Revisiting the Historical Estimates of Foreign-Born Immigration for the 2020 Demographic Analysis

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Abstract

The U.S. Census Bureau’s Demographic Analysis (DA) program uses historical data on births, deaths, and net international migration (NIM) to estimate the national population every decade. This paper contains results from our preliminary research on foreign-born immigration, which is the largest component of NIM. The 2010 DA used estimates of international migration going back to 1945. The 1945-1999 estimates were derived from various data and methods from previous DA programs while the more recent 2000-2010 estimates were developed primarily from the American Community Survey (ACS) and the 2000 Census data. Due to the differences in data and methods, international migration is not entirely comparable between these two periods. In preparation for the 2020 DA research, we develop a consistent time series of foreign-born immigration estimates from 1965 to 2015 by applying a backcasting method on data from the decennial censuses and the ACS.

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Extended abstract

Background

Demographic Analysis (DA) is a technique that uses historical data on births, deaths, and international migration to construct national-level estimates of the population by certain demographic characteristics to evaluate the decennial census (Himes and Clogg 2012). The estimates of births and deaths are developed using administrative records on vital events, which are relatively complete. The international migration estimates are developed using limited administrative records and survey data, resulting in a component that is more prone to error compared to the births and deaths components.

The Census Bureau's 2020 DA will be based on estimates of births, deaths, and net international migration from 1945 to 2020. Foreign-born immigration is the largest component of the net international migration (NIM) estimate and is our research focus for this paper. The 2010 DA included estimates of foreign-born immigration from 1945 to 2010. The estimates of foreign-born immigration from 1945 to 1999 were originally developed for the 2000 and earlier DA programs using various types of data and methods (Robinson 2011). The estimates of foreign-born immigration from 2000 to 2010 were produced using 1-year American Community Survey (ACS) data from 2000 to 2009 and the 2000 Census (Bhaskar et al 2013). Analyses of the age and sex distributions of the 2010 DA international migration estimates show inconsistencies between the historical (1945 to 1999) and recent (2000 to 2010) periods.

In this paper, we attempt to create a more consistent time-series of foreign-born immigration estimates from 1965 to 2015 by demographic detail (age, sex, race, and Hispanic origin). For the 1965-1999 time series, we apply a backcasting method on the foreign-born
population using data from previous decennial censuses. For the more recent 2000-2015 time series, we use data from the ACS. Next, we use the U.S. Department of Homeland Security’s Legal Permanent Residence (LPR) data file and previous DA data as a benchmark to compare to the new 1965-2015 series of foreign-born immigration.

**Data and Methods**

The data for this analysis come from the long-form (sample data) of the 1970, 1980, 1990, and 2000 Decennial Censuses for the 1965-1999 series and the 2001 to 2014 ACS 1-year files for the 2000-2015 series. The 2010 DA used 1-year ACS data from 2000 to 2009 to estimate foreign-born immigration (Bhaskar et al 2013). We use the year of entry (YOE), citizenship, age, sex, race, and Hispanic origin data from the decennial censuses to develop annual estimates of foreign-born immigration from 1965 to 1999 by demographic detail. Data on citizenship, YOE, residence one year ago (ROYA), age, sex, race, and Hispanic origin from the ACS are used to estimate foreign-born immigration from 2000 to 2015.

We apply a backcasting method on the initial estimates of annual foreign-born immigration to adjust for emigration and deaths. Although the year of entry variable can be used to develop estimates of annual immigration, these numbers are biased downward since they do not account for deaths and emigration occurring from when the migrants entered the U.S. to when the subsequent census was conducted. In order to correct for this bias, we “reverse-survive” the population from the census year back to the year the migrant entered the U.S. The specific method for backcasting the estimates from a given census year back to the previous census year is expressed in Equation 1, where ‘P’ represents the foreign-born population, ‘t’
represents the a census year, ‘k’ represents the number of years prior to the census year, ‘E’ represents the emigration rate, and ‘M’ represents the mortality rate.

\[ P_{(t-k-1)} = \frac{P_{(t-k)}}{(1-E_{(t-k)}) \times (1-M_{(t-k)})} \]  

(1)

Where

\[ t = \{1970, 1980, 1990, 2000\} \text{ and } \]
\[ k = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\} \]

This method contains a competing risks model, as represented in the denominator of Equation 1, which accounts for both the risk of emigrating and the risk of mortality between the year a person immigrated to the U.S. and the year of the census. The emigration rates are specific to the period being estimated. We develop them by applying a residual method on decennial census data. The mortality rates used in the model are derived from life tables produced by the National Center for Health Statistics (NCHS).

**Analysis**

To assess the accuracy of the new foreign-born immigration estimates, we compare the new series with the LPR estimates as well as the foreign-born immigration estimates from the 2010 DA. We analyze the percent differences in estimates between the LPR, 2010 DA, and the backcasted historical immigration series by age, sex, race, and Hispanic origin. We will also compare the sex ratios by age for different race and Hispanic origin groups between the series. The results from this analysis will inform the Census Bureau’s methodological research on foreign-born immigration in preparation for 2020 DA.
References:

