

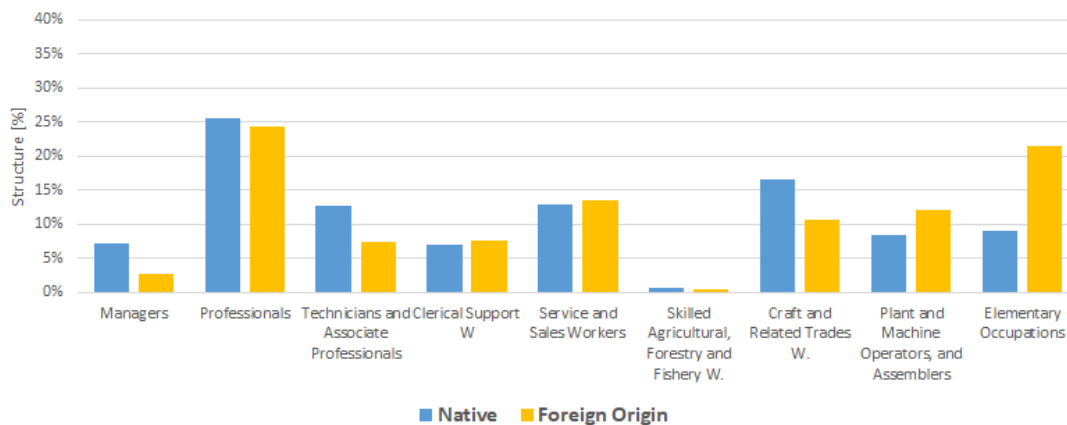
## Extended abstract

### Migration and automation – spatial clustering of foreign populations by risk of technology-induced job loss in Denmark

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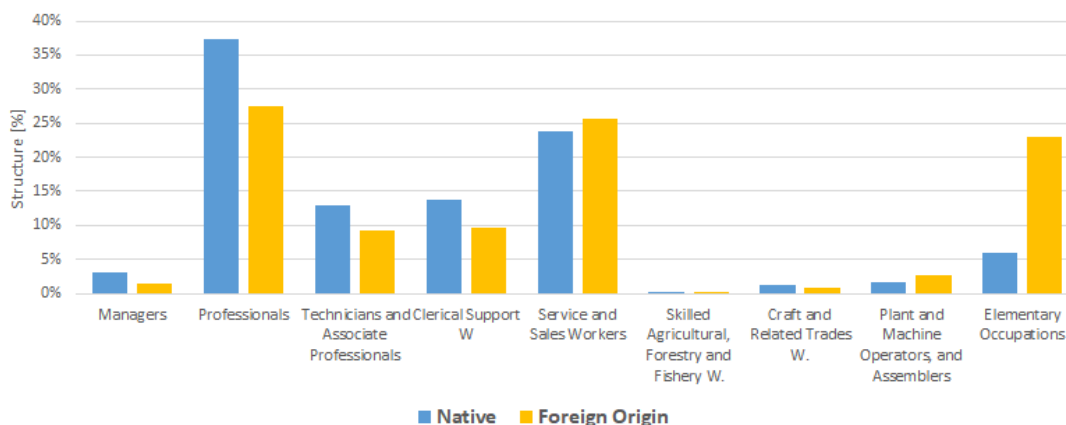
Technology-induced job change is transforming the labor market by reducing demand for routine, automatable tasks while increasing demand for both high-skill and low-skill service jobs (Lewandowski et al. 2022, Manning 2004). Migrant workers are especially affected, as many are concentrated in sectors vulnerable to automation, such as manufacturing and agriculture, yet also play an important role in growing areas like domestic and care work. These shifts highlight both gender and migrant disparities, with male migrants dominating industrial jobs and female migrants making up the majority of domestic and care workers. This is visible in Denmark, where there are significant differences in occupational structure between natives and foreign populations with (see Fig. 1 & 2).

Figure 1. Structure of males at age 20-64 by occupation and ancestry status in 2020



Source: own calculations based on Danish Labour Market Register

Figure 2. Structure of females at age 20-64 by occupation and ancestry status in 2020



Source: own calculations based on Danish Labour Market Register

The spatial allocation of migrants' place of residence is a key indicator of their integration in society. Migrants are often spatially clustered: in the EU, 30% of non-EU migrants from the largest migrant groups in their respective country report that most of their neighbors share their ethnic background. Skifter Andersen et al. (2016) found that the degree of ethnic segregation in Nordic capitals increases with the size of the immigrant population, with the strongest segregation found in Stockholm.

Our study aims to examine whether migrants are clustered not only by their socioeconomic status (income, education) (e.g. Andersson et al. 2018, Tammaru et al. 2016), but also by their risk for technology-induced job loss. The results will enable us to identify neighborhoods where many migrants are at risk of unemployment due to technology-induced job change. We will study long-term patterns of change in clustering in relation to technology-induced job loss in Denmark between 2007 and 2023, with a particular focus on the following largest Danish cities: Copenhagen, Aarhus, Aalborg and Odense.

In order to assess individual and household vulnerability to technological change, we employ the Routine Task Intensity (RTI) index proposed by Autor et al. (2003) alongside estimates for 2-digit ISCO occupations, as conducted by Lewandowski et al. (2022). RTI measures the degree to which jobs involve repetitive, predictable tasks that can be automated. Figure 3 shows a clear gradient of the RTI index by occupation in Denmark.

Figure 3. Average RTI by occupation in Denmark in 2023

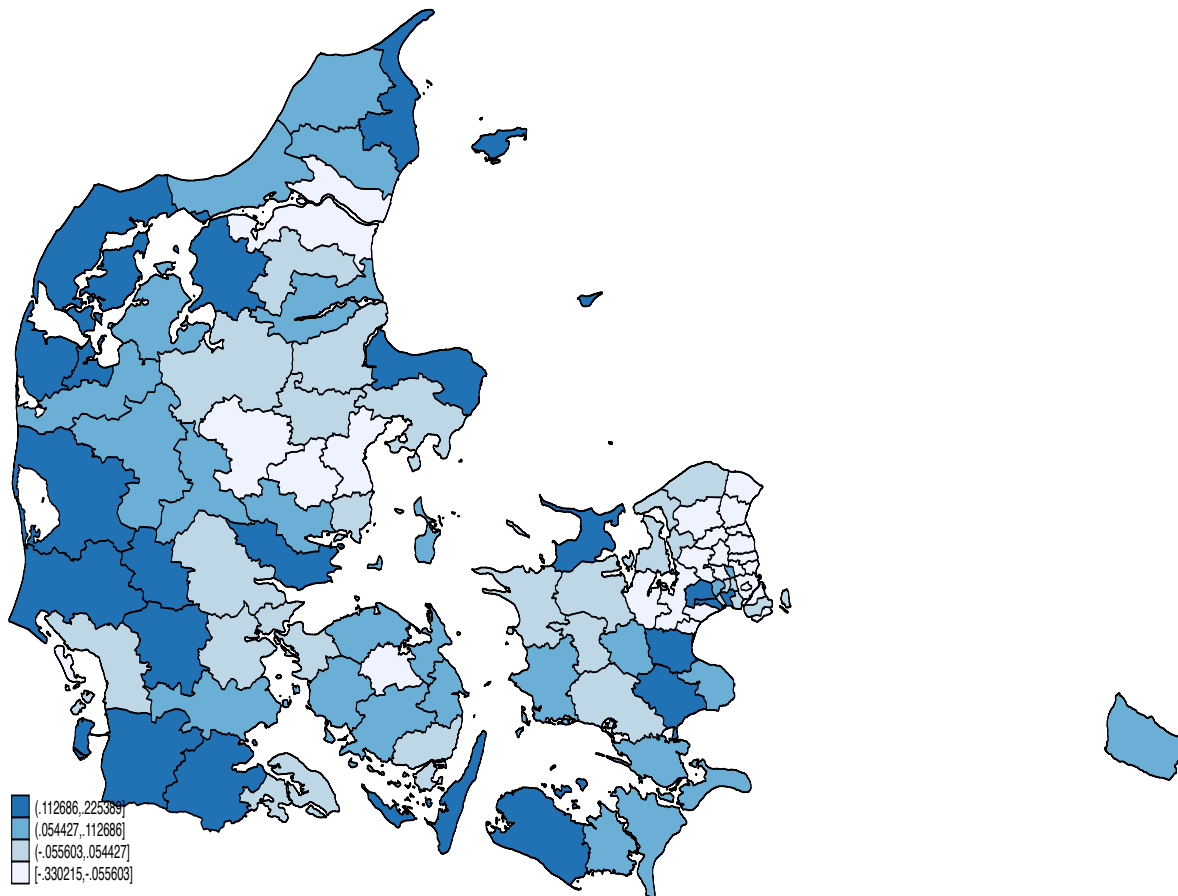


Source: own calculations based on Danish Labour Market Register and Lewandowski et al (2022)

An important contribution of this study is that we consider not only the clustering of individual migrants, but also the clustering of migrant households according to their exposure to technology-induced job changes. There are significant differences between native and migrant households that could influence the impact of technology-induced job loss. For example, losing a job may have less of a detrimental effect if one's partner has a highly secure job, and a more detrimental effect if one is the sole earner with many dependents.

The initial spatial analysis reveals significant variations in the average RTI across municipalities in Denmark (see Fig. 4).

Figure 4. Average RTI in municipalities in Denmark in 2023



Source: own calculations based on Danish Labour Market Register and Lewandowski et al (2022)

Our analysis is based on longitudinal, geo-coded register data from Denmark. Most existing studies of spatial segregation have significant shortcomings related to the use of inconsistent indices and geographical units. To overcome the so-called modifiable areal unit problem (MAUP), we will use the Geographical Information System to construct individualized, scalable neighborhoods. This is done by expanding a geographical buffer around the location of each individual/household until the “neighborhood” contains a pre-determined number of nearest neighbors. The sample of individuals/households can then be used to compute aggregate statistics such as, for example, the share of individuals/households with higher education, or certain level of RTI. By varying the number of nearest neighbors that are included in the neighborhood, it also becomes possible to measure the population compositions of these individualized neighborhoods at different scales. By applying this approach, we will be able to analyze residential segregation patterns over the long-term.

We hypothesize that migrant individuals and families will be clustered according to their risk for technology-induced job loss over and above their socioeconomic status. We expect that the degree of clustering will depend on skill level, with more clustering of among migrants with low skills.

## Literature

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