Innovations in International Migration for use in Global Population Projections

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Abstract:

Advances in projecting international migration have been hindered by a lack of adequate data. Consequently, international projection-making agencies commonly use simplistic assumptions of net-migration measures derived as residuals from demographic accounting. However, past net migration can be often volatile and are known to introduce inaccuracies when projecting populations (Rogers, 1990). This paper presents a set of global population projections to 2060, focusing on alternative international migration assumptions. Expert-based assumptions about fertility, mortality and migration developed for the new edition of the Wittgenstein Centre (WiC) global population projections are combined to project each country's population. An earlier version of these projections by age, sex, and also educational attainment was published by Lutz and colleagues in 2007. We overcome the limitations of using net-migration models and zero convergence assumptions by drawing on a first-of-a-kind set of estimated quinquennial bilateral migration flows developed by Abel (2012). Using a multiregional cohort-component projection model, alternative future migration trends are explored based on a set of 'what-if?' scenarios. Our results highlight differences in the future level and distribution of populations around the globe between a constant-rates, a convergence to zero-net, a zero flows and two 'what-if' scenarios.

Introduction:

International migration is an important driver of population growth in many countries (Lee, 2011) and a major source of uncertainty in demographic projections. Data on international migration flows is often limited in availability and comparability (Kelly, 1987; Salt, 1993; Nowok et al., 2006). Consequently, global projection models are often based on net migration measures derived as residuals from demographic accounting. Future assumptions of net migration in projection models are often simplistic: where past patterns of net migration are not utilised and future projections of related variables ignored. For example, the United Nations assumes future net migration rates for all countries will gradually tend to zero, despite sustained increases in net migration in many developed countries.

Our paper is part of a bigger project on the development of a new set of Wittgenstein Centre (WiC) population projections, firstly by age and sex for 196 countries, and, second, by age, sex and educational attainment for about 180 countries in the world. An earlier version of these projections was published in 2007 (Lutz et al. 2007; K.C. et al. 2010). The new WiC projections draw on substantially refined baseline data for fertility, mortality, migration and education, and they draw on

assumptions that were derived from argument-based opinions of experts from all around the world collected through a web survey and an expert meeting.

The accurate projection of migration in the long run is one of the most difficult challenges in population forecasting. To improve the error in projections that is attributed to the migration component, three issues are of particular importance: the baseline data, the assumptions about future trajectories, and the way migration is modelled in the projections. This paper presents the first results of projections for 196 countries for the period 2010 to 2060, carried out using directional migration probabilities in a multi-regional cohort-component framework. Drawing on a new set of estimated migration flow table developed by Abel (2012), we explore the differences in projected size and age structure of populations under a set of four alternative assumptions about future migration intensities and patterns.

Data:
This paper departs from the common practice of focusing on convergence of net migration rates towards zero by applying multiregional methods to a new set of WiC global population projections for the period 2010-2060. The innovations in population projections presented in this paper are made possible by a unique new data set of estimated bilateral global migrant transition bilateral flow tables developed by Abel (2012). This data set provides a first-of-a-kind picture of the spatial structure of international migration flows between 195 countries over the period 1960 – 2010. Estimates are based on a new flows-from-stock methodology, which exploits complete global place-of-birth migrant stock tables, recently released by the World Bank (Ozden et al., 2011). Flow estimates are derived by considering two sequential migrant stock tables from each census round. Using statistical missing data methods, maximum likelihood estimates of the migrant flow transitions that are required to meet differences in migrant stock totals are produced. For example, if a migration stock increases between two time periods, the minimum migrant flows to meet this increase are estimated. At a global level, changes in all migrant stocks are considered simultaneously, and hence a complete and comparable set of bilateral migration flows are derived. Auxiliary data for changes in migrant stock populations from births and deaths are also accounted for using standard demographic procedures. Constraining flow estimates to known migrant stock totals allows for a clear and transparent explanation of estimated migration flow patterns. The resulting data set represents 5-year migration transitions, as opposed to the number of migration movements during a decade, and is hence well suited for incorporation into population projection models. Figure 1 shows the assumed levels of immigration and emigration for the period 2005-10.

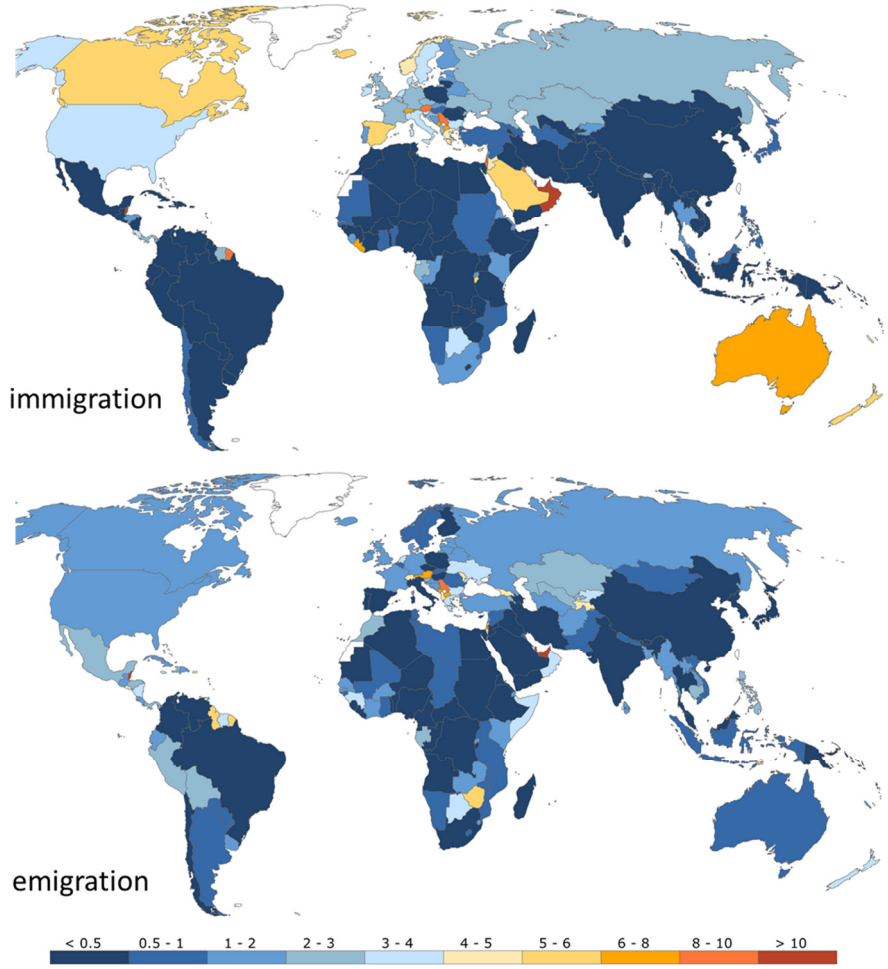


Figure 1. Assumed immigration and emigration probabilities (in %) for the period 2005-10.

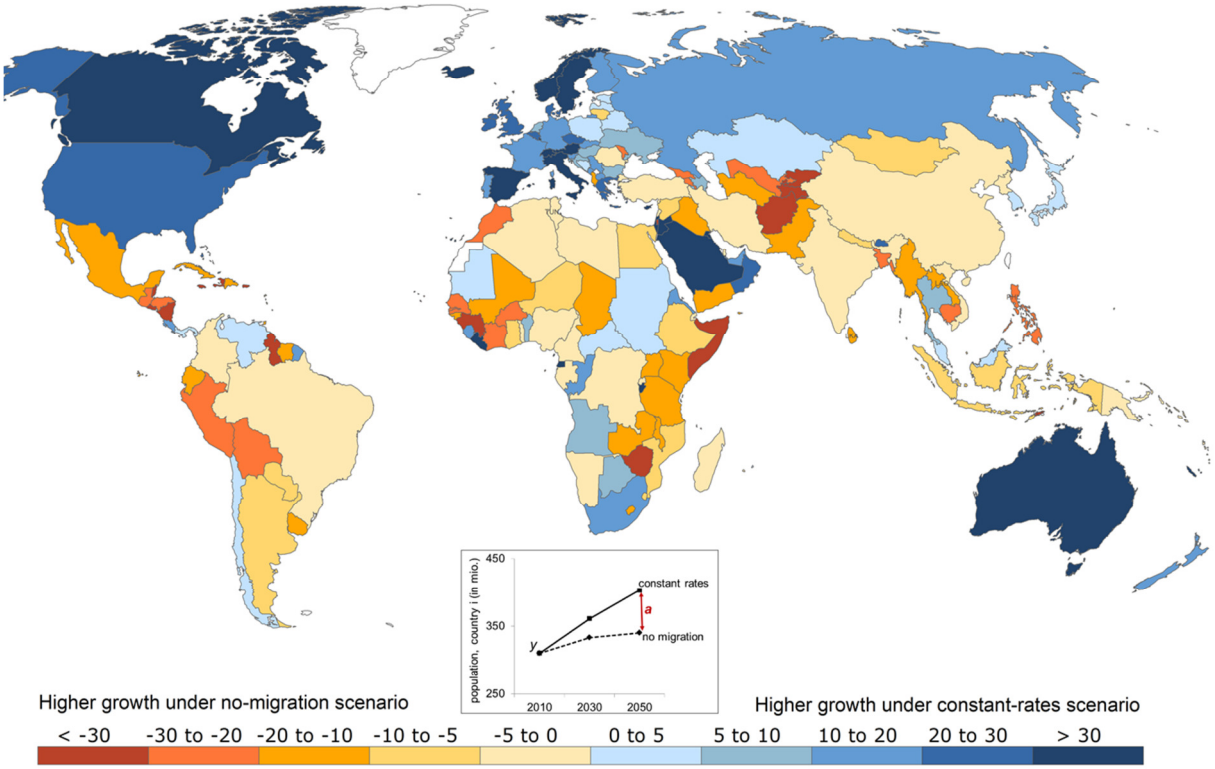
Assumptions Setting:

By identifying regularities in the spatial structure, we can circumvent the high temporal volatility of net-migration that has hindered reliable projections. In developing plausible assumptions about future international migration, we combine such empirical insights with expert views on the future trajectory of migration that were collected using an extensive on-line questionnaire sent in 2011 to all members of international population associations. Alternative migration assumptions are combined with fertility and mortality assumptions recently developed for the 2012 edition of the WiC global population projection model in a set of 'what if?' scenarios that highlight ways in which the intensity and pattern of migration may change until 2060. Our results demonstrate a number of differences in the future numbers and geographical distribution of populations around the globe between a constant-rates, a convergence to zero net, a zero flows and two 'what-if' scenarios assuming changes in migration patterns.

Results:

Baseline data for the multiregional cohort-component projection model utilise estimated migration inflows and outflows rates, by sex, derived from the aforementioned flows-from-stock methodology. Standard migration schedules are used to subdivide estimates rates by age. Full results for each of the alternative migration assumptions are currently being derived (due for completion before the end of 2012). We intend to illustrate the various influences of migration assumptions on global populations, whilst constraining other demographic components of population change to their mid-scenarios.

Initial projection results point to substantial differences in population growth over the period 2010 to 2050 under alternative migration assumptions. The results for the constant-rates and the zero-flows (no migration) scenarios shown in Figure 2, by measuring difference in each countries future population as a percentage of the 2010 population (see Figure insert). It appears that differences are not solely driven by the assumed level of net gain or loss through migration. Several eastern European countries, for example, are projected to have a higher population growth under the constant-rates scenario than under the zero-flows scenario. In the multi-biregional model, emigration numbers are projected proportional to the country's population, whereas immigration numbers are projected proportional to the rest of the world population. Hence, although Bulgaria, Belarus and Ukraine had higher emigration than immigration levels in 2005-10, the projected number of emigrants declines over time due very low fertility levels. In contrary, the projected number of immigrants increases as the population in the rest of the world grows. Therefore, populations in countries with slightly negative net-migration in 2010 and negative natural population growth are projected to record less growth under a zero-migration scenario.



The contribution of migration to projected population change, 2010-2050: comparing a constant-rates and a zero migration scenario.
Calculated as the difference in population growth between the two scenarios (a/y).

Figure 2. Differences in projected population growth under alternative migration scenarios.

References:

Abel, G. J. (2012). Estimating Global Migration Flow Tables Using Place of Birth Data. *Vienna Institute of Demography Working Paper Series* 01/2012

Kelly, J. J. (1987). Improving the Comparability of International Migration Statistics: Contributions by the Conference of European Statisticians from 1971 to Date. *International Migration Review* 21 (4), 1017--1037.

Lee, R. (2011). The Outlook for Population Growth. *Science* 333, 569-573

Panel on Population Projections, Committee on Population, National Research Council (NRC) (2000). "International Migration." *Beyond Six Billion: Forecasting the World's Population*. Washington, DC: The National Academies Press

Nowok, B., D. Kupiszewska, and M. Poulain (2006). Statistics on International Migration Flows. In M. Poulain, N. Perrin, and A. Singleton (Eds.), *Towards the Harmonisation of European Statistics on International Migration (THESIM)*, Chapter 8, pp. 203{233. Louvain-La-Neuve, Belguim: UCL{Presses Universitaires de Louvain.

Özden, Ç, C. Parsons, M. Schiff, T. Walmsley (2011). Where on Earth is Everybody? The Evolution of Global Bilateral Migration 1960-2000, *The World Bank Economic Review*

Rogers, A. (1990). Requiem for the Net Migrant. *Geographical Analysis* 22.

Salt, J. (1993*). Migration and population change in Europe.* Technical Report 19 UNIDIR/93/23, United Nations Institute for Disarmament Research, (UNIDIR), New York, New York.