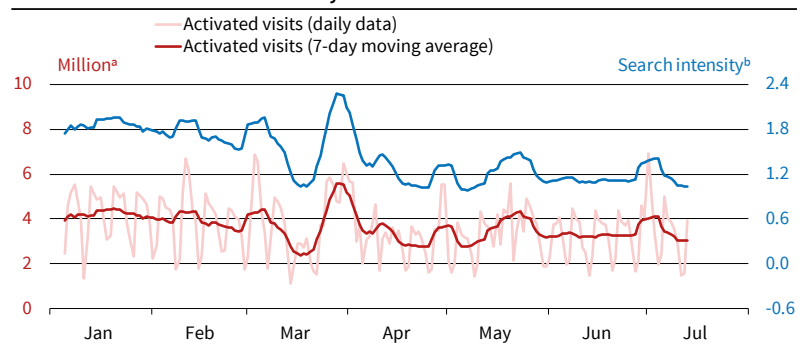
Data

We build our analysis on comprehensive data of the career network LinkedIn, a platform that is used for professional networking by workers and firms. While firms are posting jobs, workers seeking for jobs might send applications. After registering on LinkedIn, members create a profile, which is similar to a resume and add information about work experience, competencies and education.

We examine premium job postings, which are postings that are paid for by the firm. This rules out duplicates and ensures up-to-dateness. Furthermore, we use applications from members within Germany, i.e., from members who state Germany as their base location and apply for jobs in Germany.

We consider a 3-million-member sample and premium jobs postings. The behavior of these members was investigated between 1 January, 2019 and 31 May, 2020. Because the data is available on a daily basis, it allows the periods of interest to be precisely determined. The “crisis period” refers to the period between 23 March, 2020 and 31 May, 2020. We chose 23 March as this is the date when the lockdown came

Figure 2
Activated Visits and Search Intensity of Job Seekers 2020



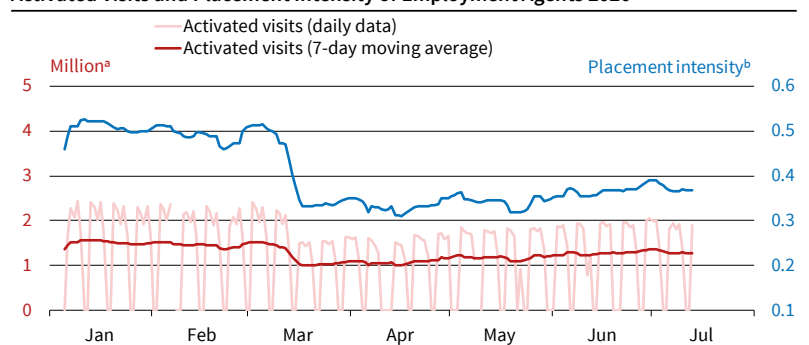
^a Activated visits from seekers on the FEA's job exchange.

^b Search intensity of seekers (activated visits divided by the number of unemployed).

Source: FEA (Netmind); authors' calculations.

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Figure 3
Activated Visits and Placement Intensity of Employment Agents 2020



^a Activated visits by employment agents on the FEA's placement platform VerBIS.

^b Placement intensity (activated visits divided by sum of vacancies and unemployed).

Source: FEA (Netmind); authors' calculations.

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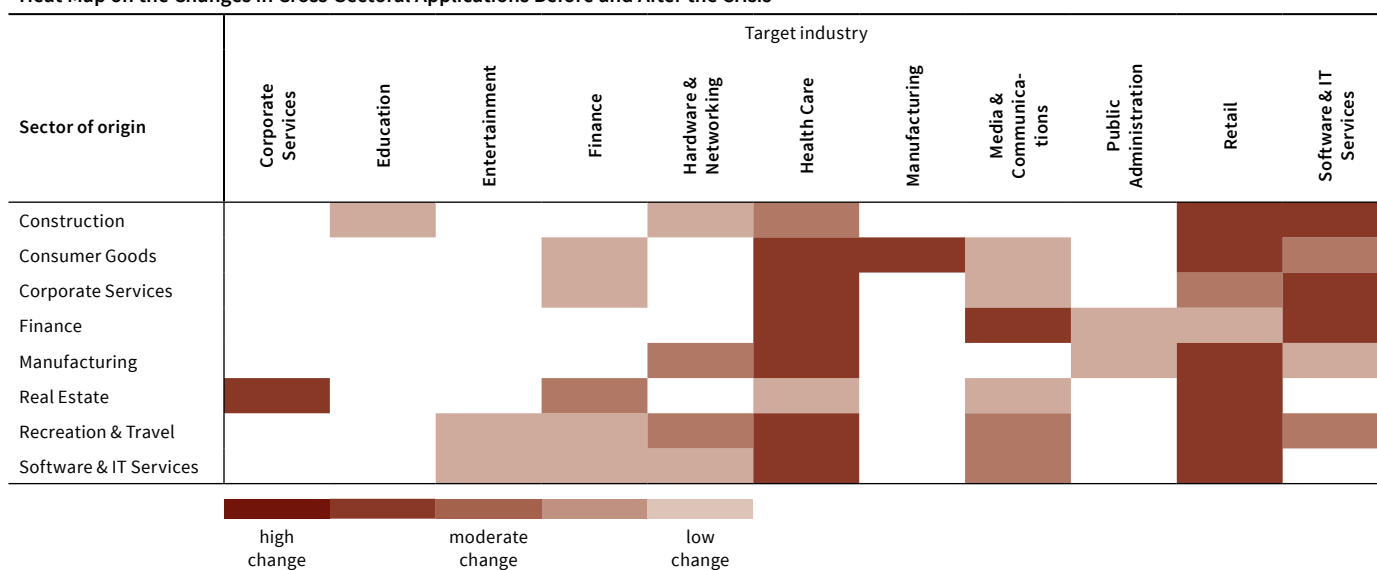
into force nationwide and comprehensively in Germany. The “pre-crisis period” refers to the same period in 2019.

Results in Industry Changes

In order to unravel the changes in cross-industry search behavior, we construct a heat map. Figure 4 shows the industry in which the people are or were last employed and in which industries they applied more frequently as a result of the crisis. In order to filter out the coronavirus effect, the percentage of applications across the industries were measured at two different times, once before and once during the lockdown, and compared to the change in the previous year period. The heat map therefore reveals the change in the shares in the wake of the coronavirus crisis. The intensity of the color represents the strength of the change. The darker the area, the greater the increase. Only the five strongest increases in an industry were taken into account. The changes range between 0.1 and 3.0 percent points.

A look at the heat map shows that people from negatively affected industries are more likely to apply in industries in which demand has increased during the coronavirus crisis, such as health, retail and

Figure 4
Heat Map on the Changes in Cross-Sectoral Applications Before and After the Crisis



Note: Top 5 positive changes; Changes of same magnitude have the same colour. Source: LinkedIn, own calculation.

Source: LinkedIn, own calculation.

software and IT service providers. Although most of the retail trade was closed during the lockdown, the additional demand in grocery or online retail could be behind this development. People from the leisure and tourism sector not only applied more frequently in the healthcare and retail sectors, but also in the IT sectors (hardware & networks, software & IT services) as well as media and communication, the financial sector and the entertainment sector. Similarly, it becomes clear that members often apply in industries that have certain overlaps with their current industry. For example, people from the consumer goods industry often apply in retail or production or people from the business services sector often apply to software and IT service providers.

Results on Job Ladder Effects

Recessions are often thought to have a cleansing effect and destroy relatively unproductive matches. However, during recessions, the match quality could also be impaired by so-called sully effects.

Adjustment processes take place not only across industries, but also through qualification or experience levels. In order to shed light on this type of adaptation, we analyze whether people apply to corresponding seniority levels, try to climb the ladder, or whether they are making compromises compared to their current level. For this purpose, we measure which proportion of applications is above, on or below the current level of experience. This proportion is measured once during the coronavirus crisis and once in the same period of the previous year.

It can be seen that during the crisis, the members applied significantly less often above their seniority (decrease by 3.3 percentage points from 27.1 percent

before the crisis to 23.8 percent during the crisis), but more often below the seniority (increase of 3.3 percentage points, from 29.2 percent before the crisis to 32.5 percent during the crisis). People on LinkedIn are less likely to try to improve their position or climb the career ladder and are more likely to make concessions on seniority. The concessions may be made to avoid unemployment. In fact, empirical evidence (Bauer 2016) shows that employees who change jobs while unemployed in the meantime suffer permanent loss of wages. This once again illustrates the tension in the job market during the coronavirus crisis.

CONCLUSION

We exploit new big data sources to study the search behavior in the labor market during the Covid-19 crisis. The results show that search and placement activities dropped significantly and have not yet fully recovered. We show that the number of applications per job has risen as a result, which means that competition has intensified.

Furthermore, the results reveal that people from industries particularly affected by the crisis apply much more frequently and there has been a significant shift in the target industries for applications. This makes reallocation processes in the crisis evident. Finally, we find that applications are made significantly more often below and significantly less often above a person's level of seniority than in the previous year. This shift from higher to lower quality applications shows a risk that the crisis is affecting the functioning of the labor market and disables the potential of employees to develop.

Our results suggest that the most critical effects of the coronavirus crisis on the labor market result

from a lack of new hires. Various policies, including simplified conditions for short-term work, aim at retaining workers and thus preventing inflows into unemployment. While these policies have been successful in avoiding additional job separations, they are not sufficient for improving the labor market sustainably and to avoid hysteresis and scarring effects. Indeed, long-term unemployment has risen considerably in Germany (Gartner and Weber 2021). To boost matches, search and placement activities must be relaunched and intensified. This can be achieved, for instance, by providing financial support for new hires (Merkl and Weber 2020). After the introduction of the “restart premium” by the German government, the options for individual wage subsidies should be temporarily expanded. Above all, it is a matter of not only taking into account placement obstacles inherent in the person, as is customary with existing instruments, but also individual affectedness by the hiring weakness that has persisted throughout the crisis. Particularly vulnerable groups include the long-term unemployed and young professionals. Unwanted side effects could be limited by excluding cases in which, after the funding became known, the person concerned was terminated by the same employer or re-employment periods are not reached.

In view of the transformation processes and reallocation in the labor market, training policy faces major challenges. This concerns several groups. For the unemployed, incentives for qualification should be improved by an education bonus beyond unemployment benefits (Hutter and Weber 2020). For short-time work, a qualification concept is needed that comprises flexible training formats, financial incentives, counseling services (Weber 2021). For employees, switching occupations and achieving new job skills should be supported by an income replacement program that allows for a secure professional reorientation for those facing the need for change after 20 years on the job.

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