Projecting Small Populations Using the Cohort Component Method: The Utility of Model-Based Rates

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For most municipalities in the nation, a population projection can inform decisions in a number of areas, including budget estimation, infrastructure investment, school planning, health planning, and a whole host of applications related to program planning, policy formulation, and program implementation. For all of these applications, age is of critical importance, making the construction of age/sex cohort component projections a preferred route. The problem is that for many places, the small size of age/sex groups precludes the creation of stable fertility, mortality, and migration rates. As the size of the base for these rates gets smaller, volatility can increase dramatically, making it impossible to construct useful projections. This paper explores the use of model rates for preparing cohort-component population projections for small areas.

Developing population projections for smaller areas, such as census tracts, has always been a difficult endeavor. Small population bases for age/sex groups with sparse numbers of vital events may lead to unstable age/sex net migration rates, making projections tenuous at best. This research evaluates the role that model-based rates can play in the construction of population projections for census tracts, compared to estimates that are based on tract-specific information. The key question concerns whether model-based projections provide added "value." The model-based projection in this study employs a cluster analysis, where eleven different variables, drawn from the 2000 Census Summary Files and vital statistics data, are used to group census tracts based on demographic and socioeconomic attributes. The age-specific fertility, mortality, and migration rates from each cluster, or "model" rates, are then applied to individual tracts within that cluster.

The geographic areas included in this analysis are within a single Public Use Microdata Area (PUMA) in northeastern Queens, one of New York City's five boroughs. This PUMA contains seven neighborhood areas, comprised of 60 census tracts. This geographic configuration was selected because it mirrors the situation in other municipalities throughout the nation, where planners require projections for small governmental units. In this instance, the PUMA has 244,000 persons. The seven neighborhoods range in population from 19,300 to 69,400, with census tracts that range in population from 385 to 14,200 persons.

Data on fertility, mortality, and net migration were used to construct "tract specific" projections (i.e. using the individual rates of each census tract). Age/sex distributions were projected at five year intervals out to 2030 for all census tracts and for the seven neighborhoods. The individual census tract projections were then added up to the seven

neighborhoods, and then compared to the neighborhood populations that were projected independently.

Tract populations were also projected using model-based rates and aggregated to the neighborhood level to see if there was a higher level of consistency with the neighborhood population projected independently. While this does not provide an evaluation of the accuracy of the tract projections produced under each scenario, greater consistency between the model-based estimates and the independently derived projections of neighborhoods does portend greater control over volatility of rates. Ultimately, we will compare these results to those from the 2010 Census enumeration, where a true benchmark can be established using the full count data. This, in turn, can help determine whether city planners and other practitioners can benefit from alternative projections based upon model-based rates derived from cluster analysis.