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L   or tory of Popu   tions [2]

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1. Gravity model

a. Calibration

Let P_t^L, P_t^M and D_t denote, respectively, the UNPD estimates of population of L ("less" in Table 1), the population of M ("more" in Table 1), and the net migration ("netmig" in Table 1) to M, for $t = $ 1950, 1955, ..., 2005. In this example, we treat L as a single country and M as a single country, as in the biregional projection model of Rogers (1995, pp. 10ff).

Ignoring all predictor variables other than population sizes of origin and destination in Kim and Cohen's (2010) gravity model, the number of immigrants from L to M in the 5-year interval starting in year t is expected to be proportional to $J_t := P_t^L{}^{0.5} : P_t^M{}^{0.5}$; and the number of emigrants from M to L in the 5-year interval starting in year t is expected to be proportional to $Q_t := P_t^L{}^{0.5} : P_t^M{}^{0.5}$. The values.

If the methods used here for USA were applied to every country, the sum over all countries of each country's net migration might not be zero. To meet the logical requirement that the summed net migration of all countries must be zero, it would be necessary to adjust the initial estimates and projections of net migration to meet that constraint, perhaps by some kind of proportional redistribution.

To use these procedures in UNPD projections, it would be necessary to distribute net migration by sex and age, perhaps by using model schedules. It might be necessary for some countries, especially small ones, to impose the constraint that every age group of each sex must remain non-negative.

These projections were deterministic. For stochastic projections, one could use the distribution of residuals (differences between observations or estimates and modeled estimates) from Kim and Cohen (2010) or from the residuals here $\tilde{e}$ = P − 0 : P ;

It would be highly desirable to validate these methods by excluding some recent estimates from the calibration and then comparing the projected net migration with those estimates.

The approaches illustrated here offer practical alternatives, based on explicit and testable analyses of historical estimates, to projections of net migration based on assumption. Future data will reveal whether the assumed future declines in net migration or the projected increases are more realistic.

E. ACKNOWLEDGMENTS

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Table 1. Net migration to more developed regions from less developed regions during 1950-54 to 2095-2099. Columns: year = initial year of quinquennium, e.g., 1950 means 1950-54. netmig: estimates of UNPD WPP 2010 (millions of net migrants per 5-year interval). projected netmig WPP2010: UNPD World Population Prospects