Accounting for Heterogeneity in the Official Austrian Population Projection

Pauline Pohl, Philip Slepecki
Statistics Austria

Martin Spielauer
Austrian Institute of Economic Research (WIFO)

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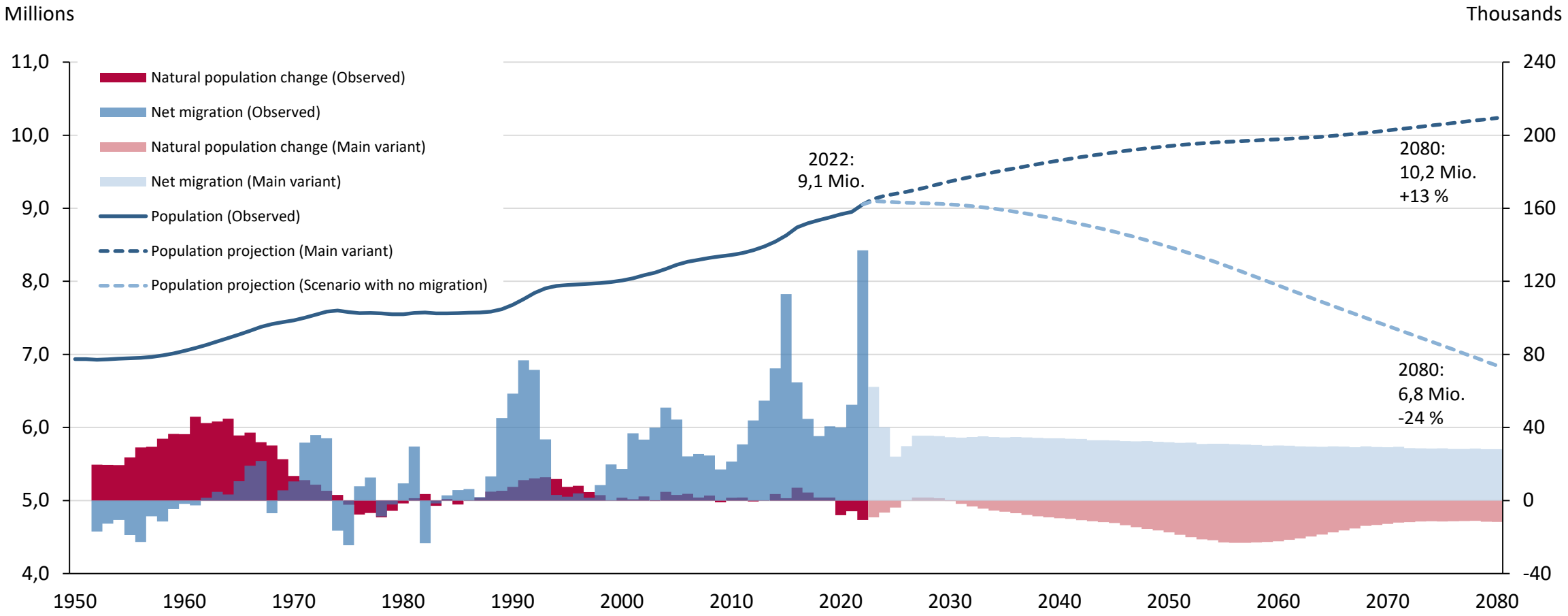
Motivation

Migration drives population growth in Austria



S. STATISTICS AUSTRIA, Population projection 2023.

Motivation

Background

- The demographic behavior of migrants will influence the future size and composition of the Austrian population.
- The **foreign-born population is highly diverse**, as evidenced by the variation in emigration risks based on country of birth and length of residence.

Objectives

- **Account for heterogeneity** among migrants to **improve accuracy and add detail** to the **official Austrian population projection**.
- Incorporate information on **country of birth** and **length of residence** in the projection.

Methods

- **Cluster analysis** to group countries of birth based on similarities in emigration patterns.
- **Hazard regression**, capturing differences in emigration risks based on age, sex, province, country of birth and duration of stay.
- **Dynamic competing risk microsimulation**, incorporating these detailed emigration hazards in the population projection.

Microsimulation model features

- Dynamic competing risk microsimulation with continuous time
- Case-based
- Simulated events: Births, deaths, migration
- Regional breakdown: Austria and federal provinces (NUTS-2)
- Programming language: Modgen[1]

[1] https://www.statcan.gc.ca/en/microsimulation/modgen/modgen

Data

Administrative (micro) data for the Austrian population, available at Statistics Austria

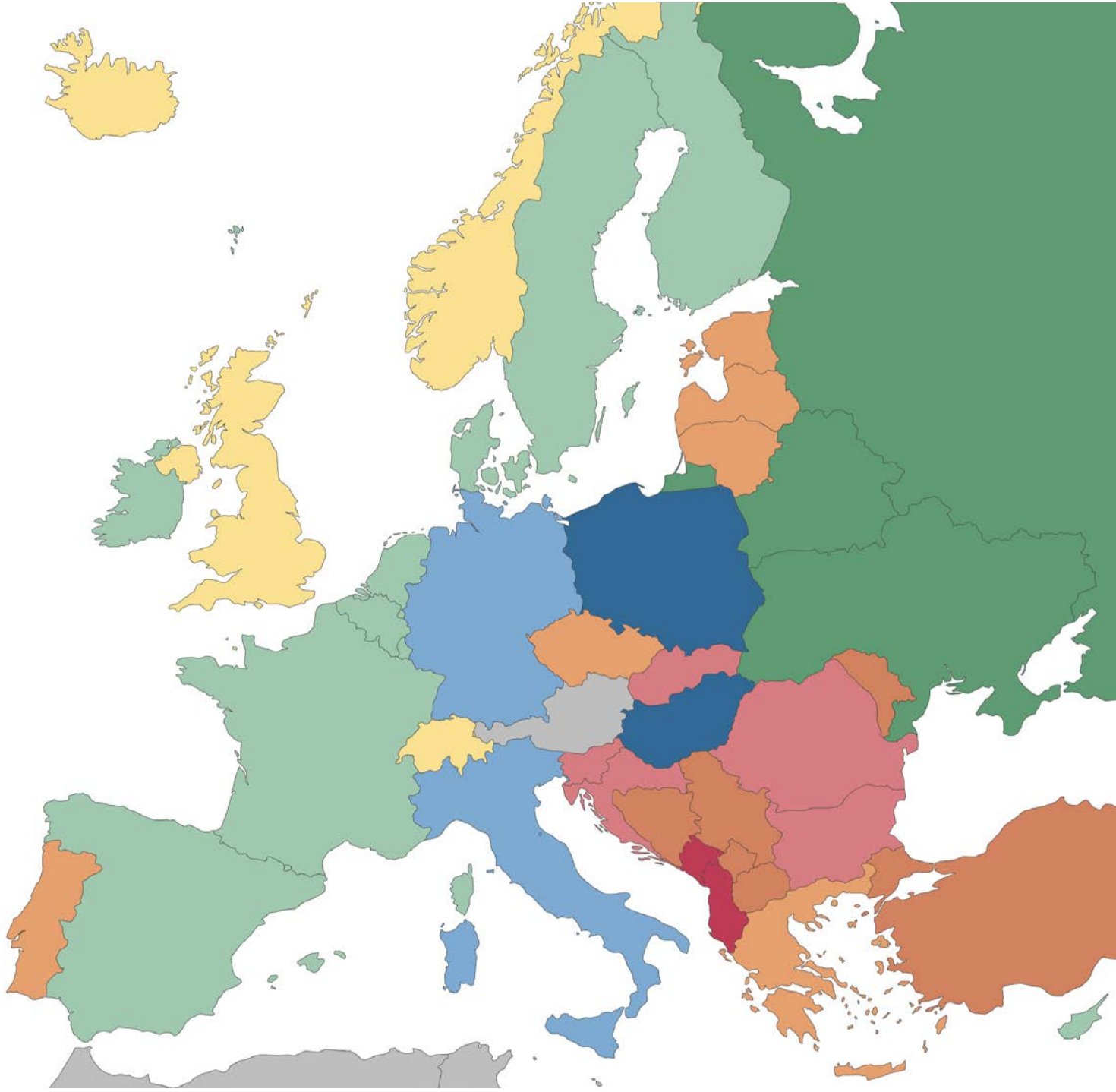
- → Base population: Resident population as of January 1st of the starting year by age, sex, province of residence, duration of residence, country of birth (clustered)
- → Main parameters are derived from Vital Statistics, Migration Statistics and Population Statistics
- → Country clusters are determined using additional data from Asylum Statistics and Register-based Labour Market Statistics

Results

Country clusters

- Administrative data aggregated at country level:
  - age,
  - sex,
  - duration of stay,
  - % of university students,
  - % in active emplyoment,
  - % with children,
  - applications for asylum and subsidiary protection

- Total of 17 clusters worldwide



Emigration hazards

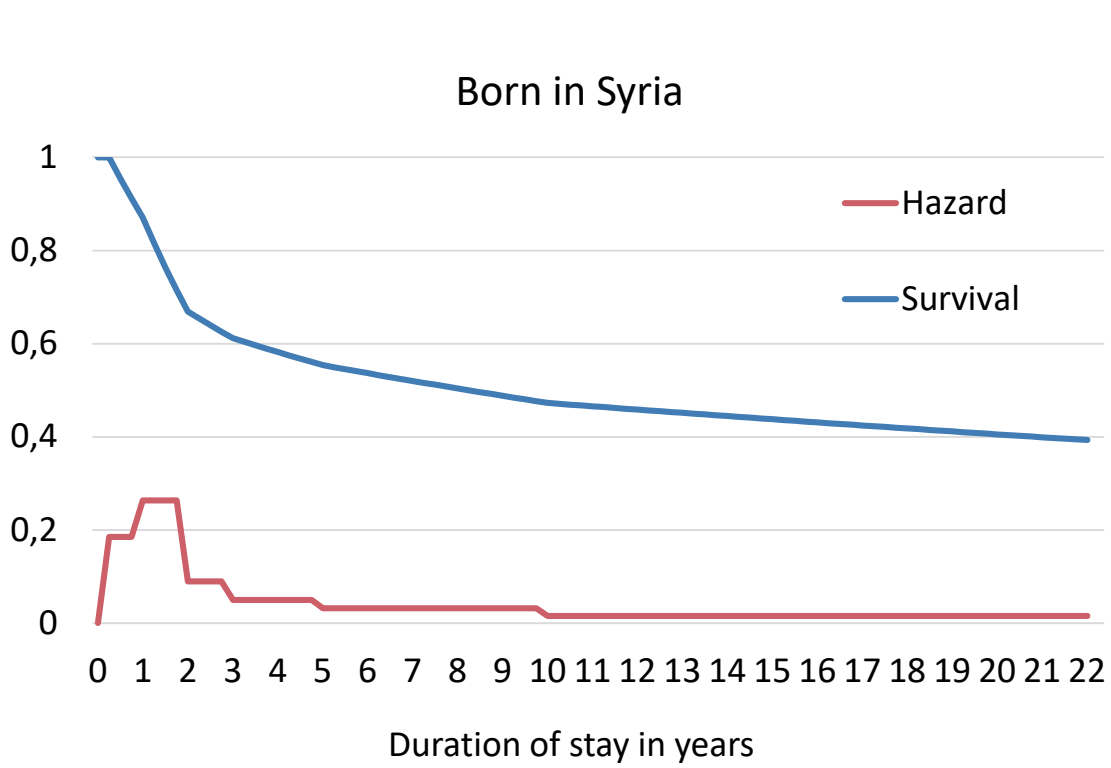
- Estimate piecewise constant hazards for emigration by sex and country cluster
- Input variables: age, federal province of residence, duration of stay

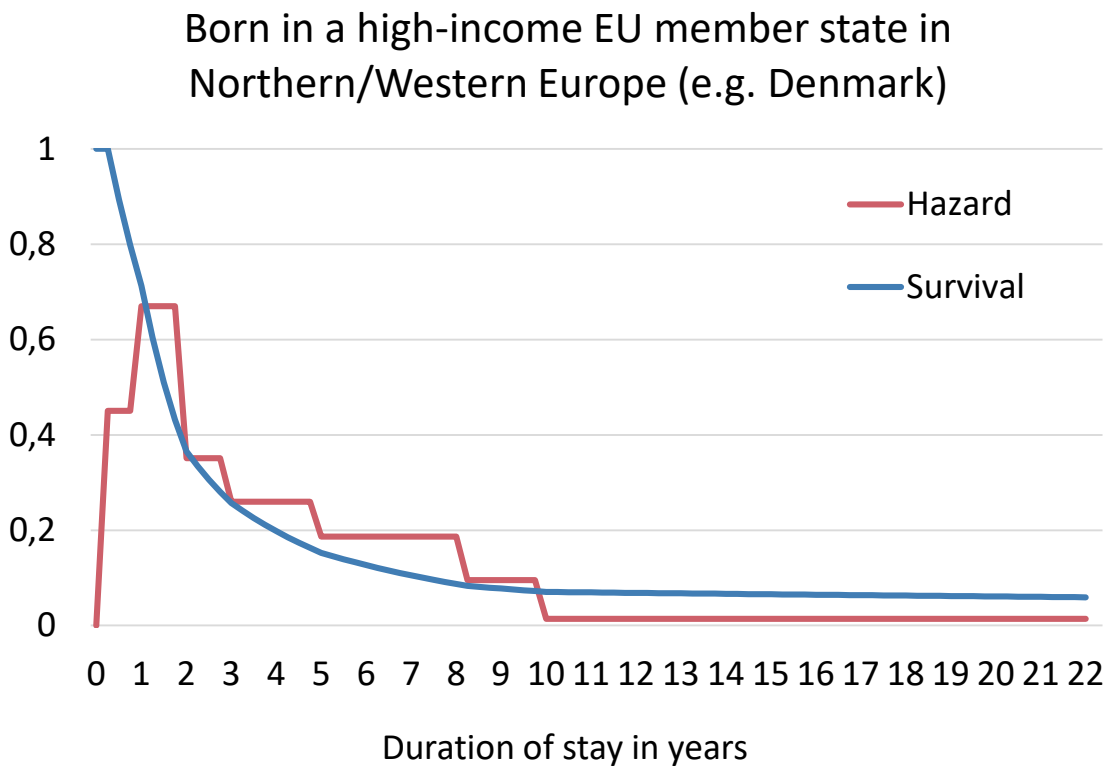
→ Does not require much additional data, but more data analysis necessary

→ Relevant because emigration patterns differ based on individual characteristics

Differences in emigration behaviour by country of birth and duration of stay

Example: 18 year old male immigrates to Austria and lives in Vienna



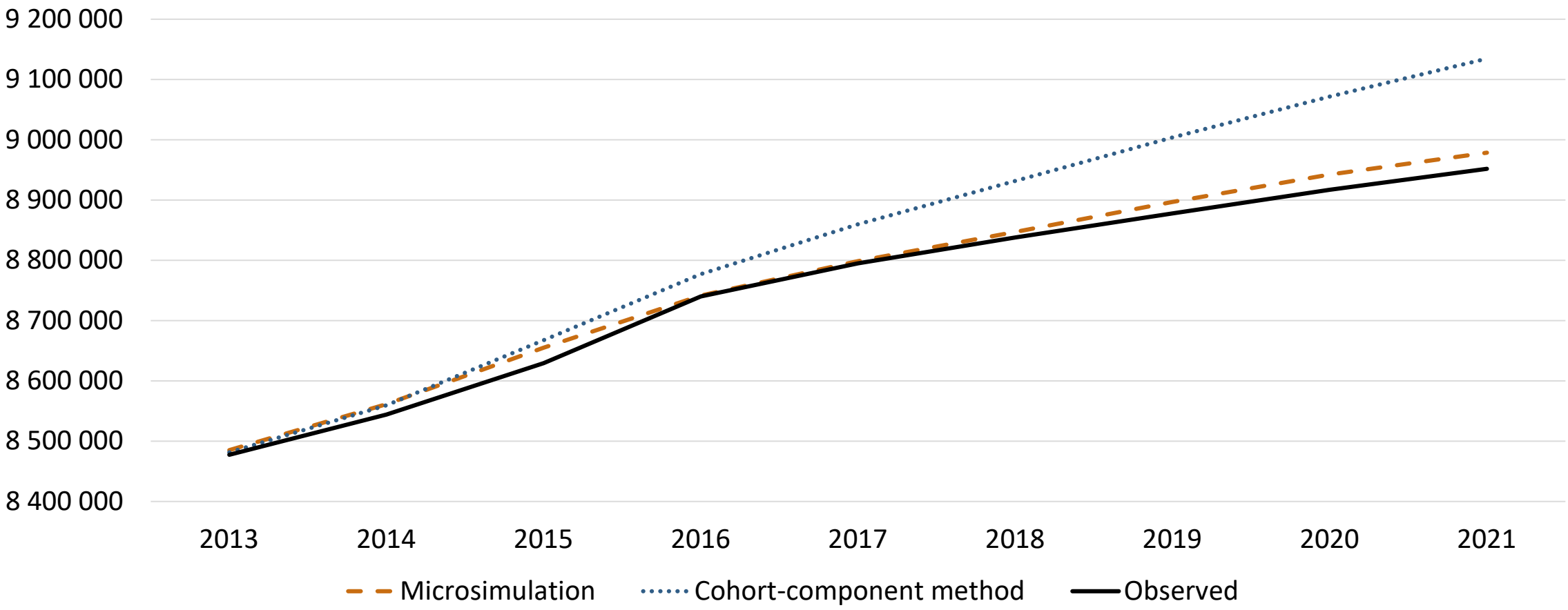


Hazard: Rate at which a person emigrates in a given time interval.
Survival: Proportion of individuals who do not emigrate until a given point in time.

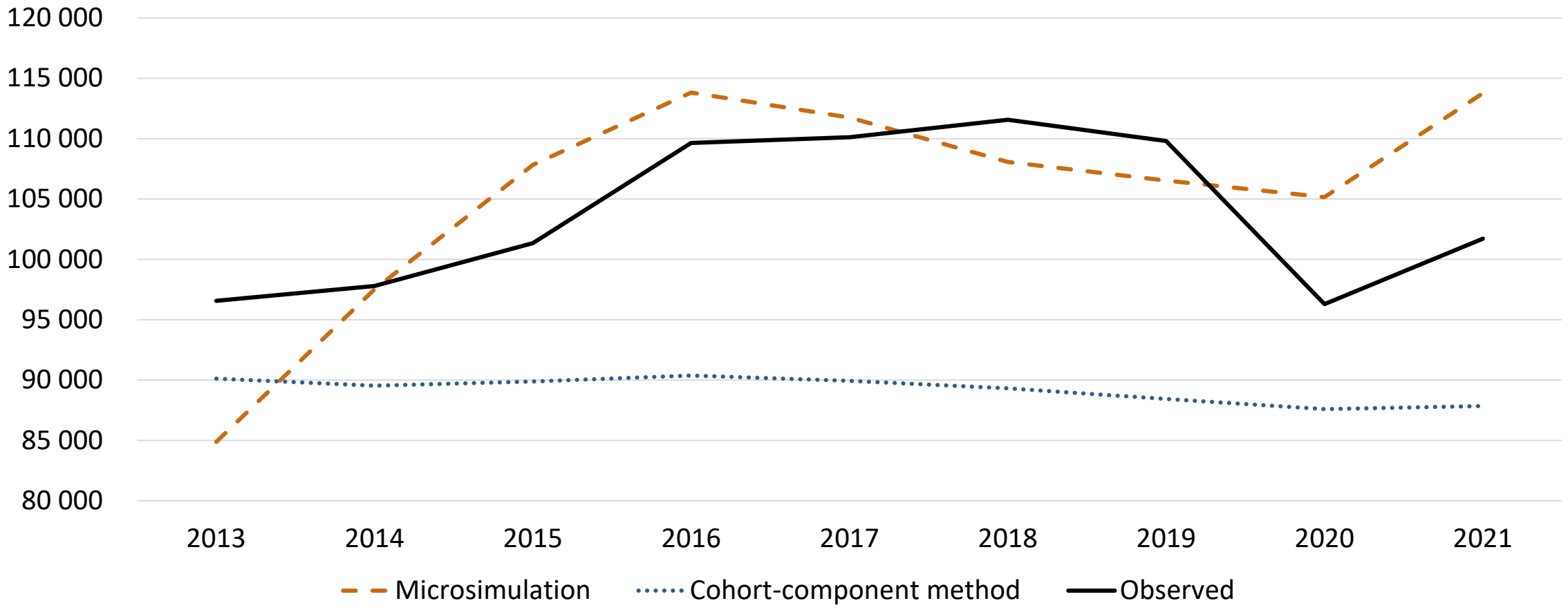
Model validation

Comparing the cohort-component method with the microsimulation model in an ex-post validation

Projected and observed population of Austria 2013-2021, based on the cohort-component method vs. the microsimulation model



Projected and observed emigration from Austria 2013-2021, based on the cohort-component method vs. the microsimulation model



Concluding remarks

- Emigration risks differ by country of birth and decrease with the duration of residence.
- Accounting for these differences impacts the projected number of emigrants as well as the size and composition of the Austrian population.
- Retrospective projection demonstrates the efficacy of the model in capturing emigration patterns, as evidenced by the close alignment with the observed emigration levels from 2013 to 2021.

For further information please contact:

Pauline Pohl
+43 1 71128 8007
pauline.pohl@statistik.gv.at

Philip Slepecki
+43 1 71128 7623
philip.slepecki@statistik.gv.at

Martin Spielauer
+43 1 798 26 01 246
martin.spielauer@wifo.ac.at

Backup

Modelling scenarios and dynamic processes
Example: Refugee migration from Ukraine

Three phases:

1. Increased immigration and reduced emigration

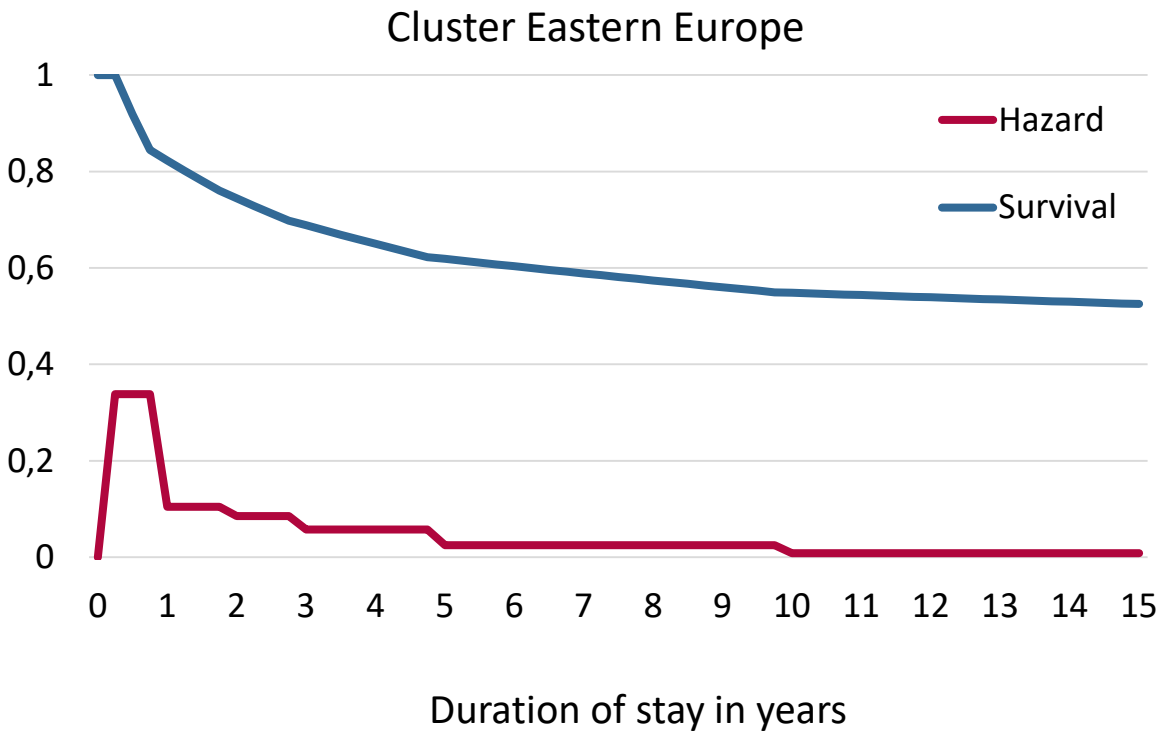
2. Increased emigration and family reunification → Inclusion of assumptions about the future immigration of male partners of female Ukrainian refugees based on survey data (UkrAiA Survey[2])

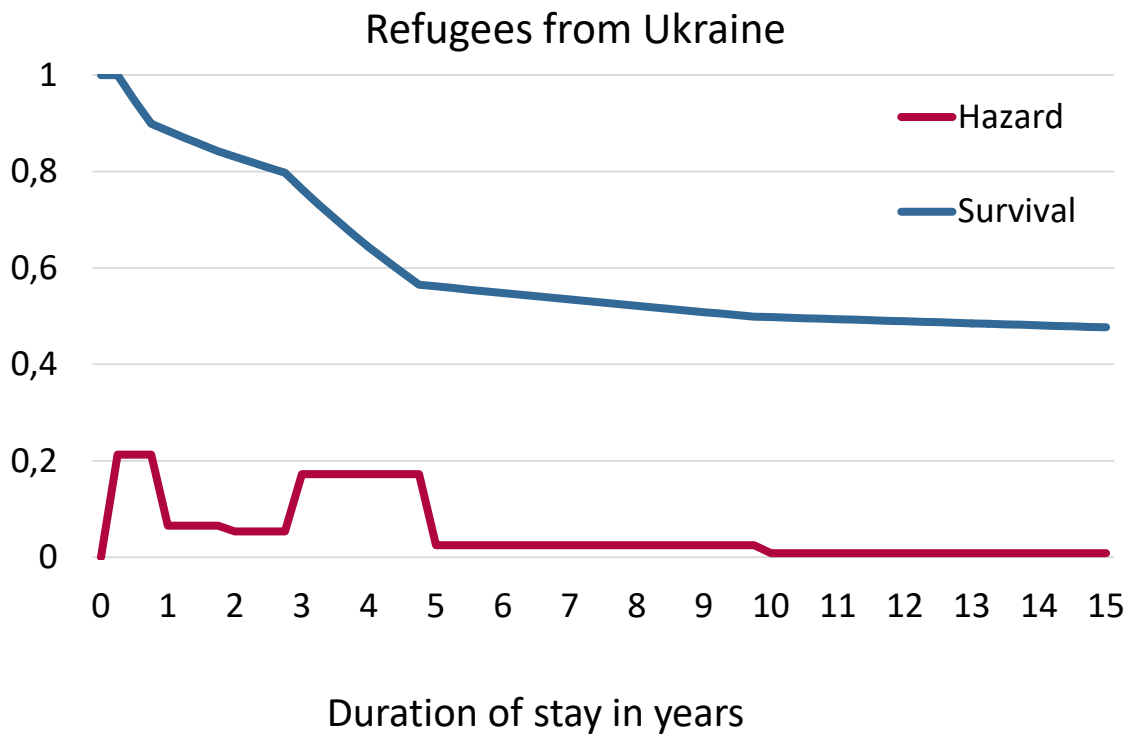
3. Emigration behaviour as before the war, higher immigration in the medium term than before the war due to larger Ukrainian community in Austria

[2] Kohlenberger, J., Buber-Ennser, I., Rengs, B., Setz, I. and Riederer, B. (2022) "UkrAiA Abschlussbericht Stadt Wien" – Final project report / presentation for the city of Vienna [Online]. Available at: https://www.ukraia.at/wp-content/uploads/2022/08/ukraia_final_report_city_of_vienna.pdf

Differences in emigration patterns: Cluster Eastern Europe vs. Refugees from Ukraine

Example: 30 year old female immigrates to Austria and lives in Vienna





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