

Spatial disparities in hiring problems:

The role of firm characteristics, job features, and search channels

Michaela Fuchs*, Annekatrin Niebuhr†, Jan Cornelius Peters‡, Georg Sieglens§

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*Institute for Employment Research (IAB), Regensburger Str. 100, 90478 Nuremberg, Germany.
Email: michaela.fuchs@iab.de, ORCID: 0000-0002-6933-846X

†Institute for Employment Research (IAB), Regensburger Str. 100, 90478 Nuremberg; and Empirical Labor Economics and Spatial Econometrics, Department of Economics, Christian-Albrechts-Universität zu Kiel, Olshausenstr. 40, 24098 Kiel, Germany. Email: annekatrin.niebuhr@iab.de, ORCID: 0000-0001-8218-0954

‡Institute of Rural Economics, Johann Heinrich von Thünen Institute, Bundesallee 64, 38116 Braunschweig, Germany. Email: cornelius.peters@thuenen.de, ORCID: 0000-0001-9328-3078

§Institute for Employment Research (IAB), Regensburger Str. 100, 90478 Nuremberg, Germany.
Email: georg.sieglens@iab.de, ORCID: 0000-0002-0219-9231

Extended Abstract

In many regions of advanced economies, labour and skill shortages are among the most urgent policy concerns. They may have negative effects on the productivity of local firms and create barriers to exploiting economic opportunities arising from new technology or to meeting environmental targets (Green and Owen, 2003; Morris et al., 2020; OECD, 2024). While there is consensus that hiring problems have increased substantially over the past years and that spatial disparities in labour shortages are significant (Green and Owen, 2003; OECD, 2024), the evidence on the spatial pattern is less clear. Some studies emphasize shortages in rural areas (Watson et al., 2006; Hoyos and Green, 2011), often focusing on specific regions and sectors such as agriculture or health (Sharma et al., 2016; Jones et al., 2019; Nyström, 2021; Innerhofer et al., 2024). Other studies which compare hiring problems in urban and rural locations suggest either that in particular large urban areas suffer from above average labour shortages (Lee and Cowling, 2014; OECD, 2024) or that, in contrary, agglomeration effects mitigate the negative impact of labour and skill shortages through more efficient matching in the local labour market (Morris et al., 2020). Moreover, still little is known about the drivers of hiring problems in general (Groiss and Sondermann, 2024) and, more specifically, about the factors that explain spatial differences in shortages faced by firms.

This paper examines the spatial dimension of labour shortages based on data from a large representative establishment survey, which is combined with administrative data. The merged data provides detailed individual-level information on establishments, vacancies and hiring processes in Germany for the years 2015 to 2023. In order to find out the extent to which hiring problems differ systematically across location types along the urban-rural hierarchy, we first analyse how difficulties in filling vacancies depend on the establishment's location in an urban, semi-urban or rural area. We apply a broad set of indicators on hiring problems, including perceived staffing problems, the number of applicants, search duration, and cancelled hiring processes. In doing so, we assess disparities

comprehensively and also consider different aspects of labour shortages. Second, we provide evidence on the factors behind the spatial disparities and, particularly, on the role of composition effects. To do this, we analyse whether establishment characteristics, vacancy features, and search channels used to fill a vacancy correlate with the intensity of hiring problems. We examine to what extent spatial disparities in hiring problems between location types can be traced back to the composition of regions with regard to these influential factors and whether there remains an explanatory role for the spatial context establishments are located in. Finally, we also investigate whether establishments react differently to problems in filling a vacancy depending on their location. More specifically, we examine concessions on offered wages and required experience and skills.

Spatial disparities in recruiting difficulties between urban and rural areas are, at least in part, likely due to composition effects if hiring problems significantly correlate with establishment characteristics, vacancy features, or search channels. One reason is that the economic structure differs along the urban-rural hierarchy with regard to the types of establishments and jobs (Niebuhr et al., 2024). These differences may result in spatially varying skills shortages if, for instance, occupational or sectoral labour markets, that are nationwide particularly tight, are concentrated on a specific type of location. Furthermore, there is evidence that different types of establishments, which are located in different area types, tend to search for workers through different channels and that this also affects which kind of workers are attracted and how long hiring takes. Specifically, Carrillo-Tudela et al. (2023) find that job postings are particularly relevant to high-wage firms, while social networks or public employment agencies play a larger role for firms paying low wages. Dauth et al. (2022) in turn show that high-wage and low-wage establishments tend to be located in different locations along the urban-rural hierarchy. Taken together, the findings suggest that – due to compositional differences – typical search channels differ between location types which might also affect the matching between workers and employers.

Our results point to statistically significant disparities in labour shortages between location types. However, the magnitude of the difference is moderate for most indicators and the spatial pattern differs depending on the indicator considered. This suggests that it is the specificity of hiring problems that varies across location types rather than the overall intensity. Moreover, we find that hiring problems correlate with establishment characteristics, features of the advertised vacancies and applied search channels, giving rise to spatial disparities in shortages. Hence, these disparities are partly due to composition effects, because location types differ with respect to factors that influence the intensity of hiring problems. We also detect spatial differences in establishment behaviour in response to hiring problems. Some employers make concessions on wage claims, while others adjust skill requirements or even cancel the recruitment process. To some extent, this behaviour is also related to the spatial sorting of jobs and establishments and thus to composition effects.

Our paper contributes to a better understanding of firms' exposure to labour shortages and their reactions towards hiring problems in urban and rural areas. First, by considering several indicators relating to both unfilled labour demand and filled positions, we cover different dimensions of labour and skill shortages. We thereby pay attention to firms' broad interpretation of both quantitative and qualitative aspects of labour shortages (see e.g. Green et al., 1998). Many studies, in contrast, rely on only one indicator to measure such shortages (e.g., Haskel and Martin, 1993; Bellmann and Hübler, 2014; Healy et al., 2015; Nyström, 2021; Groiss and Sondermann, 2024) and, therefore, might not provide a complete picture of recruitment difficulties related to labour shortages, as pointed out by Green et al. (1998). In a similar vein, Groiss and Sondermann (2024) discuss different aspects of labour shortages which cannot be examined using one specific indicator only. In particular, aggregate measures such as the vacancy rate or labour market tightness neglect important dimensions of hiring problems as they focus on unmet labour demand and labour shortages at the national, regional or

industry level. Hiring problems might not become manifest in unfilled positions as reflected by vacancies, but also consist in concessions made by the firm when recruiting a worker or cancelling search. For example, using micro data for the UK, Green et al. (1998) show that an employers' signalling of skill shortage only partly overlaps with specific experiences of hard-to-fill vacancies. This suggests that it is important to pay attention to various aspects of hiring problems. Using single indicators referring to particular dimensions of hiring problems might also explain contradictory findings on spatial disparities in the literature. Considering several indicators which relate to different aspects of labour and skill shortages, we show that the spatial pattern of disparities in fact varies depending on the applied measure of hiring problems.

Second, relying on a large, representative data set on firms' labour demand, the Job Vacancy Survey (JVS) of the Institute for Employment Research (IAB), enables us not only to provide detailed evidence on spatial disparities, but also to generalize inference. Overall, the JVS provides more in-depth insights into labour and skill shortages than most other job vacancy surveys and statistics (Bossler et al., 2020). Representative studies often offer little detail on regional hiring problems as they tend to rely on one aggregate indicator (e.g. OECD, 2024). Moreover, we avoid drawbacks of in-depth (case) studies that often utilize small samples or specific information on selected sectors or regions and therefore lack generalization (Hoyos and Green, 2011; Lee and Cowling, 2014; Nyström, 2021). Another advantage of the JVS – in addition to its representativeness and the extensive information it provides on search and recruitment processes – is that it contains detailed information about the locations of the surveyed establishments at the municipal level. Based on this, we group vacancies and establishments into urban, semi-urban and rural areas applying the degree of urbanisation (DE-GURBA) classification from DG REGIO, the Directorate-General for Regional and Urban Policy of the European Commission, and Eurostat. This enables us to take the establishments' locations into account precisely and differentiate on a small scale.

Third, our analysis also adds to the small strand of research that makes use of micro-data to investigate the causes of hiring problems (Groiss and Sondermann, 2024). Considering the role of the determinants of labour shortages for spatial disparities, we provide evidence on an issue that has not received much attention in this literature. Lee and Cowling (2014) apply a similar approach to investigate spatial disparities in perceptions of, inter alia, recruiting problems in the UK and examine whether they are related to firm characteristics. However, considering more generally barriers to firm growth, the study does not provide much detail on labour shortages. Their results indicate that firms located in urban areas are more concerned about recruiting issues than rural firms, which is due to firm characteristics. Groiss and Sondermann (2024) find that labour shortages in EU areas are primarily related to structural factors that change slowly over time. While firm characteristics are important predictors of hiring problems according to their results, the probability that firms report problems also increases if there is a local shortage of labour supply and relatively low unemployment. This suggests that both firm characteristics and the spatial context seem to play a role.

Using information on filled vacancies, we investigate whether establishment characteristics as well as job features and search channels correlate with the intensity of hiring problems. Previous studies tend to focus on the role of firm characteristics (see e.g. Lee and Cowling, 2014; Groiss and Sondermann, 2024). Applying a broad range of indicators for hiring problems, we make use of different microeconomic estimation techniques depending on the respective measure for labour shortage. They include logistic and negative binomial regressions as well as survival analysis. With these regressions, we examine spatial disparities in hiring problems and in the extent to which these differences can be attributed to composition effects with respect to the recruiting establishment, the type of job, and the applied search channels.

A fourth contribution relates to the policy dimension of regional labour and skill shortages. Understanding the extent to which spatial differences in recruitment problems are related to the attributes of establishments, jobs, and search channels, or to spatial factors such as the regional labour supply, is important for designing policies to counteract hiring problems. Some recent studies advocate place-based approaches to address regional labour and skill shortages (Corradini et al., 2023; OECD, 2024). This assumes that firms differ in the obstacles they face depending on their location (Lee and Cowling, 2014). However, measures focusing on specific types of local labour markets are probably less effective than policies which aim at directly supporting particular types of firms if more severe hiring problems are primarily due to characteristics of establishments that prevail in these areas (see also Lee and Cowling, 2014). A place-based approach, in contrast, might be preferable if firms face hiring problems first of all because of the specificities of their location.

Beyond the question of whether place-based policies represent an adequate approach to address local labour and skill shortages, it is also important to know how firms respond to hiring problems and whether these responses are affected by the spatial context. Lee and Cowling (2014) argue that firms likely adapt their strategies to reflect the (dis)advantages of their location. While subsidizing job-related training might be a good option if firms tend to adjust skill requirements in response to local skill shortage, cancelled hiring processes likely call for other policies. However, previous studies on local hiring problems tend to pay little attention to spatial differences in adaptation strategies of employers (e.g., Green and Owen, 2003; Nyström, 2021). Based on information available in the JVS, we provide novel information on whether employers' reactions towards local labour and skill shortages differ across space and on the factors behind these disparities.