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BRINGING ACS TO BEAR ON LOCAL ESTIMATE METHODOLOGIES: An Exploratory Analysis of Base Ratios

Authors:
David A. Egan-Robertson, State of Wisconsin Demographic Services Center
Charles D. Palit, University of Wisconsin-Madison

The Problem

Applied demographers who create local government estimates need to rely on symptomatic indicators of population change. While demographic units may collect some of their administrative-records data directly, in many cases indicators are collected, processed and summarized by external sources for non-demographic purposes.

In order to form a base view of communities' relationships between these indicators and their populations, many estimation methods employ censal ratios: the number of indicators per person at a census. Ongoing year-to-year calculations apply some type of an adjustment methodology to produce a current estimate. With a census usually occurring only every ten years, the base ratio may become "stale" over time. Changes in state laws—for example, the income threshold at which a household is required to file a tax return—during the course of the decade may also cause the original assumptions of the base ratio to become suspect.

Furthermore, making small-area estimates usually means that the demographer is dealing with small quantities of indicators. The vagaries of small numbers could produce misleading base ratios, as well as year-to-year variations through the following decade that vex our efforts to produce consistent, reliable estimates.

The Possible Solution

The advent of the American Community Survey offers an opportunity to review the efficacy of censal ratios. Could the continuous-measurement ACS estimates allow applied demographers to develop "fresh" base ratios as a decade progresses?

In addition, because the ACS data is collected across multi-year periods, one could logically pursue averaging symptomatic data across the same time period as the ACS. Could this offer a cure for the ups-and-downs that may occur in symptoms annually that bedevil the production of sensible estimates?

The purpose of this research is to test this new modeling idea—in short, resetting our base ratios mid-decade, using multiple years of symptoms—against ones based on the standard censal ratios, with the goal of producing better estimates in comparison to the 2010 Census enumeration.

The Approach

The State of Wisconsin's population estimates and symptomatic data, as well as ACS 3-year estimates from 2005-07 and 2006-08, will be used in testing these proposed solutions.

Wisconsin's Demographic Services Center has been producing annual population estimates for the state, its 72 counties, and 1,900 county subdivisions for nearly 40 years. Its initial ratio difference methods, still used, employ vehicle registrations from the state's Department of Transportation (DOT) and state tax returns from the Department of Revenue (DOR). (Demographic Services also collects municipal housing stock changes every year through a survey of all municipalities; these data are used in housing-based methodologies.)

While offering the needed coverage of all local geographies, the DOT and DOR data have their problems. As mentioned above, county subdivisions with small populations have small numbers of indicators. Wisconsin has almost "1,000 under 1,000:" 988 minor civil divisions have fewer than 1,000 residents. Furthermore, both DOT and DOR converted their databases during the 2000-2010 period. These changeovers produced sizeable annual alterations in the counts of vehicles and taxpayers among some municipalities, which could not be related to demographic shifts of a similar scale. Finally, possible administrative changes—for example, the way vehicles are classified, or legislative alterations in tax filing thresholds—may have a causal impact on symptoms that are not possible to quantify.

Using the ACS 3-year estimates for 52 counties and 37 county subdivisions, as well as the "balance of state" (20 counties) and "balance of counties" for those with county subdivisions in the ACS pool (19), we will analyze the plausibility of computing triennial base ratios and applying them to symptomatic indicators for subsequent years. In short, for calculating estimates, we will begin not from a decennial census-based ratio, but from an ACS-based ratio.

The Expected Findings

Our analysis will encompass two, and possibly three, comparisons. First, we will study the variability between the symptomatic ratios as indicated by the ACS mid-decade estimates and our traditional censal ratios. Second, carrying the estimation process forward from our differing three bases, we will determine the variation between the population estimates that are generated.

Third, should Wisconsin's Census 2010 redistricting data be released with adequate time before the PAA 2011 conference, we will evaluate the performance of the different estimates in comparison to the enumeration results, calculating and summarizing various measurements of error.