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Volume Author/Editor: Simon Kuznets and Ernest Rubin

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Chapter Author: Simon Kuznets, Ernest Rubin

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Part III

Statistical Methods and Problems

1. General Outline of Method

Three factors produce changes in the size of a given foreign born population over a specified time interval: immigration, emigration, and mortality. The estimating equation may be given as

$$P_n = P_o - \sum_o^n (M_{P_o}) + \sum_o^n (i - e) - \sum_o^n (M_{i-e})$$

where:

P_n = population after interval of n years

P_o = original population

$\sum_o^n (M_{P_o})$ = mortality occurring in original population in n years

$\sum_o^n (i - e)$ = net difference over n years between immigration (i) and emigration (e)

$\sum_o^n (M_{i-e})$ = mortality occurring in net migration total for n years.

For maximum accuracy it would be desirable to use the smallest possible subdivision of the n-year interval: apply annual death rates, on an age-specific basis, to the foreign born population, and use a sequence of annual migration estimates. But mortality data are not available on an annual basis. Furthermore, in computing the mortality of net migration we had to apply rates that pertain to the foreign born whites already in the country. Theoretically at least, a different set of mortality rates is needed for this immigrant group but it is not available.

The method of annual estimation, even if annual mortality rates were available, would require an inordinate amount of labor and time. It is doubtful whether the results would be substantially more accurate and worthwhile than those obtained by a simplified procedure that preserves the fundamental aspects of the basic method. To reduce extensive computations a system of centering was adopted. It was assumed, for the decades 1900–1930, that the following procedure for centering net immigration during the decade would not do violence to the facts: (a) calculate survivors of the foreign born population at the beginning of a decade for 3 years, using rates reflecting mortality for this period; (b) redistribute the surviving population into the usual census age groups and add net immigration occurring in the first quinquennium of the decade in question; (c) calculate survivors of the population obtained by the addition in (b) for a 4-year interval using rates that approximate mortality for this particular interval; (d) redistribute the surviving population obtained in (c) into the regular census age groups and add the net immigration occurring in the second quinquennium of the decade; (e) calculate survivors of the population obtained in (d) for the last 3-year interval, using rates reflecting mortality for this period; and (f) redistribute the surviving population obtained in (e) into census age groups (see Table B–3 for sequence of operations for males, 1920–1930).

For 1930–1940 the total volume of recorded migration was very small and almost balanced out completely for the decade. Consequently for this decade we assumed that net immigration could be centered at the midpoint, reducing the number of operations required.

For the decades 1870–1900, the survival ratios used for the foreign born whites are based on extrapolation of English life tables over this period. In view of the approximate nature of these ratios, a simplification of the procedure similar to that for the 1930–1940 decade was adopted. Five- and ten-year survival ratios were prepared for each decade. The entire foreign born white population at the beginning of the census period was survived for 10 years, e.g. from 1870 to 1880 using the appropriate 10-year survival ratios. Net migration during the 1870–1880 decade was centered

at the midpoint, 1875, and survived for 5 years, i.e. to 1880. Both survived groups were then combined to give the estimated foreign born white population of 1880. Since net migration was somewhat heavier in the first quinquennium than in the second for each decade between 1870 and 1900, this method tends to underestimate slightly foreign born mortality. However, we felt that further refinement of centering was not warranted.

2. Census Data on Foreign Born Population

a. Race. For the entire period, only the foreign born whites in continental United States are considered. This is at variance with the migration statistics which include all foreign born (white and nonwhite) and certain possessions outside continental United States. In the 1930 census, Mexicans were returned as nonwhite although in all the other censuses from 1870 to 1940 they were regarded as white. For the purpose of this analysis the revised 1930 census returns, showing Mexicans as whites, were used.

Foreign born nonwhites and foreign born in territorial possessions were excluded from analysis because consistent treatment was impossible and particularly because adequate mortality data were not available. But the omission is small relative to all foreign born whites or to the total migration streams. The census figure of foreign born in 1930, when it was at its highest, was 14.2 million (see *Historical Statistics of the United States, 1789–1945,* Bureau of the Census, Series B 193, p. 30), and the total of whites (including Mexicans) was 14.0 million. Nor did any significant part of the stream of foreign migrants flow to the territorial possessions.

b. Treatment of Transients. Prior to the census of 1930, the written instructions to enumerators did not indicate any explicit limitation on the count of the foreign born in the United States.[1] In 1930, the following instruction was observed: [2] "502. *Foreigners temporarily in the United States.*—Foreigners visiting in the United States for a purely temporary period are not to be enumerated

[1] A special category, officers and crews of foreign ships temporarily in a harbor, was exempted from the count of foreign born in 1920. (*Instructions to Enumerators, Fourteenth Census of the United States,* Bureau of the Census, 1919, p. 19, par. 64.)
[2] *Instructions to Enumerators, Population and Agriculture, Fifteenth Census of the United States,* Revised and Supplemental Instructions, Bureau of the Census, 1930, p. I.

unless they are employed here. If they are working they are to be enumerated no matter how short their intended stay." The census of 1930 does not indicate how many foreign born, here temporarily, were employed. A modification of this instruction for the enumeration of the foreign born was adopted for the 1940 census.[3] Essentially, the count of foreign born in 1930 and 1940 referred to the resident foreign born population, that is, naturalized citizens [4] and immigrants. It is also likely that some aliens, temporarily or illegally in the United States in 1930 and 1940, were also enumerated while some foreign born residents were missed in the census operation. Aliens who had temporarily left the country prior to January 1, 1920, were not enumerated in the 1920 census because ". . . nothing definite can be known as to whether such aliens intend to return"; a similar instruction applied to the 1930 census.[5]

It is fairly clear that enumerations in the censuses of 1930 and 1940 represent primarily the foreign born resident in this country while in previous censuses they include nonresident foreign born. This discontinuity is directly related to the development of the immigration laws. Prior to 1921, when the first immigration quota act was passed, the difference between foreign born permanently in the United States and those here for temporary residence had no real basis in law: except for special minor classes, aliens were admitted to the United States with no restriction on their *intended* length of stay. The admission of an alien for temporary or permanent residence became a matter of law as a result of the quota

[3] *Instructions to Enumerators, Population and Agriculture, Sixteenth Census of the United States,* Bureau of the Census, 1940, p. 16: "Persons not to be Enumerated in Your District: 313d. Persons from abroad temporarily visiting or traveling in the United States and foreign persons employed in the diplomatic or consular service of their country. (Enumerate other persons from abroad who are *students in this country* or who are *employed here,* however, even though they do not expect to remain here permanently.)"

[4] *Ibid.,* p. 14, note 1: "78. *Citizens abroad at time of enumeration.* Any citizen of the United States who is a member of a family living in your district, but abroad temporarily at the time of the enumeration, should be enumerated as of your district. It does not matter how long the absence abroad is continued provided the person intends to return to the United States. These instructions apply only to *citizens* of the United States and not to aliens who have left this country."

[5] *Instructions to Enumerators, Fourteenth Census of the United States,* Bureau of the Census, 1919, Sec. 63, p. 19; 1930, Sec. 78, p. 14.

system. Aliens admitted temporarily, i.e. as nonimmigrants, subsequent to the Quota Immigration Act of 1924, who overstayed the period for which they were admitted, were subject to deportation.[6] Thus, the nonenumeration of foreign born in the United States who were in fact nonimmigrants and were required to leave after a temporary stay in this country was a justifiable procedure in the 1930 and 1940 censuses.

This varying definition of foreign born in the successive censuses compelled certain decisions in our statistical analysis concerning the treatment of migration flows. For all decades prior to 1920–1930 we used arrivals of all alien passengers, whether immigrants or nonimmigrants, and departures of all aliens, whether emigrants or nonemigrants. This procedure would have been followed for most decades in any case, since migration data distinguish immigrants and emigrants from other aliens only from 1908 onward. But regardless of lack of data, this distinction was unrealistic and inconsistent with census definitions of foreign born prior to the census of 1930. Only for 1920–1930 and 1930–1940 could we, and did we, use migration of immigrants and emigrants alone.

c. Age and Sex. The census data on age and sex of foreign born population are quite detailed and present no particular difficulties in the application of the procedures employed here.

d. Undercounts and Errors. The starting point of this investigation is 1870. "The Census of 1870 was very deficient in the Southern States, and it has since been demonstrated by the census officials that the population in 1870 was approximately 39,818,449, instead of 38,558,371, as given in the report of the census." [7] Although this underenumeration occurred primarily in the South, the foreign born population of 1870 may also have been underenumerated. The geographic distribution of the foreign born in the United States would suggest that, proportionally, the underenumeration for this class was less than for the native population. Criticism of the 1890 census count of Italians indicated substantial

[6] Sec. 14 (43 Stat. 162).

[7] Carroll D. Wright and William C. Hunt, *The History and Growth of the United States Census,* Government Printing Office, 1900. p. 57*n*.

underenumeration for this group.[8] This study corroborates Richard Mayo-Smith's conclusion as to probable underenumeration of the foreign born in the 1890 census.[9]

The general character of census data must always be kept in mind. For example, census enumeration of the population over the 70-year period reflects changes not only in the nature of the instructions and training of enumerators, but also in the quality of the enumerators. Prior to 1900, the Census Bureau was not a continuing agency but was set up every 10 years for the sole purpose of taking the decennial census. This meant complete changes in personnel, type of instruction, and kind of enumerators. There were no training periods for enumerators comparable to those for the censuses of 1930 and 1940. Assistant marshals who were appointed to do these jobs were selected on a political rather than competence basis. It is, of course, impossible to measure the magnitude of the errors introduced into the data by untrained enumerators.

Furthermore the accuracy of information supplied by respondents probably improved as the educational level of the general population rose during this 70-year period. Errors in reporting age, nativity, or other characteristics of the population obviously affected the census data. Thus, some foreign born persons illegally in the United States probably were enumerated while some foreign born legally in the country were not or were returned as native born. Presumably a small number of native born persons were identified erroneously as foreign born.

3. Migration Data

a. General Organization and Character. From 1866 until 1892 the Bureau of Statistics in the Treasury Department published annually the statistics of immigration based upon the returns furnished by the various customs districts of the United States.[10] For

[8] See *Quarterly Publications of the American Statistical Association,* March 1896, p. 63.

[9] "Immigration and the Foreign Born Population," *Quarterly Publications of the American Statistical Association,* March–June 1893, pp. 304–320.

[10] *Foreign Commerce and Navigation of the United States,* Annual Reports of the Bureau of Foreign and Domestic Commerce.

1893, 1894, and 1895 the Bureau of Statistics continued to compile these data although the publication of migration statistics had been transferred to the Office of Superintendent of Immigration, Treasury Department, beginning with the fiscal year 1892. It was in 1892 that the Immigration Service was founded as a separate bureau, distinct from the Customs Service that previously had been enforcing the immigration laws.

This administrative change led to various modifications in the statistical reporting. The figures on the movement of aliens to and from the United States published by the Bureau of Statistics were apparently more complete than those of the Bureau of Immigration if only because the former included cabin passengers in its statistics.[11] For the years for which we have two sets of data, 1892–1895, the Bureau of Statistics total exceeds that of the Bureau of Immigration by 208 thousand, or about 13 per cent. We used the Bureau of Statistics data as long as they were available, and starting with 1895, used the Bureau of Immigration data.

Cabin passengers were first included with immigrants in 1904. Prior to that time only aliens traveling as steerage passengers were classified as immigrants; the category of nonimmigrants probably included cabin passengers but this is not certain.[12]

While the reporting of persons arriving in the United States has been required by law since 1819, official information on departures was not gathered until 1907. For this study, it was necessary to *estimate* departures of foreign born for 1870–1907 (see Section b below).

Beginning in 1908, data on migration of the alien foreign born are given for four classes: (a) immigrants—persons coming to the United States for permanent residence; (b) nonimmigrants—persons coming for temporary stay; (c) emigrants—persons who came

11 Walter F. Willcox, *International Migrations,* Vol. II (National Bureau of Economic Research, 1931), p. 651.

12 Before January 1, 1906, the alien arrival was counted as an immigrant, even though returning to the United States from a temporary visit abroad. See *Annual Report of the Commissioner-General of Immigration, 1906,* Bureau of Immigration and Naturalization, 1907, pp. 4, 5, 9; and Imre Ferenczi, *International Migrations,* Vol. I (National Bureau of Economic Research, 1929), p. 374.

as immigrants but are departing to take up residence abroad; and (d) nonemigrants—persons who have permanent residence in this country and who are departing for a temporary stay abroad, and also persons who came here as nonimmigrants and are returning to their permanent residence abroad.

b. Estimating Departures of Aliens, 1870–1907. For the period prior to 1908 the annual reports published data, furnished by courtesy of the steamship companies, on passengers departing. In order to estimate foreign born departing (assuming total coverage by the steamship companies of departures other than border crossings), it was first necessary to subtract the number of United States citizens from the total of departing passengers. For 1870–1900 the former were estimated by examining statistics of passenger arrivals, which indicate the number of arriving United States citizens, and by assuming, with regard to the citizens that: (1) average time spent abroad was 1 year; (2) their median age was 35 (in order to estimate mortality abroad); (3) a small percentage (0.5 per cent) remained abroad permanently. It will be recalled that this category comprises native and naturalized citizens. This method, admittedly crude, is somewhat more accurate than assuming that the number of departures of United States citizens is equal on the average to the number of arrivals.

The method just described was used for the period 1870–1900 and is restricted to emigration by water. For the decade 1900–1910 a different procedure was followed. Estimates of emigrants for 1900–1907 were obtained on the assumption that this class was comparable to recorded emigration for 1908–1914. (After 1914, World War I and the quota acts of 1921 and 1924 introduced distortions that affected the trend.) We therefore applied the ratios of departures to arrivals, available for 1908–1914, to the data on arrivals for 1900–1907 (the ratios were 0.409 for males and 0.172 for females).

c. Scope of Data: Reporting Area. The acquisition of insular possessions, as well as changes in ports of entry in the United States, have affected the internal comparability of the migration statistics. Thus, starting with 1870 the statistics include Alaska as

a port of entry of the United States.[13] Prior to 1892 arrivals are recorded only for water ports of entry of continental United States and Alaska. An important addition was made in 1894: immigrants to the United States who arrived by way of Canadian seaports were included. Honolulu, Hawaii Territory, became a port of entry in 1901, and San Juan, Puerto Rico in 1902. In 1904 Ketchikan, Alaska was made a port of entry and land border ports of entry were established on the Mexican and Canadian borders. The Philippine Islands are shown as a port of entry in 1910, but statistics for this port are not included in the official totals. The migration data used in this report include, therefore, migration to and from the extracontinental territories described above. However, the lack of strict comparability over time and the inconsistency with the census coverage of foreign born have no appreciable significance.

Two other problems of scope are much more important. The first bears upon the number of ports for entry and for departure. The immigration data for 1870–1892 are based on the statistics gathered at the various customs districts of the United States by customs inspectors. The annual reports prior to 1892 indicate considerable differences in number between ports listed for entry and for departure. For example, the Annual Report of 1870 shows 42 customs districts as points of entry, but only 20 customs districts as points of departure.[14] Likewise the Annual Statement of 1880 [15] lists 39 customs districts for arriving passengers but only 22 customs districts for departing passengers.

Since departures were voluntarily reported by the steamship companies, the foregoing suggests understatement of emigration compared with immigration. But the differential bias is minor. In 1870 and 1880 customs districts are listed for arriving passengers that do not appear for departing passengers. The customs districts for which departures are given reported 85.7 per cent of the recorded arrivals in 1870 and 78.1 per cent of the recorded arrivals

13 *Commerce and Navigation of the United States,* Annual Report of the Chief of the Bureau of Statistics, 1871.
14 *Ibid* (for fiscal year ended June 30, 1870), pp. 676–677, 712.
15 Pp. 688–689, 735.

in 1880. Even as the figures stand, the possible underestimate of departures is not fatal. But it should be further reduced because departures may well be more concentrated in a few ports than arrivals; and in some instances the statistics of departures by customs district may represent administrative consolidation. On balance, estimated departures may still be understated and therefore the true shortages of census enumerations of foreign born may be smaller than they appear.

However, the major problem is the flow across the land boundaries (not recorded until recently except for arrivals since 1894 via Canadian ports destined for the United States). Immigration from Canada and Mexico was inadequately reported for the decade 1870–1880 since the reports do not reflect land border movements but refer only to entry by water. For the period 1880–1885 the immigration statistics of the United States indicate that about 393 thousand foreign born persons came from Canada and 2 thousand from Mexico. Approximately 380 thousand aliens passed through Canada en route to the United States during the years 1885–1890 and are not included in the reported statistics.[16]

Canadian immigration statistics indicate that for the period 1881–1890, 527 thousand persons came from the United States as the country of last residence.[17] According to the Canadian census very few of this number could have been United States citizens.[18] Even a figure of 500 thousand for foreign born who went to Canada from the United States is too high since *total* Canadian population increased only 500 thousand between 1881 and 1891.

Data on foreign born entering the United States are incomplete for part of the 1890–1900 decade since they exclude aliens who landed in Canada and subsequently entered the United States.[19] For the calendar years 1890 and 1891, according to Canadian statistics, there were 104 thousand and 105 thousand such immi-

16 *Annual Report of the Superintendent of Immigration, 1892,* Bureau of Immigration, p. 30.
17 Ferenczi, *op. cit.,* p. 361.
18 *Census of Canada,* 1901, Vol. 1, p. 482, gives Canadian population by birthplace. In 1881, there were 77,753 persons in Canada who were born in the United States; 10 years later, in 1891, there were 80,915 such persons, an increase of only 3,000.
19 *Annual Report of the Superintendent of Immigration, 1892,* p. 30.

grants. The 1894 report included this group for the first time,[20] although the 1893 report states that in addition to 440 thousand immigrants indicated as the official total, ". . . 28,108 immigrants arrived [at Boston] from Dominion of Canada. . . ." [21] With regard to border-crossers of Canadian or Mexican nationality there are no data available in the migration reports for this decade. Border-crossing inspections were instituted in the United States in 1904.

Improvement in the statistics of border migration was gradual, increased by the need to police the borders after the Quota Acts of 1921 and 1924. An Immigration Border Patrol, operating on both the Canadian and Mexican borders, was created in 1924–1925. Additional land border ports of entry were added after 1904 and more accurate migration data became possible. For this report, border-crossing net migration had to be estimated on the basis of the migration data and the censuses for 1870–1900; but, for lack of data, this adjustment could not be incorporated in the continuous and detailed decade-to-decade analysis.

d. Minor Questions of Scope

i. Race. The migration statistics include all races, and nonwhites cannot be subtracted. Nonwhite net migration, however, is a small percentage of total. In 1870–1880, perhaps the most important decade for nonwhite immigration since the Chinese Exclusion Act became law in 1882, approximately 120 thousand Chinese, almost all males, arrived in the United States. The censuses of 1870 and 1880 indicate an increase of Chinese foreign born in the United States of 41 thousand; i.e. there were 63 thousand in the United States in 1870 and 104 thousand in 1880.

ii. Seamen. Foreign born seamen who entered the United States and became part of the population are not included in the migration statistics. Statistics on the crews of foreign vessels entering and departing from the United States are available for 1870–1876 and then were discontinued.[22] The annual reports of the Immigra-

20 *Annual Report of the Superintendent of Immigration, 1894,* p. 3.
21 *Annual Report of the Superintendent of Immigration, 1893,* p. 3.
22 *Commerce and Navigation of the United States,* Annual Reports of the Bureau of Statistics, 1870–1876.

tion Service since the early 1900's refer to the problem of deserting alien seamen. Under the Quota Act of 1924 alien seamen are admitted as nonimmigrants but are not counted in the statistics for this group. Although all alien seamen reported as deserters did not actually remain in the United States, at least before 1924 this group does represent a net addition to the foreign born population since 1870. There is no way of estimating the magnitude of this factor.

iii. In addition to the illegal entrants and the unrecorded departures, there are groups for which statistical data exist, although not as part of the official migration statistics. For example, deportees (some of them "voluntary departures") may include persons who have been counted in censuses of the foreign born; yet their departures are not registered in the outflow statistics, whether of immigrants or of nonimmigrants. Prior to the 1920's, however, these classes were unimportant quantitatively. Special cases also exist of laborers imported into the United States during World Wars I and II, under emergency legislation, who are not included in immigration statistics.

All the groups covered in this section should have been accounted for, but no continuous data exist. Hence, as in the case of the far more important movements across the Canadian and Mexican borders, we can make adjustments only for some decades (see Section 5 below).

e. Distribution by Sex. Data on arrivals are given separately for males and females throughout the period. But no such information is available for total alien departures which we estimated prior to 1908. We applied a constant factor of 0.828 to determine the number of *male* departures, a ratio estimated on the basis of the official data for 1908–1914 and the sex distribution of the immigrant flows for 1900–1907. The use of this constant ratio may have introduced errors into our estimate prior to 1908 and consequently affected the derived numbers of foreign born males and females. But the preponderance of males among departures has been a constant characteristic of the out-migration streams during the periods for which data are available. Furthermore, about 75 per cent of total departures of noncabin passengers for the period

1870–1902 were males.[23] Since departures of native born United States citizens were not likely to be as heavily dominated by males as those of foreign born, these data tend to confirm the high level of the ratio used for the period prior to 1908. Nor do the Ferenczi data indicate any marked variations in the ratio.

f. Age Classes. Statistics on the age distribution of migrant aliens to and from the United States for 1870–1940 have varied considerably. For immigrants data are available for the following age groups in the annual reports: [24]

Period	*Age Groups*	*Number of Groups*
1870–1898	Under 15, 15–40, and 41 years and over	3
1899–1917	Under 14, 14–44, and 45 years and over	3
1918–1924	Under 16, 16–44, and 45 years and over	3
1925–1939	Under 16, 16–21, 22–29, 30–37, 38–44, and 45 years and over	6
1940–1944	Under 11, 11–15, 16–20, 21–25, 26–30, 31–35, 36–40, 41–45, 46–50, 51–55, 56–60, and 61 years and over	12

A similar grouping is available for nonimmigrant arrivals since 1870 and for departing aliens since 1908. For naturalized citizens departing from the United States the age distribution data are very meager. Data for this class were first collected in 1918 and published each year until 1932; thereafter, information has appeared irregularly. No information on arrivals of naturalized citizens has been reported.

Obviously, the distribution of the migration data into 5-year age groups comparable to the census classification, especially for the period 1870–1924 when only three broad age groups were given, is no easy matter. A study was made of the age characteristics of immigrants, based on detailed data from foreign sources for most of the period under discussion. The method of cumulative distribution was finally adopted to obtain the necessary age class in-

[23] Including United States citizens and presumably native born; see Ferenczi, *op. cit.*, p. 471.

[24] *Historical Statistics of the United States, 1789–1945*, p. 22. Since 1945, age data have been reported by 5-year groups comparable to that of the census, beginning with the class "under 5 years" and terminating with the open-end class "100 years and over."

tervals, and the results were checked against alternative sets of data to insure consistency.[25]

The age distribution of foreign born persons leaving the country, first reported in 1908, is given in detail after 1925. It was possible, however, to develop evidence on the characteristics of departing aliens after 1908, e.g. length of residence in the United States. These data suggest that the median age of departing aliens is significantly higher than that of arriving aliens. Two facts explain this difference: (1) proportionately fewer alien children under 14 years of age and (2) proportionately more adults 45 years old and over depart than enter the United States. In 1900–1910, the middle decade of the period covered in this study, the median age of departing males was 28.9 years and of departing females, 27.3; while the median ages of the respective arrival groups were 26.6 and 23.7.[26]

The age distribution of departing aliens for years prior to 1908 was based on that reported for 1908–1914. Here again the use of a constant base applied to a period of almost forty years may have introduced errors. But departures are, with some lag, reflections of arrivals; and the age distribution of arrivals has, on the whole, been relatively constant. Finally, in the earlier decades, when departures were small fractions of arrivals, errors in either the sex or age distribution of the former would have had limited effect on the sex and age distribution of the estimated foreign born population at the end of a decade.

g. *Biases in the Migration Data.* It should be clear from the discussion above that the migration data, for most of the period cov-

25 The following works were of value in this connection: Gustav Sundbärg, *Bevölkerungsstatistik Schwedens: 1750–1900* (Stockholm, 1907), p. 160; *Annuario Statistico Della Emigrazione Italiana dal 1876 al 1925* (Rome, 1925), p. 528; J. Conrad, *Grundriss zum Studium der Politischen Oekonomie, Vierter Teil: Statistik* (Jena, 1902), pp. 179–180; Ferenczi, *op. cit.*, for the following countries: Norway (p. 748), Sweden (p. 756), Denmark (p. 667), Germany (p. 698), Hungary (p. 719), British Isles (p. 642), Czechoslovakia (p. 661).

26 In 1910–1920, when migration was considerably affected by World War I, the median age of male arrivals was 26.7 years and of departures 29.9; of female arrivals 23.0 and of departures 28.2. In 1920–1930, only immigrant and emigrant categories were considered because of the quota acts. The median age of male immigrants for this decade was 26.1 and for male emigrants was 36.1; the corresponding median ages for females were 24.8 and 33.9.

ered in the analysis, are for a somewhat changing area of coverage and subject to serious biases. The major defect is the exclusion of movements across land borders and incomplete coverage even of arrivals and departures by sea. In addition to these difficulties, adequate data on sex and age of emigrants prior to 1908 are lacking.

Yet this recital of inconsistencies and gaps should not exaggerate their possible effects on the broad estimates of migration flows and survivals. Both arrivals and departures may suffer from undercount, but the absolute magnitude of the latter in the net balance probably did not constitute a large relative error in the decades when net immigration was substantial (i.e. prior to 1930); and in the later years, when immigration was more limited, the available data were much more complete. The deficiencies of sex and age data for departures prior to 1908 are of limited consequence since departures were until after 1900 small fractions of arrivals, since the unknown age structure of the former is determined in large part by the known structure of the latter, and since deaths of the *net* balance of migration during a decade are small compared with deaths calculated for the initial census population of foreign born.

These comments are not intended to minimize the defects of the data or the consequent possible errors in the estimates, but rather to suggest a perspective in evaluating them.

4. Mortality Data and Methods

a. Data for 1900–1940. For 1900–1940 mortality data of the foreign born white population, by age and sex, are based on the death registration area of the United States. This area has varied considerably because federal mortality statistics have depended upon agreement by the individual states. Thus, the "original registration states" of 1900 included only Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Indiana, Michigan, and the District of Columbia.[27] This area represented 27 per cent of the total population of the United

[27] *United States Life Tables: 1890, 1901, 1910 and 1901–1910,* prepared by James W. Glover, Bureau of the Census, 1921, pp. 66–67.

States in 1900 and about 44 per cent of the foreign born white population. Ten years later, in 1910, the registration area comprised 20 states and the District of Columbia and constituted more than half the total population and close to 80 per cent of the foreign born white population.[28] By 1920 the death registration area included 34 states and the District of Columbia, representing 82 per cent of the total population and 92 per cent of the foreign born white population.[29] In 1930 the death registration area of the country was complete except for Texas which entered in 1933.

Obviously, until 1940, the death rates of the foreign born white population are based on samples of varying size and representativeness. These samples of the foreign born universe, however, are quite large, and should yield fairly reliable age-specific rates between census dates. These rates should approximate mortality experience within a decade provided that no special circumstance affecting mortality existed at the terminal points of the census period or during the interval between them. Except in 1910–1920, when undue mortality resulted from the influenza epidemic of 1918 and possibly from casualties in the armed forces during World War I, this condition was satisfied.

b. Estimation of Mortality for 1870–1900. Adequate mortality data of the foreign born white population for 1890 are not available; [30] and for the 1870 and 1880 decades there is no information, official or otherwise, on age-specific death rates of the foreign born whites.

Professor Dorothy S. Thomas of the University of Pennsylvania has carefully examined the problem of estimating foreign born white mortality in the United States for the period 1870–1900. The following quotation from an unpublished memorandum indicates the procedure she developed.

28 *Historical Statistics of the United States, 1789–1945,* p. 45.
29 *Mortality Statistics: 1920,* Bureau of the Census, 1922, p. 3.
30 William S. Rossiter in *Increase of Population of the United States, 1910–1920,* Bureau of the Census Monograph I, 1922, gives the death rate of the total foreign born white population in 1890 as 19.4 per 1,000 (p. 200). See also C. H. Forsyth, "Trend of Longevity," *Quarterly Publications of the American Statistical Association,* December 1919, pp. 495–501.

In view of the faulty life tables available for the United States prior to 1900, there is no easy solution to the problem of estimating the trend and levels of foreign born mortality from 1870 to the turn of the century. Three possible procedures were considered:

1. To utilize the Massachusetts mortality data, for the whole period, with perhaps differential weights.

2. To estimate trends from census survival ratios for native whites * for the period 1870–1900 after adjusting them to a lower level for foreign born whites by applying a correction based on the differences between survival ratios computed from Grove-Linder data for, say, 1900–1910.

3. To utilize "reliable" life tables from some other country for the earlier period, if it could be demonstrated that the foreign series followed the trends of the Grove-Linder series during some overlapping period in the twentieth century and if the foreign milieu and economic development were not too dissimilar from the American during this earlier period.

The first possibility was rejected, partly because of its unrepresentativeness, partly because of its internal inconsistency.

The second possibility was rejected, partly because of a desire to have independent estimates made by the life table procedure applied to both stock and flow for comparison with other procedures where *census* survival ratios were applied to *census* data alone. Moreover, census survival ratios are extremely unreliable indicators of *trends* during this early period, because of underenumeration in both 1870 and 1890, which was greater at the former than at the latter date.

In lieu of any better possibility, the use of foreign series was thoroughly explored. The longest, most consistent, and unquestionably the most reliable series available are the Swedish, but, unfortunately for our purpose, Sweden's socio-economic development during the late nineteenth century differed markedly from our own, particularly in respect to its late industrialization and slow urbanization. Even by 1900, less than 45 per cent of its population was dependent on nonagricultural pursuits for a livelihood, and the proportion of its population living in towns and cities represented only 22 per cent. Moreover, Sweden's gain in expectation of life exceeded that of most other European countries during the second half of the nineteenth century, i.e. there was a markedly more rapid rate of decline in age-specific mortality. Following a suggestion of Dublin and Lotka, we decided that it would be "a fair presumption that the earlier English life tables would also represent approximately the conditions of mortality in the United States at the corresponding epoch" (*Length of Life,* Ronald, 1936, p. 45). It seemed appropriate to test this suggestion for application to the foreign born series in view of the high degree of urbanization of our foreign born population (and of the English population)

* Dr. Thomas and Dr. Everett Lee are utilizing "census survival ratios" in a study of population redistribution. A census survival ratio is the ratio of the number in a certain age group at one census to the number in the age group 10 years younger at the preceding census.

and of the ethnic composition of our "old immigration" (i.e. the heavy weighting with British elements prior to 1890). Moreover, English life tables for the period with which we were concerned had been prepared under the expert guidance of Farr and of George King. We therefore computed 10-year survival ratios for the following official English life tables: 1871–1880, 1881–1890, 1891–1900, 1901–1910, 1910–1912, and 1920–1922.

Detailed comparisons of the English and foreign born survival ratios for each sex, age group by age group, indicate that the slopes are highly similar for the first decade of the twentieth century. For the second decade the English survival ratios flatten out for some ages while the American continue to rise, and vice versa. For all ages up to 70–74, and for both sexes, the English survival ratios were, for comparable periods, appreciably higher than were those for foreign born whites in the 1900 registration area. In view of the similarity of slope for the first decade of the twentieth century, and the relative constancy in the difference between levels, we lowered the English stationary population for each of the nineteenth century decades by applying to each age-sex group through ages 55–59 the ratio of the stationary population in the English tables of 1901–1910 to the stationary population in our foreign born tables of 1900–1910, and then computed survival ratios for the adjusted series. We accepted these as estimates of the trend in our foreign born series from 1870–1880 through 1890–1900. For ages 60 and over, we computed ratios as above, but extrapolated the adjusted English stationary population for 1890–1900 backward to 1870–1880, i.e. we assumed there was no trend in survival for these age groups during the two earliest decades. In order to obtain an indication of the extent of error of estimate, the English series were projected forward to 1910 by applying the correction ratios to the observed English values for 1910–1912. The discrepancy between estimate and observation was consistently a very slight one, except for the terminal age groups.

We know of no way in which we can adequately test the validity of our estimates, since the reason for making these estimates was that we had no series for the area, time period, and population groups which would show their actual patterns and trends of mortality. Our estimates do seem to make sense and, in general, to reflect the trend of increasing survival which we believe occurred in highly industrialized countries during the late nineteenth century. On this basis, we can probably justify their use, except for the very first and the last two or three age groups. There were so few foreign born children under 10 years of age that the rates are unreliable, although the trend for this group is not unreasonable. Correspondingly, the estimated survival ratios for ages 55–59 (age at beginning of decade) through 70–74 (age at end of decade) are probably not too bad. The estimated ratios for ages 75 and over (age at end of decade) are, however, subject to wide margins of error, for this is an "open-end" age group, the composition of which undoubtedly varied greatly from the nineteenth century English standard and varied greatly for the foreign born white series from one decade to another during the twentieth century. It would probably have been better to have omitted the very young

and the very old from all computations, but this could not have been done in a straightforward manner and would have required further estimates based on further insecure premises. Inasmuch as the numbers involved in initial and terminal ages are relatively unimportant for most of the period considered, no great distortion will result by use of our estimated ratios. With the aging of the foreign born over time, however, it is well to be on the alert for bizarre patterns of migration estimated on the basis of terminal ratios.

c. Calculating the Survival Ratios. To estimate the number of survivors of a given population by specified age groups over a period of years, survival ratio tables, based on age-specific death rates are necessary. The calculation of survival ratios depends upon the stationary population by single years of age as given in life tables; and life tables are based on the mortality experience of the population for a given time period. Such tables, based on the mortality experience of the foreign born white population for the period 1870–1940, had to be prepared in the estimation process.

Various techniques have been developed for making life tables based on age-specific death rates. The Doering-Forbes method has been followed throughout this study.[31] Before their formulas could be applied, the age-specific death rates, given for the terminal points of each decade, had to be adjusted to reflect mortality throughout the decade. For 1930–1940 when net immigration was extremely light, two life tables were prepared, for 1930–1935 and

[31] Carl R. Doering and Alice L. Forbes, "A Skeleton Life Table," *Proceedings of the National Academy of Sciences*, September 1938, pp. 400–405. The basic formulas used in all intervals except the first and last are

$$L_x^{x+h} = \frac{l_x}{\frac{l}{h} + \frac{l}{2} m_x^{x+h}}$$

$$d_x^{x+h} = m_x^{x+h} L_x^{x+h}$$

$$l_{x+h} = l_x - d_x^{x+h}$$

where

L_x^{x+h} = stationary population in the age group x to $x + h$ years
m_x^{x+h} = per capita death rate for this age group
l_x = number alive at beginning of year of age
h = the number of years of the age group
l_{x+h} = number of survivors of group l_x after mortality of h years
d_x^{x+h} = deaths in the cohort for the age group.

for 1935–1940. Average age-specific death rates were obtained for the first quinquennium by weighting the 1930 rates by 3 and the 1940 rates by 1; for the second quinquennium by weighting the 1940 rates by 3 and the 1930 rates by 1.

For 1900–1930, however, net immigration was a substantial factor and specific death rates for foreign born were available; consequently three life tables were prepared for each decade. Each decade was split into three periods, e.g. the 1920–1930 into 1920–1923, 1923–1927, and 1927–1930, i.e. 3-year, 4-year, and 3-year periods. Average age-specific death rates for these three periods, based on the actual terminal death rates of the decade, were obtained by weighting as follows: for the 3-year period 1920–1923, the 1920 rates were multiplied by 7 and the 1930 rates by 3; for the 4-year period 1923–1927, the terminal decade rates were simply averaged; for the 3-year period 1927–1930, the 1930 rates were multiplied by 7 and the 1920 rates by 3. For the period 1870–1900, survival ratios based on Dr. Thomas's approximations derived from English life tables were applied, as described in Section 1, above. Table B–2 shows the generally upward trend in 5-year survival ratios for selected periods from 1870 to 1940.

Having determined the necessary age-specific death rates, we constructed abridged life tables, using the Doering-Forbes formulas to convert to a stationary population for specific age intervals. The tabulation on page 70 gives an example of such a life table.

In this tabulation the data are given for 10-year age groups, except for the age groups 0–1, 1–4, and 85 and over. However, the age distribution of the foreign born white population is given by 5-year age groups in the censuses. To compute survival ratios for the 5-year age groups stationary population values (L_x) for single years were derived in the following manner. The stationary population by age groups was plotted on an equal area basis.[32] The x axis represents the number of years in an age group, and the y axis represents the frequency for that age group, per year; the area formed by multiplying the height by the base is a rectangle corresponding to the frequency (L_x) for that age group. By joining

[32] Arthur Newsholme, *The Elements of Vital Statistics* (3rd ed., Macmillan, 1899), pp. 265–269.

ABRIDGED LIFE TABLE OF FOREIGN BORN WHITE FEMALES, 1920–1923

Age Group	*Death Rate* m_x^{x+h}	*Number Alive at Beginning of Age Group* l_x	*Stationary Population* L_x^{x+h}	*Deaths* d_x^{x+h}	*Stationary Population in Year of Age and All Later Years* T_x
0– 1	.0710	100,000	94,178[a]	7,100	5,573,656
1– 4	.0141	92,900	368,578	5,197	5,479,478
5–14	.0026	87,703	865,775	2,251	5,110,900
15–24	.0043	85,452	836,535	3,597	4,245,125
25–34	.0057	81,855	795,868	4,536	3,408,590
35–44	.0068	77,319	747,766	5,085	2,612,722
45–54	.0115	72,234	683,064	7,855	1,864,956
55–64	.0244	64,379	573,788	14,000	1,181,892
65–74	.0545	50,379	395,906	21,577	608,104
75–84	.1179	28,802	181,202	21,363	212,198
85 and over	.2400	7,439	30,996	7,439	30,996
Check line			5,573,656	100,000	

[a] Doering-Forbes corrective factor of 18 per cent was used.

Source: Based on 1920 and 1930 rates given by Forrest E. Linder and Robert D. Grove, *Vital Statistics Rates in the United States, 1900–1940,* Bureau of the Census, 1943, pp. 186–187.

the midpoints of the upper bases of these rectangles we drew an L_x curve on which approximately the same area was added to the rectangle to the left of the midpoint as was subtracted from the rectangle to its right. From this curve yearly L_x values were estimated by taking the midpoint between two successive years. The estimates were adjusted by subtraction from or addition to the L_x values for age groups given in the abridged life table. Part of the life table for foreign born females for single years, 1920–1923, is given in the accompanying tabulation.

YEARLY STATIONARY POPULATION VALUES, FEMALES, 1920–1923

Year of Age	L_x
20–21	83,798
21–22	83,448
22–23	83,048
23–24	82,648
24–25	82,348
25–26	81,687

The next step in the computation was to prepare the *survival* ratios, which indicate the proportion of persons within a given age range expected to survive the next year of life. To find the survival ratio of persons in the age group 20–21, the ratio L_{x+h}/L_x is used, i.e. in the above case 83,448/83,798, or 0.99582. This means that 0.99582 of the number of females between 20 and 21 years of age can be expected to reach the interval between 21 and 22 years of age.

Survival ratios for 5-year age groups were then calculated. Thus, the single years of the stationary population L_x had to be summed in series as follows:

$$L_{0-1} + L_{1-2} + L_{2-3} + L_{3-4} + L_{4-5} = L_{0-5}$$
$$L_{1-2} + L_{2-3} + L_{3-4} + L_{4-5} + L_{5-6} = L_{1-6}, \text{ etc.}$$

The proportion of persons in age groups 0–5 expected to survive for 1 year is given by the ratio L_{1-6}/L_{0-5}; expected to survive for 2 years, L_{2-7}/L_{0-5}, etc. This procedure was applied in the same way to all the 5-year age groups. To illustrate: The L_x's in the foregoing tabulation are summed from 20 to 25 years, giving $L_{20-25} = 415{,}290$, and from 21 to 26 years, giving $L_{21-26} = 413{,}179$. The ratio $L_{21-26}/L_{20-25} = 0.99492$ means that this proportion of the number of persons in the age group 20–25 years can be expected to survive for one year. A modification of the method, using the T_x value (stationary population in year of age and all later years), was applied to the terminal age group, e.g. 85 years and over.

d. Effects of Possible Errors in Mortality Data. The mortality data for the foreign born may contain sizable errors, and their possible effects on our calculations should be considered.

First, we have assumed that English life tables for 1870–1900 adequately reflect trends in foreign born white mortality in the United States. We have thus incorporated whatever defects the English series have. There is no way of knowing whether, by using these data, we have made an error and, if so, in what direction or in what order of magnitude. The method of surviving has, however, resulted in low estimates for the younger age groups.

Second, the mortality data refer either directly or indirectly to the already resident foreign born population. Yet we have to apply them to the net balance of arrivals or departures, the latter also largely composed of recent arrivals. If, as is possible, mortality for the same sex and age classes is greater among recent arrivals than among foreign born who have been in the country for some time, we are underestimating mortality and overestimating survivors at the end of the decade.

Third, in our calculations we average death rates given for successive points of time. This is a point of some importance in view of the erratic fluctuations in the rates. When the rates are averaged, such fluctuations may be at least partly ironed out.

Fourth, in the age structure of both resident and newly arriving foreign born population the very young groups—for which death rates are rather erratic and perhaps less adequate than for the adult groups—have comparatively little weight. Hence even sizable errors in the death rates for these groups would have little effect on the total estimated foreign born population at the end of a decade.

Finally, and perhaps most important, deaths are a relatively limited variable, compared with the others in the estimating equation: resident foreign born population at the beginning of a decade, and arrivals and departures during the decade. In all the decades before 1920 or even 1930, initial population and the migratory flows during the decades are overwhelmingly larger than the calculated deaths. It follows that fairly sizable proportional errors in the estimates of deaths can have only a very limited effect on the proportional errors in the final estimate of the foreign born population at the end of a decade.

5. Problems of Reconciliation

In the systematic calculations carried through for each decade, certain specific gaps and defects in the data could not be corrected since the necessary data could be found only for some decades. These deficiencies are listed here and an attempt is made to appraise their importance. Although the adjustments for these defects cannot be fully utilized in the continuous series discussed in

Part II, they do bring into sharper focus the picture of the consistency (or lack of consistency) between the estimates (and hence migration and mortality data) and the census enumerations of foreign born.

Table 10 provides a full summary; a comparison of the enumerated totals and the estimated totals from the continuous systematic calculations described in the earlier sections (the top three lines); and then the various items for which discontinuous adjustments, with a rough breakdown by sex, can be made. In general, the census enumerations tend to run short of the adjusted estimates, confirming the repeated claim that the census underenumerates foreign born residents in this country. Indeed, in only three of the fourteen comparisons is the enumerated total larger than the adjusted estimate and, in those, only slightly. However, the differences are not large, at most about 7 per cent for males and much less for females.

The adjustments reduce the discrepancy between the estimated and enumerated totals. Because the nature of the adjustments reveals so clearly the gaps and inconsistencies in migration mortality and census data, a specific listing decade by decade is provided.

1870–1880

Table 10 indicates that the census enumeration of 1880 for males is 118 thousand less than the estimate, and the corresponding figure for females is 40 thousand more than the estimate. Adjustment for special factors changes these differences to a shortage of 33 thousand for males and an excess of 55 thousand for females.

Net migration of alien seamen, which on the basis of reported statistics for 1870–1876 was estimated for the 1870–1880 decade at 30 thousand, is an addition to the estimate primarily involving males. The presumption is that these persons would have been counted as foreign born in the 1880 census. Statistics for arriving and departing foreign born seamen were not included in the regular migration data of the United States.

The migration statistics embrace whites and nonwhites, but no breakdown by racial components is available. Information is given for country of birth or origin and also country of last residence of

TABLE 10

RECONCILIATION OF ESTIMATES AND CENSUS ENUMERATIONS OF THE FOREIGN BORN WHITE POPULATION OF THE UNITED STATES, 1880–1940
(*thousands*)

ITEM	1880		1890		1900		1910		1920		1930		1940	
	Males	*Females*	*Males*	*Females*	*Males*	*Females*	*Males*	*Females*	*Males*	*Females*	*Males*	*Females*	*Males*	*Females*
Estimate	3,640	2,998	5,306	4,183	5,144	4,561	7,504	5,826	7,819	6,379	7,622	6,618	6,007	5,534
Census	3,522	3,038	4,952	4,170	5,515	4,699	7,524	5,822	7,528	6,184	7,502	6,481	6,011	5,408
Difference (census – estimate)	−118	+40	−354	−13	+371	+138	+20	−4	−291	−195	−120	−137	+4	−126
Factors raising estimate:														
Net migration of alien seamen	30	0	...	...	...	...	...	...	...	...	...	...	...	...
Unreported alien arrivals from Canada	...	...	239	129	405	270	...	...	...	...	...	...	...	...
Net emigration of naturalized foreign born	...	...	...	...	...	...	25	5	...	...	...	...	...	...
Mexicans not included in migration data	...	...	...	...	...	...	...	...	100	18	...	...	...	...
Net migration deficit of nonwhites included in data	...	...	...	...	...	...	...	...	...	...	3	...	...	...
Revised data on migration	...	...	...	...	...	...	...	...	...	...	18	10	...	...
Aliens deported	...	...	...	...	...	...	...	...	...	...	...	...	117	13
Factors lowering estimate:														
Net migration of nonwhites	40	5	...	...	...	...	39	3	15	60	...	36	...	...
Emigration underestimated	75	10	75	25	98	42	...	...	...	...	...	...	...	...
Mortality underestimated	...	...	...	...	...	...	...	...	55	30	...	...	20	10
Unreported alien departures to Canada	...	...	175	75	32	18	...	...	...	...	...	...	...	...
Net migration to U.S. possessions included in migration data	...	...	...	...	...	...	...	...	18	2	...	...	...	...
Underestimate of departures of naturalized citizens	...	...	...	...	...	...	...	...	45	15	...	...	...	...
Nonimmigrant students counted in census	...	...	...	...	...	...	...	...	...	...	...	...	8	2
Revised difference	−33	+55	−343	−42	+96	−72	+34	−6	−258	−106	−141	−111	−85	−127

... Indicates absence of data.

the foreign born migrant, but these data do not yield an accurate subdivision by race. For 1870–1880, however, census data on racial components of the foreign born can be used. Foreign born Chinese in the United States increased 40 thousand, and the remainder of the nonwhite foreign born population increased 5 thousand during this decade. Of this recorded increase approximately 40 thousand were males and 5 thousand females. Since these were included in the immigration data they must be subtracted from the difference.

Emigration of foreign born from the United States prior to 1908 was estimated on the basis of passengers leaving this country by water, as reported to the Bureau of Immigration. On this basis, estimated alien male departures for this decade amounted to 528 thousand. These passenger data are incomplete for three reasons: (a) not all the steamship companies reported passenger departures, nor is it known how complete the reports were of those making them; (b) about 20 departure ports were listed in the annual reports for this decade compared with about 40 entry ports; (c) the passenger data do not include migration to Canada and Mexico.

We assumed (a) that underreporting for male departures was about 10 per cent by sea, i.e. on the basis of the passenger data, and (b) that about 2 thousand net alien departures per year should be added for border migration. This yields a figure of 75 thousand for males. Female departures by sea amounted to 203 thousand during the decade, and we assumed that underreporting for females would be half that for males, or 5 per cent; we made no allowance for net border migration.

1880–1890

The estimate, although larger than the census enumerated total, must be increased further because the data on the foreign born immigration to the United States by way of Canada were discontinued after 1894. Using the reported statistics for the first quinquennium, we estimated that 393 thousand foreign born persons came from Canada during 1885–1890 and were not recorded in the migration data. On the basis of the recorded data we estimated that about 239 thousand males and 129 thousand females

had survived until 1890, i.e. mortality for this group was about 25 thousand.

Analogous to the foregoing factor, but decreasing the estimate, is the unreported movement by land of foreign born from the United States to Canada. Direct data are not available but according to the Canadian immigration statistics and to the Canadian census of 1891, 527 thousand persons came from the United States during the period 1880–1890. Of this group, probably very few were native born citizens of the United States. The decrease factor, estimated at 250 thousand for the second quinquennium (175 thousand males and 75 thousand females), is less than half of the 527 thousand and very likely understates the actual number of foreign born departures.

Emigration by water was underestimated for 1890 for the reason given for 1880. The conditions of reporting departures were about the same as in 1870–1880. The correction for emigration was about 10 per cent for males and about 9 per cent for females of estimated departures.

1890–1900

An exceptionally large factor for this decade is the unreported alien inflow from Canada. For 1894–1900 there are no official data of the number of foreign born who landed in Canada and crossed the land border into the United States. The estimate given here is based on information for this group recorded prior to 1894. Aliens of Canadian or Mexican nativity who crossed the border during this decade are included, as suggested, by comparing the United States censuses of 1890 and 1900 for these groups.

A crude allowance for the underestimate in emigration had again to be made. Of the adjustment of 140 thousand, or 8.8 per cent of the estimated total emigration, 98 thousand were allocated to males and 42 thousand to females.

1900–1910

This decade is the first for which adequate mortality rates for the foreign born were available and the one in which the official recording of emigration of aliens was initiated in the United States.

Net emigration of naturalized foreign born citizens, an item that would decrease the estimated total, is not included in the migration data for 1900–1910, which are for aliens alone. For 1910–1920 (atypical because of World War I), official reports suggest an estimated deficit net migration of naturalized citizens of about 60 thousand. In the conservative estimate given here for 1900–1910 only half this amount was used.

On the other hand, net migration of nonwhites had to be adjusted. According to the censuses of 1900 and 1910, the nonwhite foreign born increased from 127 thousand to 170 thousand. This increase was adopted.

1910–1920

The most important factor for this decade was "Mexicans not included in migration data." Because of the manpower shortage in World War I the United States government imported thousands of Mexicans under congressional enactment. These persons were not included in the in-migration statistics. The census of 1920 indicates an increase of 260 thousand persons of Mexican birth, whereas net migration reported is only 142 thousand for the decade.

Nonwhites were included in the migration data. There was a net migration to this country of 15 thousand males and 60 thousand females after mortality had been taken into account.

Another factor of importance was the underestimate of mortality. Mortality for 1910–1920 was estimated on the basis of age-specific death rates of the foreign born whites in 1910 and 1920, the terminal points of the decade. In the fall of 1918 and continuing to the spring of 1919 there was a widespread influenza epidemic in the United States resulting in an unusually high national mortality. On the basis of the death rate for the entire country and the age and sex distribution of the foreign born whites an estimate of the foreign born deaths was prepared for 1918–1919. The figures in Table 10 are a conservative appraisal of the underestimate of foreign born white deaths in those years.

During 1910–1920 aliens going to some of the possessions of the United States were recorded in the total immigration statistics for

continental United States. The net migration of aliens to these possessions was approximately 20 thousand.

Emigration statistics did not record the departures of naturalized citizens for the entire period. On the basis of departures of all citizens for the decade and of naturalized citizens in 1918–1920 (these years were certainly not typical of such departures) we estimated that there was a net emigration of 60 thousand naturalized citizens.

1920–1930

The migration data show 58 thousand nonwhite male immigrants and 61 thousand nonwhite male emigrants. Since these data were included in the total migration statistics, after the mortality adjustment, about 3 thousand were added to the estimate for the end of decade. A further addition of 18 thousand males and of 10 thousand females was made to take account of a revision in the migration data reported by the Immigration and Naturalization Service.

For nonwhite female migrants the immigration statistics include 49.5 thousand while the emigration data report only 13.5 thousand. The balance of 36 thousand is therefore subtracted from the estimate of foreign born for the end of decade.

1930–1940

The annual emigration statistics do not include the number of aliens deported or those who left the United States voluntarily in lieu of deportation. Between 1930 and 1940 there were approximately 200 thousand aliens in this special category, 90 per cent of whom were males. Obviously, aliens who entered the United States illegally would not be registered in the immigration statistics. However, illegal entry is only one of many reasons for deportation or voluntary departure in lieu of deportation. The estimate shown includes only deportations.

The adjustment for mortality is based on an assumption made by Thompson and Whelpton in *Population Trends in the United States* (McGraw-Hill, 1933, p. 234) that about 2 per cent of white deaths in the registration area were not registered in the period

1921–1930. Presumably, a similar adjustment on the decrease side could have been made for the decade ending in 1930. There is no direct information on the reporting of foreign born white deaths in 1930–1940. However, since the foreign born whites were more concentrated in large cities than was the native white population and since, in general, the registration of mortality is better organized and administered in the urban areas, the adjustment may be too large.

Under the provisions of the Immigration Act of 1924, 20 thousand students were admitted to the United States as nonimmigrants between 1930 and 1940. Census enumerators in 1940 were instructed to count them as part of the foreign born population. It is estimated that of the 20 thousand admitted, about 10 thousand left the United States. This group is entered as a lowering factor because they are not included in the statistics for immigrants.

As already stated, the reconciliation process depended on estimates in many instances and no information was available on the age distribution for the special factors. Consequently, it would have been very difficult, even if at all possible, to use these factors in our direct calculations. Since they could not be used to revise the estimates by age groups, they cannot be taken into account in the comparison in Table 11. Despite this qualification the comparison does shed light on the consistency of census enumerations of foreign born with the migration and mortality data and is worthwhile since the census data are useful for analysis of the contribution of migration and the foreign born to the labor force of this country and to its population through the founding of families and raising of new generations.

As was to be expected, the relative disparities between the census enumerations and our estimates are larger for the specific age groups than for the over-all totals. But it is significant that the census enumerations are consistently larger than the migration-survival estimates in the younger groups and consistently smaller in those adult groups whose rate of participation in the labor force

TABLE 11

CENSUS ENUMERATION AND ESTIMATED TOTAL OF FOREIGN BORN WHITE POPULATION, BY SEX AND AGE, 1880–1940

(*thousands*)

Age Group	*1880*	*1890*	*1900*	*1910*	*1920*	*1930*	*1940*
			Total				
0–14 Years							
1. Census	424	731	511	759	546	355	83
2. Estimate	254	399	319	754	526	215	46
3. Difference (1 − 2)	+169	+332	+192	+5	+20	+140	+37
15–24 Years							
4. Census	907	1,439	1,481	2,104	1,455	1,124	374
5. Estimate	870	1,352	1,213	1,909	1,529	1,291	400
6. Difference (4 − 5)	+38	+86	+268	+195	−74	−167	−26
25–34 Years							
7. Census	1,434	2,015	2,271	3,168	3,108	2,436	1,134
8. Estimate	1,636	2,394	2,249	3,235	3,106	2,501	1,157
9. Difference (7 − 8)	−203	−380	+22	−67	+2	−65	−23
35–44 Years							
10. Census	1,502	1,731	2,144	2,712	3,166	3,448	2,312
11. Estimate	1,715	2,243	2,339	3,039	3,456	3,340	2,318
12. Difference (10 − 11)	−213	−512	−196	−327	−290	+108	−6
45–54 Years							
13. Census	1,208	1,497	1,644	2,072	2,467	2,955	3,069
14. Estimate	1,193	1,539	1,591	2,049	2,540	2,988	3,147
15. Difference (13 − 14)	+15	−42	+52	+23	−73	−33	−78
55–64 Years							
16. Census	684	1,003	1,188	1,329	1,624	1,974	2,387
17. Estimate	666	1,006	1,179	1,318	1,722	2,115	2,465
18. Difference (16 − 17)	+18	−4	+9	+3	−98	−141	−78
65 Years and Over[a]							
19. Census	402	707	975	1,210	1,348	1,692	2,059
20. Estimate	306	555	814	1,027	1,321	1,792	2,007
21. Difference (19 − 20)	+96	+152	+161	+183	+27	−100	+52
			Males				
0–14 Years							
22. Census	214	371	258	384	276	179	42
23. Estimate	121	188	147	398	263	126	25
24. Difference (22 − 23)	+93	+184	+110	−14	+13	+53	+17
15–24 Years							
25. Census	458	734	728	1,176	716	552	181
26. Estimate	450	709	578	1,037	763	700	194
27. Difference (25 − 26)	+9	+25	+150	+139	−47	−148	−13
25–34 Years							
28. Census	785	1,152	1,250	1,879	1,739	1,265	537
29. Estimate	907	1,388	1,181	1,920	1,732	1,323	535
30. Difference (28 − 29)	−123	−237	+70	−41	+7	−58	+2

TABLE 11 (*Continued*)

Age Group	*1880*	*1890*	*1900*	*1910*	*1920*	*1930*	*1940*
35–44 Years							
31. Census	818	969	1,230	1,564	1,812	1,926	1,187
32. Estimate	987	1,359	1,349	1,795	2,031	1,836	1,164
33. Difference (31 − 32)	−169	−390	−119	−231	−219	+90	+23
45–54 Years							
34. Census	659	816	909	1,183	1,396	1,645	1,700
35. Estimate	632	821	843	1,119	1,401	1,653	1,729
36. Difference (34 − 35)	+27	−5	+66	+64	−5	−8	−29
55–64 Years							
37. Census	378	533	631	712	896	1,057	1,309
38. Estimate	378	542	625	710	949	1,117	1,335
39. Difference (37 − 38)	[b]	−9	+6	+2	−53	−60	−26
65 Years and Over[a]							
40. Census	210	377	510	627	693	879	1,054
41. Estimate	166	299	422	525	681	868	1,025
42. Difference (40 − 41)	+44	+79	+88	+102	+12	+11	+29
Females							
0–14 Years							
43. Census	210	360	253	375	270	176	41
44. Estimate	133	212	172	356	263	89	21
45. Difference (43 − 44)	+76	+148	+81	+19	+7	+87	+20
15–24 Years							
46. Census	449	705	754	928	739	572	193
47. Estimate	420	643	636	872	766	591	206
48. Difference (46 − 47)	+29	+62	+118	+56	−27	−19	−13
25–34 Years							
49. Census	649	863	1,021	1,289	1,369	1,171	597
50. Estimate	729	1,006	1,068	1,315	1,374	1,178	622
51. Difference (49 − 50)	−80	−143	−48	−26	−5	−7	−25
35–44 Years							
52. Census	684	762	914	1,148	1,354	1,522	1,125
53. Estimate	728	884	990	1,244	1,425	1,504	1,154
54. Difference (52 − 53)	−44	−122	−77	−96	−71	+18	−29
45–54 Years							
55. Census	549	681	735	889	1,071	1,310	1,369
56. Estimate	561	718	749	930	1,139	1,335	1,418
57. Difference (55 − 56)	−12	−37	−14	−41	−68	−25	−49
55–64 Years							
58. Census	306	470	557	609	728	917	1,078
59. Estimate	288	465	555	608	773	998	1,130
60. Difference (58 − 59)	+18	+5	+2	+1	−45	−81	−52
65 Years and Over[a]							
61. Census	191	329	465	583	655	813	1,005
62. Estimate	140	256	392	502	640	924	982
63. Difference (61 − 62)	+52	+74	+74	+81	+15	−111	+23

[a] Includes population with age unknown.

[b] Less than −5 thousand.

Because of rounding, detail will not necessarily add to total.

is among the highest, i.e. the groups from 24 to 54 or 64 years of age.

The shortage of the census totals in the adult groups is not too surprising if the assumption that some foreign born pass as native born is at all true. Under conditions in which a native enjoys some social and economic advantages and in which at least some groups of foreign born desire to associate themselves closely with the life of their chosen country, a fraction of the resident foreign born very likely does report itself as native born. Furthermore, since it is simpler to report native birth and requires less additional information, there may well be a bias toward overreporting it—if only because census enumerators attempt to cover a maximum number of individuals within the time available for filling in interview schedules.

The excess of census enumerations in the younger groups is unexpected. The practice followed in the estimates of centering migration flows (at two points in each decade for 1900–1930 and at one point in 1870–1900 and 1930–1940) could hardly contribute much to this result. Although by this procedure infants and children of about 3 or 4 years of age and under are underestimated at the end of the decade, those in the age immediately above are overestimated. The explanation must lie in the possibility of greater undercoverage of children in the in-migration statistics, overestimate of young groups among the departures, exaggeration of the mortality rates for the young groups, and in a tendency in the census to report young native born children of foreign born parents, particularly of relatively recent arrivals, as foreign born.

All these factors may be important but we would discount the possible effect of errors in the estimates of departures since the proportions of the latter even among adult groups are rather low for most decades, and they would be particularly low for the very young groups. Nor would any error in mortality rates be likely to have a marked effect. The fact is that the census count for males under 10 years of age is larger than the number of male immigrants in that age group in all decades, if we assume that 10 per cent of total immigration are under 10 years of age at the time of entry—a fairly liberal allowance. In other words, the discrepancy

is in the immigration and the census data, and only to a limited degree can it be assigned to mortality and emigration calculations. The discrepancy is actually even greater if, as has been generally claimed, census totals tend to underestimate the number of children under 5. The usual sources of shortages in immigration data—land crossings, illegal entry, and the extended stay of transients—are perhaps least important for the very young groups. It is impossible to state with any assurance which of the two major sources of the discrepancy, understatement in the immigration data or overstatement in the census data, is more important.