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Volume Author/Editor: David M. Blank

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Chapter Author: David M. Blank

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APPENDIX D

DERIVATION OF THE ANNEXATION ADJUSTMENT

IDEALLY in calculations for the years in a given decade prior to an annexation, the decade population change of a city should be measured as the difference in population in the original area of the city at the two censal dates. In calculations for the years after an annexation, the decade population change of a city should be measured as the difference between the population at the initial censal date of the city and the area later annexed, on the one hand, and the total population at the terminal censal date of the entire city, including the annexed area, on the other. Building permit data are gathered in a comparable form, since permits are typically required throughout the area of a city. Thus the coverage of such records is automatically extended in the year in which an annexation takes place. But it was usually impossible to separate the population of a city at a given censal year into the population of the area contained in the city at the preceding censal year and the population of any area annexed during the decade. Further, it was often impossible to determine the population at the preceding censal year of an area annexed during a decade, particularly if the annexed area was only part of a municipal unit or had only a small population. All that is usually available from Census materials is the population of the city at the initial and terminal censal dates and the population of the annexed territory at the time of annexation. Accordingly, the annexation adjustment finally employed was an approximation to the theoretically correct figure.

The adjustment simply involved the subtraction from the population change of a city, obtained from Census records, of the population of the annexed area at the time of annexation. This procedure assumed that the annexed territories were rural areas prior to annexation,¹ and that the increase in population of the annexed area over the decade was small compared with the population of the territory at the time of annexation. The adjustment was made both for the reporting cities in each size class for each year and for the total list of cities in each size class.

To illustrate the annexation adjustment, we shall assume that a given city had a population of 10,000 in 1900 and 13,200 in 1910; that in 1904 the city annexed an area that had a population of 1,100 in the year of annexation; and that the 1910 population of the city was composed of 12,000 persons

¹ This was true except for a very small number of consolidations of already existing cities for which special techniques were followed. The consolidation of New York City in 1898 required no adjustment in these calculations, since the five boroughs were always treated as separate cities.

living in the original area of the city and 1,200 persons living in the area that had been annexed. In the adjustment procedure used in these calculations, the adjusted change in population of the city was determined by subtracting 1,100, the population of the annexed area at the time of annexation, from 3,200, the increase in population of the city between censal dates.

The theoretically correct procedure would have been to develop separate estimates of adjusted decade change in population for the years before and after annexation. For the years 1900-1903, the change in population used in the calculations should have been 2,000, the increase in population over the decade of the original area of the city. For the years 1904-1909, the population change estimate should have been 2,200, the sum of the decade increase in population in the old area of the city and the estimated decade increase in population in the annexed area. It will be noted, however, that the adjusted estimate employed lies between the two correct estimates and that the error margin involved in this procedure is small in absolute terms and very much smaller than the error margin involved in using censal changes in population without correcting for annexations. The figures used in the example overstate, if anything, the errors involved in the present technique, since the great bulk of annexations involved population of much less than 10 per cent of the annexing cities.

The Census volumes themselves provide few data on annexations. To obtain the required information, it was therefore necessary to consult the files of the Bureau of the Census and to extract from them a list of the annexations made by all the cities in the three sample divisions and the population of each annexed territory at the time of annexation.

Beginning in 1902, the Bureau of the Census requested annual annexation reports from all but the smallest cities. Special report forms were prepared and city officials were requested to fill out and forward these forms each year to the Bureau of the Census. The bulk of the annexation data obtained from the Census files was drawn from these report forms.

The Bureau apparently requested data on annexations prior to 1902 at the time when the first annual reports were requested. Compliance, however, was generally poor, and few annexation data relating to the period 1890-1901 were in the files. Such information as was available was restricted to the larger cities and often did not include estimates of the annexed population. The pre-1902 annexation data used in these calculations, therefore, are very incomplete.

Even for the years 1902-29 there were numerous lapses in the individual city reports, particularly those of the smaller cities.² Where possible, gaps in the annual reports were filled by information gathered from other material in the files, particularly from letters to the Bureau of the Census by city officials, postmasters, newspaper editors, or former city engineers. The pro-

² No annexation data for cities in Delaware for any years were in the files.

cedure followed was to use the estimate given in the report form if available, postmasters' estimates as second best, and then any other available estimates if the first two choices were missing.

To conform with the general classification procedure, cities in each division that annexed territory within a decade were listed in terms of their city size classifications as of the beginning of the decade and relisted in terms of their classification at the end of the decade. The population of the territories annexed during the decade by the cities in each size class, defined by the population of these cities at the initial censal year, was summed. This sum was then subtracted from the decade change in population of the cities in each size class, and the remainder was used as the adjusted decade change in population for these cities in the calculations for the initial censal year and the four years following. The population of the territories annexed by the cities in each size class was then totaled again, but on the basis of the city size classification at the end of the decade. This sum was subtracted from the population change estimated for each size class, classified as of the end of the decade, and the result was employed as the adjusted decade change in population in the computations for each of the five years preceding the following censal year.

To give an example, the decade change in population for city size class III in the Middle Atlantic division, employed in the calculations for each year, 1900-1904, was earlier defined as the change in population between 1900 and 1910 of cities that had populations between 25,000 and 99,999 in 1900, viz., 443,025. The population of territories annexed between 1900 and 1910 by cities in this region which were in size class III in 1900 was summed. This total, 31,774, was subtracted from the decade changes in population, as reported by the Census volumes, of cities in size class III in 1900. The result, 411,251, was the estimate of the true decade change in population of the size class III cities and was used for each year, 1900-1904.

Similarly, the decade change in population for this size class, used for each year between 1905 and 1909, was the change in population between 1900 and 1910 of cities that fell into size class III in 1910, viz., 573,894. The population of areas annexed by such cities between 1900 and 1910 (40,882) was subtracted from this decade population change and the remainder (533,012) was employed in the calculations for size class III for each year, 1905-1909.

The adjustment for annexations by reporting cities followed essentially the same procedure. However, since the composition of the sample in any size class often changed from year to year, this annexation correction was recomputed for each year. For illustration, we shall assume that the sample for size class III in the Middle Atlantic division for 1901 consisted of cities *A* and *B*. The change in censal population, 1900-10, of these cities was 10,000. Neither city annexed any population during the period 1900-1909. The

decade change in population of the sample for the year 1901 was, therefore, 10,000. In 1902, city *C* was added to the sample in this size class. The censal change in population of City *C*, 1900-10, was 3,000. Therefore, the unadjusted decade change in population for the sample for 1902 was 13,000. But the annexation data indicated that City *C* annexed territory with 1,000 persons in 1904 and territory with 500 persons in 1908. Subtracting 1,500 from the unadjusted decade population change of 13,000 yields 11,500 as the change in population, corrected for annexations, that was used in the calculations for 1902.