Exploring Spatial and Demographic Official Statistics on Personal Insolvency

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Introduction

- Current crises have increased economic and financial burdens on individuals and households.
- Economic indicators such as personal insolvencies as a measure of economic distress are important.
- German Official Statistics publish absolute numbers on personal insolvencies on a federal-state level based on insolvency announcements from local courts.
- We will derive new statistics using administrative data with data mining to inform on the demographic and spatial distribution of insolvencies.

Background

- Declarations of (personal) insolvencies must be made public in Germany (§9 InsO). It is a crime to obfuscate or delay insolvencies.
- Personal insolvency is a simplified procedure for handling the insolvency of a natural person (private individual). It is intended to equally satisfy the creditors of an insolvent debtor on a pro-rata basis.
- Declarations are published in a large administrative database after the respective court decision.
- The information is extracted to derive statistics on the age and geospatial distribution of individuals affected by personal insolvency.

Data

- The period under study is March 2022 until the end of August 2022.
- Within this period, 64,285 entries related to personal insolvency proceedings have been selected[1] from the database.
- Information was extracted from large text-field entries using data and text-mining techniques; geo-location data was geo-coded.
- It was impossible to determine the age for about 5% of the cases, and for 0.3%, the geo-location could not be resolved (usually because the location was unspecified or located outside of Germany).

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[1]We selected only non-rejected personal insolvency proceedings.

Methods

- To obtain personal insolvency incidence on different geographical unit levels, we linked
  - geo-location,
  - geographical data (federal state level, 16 units; postal code level, 8,725 units), and
  - population size.
- Using Moran's *I*, we studied whether adjacent and bordering regions are similar in terms of autocorrelation or if there is clustering of values (dispersion).
  - Calculates the correlation of a variable with itself.
  - -1 = clustering of different values (dispersion), 0 = no autocorrelation (randomness), 1 = perfect clustering of similar values (opposite of dispersion).
- By calculating Moran's *I* for geographical units, we can find insights into the clustering of insolvency incidences, which is important for questions concerning social policies.
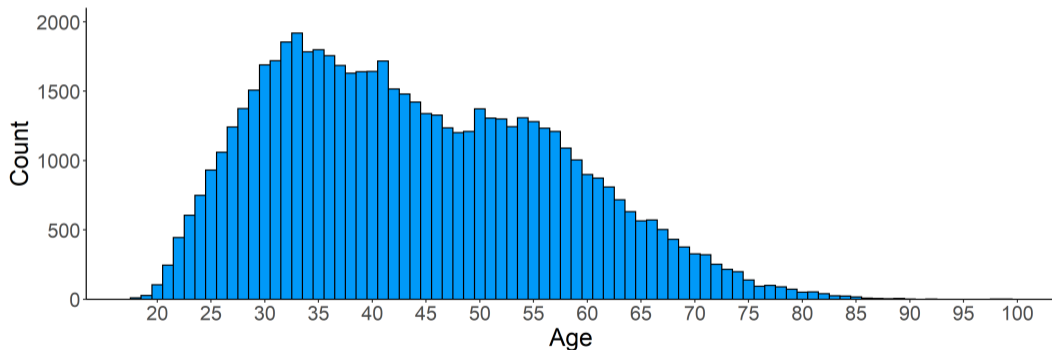
Results

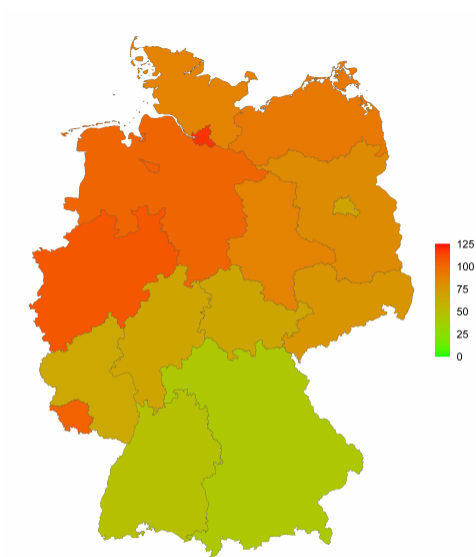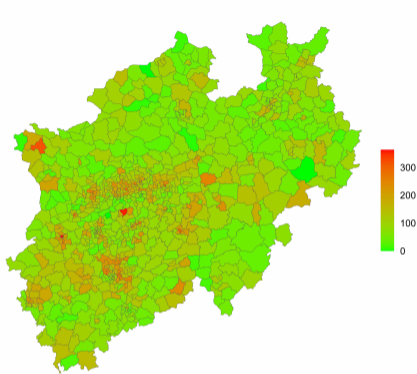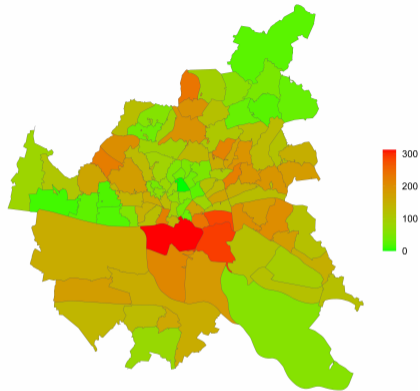Figure: Histogram of personal insolvency in Germany by age (binwidth = 1).

Figure: Spatial distribution of personal insolvencies on the federal state level. Color gradient indicates the number in each federal state per 100,000 inhabitants.

(a) North Rhine-Westphalia (largest state)   (b) Hamburg (largest incidence)

Figure: Spatial distribution of personal insolvencies on the postal code level. Color gradient indicates the number in each federal state per 100,000 inhabitants.

Results: Summary

- The maximum of personal insolvencies is found in Hamburg (119 per 100,000 inhabitants) and the minimum in Bavaria (43 per 100,000 inhabitants).
- Averaged over all federal states, there are 82 personal insolvencies per 100,000 inhabitants. Here, $I = 0.38$, indicating moderate clustering of similar values[2].
- Both panels show smaller values for rural and larger for urban areas. For North Rhine-Westphalia, the mean personal insolvencies per 100,000 inhabitants is 108, and the maximum is 363. The spatial autocorrelation is $I = 0.38$.
- For Hamburg, the mean is 119, and the maximum is 312. For North Rhine-Westphalia, The spatial autocorrelation is $I = 0.44$.
- Overall, the autocorrelation measures show moderate clustering, which can be confirmed visually.

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[2]All Moran's I significance tests for all values reported here showed $p < 0.01$.

Potential applications, outlook and limitations

- The information can be used as auxiliary information for small area estimation applications on, e.g., poverty or unemployment.

- Poverty or low credit-rating as an aspect of cumulative disadvantages (social inequality across the life course) (DiPrete and Eirich 2006; Vogt Yuan 2008).

- Spatial statistics on personal insolvency could be used as indicators for policymakers to identify disadvantaged regions and allocate resources to affected families/individuals (Bishop 2013; Hentschel et al. 2000).

- This study has several limitations, including its experimental nature and the short time series. Accordingly, no comprehensive conclusions can be drawn yet.

- Further research: spatial correlations (insolvencies, education, income, ...), gender differences, business insolvencies.

Conclusions

- This research demonstrated using data science tools to extract previously unused information from an existing administrative database.

- This new information enables the production of more precise official statistics on personal insolvencies concerning demographic and spatial statistics.

- The added value of these statistics will become particularly apparent when factors such as the pandemic or war are reflected in regional effects.

- Furthermore, this database can serve as a source for various socio-political questions concerning social inequality.

References

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