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Population Division

INTRODUCTION

The Laboratory of Populations at The Rockefeller University and Columbia University, New York City, is an academic research unit devoted to understanding human and non-human populations. This document summarizes the results of recent research on human international migration from the Laboratory of Populationsand its collaborators, and indicates plans for future research. Collaborators in these studies have been colleagues at the United Nations Population Division (Marta Roig) and the Department of Sociology at the University of Wisconsin, Madison (Keuntae Kim) as well asformer members of the Laboratory of Populations (Daniel C. Reuman,CaiGoGwilt).

A. BACKGROUND

International migration will play an increasing role in the demographic future of nations if fertility continues to decline in most countries. Net immigration already accounts for roughly 40% of population growth in the United States of Americaand about 90% in the EU-15 countries (Howe and Jackson, 2006).

In projecting international migration, the United Nations Population Division (2003, paragraphs 57-59) identified the need for a demographically plausible, programmable algorithm that automatically projects a zero world balance of net migration and prevents projected net emigration from completely depleting the population of any sending country. To meet this need, the Laboratory of Populations and collaborators proposedmodels and empirically based equations for projecting future numbers of international migrants from any country or region to any other. These algorithms are comparable in transparency and generality to standard cohort-component methods of projecting births and deaths.

Most theories of international migration draw on social, economic and/or political factors to explain migration (Bijak, 2008; Massey et al., 1993, 1998; Faist, 2000), such as differences among countries in gross domestic product, labor markets, migration policies, social networks of prior migrants, and cognitive and behavioral attributes of individuals (Howe and Jackson, 2006;Ritchey, 1976; Dorigo and Tobler, 1983). Although states and governments influence migration via their laws and regulations, and some past empirical studies attempted to incorporate some form of policy measures, data on this subject are sparse, and predictive models of policy are not available.For multi-decadal demographic projections, it seems more difficult to project such non-demographic variables than it is to project demographic variables such as fertility and mortality.

The intellectual antecedents of the new proposed models include Zipf's (1946, 1949) model of inter-city migration, which is one of several "gravity" models in the social sciences (Rogers, 2008).The proposed models assume the availability only of constant geographic or historical variables and of population sizes which can be projected incrementally in time by accepted demographic procedures.

The models make possible deterministic and stochastic projections of migration and hence of population.The approach presented here is different from methods of projecting migrant flows currently practiced in international demographic institutions, the United States of America, European countries, and other developed countries (Fertig and Schmidt, 2001; Howe and Jackson, 2006; Bijak, 2008; Raymer and Willekens, 2008; Rogers, 2008).

B. MAJOR FINDINGS

The dependent variable of the models is the logarithm (base-10) of the annual number, m_{ijt}, of migrants from origin country i to destination country j in the calendar year t. This dependent variable, called log migrant flow, has advantages and disadvantages. Compared to the choice of

net migration as a dependent variable, migrant flow has the advantage of assuring that the world total of net migration will be zero (Cohen, 2008, p. 418). However, migrant flow as a dependent variable has the disadvantages that many countries do not produce reliable data on migrant flows, and that among countries that do publish such data, the definitions of migrant frequently differ from country to country.

Two models were developed for different purposes. The purpose of the first model (Cohen et al. 2008) was to find equations useful for prediction of migrant flow from any origin to any destination. The coefficients of the equations were estimated using 43653 recordsfrom 11 industrialized countries of annual migrant flows during 1960-2004. The countries were Australia, Belgium, Canada, Denmark, Germany, Italy, the Netherlands, Spain, Sweden, the United Kingdom [UK] and the United States of America. These countries reported numbers of immigrants annually from 228 origins and to 195 destinations.

The dependent variable log migrant flow was described by a log-linear model with independent variables that took account of calendar year, the populations of origin and destination, the geographical land areas of origin and destination, the great-circle distance from the capital city of

Howe, Neil and Richard Jackson (2006). Long-term immigration projection methods: current practice and how to improve it.Center for Retirement ResearchWorking Paper, No. 2006-3.Washington DC: Center for Strategic and International Studies (CSIS).
Kim, Keuntae and Joel E. Cohen (2010). Determinants of international migration flows to and from industrialized countries: a panel data approach beyond gravity. *International Migration*