The Impact of Revising the International Migration Components on the 2010 Demographic Analysis Sex Ratios

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Introduction

Demographic Analysis (DA) is a technique that uses administrative and survey data to create estimates of the population by demographic characteristics. Historically, DA estimates have been used in conjunction with results from a post-enumeration survey as benchmarks for evaluating coverage of the decennial census. For DA in 2010, the Census Bureau produced five series of national-level estimates of the population by age, sex, race (Black/non-Black), and, for the population under age 20, by Hispanic origin. The estimates were produced independently from the 2010 Census and were released to the public on December 6, 2010, prior to the release of 2010 Census counts.

DA estimates for the population aged 0-64 on April 1, 2010 (Census Day) were produced using the cohort-component method, where:

$$\textbf{Population}_{\text{Aged 0-64}} = \textbf{Births}_{1945\text{-}2010} - \textbf{Deaths}_{1945\text{-}2010} + \textbf{Net International Migration}_{1945\text{-}2010}.$$

The population aged 0-64 on April 1, 2010 is equal to births from April 1, 1945 through March 31, 2010 minus deaths from April 1, 1945 through March 31, 2010 plus net international migration (NIM) over the time period. A Medicare-based methodology was used to produce estimates for the population aged 65 and older in the original DA series and did not include an international migration component. Of the components of population change in DA—births, deaths, and international migration—estimates of international migration have the most uncertainty and variation across the series.

For 2010 DA, the Population Division of the Census Bureau focused substantial effort on estimating the subcomponents of net international migration (NIM) from 2000 to 2010, which

included foreign-born immigration, foreign-born emigration, migration between the United States and Puerto Rico, and net international migration of U.S. natives. The international migration estimates from 1945 to 2000 incorporated results from prior Census Bureau research as part of the 2000 Demographic Analysis-Population Estimates (DAPE) project (Robinson 2011). The five series of international migration estimates were developed by altering the data or methods used to estimate the different subcomponents (Bhaskar et al. 2011, Cortés et al. 2011, Demographic Analysis Research Team 2010, Devine et al. 2012).

Analysis of the 2010 DA estimates revealed a pattern in the age-specific sex ratios for the resident population that was not present in 1990 and 2000 DA estimates.[1] The sex ratio that peaked around age 20 in 2000 aged forward ten years to peak around age 30 in 2010 (Figure 1). Subsequent research showed that this shift in the peak of the sex ratios was largely caused by estimates of international migration.

Census Bureau research focused primarily on evaluating two theories behind the aging forward of the sex ratios: migration momentum and the spurious cohort effect (Jensen 2012). The term "migration momentum" is used to describe the process whereby predominantly male immigrants who entered the United States in the late 1980s and 1990s were still present in the United States in 2010, and the subsequent flow of female immigrants from the same birth cohorts were not sufficiently high to offset the high sex ratios of these flows. An alternative explanation for the aging forward of the sex ratios could be due a spurious cohort effect, or the improper aging

[1] Age-specific sex ratios specify the number of males per 100 females of a specific age. A sex ratio of 100 indicates an equal number of males and females, whereas numbers above 100 indicate more males, and numbers below 100 indicate more females.

forward of a large number of males. This could occur if we underestimated the levels of emigration, or if we emigrated out too many females relative to males.

Migration from Mexico comprises a substantial part of the migration flows entering and leaving the United States. As part of the research effort, we collaborated with a colleague from the Instituto Nacional de Estadística y Geografía (INEGI) and analyzed results from the 2010 Mexico Census (Censo de Población y Vivienda).[2] The data indicated a substantial level of return migration from the United States to Mexico during the 2005 to 2010 period. In May 2012, we released a revised DA middle-series of estimates by age, sex, and race (Black/non-Black) that incorporated several data and method changes including the use of information from the 2010 Mexico Census to update the foreign-born emigration component. The poster briefly discusses the methods used to estimate international migration in the original 2010 DA series, and provides more detailed information on the data and method changes included in the revised DA series.

Data and Methods

The revised and the original series of international migration estimates built on pre-2000 migration estimates from 2000 Demographic Analysis. The revised series included the following major updates to the international migration component:

1. The foreign-born immigration subcomponent was processed separately for flows between the United States and Mexico and flows between the United States and other countries.

[2] Data from the 2010 Mexico Census is available online at < http://www.censo2010.org.mx/ > (accessed September 17, 2012).

2. The foreign-born emigration subcomponent was processed separately for flows between the United States and Mexico and flows between the United States and other countries. The estimate of foreign-born emigration to Mexico was revised to incorporate information from the 2010 Mexico Census.
3. The revised series altered the assumption of zero net international migration to and from group quarters (in the original series it was assumed that inflows equaled outflows).
4. Information from the multiyear 2007-2009 American Community Survey (ACS) were incorporated into the national-level estimate of characteristics for the NIM subcomponents later in the decade (original series used information from the 2005-2007 ACS).

In addition to these changes in net international migration, several improvements were implemented to the birth, death, and Medicare-based estimates (Devine and Scopilliti 2012).[3] For example, a substantial method change was implemented that impacted estimates for the population aged 65-74. The original series used the Medicare-based method to estimate the population aged 65-74, whereas the updated series used the cohort-component method to estimate the population aged 75 and older.

Discussion and Conclusion

[3] Summary-level information on these improvements is available in the methodology statement that accompanied the release. It is available at <http://www.census.gov/popest/research/DA_Methodology.pdf>.

In sum, the research performed by the U.S. Census Bureau ultimately led to the release of a revised series of 2010 Demographic Analysis estimates. In addition to providing a measure of the size and characteristics of the U.S. population on Census day, the DA estimates have historically been used to measure the coverage of the decennial census. Understanding the strengths and limitations of these estimates is important, particularly as we turn our focus to 2020 Demographic Analysis and 2020 Decennial Census operations.

References

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