

Appendix J: Description of Tract Remapping Methodology

Tract Remapping Methodology¹

To explain the normalization of historic tract data to 2000 tract boundaries, we start with the remapping of 1990 tract data to 2000 tracts. Remapping between these two years is made easier by the fact that the U.S. was completely covered by tracts in both 1990 and 2000, as well as by census blocks.² Because of the availability of block-level geographic data, the weighting of 1990 data to 2000 tracts is likely the most accurate of all the tract remappings. The basic methodology was to use the smaller blocks to determine the population-weighted proportion of a 1990 tract that was later redefined as part of a 2000 tract. These weights could then be applied to the 1990 tract level data to remap it to 2000 tract boundaries.

We began by relating 1990 to 2000 blocks using the Census Tiger/Line® 2000, Type 1 and Type 3 records. Like census tracts, blocks also change definitions from census to census. About 85 percent of all blocks had a 1:1 matching relationship between 1990 and 2000, while 10 percent had a 2:1 relationship and 5 percent had a greater than 2:1. In some cases, hundreds of 2000 blocks related to a single 1990 block, and vice-versa.

Within a particular census year, blocks do not cross tract boundaries. When going from 1990 block to 2000 tract boundaries, however, it is entirely possible for a block to be in multiple tracts. To determine more precisely the proportion of the 1990 block population that lived within the subsequent tract boundary, we used the 1990 Streets coverage from Tiger/Line 1992 as a way of determining the relative proportion of each block to assign to a tract. To split a block into parts, the sub-block areas were weighted according to the 1990 Streets relating to each 2000 block part. The assumption is that the presence of local streets or roads indicate areas where the population lived. Using all of this information, a correspondence between 1990 and 2000 blocks was produced, as well as a weighting value to help split block demographics for those blocks that split or merged between 1990 and 2000. We refer to the file produced by this process as the 1990 to 2000 Block Weighting File (BWF).

The BWF was then applied to 1990 block-level demographics from the 1990 Redistricting release PL94-171. This allowed us to produce 1990 to 2000 tract weights, which allow for splits and merges in tracts, based on block level populations.³ The fact that we have population data at the sub-tract (i.e., block) level for the entire U.S. is important in more accurately weighting 1990 tract data to 2000 tract boundaries.



The same is not the case for earlier census years. In 1980, tracts only covered urban areas, as well as a few rural areas in certain states. In 1970, tracts covered most urban areas only. We also did not have a reliable source of 1980 or 1970 block or block group data that could be used to construct the tract weights. Therefore, to remap data for 1980 and 1970 tracts to 2000 tract boundaries, we again relied on 1990 blocks.

The 1980 tracts were related to 1990 tracts and blocks using the correspondence between these two found in the Census Bureau release of TIGER/Line 1992. This correspondence was found to be very good between 1980 tracts and 1990 blocks, but incomplete for 1980 block groups to 1990 blocks. This means that splitting a 1980 tract into 1990 tracts had to be done spatially, meaning based solely on the 1990 block to 1980 tract correspondence. A more accurate weighting between 1980 and 1990 could have been done if 1980 geographic areas smaller than tracts were available, but because of a poor correspondence in TIGER/Line 1992 to 1980 block groups, this was not possible. Even if a perfect 1990 block to 1980 block group correspondence existed, we would have to consider the problem of suppressed 1980 data, which is more likely to occur in the less populated areas, and therefore very likely to be present in block or block group data.

The 1970 tracts were bridged to 1990 blocks using the 1970 to 1980 tract correspondence file produced by the US Census Bureau, along with boundary files scanned from the Urban Atlas files in 1975. The Census tract correspondence file produced good results, except where two or more 1970 tracts were merged into a single 1980 tract (less than two percent of the cases). In these cases, the spatial knowledge of a 1970 tract boundary was taken from the Urban Atlas boundary file.⁴ One problem with the Urban Atlas boundary file is that it was digitized from paper maps, and in some cases it incorrectly, albeit slightly, crosses states and county boundaries. A filter was applied to fix this problem. Once the relationship between 1970 and 1980 tracts was determined, 1970 tracts could be related to 1990 blocks using the 1980 tract to 1990 block correspondence developed previously. Again, although 1970 block groups exist, a spatial coverage of them does not, and therefore a 1970 tract universe weighting using block groups was not possible.

Once the tract weights were computed, they were used to normalize all 1970, 1980, and 1990 NCDB counts to 2000 tract boundaries. This was done using a weighted sum for population and housing unit counts and a weighted average for medians.



Notes

¹ This methodology description was prepared by Craig Cornelius, President, GeoLytics, Inc. and Peter Tatian, the Urban Institute.

² Census blocks are the smallest unit of geography for which decennial census data are reported. A block is an area bounded on all sides by visible features, such as streets, roads, streams, and railroad tracks, and by invisible boundaries, such as city, town, township, and county limits, property lines, and short, imaginary extensions of streets and roads. Generally, census blocks are small in area; for example, a block bounded by city streets. However, census blocks in remote areas may be large and irregular and contain many square miles (U.S. Census Bureau, 2001). Data for census blocks can be aggregated up to census block groups and to tracts.

³ All of the remapping weights used in preparing the NCDB are based on total population. It is also possible, using this same methodology, to create weights based on other demographic or housing counts, such as children, African American persons, or owner-occupied housing units. Using multiple weights creates enormous complications, however, as subpopulations weighted differently will not necessarily add up to the total population within a tract. Therefore, we have chosen to use one set of population-based weights for remapping all data to maintain internal consistency of population counts.

⁴ The source of the Urban Atlas boundaries is documented as a project between Harvard University and the U.S. Census Bureau.

