Regional attractiveness for migrants is multidimensional and age- and education-dependent

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Interregional migration models; regional development, age-dependency; level of education; machine-learning

Introduction

The reasons why migrants are attracted to certain regions and not to others has intrigued geographers, economists, demographers and others for a long time (For an overview see Stillwell, 2009). Push-pull, gravity-type, entropy-based, or Poisson-models are but a few examples of the kind of approaches that have been used to study the flows of migrants between regions. More recently, Bayesian methods and machine-learning techniques were added to this set of analysis tools. Economic variables, migrant stock-variables, regional amenities and other regional characteristics have proved to be important as explanatory factors. Many of the existing approaches disregard the basic demographic fact that regional attractiveness is highly dependent of the stage in the life cycle. Young people have different locational preferences than older people. Moreover, human capital is a very important factor to understand migration (Poot et al., 2008). In addition, given the increasingly multi-ethnic composition of many countries, county of birth may be hypothesized to have an impact on locational preferences of internal migration.

This paper extends the body knowledge of interregional migration by taking into account the demographic dimensions of age, gender, country of birth, and level of education in a model of the regional attractiveness for migrants. We conceptualize regional attractiveness following the theoretical reasoning of Pike et al. (2016) of regional development, where three dimensions are distinguished: economic, social, and living environment. Accordingly, data on 10 economic indicators, 16 social indicators, and 12 living environment were collected at the NUTS 3 level in Europe from 2010 to 2021. For each NUTS 3 region an economic, social, living environment, and overall development score were computed from these data.

In this paper, using machine learning methodology, we analyse the relationship between these regional development scores to internal migration data in Norway. From this we explore how different dimensions of regional development are prioritized in regional migration preferences as a function of age, sex, education, and country of birth.

This study is part of a broader Europe-wide study, sponsored by Horizon Europe, PREMIUM_EU, to develop a regional policy tool for use mobility for boosting regional development of vulnerable regions in Europe (https://premium-eu.org).

Methodology

The relationship between migration and regional development is modeled by defining that region i has the economic, social-cultural, and living environment scores E_i, S_i, L_i. The priority people of type k place on the economic, social and living environment dimensions is $\rho_{Ek}, \rho_{Sk}, and \rho_{Lk}$, with the restriction that the sum of $\rho_{Ek}, \rho_{Sk}, and \rho_{Lk}$ must be 1, and they are each restricted to the range between 0 and 1. Here k specifies a specific age group, sex, educational level and/or country of origin.

Accordingly, the attractiveness of region i to migrants of type k is defined as:

$$A_{ik} = E_i \rho_{Ek} + S_i \rho_{Sk} + L_i \rho_{Lk}$$

Internal migration data from 2010 to 2022 from the Norwegian population register is collated. The best-fit priorities for each migrant type, k, are estimated via a machine learning algorithm making use of Markov chain Monte Carlo (MCMC) sampling. This algorithm models the priorities by comparing the migration flows to each region in each year, to the region's development profiles at those times.

Results

First only the impact of age and sex are considered. Figures 1a, 1b, and 1c show the modeled priorities given to the economic, social, and living environment dimensions respectively as a function of age. The results for men are shown in blue, and women in red. It is apparent from these figures that from late teens to early thirties economic considerations dominate, through this drops off slightly earlier for women. At later ages the social and living environment dimensions dominate. Earlier ages are not included in this discussion because children do not make migration decisions, though they of course an important factor in the migration decisions of the family unit. At ages above thirty the social dimension is prioritized approximately twice as much as the living environment dimension, but men seem to give slightly more importance to living environment than women, at the expense of their social weighting.

The impact of education on migrant priorites is examined. Migrants are divided into low, medium, and high educational categories, where low is primary or no education, and high means some tertiary education. The priorites for these groups are shown in the top (low education), middle (medium education), and bottom (high education) rows of Fig. 2. The results for the lowest educated are noisier than for the other two groups because there are very few people with low education in Norway. Neverthes these results demonstate several key trends.

Firstly, the economic priority, ρ_{Ek} correlates positively with education; it reduces more sharply and at earlier ages for lower educated groups, but remains high all the way up to age 30 for the highest educated. Secondly, the social priority, ρ_{Sk} correlates positively with education. There is also a conspicuous peak for highly educated 30-40 year olds where the social dimension dominates to the exclusion of over all other considerations. This may reflect both the desires of those individuals experiencing an expansion of choice as they are becoming established in their careers. It may also reflect practical considerations as many families form and children are born on this age range. In contrast, the living environment priority, ρ_{Lk} correlates negatively with education. Thirdly, the priorities for men and women are extremely similar for medium and high educated individuals, but show considerable divergence for those with low or no education.

Figure 1   The modeled priorities given to the economic, social, and living environment dimensions
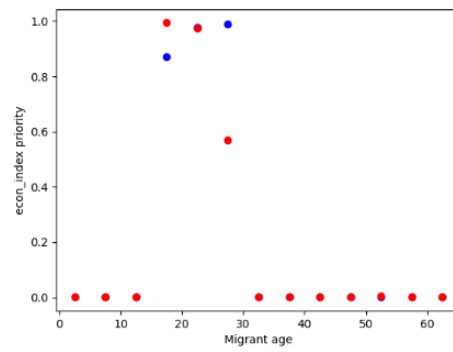

Figure 1a: economic dimension
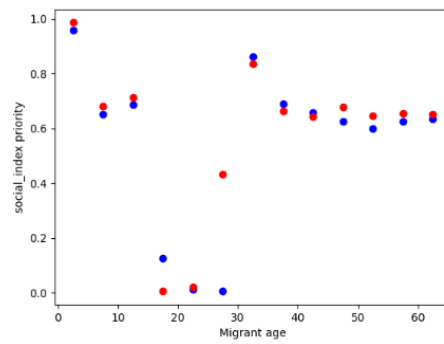

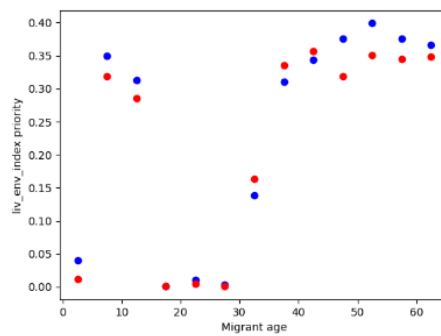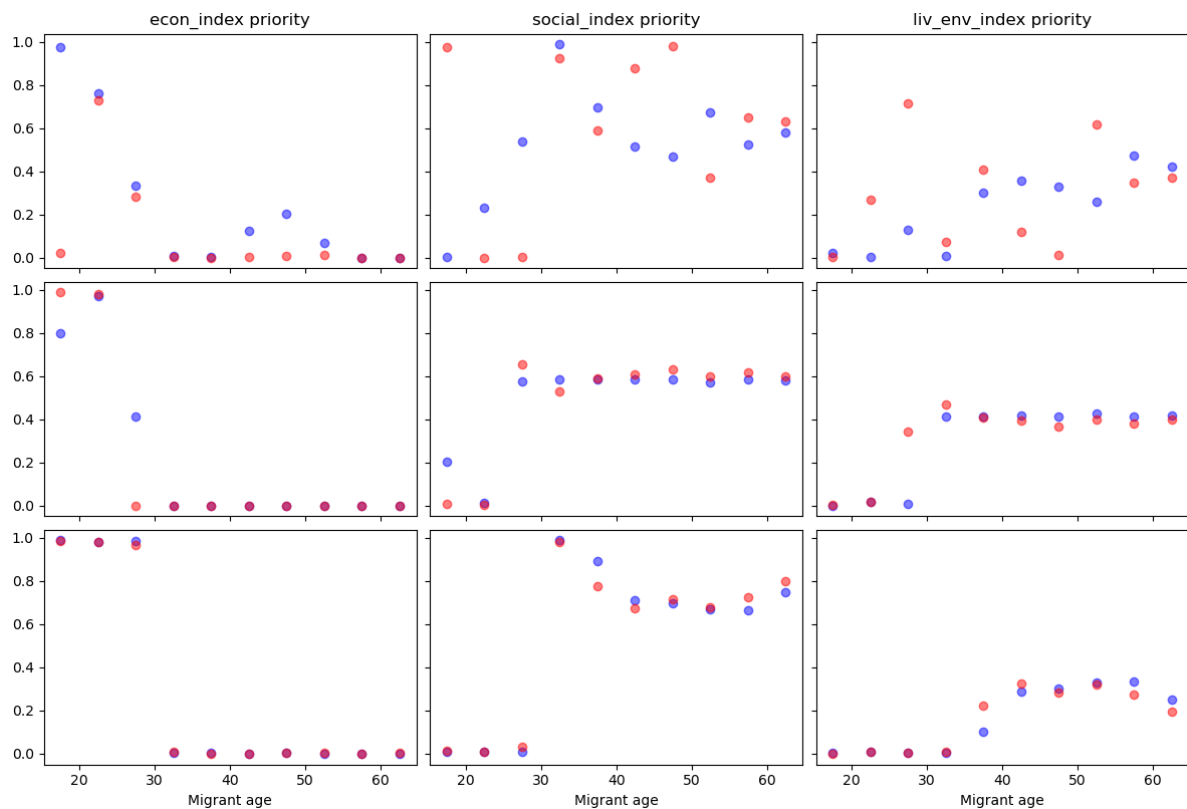Figure 1b: Social dimension

Figure 1c: Environmental dimension

Figure 2   Modeled priorities given to the economic, social, and living environment
            dimensions by level of education. First row: high education, second row:
            middle education: third row: low education

Conclusions and future work

This work sheds light on what factors migrants consider when making migration choices. This information is of use to regional policy makers as they make decisions to develop their regions. Notably, these findings demonstrate that even vulnerable regions experiencing population decline may be able to attract migrants by focusing on improving their social conditions and, to a lesser extent, living environment.

For the next steps of this work we will extend this research to other countries. We have internal migration data from a number of other countries such and Sweden, the Netherlands, and Spain, which is in the process of being analysed. This will enable the similarities and differences in migrant priorities to be compared internationally.

References

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