

Project title: Segregation and regional mobility

Project number: K165/2018

Executive Summary

The project "Segregation and regional mobility" documents the extent and intertemporal development of regional inequality in Germany and provides causal evidence on the causes and consequences of local segregation. At the core of these analyses is a newly compiled comprehensive small-scale dataset. The project was undertaken by the RWI – Leibniz Institute for Economic Research in collaboration with the Institute for Employment Research (IAB), the Düsseldorf Institute for Competition Economics (DICE), and the University Pompeu Fabra in Barcelona.

Regional inequality has generated policy concerns not only in Germany. This project aims to quantify regional inequality in Germany and to analyze its drivers and consequences. We built several small-scale databases, enabling us to go beyond the administrative levels of cities or districts and zoom into small spatial units. We created a unique longitudinal dataset with fine regional information based on grid cells (1x1km). Structural information about the local population and housing price indices (RWI-GEO-GRID and RWI-GEO-RED/X) is combined with detailed employment biographies of the German workforce (GridAB). The data are enhanced by election results for 2017 and infrastructural information. For the first time, a complete set of variables is available to analyse the causes and consequences of regional inequality using state-of-the-art empirical methods. The GridAB dataset will be made available to the scientific community through the research data centre (FDZ) of the IAB. All other datasets are already made available or will be made available through the FDZ Ruhr.

The project results reveal that there is substantial segregation with respect to employment, wages and skills within cities. Further, we show that earnings inequality has developed differently between and within regions in Germany. Going beyond this descriptive work, different causal analyses focus on different questions. We analyze the driving factors of segregation against the background of the refugee inflow. Using a novel spatial equilibrium model, we show that the refugee inflows between 2014 and 2017 led to partial displacement effects in local labor markets and increases in housing prices, especially in localities with inelastic housing supply. We also provide evidence that these refugee inflows decrease the shares of far-right voting in West German urban neighborhoods.

Additionally to the driving factors of segregation, we also analyse the consequences of segregation for the housing and the labour market. Regarding the housing market, we show how the unequal distribution of noise pollution affects housing prices. Further, we test if rent-control policies alleviate segregation forces. Regarding the labour market we analyse whether local income inequality influences the labour market integration of refugees. Further, we study whether local female employment rates foster the labour market integration of female refugees. Finally, we test whether neighborhood unemployment foster regional job mobility?

1. Achievement of objectives and milestones

The project comprised five working packages (WP).

Descriptive overview of segregation (WP 1):

The first WP focused on reviewing the existing literature and building a comprehensive dataset to analyze the interdependencies between segregation and regional mobility. The first Milestone (MS) was achieved by completing a comprehensive and systematic review of the literature on the related research fields, in particular segregation, inequality, and worker mobility (MS 1.1). Parallel to the literature review, the different data sets were processed, prepared, and aggregated to 1km² grid cells. This process included two major data sources: First, we constructed a grid-level dataset (GridAB) based on individual-level administrative data from Integrated Employment Biographies (IEB) of the IAB that covers almost the entire

German workforce between 2000 and 2017. This database comprises employment status, wages, and labor market skills (MS 1.2). Second, we extended the RWI-GEO-GRID data that contains socio-economic and demographic characteristics for Germany at on the 1km² grid level (MS 1.3). We extended the intertemporal coverage of the RWI-GEO-GRID data to recent years, such that the database covers the time period from 2007 to 2022. Moreover, the funding of the project allowed an enhancement of the RWI-GEO-GRID with information on household moves and socioeconomic milieus. In addition to the proposal, election results German electoral districts (Wahlbezirke) have been collected. However, geometries for the districts or locations of the polling stations are not centrally available and have been collected by hand. All datasets are already available or will be made available to the scientific community through the research data centres (FDZ) of the IAB and the RWI.

Based on these new data sets, we derived different types of inequality and segregation measures. Different measures were correlated with each other and graphically illustrated in maps (MS 1.4 and 1.5) (Ostermann et al., 2022, Fremerey et al. 2022).

Evolution of segregation over time (WP 2):

The second WP focused on the intertemporal development of inequality (MS 2.1) and segregation (MS 2.2) in Germany. Based on the database compiled in the first WP, we showed that urban neighborhoods do not only differ in their income level but also in their income homogeneity. Moreover, East and West German cities substantially differ in their level and development of income inequality. These inner-German differences are caused by persistent differences in employment status and heterogeneous effects of the introduction of minimum wages in 2015. The policy report (“Kurzbericht”) will be published in the second half of 2023 (MS 2.3). The report focus on a few cities (MS 2.4) allowing the visual illustration of the findings.

Causes of segregation (WP 3):

The causes of segregation were analyzed in the third WP. A special focus was placed on the impacts of changes in residential locations and wages. The first milestone of this WP was achieved by preparing the IEB data to mirror these changes (MS 3.1). The next milestones were reached by analyzing tipping points following the large refugee inflow, with a particular focus on the local housing market and the composition of the local population (MS 3.2, 3.3, and 3.4). Using a novel spatial equilibrium model, we showed that the refugee inflows between 2014 and 2017 led to partial displacement effects in local labor markets and increases in housing prices, especially in localities with inelastic housing supply (Glitz et al., 2023). Beyond the proposed milestones, we analyzed whether these refugee inflows had an impact on right-wing populist voting in the German federal election in 2017, showing that refugee inflows decreased the shares of far-right voting in West German urban neighborhoods (Fremerey, Hörnig, and Schaffner, 2022).

Consequences of segregation (WP 4):

The fourth WP investigated the consequences of segregation, particularly with respect to price differentials in local real estate markets. The first milestones (MS 4.1 and 4.2) of this WP were reached by preparing and publishing the RWI-GEO-RED data on property-level real estate prices (Schaffner and Thiel, 2022) and the RWI-GEO-RED/X data (Klick and Schaffner, 2019, 2021). The latter contains regional price indices for apartment purchases, house purchases, and rental properties at the level of districts, municipalities, and labor market regions (2007-2022). Price indices were constructed based on the RWI-GEO-RED data using hedonic regressions that account for detailed property characteristics, allowing us to capture regional and intertemporal differences in real estate prices.

As an application of the analyses of segregation effects, we consider housing prices as a consequence of segregation (MS 4.3). We investigated whether aging municipalities show weaker house price developments due to a de-investment of old-aged inhabitants. We document robust price effects of an aging society (Breidenbach, Jäger, and Tarrutis, 2022).

In addition to the initially proposed research questions, we further analyzed the effects of rent control policies and regional noise exposure on housing prices (MS 4.4). Rent control policies aim at preventing gentrification, implying that they can potentially reduce segregation. By studying the impact of rent control on the German rental market, we showed that these policies only have temporary impacts on rents, with prices moving back to their former trend shortly

after policy implementation (Breidenbach, Eilers, and Fries, 2022). Additionally, we provided evidence on the relationship between locational choices, measured by housing prices, and aircraft-related noise. We found positive price effects of the closure of Berlin-Tegel for neighboring apartments that were exposed to aircraft noise (Breidenbach, Cohen, and Schaffner, 2022). Similarly, we exploited the Covid-19 pandemic as an exogenous shock to the aviation industry and found that affected residents perceive reduced noise levels as a positive amenity (Breidenbach and Thiel, 2023). Finally, we analyze the effects of energy construction sites on housing prices.¹

In addition to the proposal, we have conducted two papers on neighborhood effects. First, we concentrate on the labour market integration of refugee women. We investigate the influence of the share of female employment in the neighborhood on the labour market integration of female refugees. We exploit different levels of female employment in the grid cells to provide evidence on the labour market integration of refugee women. (Bähr and Ostermann 2023²)

In another study we investigate the effect of changes in the individual local labour market (LLM) opportunities and neighborhood unemployment on the probability of leaving a LLM. We provide direct evidence of how lower opportunities and higher unemployment positively influence regional mobility. The paper is currently under review. (Ostermann and Abraham, 2023³)

Compensation of social inequalities due to housing prices (WP 5):

WP 5 builds on the former working package. The real wage inequality arises from housing price indices in combination with the nominal wage inequality. The working paper (Breidenbach, Klick, Schaffner 2023) is still work in progress and will be published in 2023 (MS 5.1 and 5.2).

2. Activities and obstacles

Activities

In the beginning of the project in 2019, all partners conducted a comprehensive literature review. Throughout the initial project phase, we regularly scheduled project meetings to work on research ideas and to evaluate the data needed. Based on these meetings and a catalogue of available IAB data, we outlined the optimal data set and discussed its feasibility with the data security officers at IAB.

Once we agreed on the optimal data set, the IAB researchers processed and aggregated the individual-level data to the grid level. The RWI researchers focused on expanding the RWI-GEO-GRID database by covering the most recent time periods and linking it with additional data on household moves and socioeconomic milieus.

Moreover, the RWI and DICE researchers collected information on election results at the level of electoral districts (Wahlbezirk, smallest unit) for Germany. Since the location and shape of the districts were not centrally available, the research teams in Essen and Dusseldorf collected information on the location of polling stations and the shapefiles of the election districts for each municipality separately. These different data sources were combined to get election results on a very small-scale level.

These data sets were used in the empirical analyses, which were undertaken by all research teams.

Obstacles

In the first WP, data preparation was delayed due to technical constraints in data processing, a long process for fulfilling all data security requirements, and finally the onset of the pandemic. Due to the problems that had arisen, more personnel costs were needed for this WP.

¹ Quentel, M. "Does infrastructure and energy construction sites and residential mobility influence property values?", mimeo.

² Bähr, S: and Ostermann, K. „Gendered Neighborhood Networks and the Labor Market Integration of Female Refugees“, mimeo.

³ Ostermann, K. and M. Abraham "From Mobility Booster to Barrier: How the neighborhood context mitigates the effect of poor labor market opportunities", mimeo.

Moreover, three main IAB researchers left academia (Peter Haller, Uwe Blien, and Johann Eppelsheimer) during the initial project phase in 2019/2020. Since the novel data set is generated from complex and large-scale individual-level data, the process took much longer than expected under the described circumstances. The pandemic and its resulting server restrictions at the IAB further delayed the production of the GridAB data, with a first finished version in June 2020. Due to the lockdown restrictions, planned research stays of researchers from RWI and the University of Dusseldorf at the IAB had to be postponed and finally cancelled. Instead, the IAB team devised a remote access structure, so that the project partners could prepare their programs using mock-up data and send in their code. All these delays combined led to data work with GridAB data starting in summer 2020 with preliminary data and late 2021 for the final data set.

To bridge the time until the arrival of the final dataset, we decided to expand our research agenda based on synergies of the project team. Prior to the project start, a team of researchers from the IAB, University Pompeu Fabra, and the RWI has started to investigate the consequences of the refugee inflows between 2015 and 2017. We linked the data on refugee inflows with election results to investigate the right shift of the last Bundestag election in Germany.

In addition to the proposal, we have also collected childcare fees on municipality level. However, data collection was time consuming, and we decided to analyze these data after the project. In contrast to the planned data strategy, the data security process in the IAB had not allowed the combination of grid cell data from IAB with additional grid cell data until mid-2022.

3. Results and successes

The project has resulted in 5 discussion papers (one of them revise and resubmit), 4 peer-reviewed publications and 2 data reports. Further, there are 5 additional papers that are still work in progress and should be finished in 2023. The papers are part of the dissertations of Lea Eilers and Melinda Fremerey. Further, they will be part of the still ongoing dissertations of Lukas Hörnig, Kerstin Ostermann, Milan Quentel and Patrick Thiel. Based on the experiences in this project additional funding by the DFG was acquired by Sandra Schaffner and by Philipp Breidenbach by the UBA. Both projects are based on small-scale neighborhood data. Further, we organized a workshop that was funded by the Thyssen foundation.

The project results lead to 2 press releases, 2 newspaper articles and 4 RWI-Daten-Fokus, that are targeted at the media and the public. The discussion papers are submitted to journals or will be submitted in the next few weeks. The research ideas that are still work in progress will be continued. Further, RWI and IAB (Sandra Schaffner and Wolfgang Dauth) have applied for funding at Thyssen foundation for a follow-up project.

4. Equal opportunities, career development and internationalisation

The project is conducted by a mixed group regarding gender of researchers. The different teams mainly consist of German researchers. The job openings for the free positions were posted in English to also reach international applicants and especially women were invited to apply for. The team became more international during the project by Jeffrey Cohen (USA), Arijit Ghosh (Indian) Joan Monras (Spanish).

The hiring committee at the RWI includes a women's representative who ensures that there is no gender discrimination. She is also available for complaints if there is inappropriate behaviour at the workplace. Furthermore, the project-coordinator is female, highlighting the gender equality at the participating institutions and the project team. One aim of the project was to promote young researchers. As far as possible, we built teams that consist of young and experienced researchers. The papers are part of the dissertations of 5 PhD students.

5. Structures and collaboration

The teams (RWI, IAB, Dusseldorf, Barcelona) work together through collaboration agreements that were made before the program start in April 2019. There were two meetings of all project

partners in Essen (April and November 2019). Further planned meetings in Nuremberg and Essen were held virtually due to the pandemic. During the first two meetings, sub-teams were built that meet (virtually) advance their individual working packages. Some of these teams are only made up by researchers of one institution but most teams have members in different institutions. Most researchers are part of several teams. The progress made by the individual sub-teams has been presented to all participating researchers at the general project meetings.

6. Quality assurance

In this project there are two main strands of quality that have to be considered: quality of the different data collected and generated as well as the quality of the empirical analyses conducted within the project. Both, IAB and the RWI host a research data centre accredited by the German Data Forum (RatSWD). In the RWI the project members are also part of the FDZ Ruhr and work closely together with the data security officer of the RWI. All quality standards of the two data centres are applied during the project. The novel generation of the GridAB data was done on the large scale and complex individual level administrative data of the BA. This necessitated the accumulation of content knowledge, technical progress and data protection knowledge. First, to ascertain the required set of variables, discussions with the researchers of the project team and harnessing IAB best practices regarding data preparation were used. Second, to overcome the technical issues of preparing the complex administrative data set, geocoding, and aggregating the data to grid cells, IAB's data infrastructure department (DIM) and the competence centre of empirical methods (KEM) were consulted. Third, since GridAB data is based on social security data, which is subject to a high level of data protection. The IAB team collaborated closely with the IAB's data security officers to enable data use while maintaining privacy protection. To facilitate data access and document all steps, the IAB researchers created a data report.

All institutions followed the guidelines of good scientific practice of the German DFG. In the RWI the Research Data Policy ensures that all preparation code of scientific papers must be archived to ensure possible replications. This applied to all research projects of the project. To ensure good scientific quality, all projects are presented in internal seminars of the participating institutions, in the project meetings, and in scientific workshops and conferences. Further, all papers have been and will be submitted to peer-reviewed journals.

7. Additional resources

The **RWI** contributes human resources in the form of researchers Sandra Schaffner and Philipp Breidenbach as in-kind resources. Sandra Schaffner co-ordinates the project, both researchers have worked in several sub-teams. Their work for the project sums up to 16 person-months. **IAB** contributes use of its data and server infrastructure and as well as consulting human resources from IAB's data infrastructure and data security departments. Kerstin Ostermann is partly funded by the joint doctoral program in labour market research of the Institute for Employment Research (IAB) and the School of Business and Economics of the University of Erlangen-Nuremberg (FAU), which allows her to contribute more than her 25% position to the project. **Universitat Pompeu Fabra** contributes human resources in the form of researchers Albrecht Glitz, Joan Monras and Milan Quentel, who have contributed 6, 6 and 8 person-months, respectively, to the project.

8. Outlook

We want to analyze in a follow-up research project how the Covid pandemic reshaped regional labor markets and if there are gender-specific effects due to increased working from home. A proposal for funding is already submitted to a foundation. Finally, we want to work on the already started project examining the effects of regional childcare fees on maternal labour supply as well as the small-scale regional effects of the Fukushima-catastrophe.