Parsimonious Stochastic Forecasting of International and Internal Migration on the NUTS-3 level – An Outlook of Regional Depopulation Trends in Germany

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Abstract

We use small-area data on emigration from and immigration to the NUTS-3 regions in Germany (*Kreise* or *Districts*) for the period 1995-2019 in combination with district-level population data to compute pseudo immigration and emigration rates of the districts, which will then be used to produce a forecast model of age-specific migration until 2040 that covers correlations between the migration of the districts and the demographic groups by multivariate methods and long-term trends via classical time series methods. Moreover, we cover the association between immigration and emigration. Autoregressive integrated moving average (ARIMA) models and Monte Carlo simulation cover stochasticity and short-term shocks which may appear in the future. Our model results can be used for further planning of processes depending on regional migration trends. Our model will above that be constructed as a parsimonious migration model, which forecasts international migration between Germany and other countries alongside our internal migration model, making it adapt to be integrated into national migration models as well within national population forecasts.

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