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Leibniz Institute
for the Social Sciences

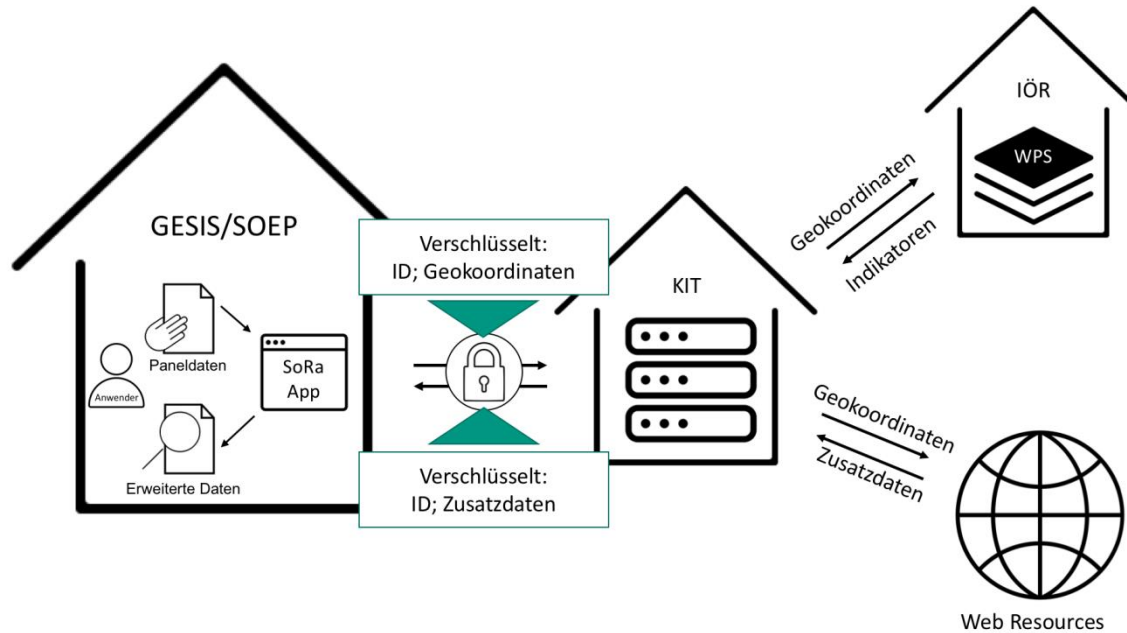


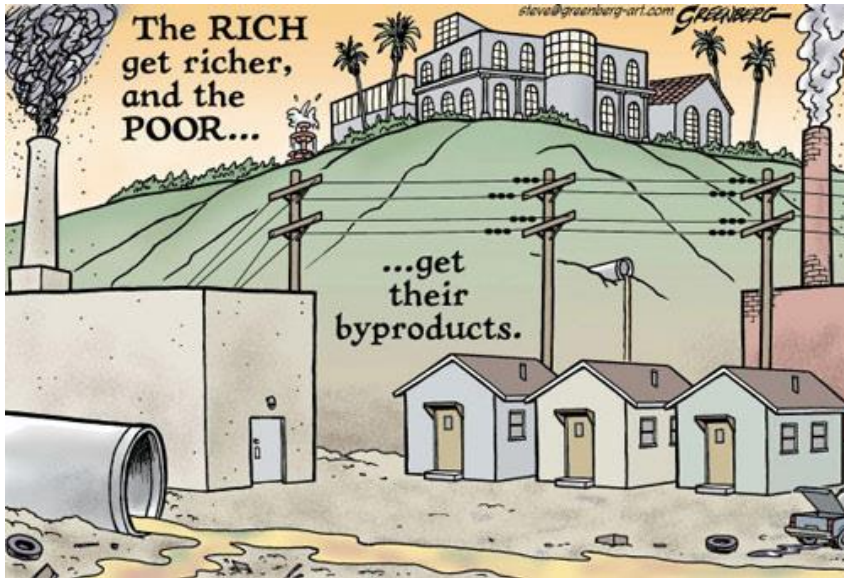
Investigating Social and Ethnic Inequality by Linking Survey Data to Geospatial Data

Stefan Müller et al., February 11, 2019

Also, non-obvious data sources can be illuminating for social research. They corroborate previous findings and open up new paths for future studies.

Social-Spatial Research Data Infrastructure





<https://www.uowblogs.com/as738/2017/05/08/the-rich-get-richer-the-poor-get-their-bi-products-an-african-case-study/>

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future

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Deep Civilisation Risk

Are we on the road to civilisation collapse?

Studying the demise of historic civilisations can tell us how much risk we face today, says collapse expert Luke Kemp. Worryingly, the signs are worsening.

Related Stories

The greatest threat to civilisation

By Luke Kemp
19 February 2019

<http://www.bbc.com/future/story/20190218-are-we-on-the-road-to-civilisation-collapse>

An Issue World-Wide But Also Locally

Low Environmental Inequality

High Environmental Inequality

Gelsenkirchen

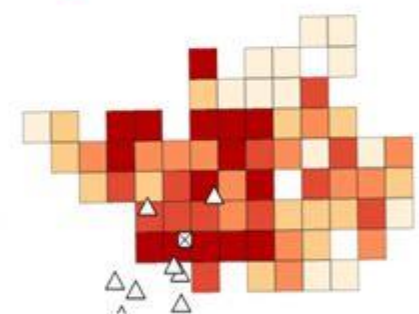
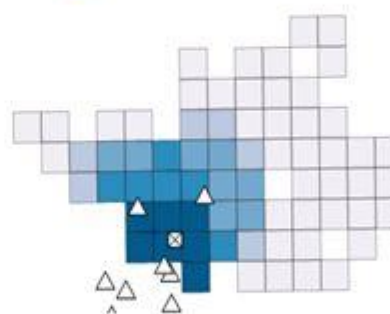
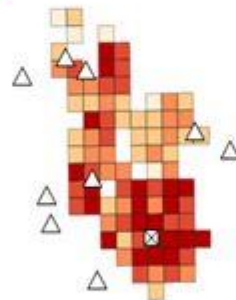
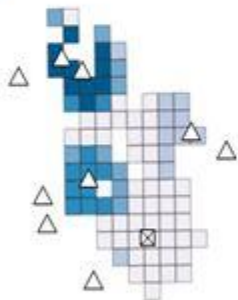
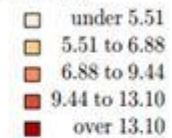
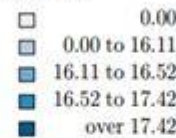
Leverkusen

In Air Pollution

% Foreigners

In Air Pollution

% Foreigners



△ Facility location ⊗ City centre

<https://www.urbanstudiesonline.com/resources/resource/bringing-urban-space-back-in-a-multilevel-analysis-of-environmental-inequality-in-germany/> (Analysis of Tobias Rüttenauer, TU Kaiserslautern)

Previous Studies

Major factors of environmental hazards exposure:

- Income and wealth (e.g., Braubach and Fairburn 2010; Diekmann and Meyer 2010)
- Ethnic minority group status (e.g, Zwickl, Ash, and Boyce 2014; Crowder and Downey 2010)
- Other sociodemographic groups, such as single parents (Downey, Crowder, and Kemp 2016)

Theoretical Explanations

Socio-Economic Inequality Thesis

- Inequalities due to differences in, e.g., income

Ethnic-Income Inequality Thesis

- Ethnic inequalities due to differences in, e.g., income

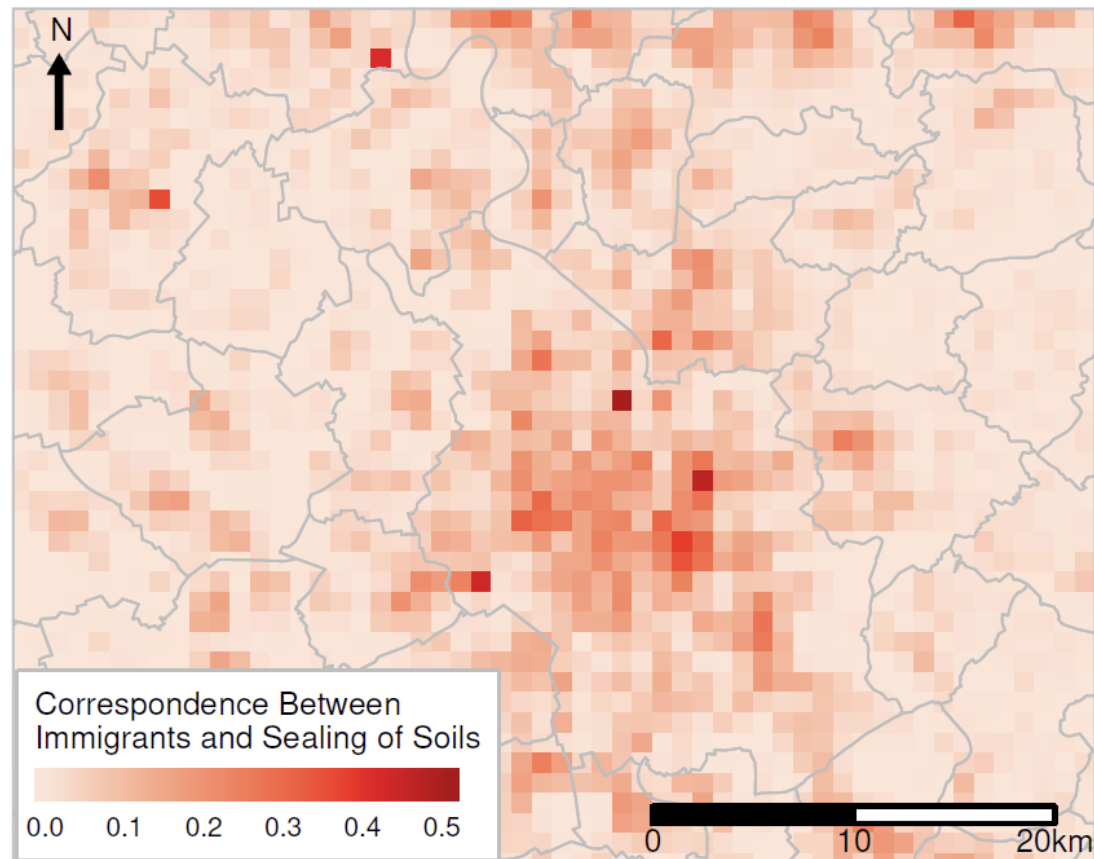
Ethnic Discrimination

- Ethnic inequalities due to discrimination

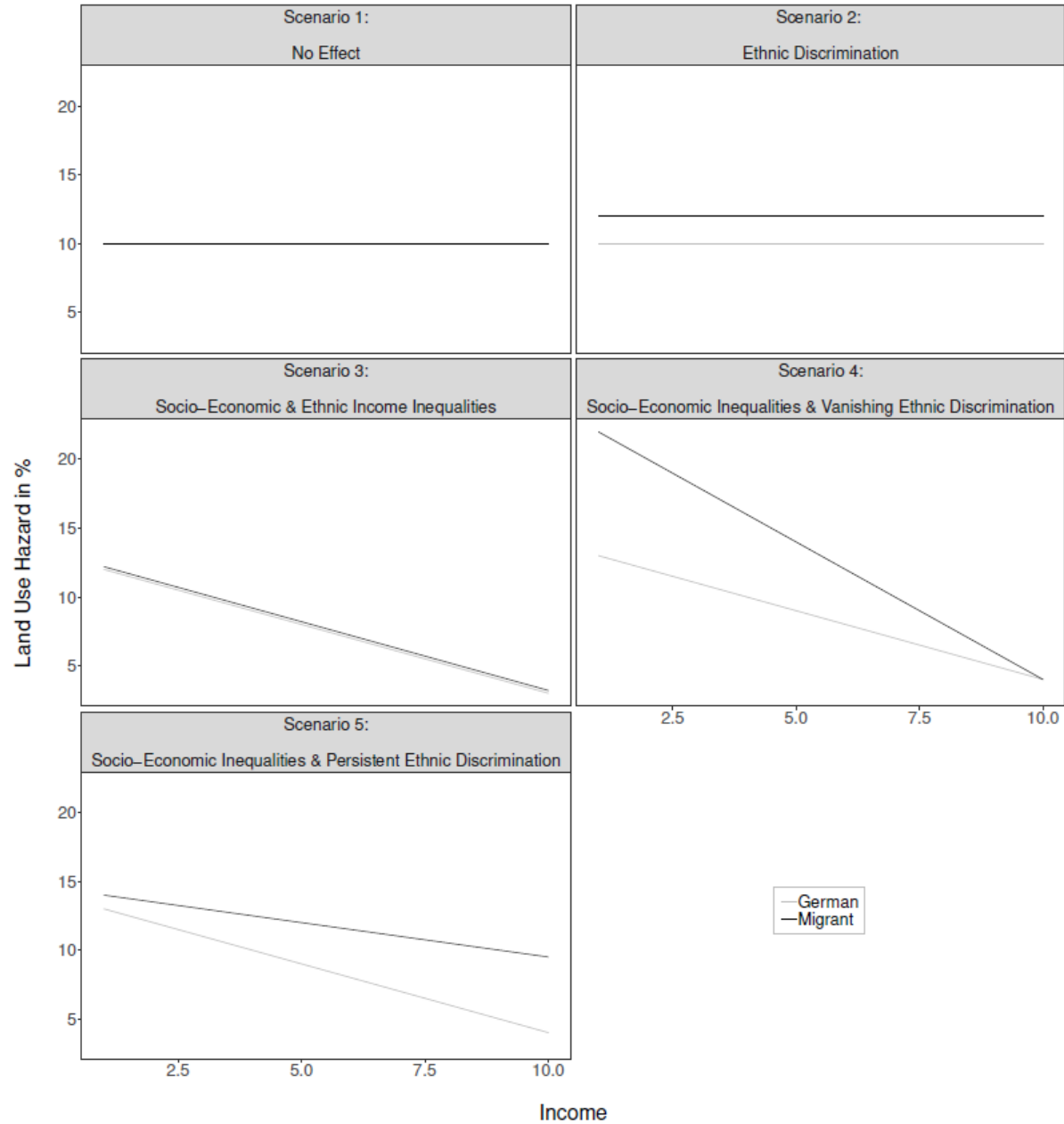
Spatial Assimilation

- Ethnic inequalities due to assimilation

Which Explanation May Apply?



Data Sources: Leibniz Institute of Ecological Urban and Regional Development (2018) and Federal Agency for Cartography and Geodesy (2018); the values of both data sources were normalized to a scale between 0 and 1, and multiplied



Survey Data: GESIS Panel

Georeferenced subsample from 2014 (N = 3,852)

- Dependent variable: sealing of soils (see next slide)
- Main predictor I: household income
 - ▶ A scale of 1 to 17
- Main predictor II: migrant status
 - ▶ Citizenship of respondents' fathers
- Controls: age, gender, education, homeownership, household size, number of inhabitants in the municipality

We also used data on 100 imputed datasets.

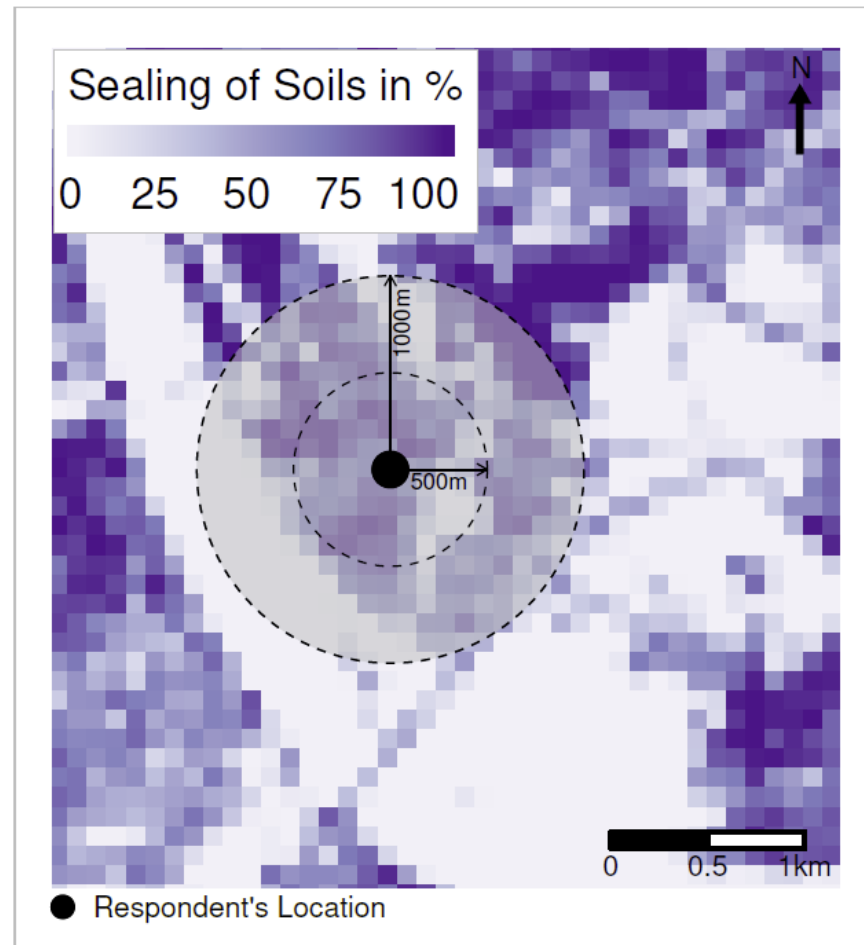
Geospatial Data: IOER Monitor

Sealing of soils

- air- and water-tight coverage of soils
 - ▶ affects the exchange of air
 - ▶ heats up the environment

- inverse indicator for green areas
 - ▶ these are important for well-being and health (World Health Organization 2016)

Spatial Linking: Buffers



Data Source: Leibniz Institute of Ecological Urban and Regional Development (2018)

Analysis Strategy: Linear Predictions

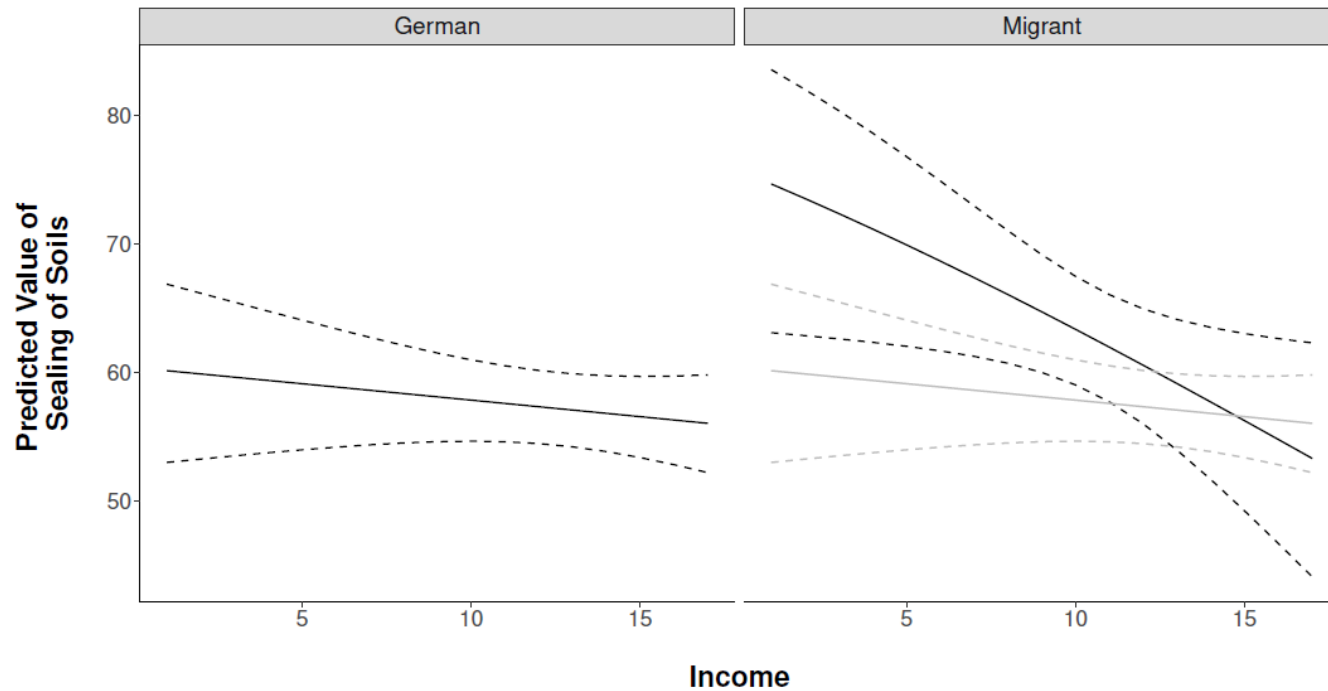
- Lead to predictions below 0% and above 100%
- A logit transformation helps:

$$y_{logit} = \ln \frac{y}{1-y}$$

- bounds the predicted values to an interval between -3.663562 and 3.663562
- After re-transforming, the values lie between 0% and 100%:

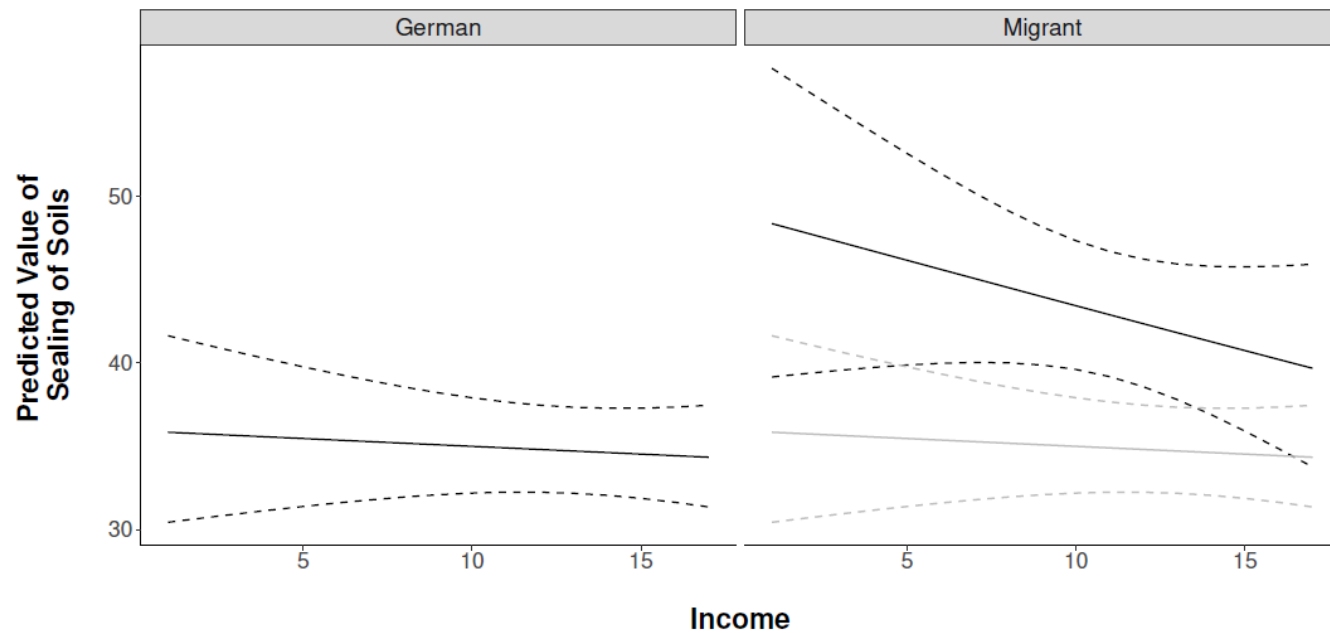
$$\hat{y} = \frac{e^{\hat{y}_{logit}}}{1 + e^{\hat{y}_{logit}}}$$

100 Meters × 100 Meters Neighborhoods



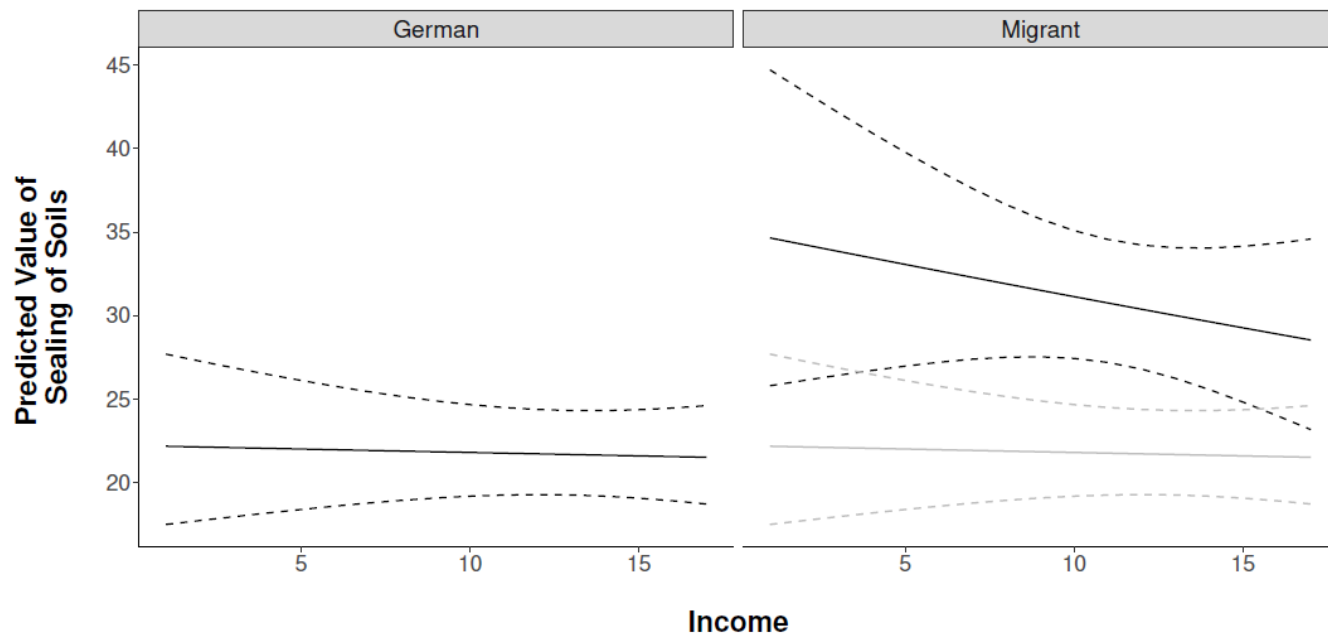
Note: Georeferenced GESIS Panel 2014 (GESIS - Leibniz Institute for the Social Sciences, 2017); imputed, predicted and combined using Rubin's Rule; 95% confidence intervals based on cluster robust standard errors; estimates are controlled for age, gender, education, homeownership, household size, number of inhabitants in municipality; N = 3,852

500 Meters Buffer Ego-Hoods



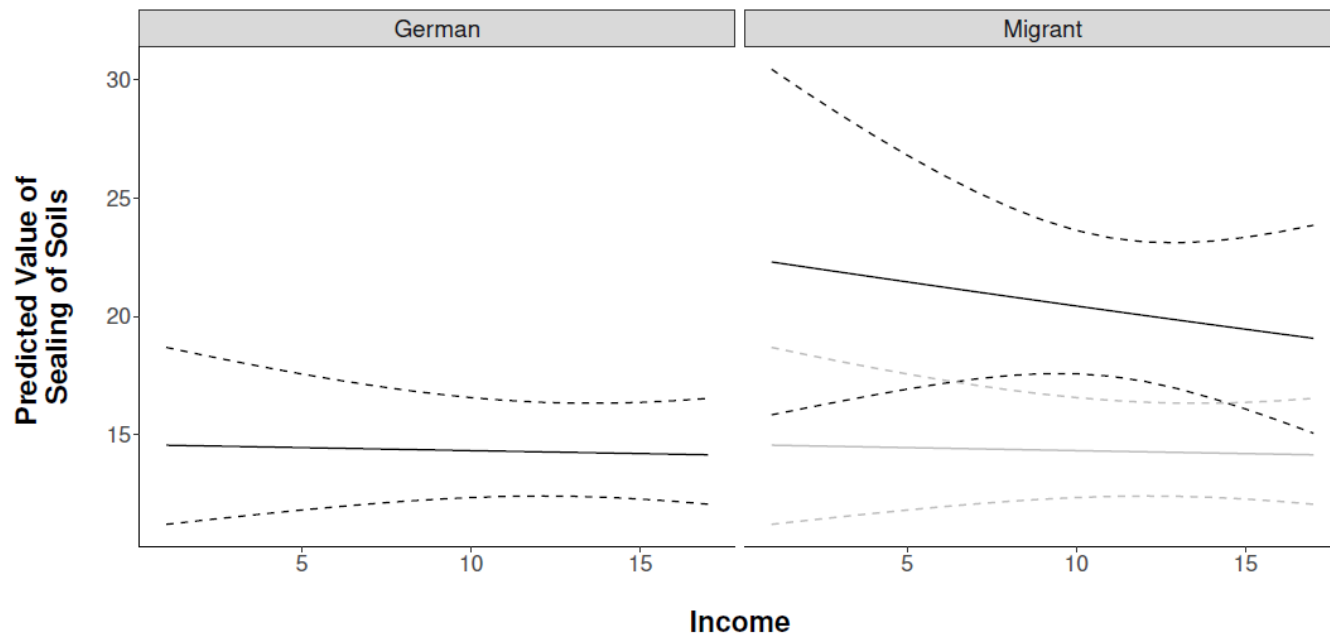
Note: Georeferenced GESIS Panel 2014 (GESIS - Leibniz Institute for the Social Sciences, 2017); imputed, predicted and combined using Rubin's Rule; 95% confidence intervals based on cluster robust standard errors; estimates are controlled for age, gender, education, homeownership, household size, number of inhabitants in municipality; N = 3,852

1000 Meters Buffer Ego-Hoods



Note: Georeferenced GESIS Panel 2014 (GESIS - Leibniz Institute for the Social Sciences, 2017); imputed, predicted and combined using Rubin's Rule; 95% confidence intervals based on cluster robust standard errors; estimates are controlled for age, gender, education, homeownership, household size, number of inhabitants in municipality; N = 3,852

2000 Meters Buffer Ego-Hoods



Note: Georeferenced GESIS Panel 2014 (GESIS - Leibniz Institute for the Social Sciences, 2017); imputed, predicted and combined using Rubin's Rule; 95% confidence intervals based on cluster robust standard errors; estimates are controlled for age, gender, education, homeownership, household size, number of inhabitants in municipality; N = 3,852

The Role of Population Density

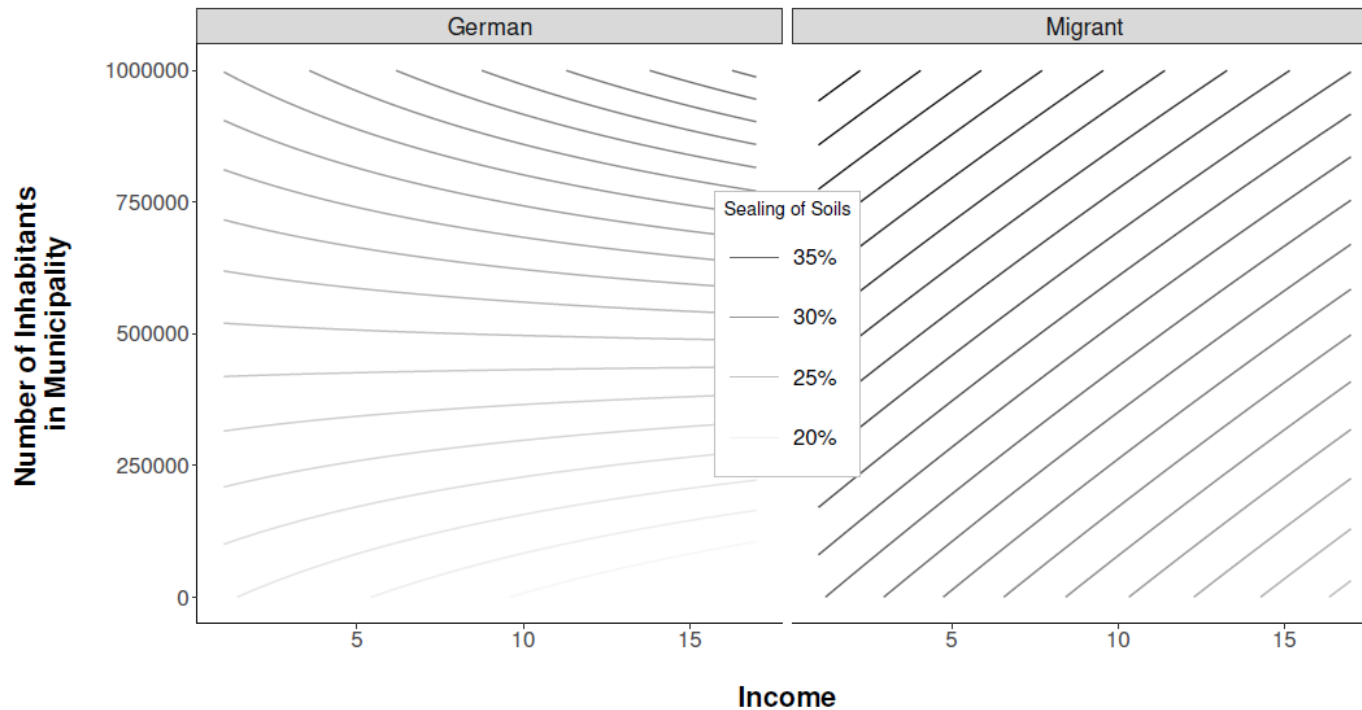
Population density may confound with the results

- Because more migrant people live in larger than in smaller cities?

In the following, we included an interaction between income, migrant status and municipality size in the analysis

- At best, this creates some robustness to the findings

Robustness Check



Note: Georeferenced GESIS Panel 2014 (GESIS - Leibniz Institute for the Social Sciences, 2017); based on unimputed data; estimates are controlled for age, gender, education, homeownership, household size, number of inhabitants in municipality; N = 2,528

Summary of Results

Substantially

- Income reduces the exposure to sealing of soils hazards
- Migrant people's level of exposure remain higher than the one of the German group

Methodologically

- The predictions are most pronounced in 1000 meters buffer ego-hoods
- They start getting less pronounced in 2000 meters buffers

Conclusion

The study adds to the literature of environmental inequalities

- They also exist in Germany
- Also for land use hazards

Uncommon indicators of environmental hazards yield corroborate existinz findings

This is also a case study for the use of georeferenced survey data (and the infrastructure we build for providing easy access)

All analysis results and figures in:

Müller, S. (2019). Using Georeferenced Data in Social Science Survey Research. The Method of Spatial Linking and Its Application with the German General Social Survey and the GESIS Panel. Unpublished Dissertation at the University of Cologne

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