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Estimation of the Annual Emigration of U.S. Born Persons by Using Foreign Censuses and Selected Administrative Data: Circa 1980

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ESTIMATION OF THE ANNUAL EMIGRATION OF U.S. BORN PERSONS BY USING FOREIGN CENSUSES AND SELECTED ADMINISTRATIVE DATA: CIRCA 1980

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INTRODUCTION

The methodologies currently used by the Census Bureau to estimate and project the U.S. population still lack a believable estimate of that elusive process: emigration. For a long time we have not had a current, empirically-based, measure of the annual emigration rate of the U.S. population by age, sex, and race. Although compared to the annual volume of foreign immigration to the U.S. annual emigration from the U.S. is probably small, lack of a reliable figure for the net annual outflow of persons from the U.S. inhibits us: (1) in making more accurate estimates and projections of the U.S. population, and (2) in determining more precisely the population coverage error in our decennial censuses.

The Estimation of U.S. Emigration.

Current strategies for estimating emigration are in the domain of analytical demography, and a mainstay of this analysis is the residual technique of the cohort-survival method. Warren and Peck (1980) and Ahmed and Robinson (1994) have produced estimates of foreign born emigration by this method. However, because the components of the U.S. emigrant population - composed of native-born as well as foreign born persons - includes a mixture of population subgroups (e.g. students, business persons, U.S. federal official and dependents, retirees, etc.) the accurate estimation of the emigration process may not be responsive solely to analytical techniques.

Analytical methods alone are insufficient to fully measure the emigration factor in U.S. population dynamics, and for a complete estimation of this process we probably need to use analytical methods in combination with information derived from adminiatrative records.

In this study, the cohort survival method of analytical demography is supplemented by State Department U.S. citizen registration-data to estimate the annual rate of U.S. born emigration. The estimates generated, by age, sex, and race are not unreasonable reaching: 48,000 U.S. native born emigrants annually. This estimate is certainly no less credible than the current estimate of native-born emigration being used in our national estimation and projection programs.

Strategy of this Study.

Notwithstanding obvious contemporary growth in world mobility, the Census Bureau for a long time has estimated annual foreign born emigration at 133,000 persons and native born emigration at 27,000 persons. Recently, however, the Bureau has updated its foreign born estimate to 195,000 per year (see Ahmed and Robinson, 1994); although the much more complex problem of estimating native emigration remains.

Hence, the estimate now being used for total annual emigration (i.e. foreign plus native born) is still outdated and improbable; and to compound this weakness, its suposed age, sex, and race distribution is still constrained to mirror that of recent legal immigrants.

Passel and Peck (1979) listed some specific methods to estimate emigration, including: (1) the application of intercensal cohort survival; (2) the use of INS exit data; (3) the use of foreign census data; (4) the use of federal administrative record data; and (5) the use of sample survey data. In our attempt to estimate the emigration of U.S. born persons, we have used two of the above methods, namely: survival of intercensal cohort data, and compilation of federal administrative record data.

Specifically, I applied the intercensal cohort survival technique to the two latest censuses of a selected number of foreign countries which had enumerated U.S. residents by birth. In addition, I used U.S. State Department information on U.S. citizens registering at U.S. posts abroad (e.g. Consulates, Embassies,etc.). By combining these two methods and making some basic assumptions, I was able to estimate the net annual emigration of U.S. born persons by age, sex, and race.

We must note, however, that this study is mainly exploratory and that its principal intent is to stimulate more research on foreign and native born emigration from the United States by applying methods of demographic analysis in conjunction with the use of administrative-record data. Nevertheless, the emigration estimates produced here are clearly more plausible and realistic than those used currently in our programs to estimate and project the U.S. population and to estimate decennial census net coverage error.

THE COHORT-SURVIVAL METHOD

In the first phase of the study, I used the cohort-survival-technique on data on U.S. persons living abroad obtained from selected foreign country censuses. In addition to standard cohort survival, I also used reverse-survival to "bring forward" the age-sex cohorts of U.S. born persons enumerated in the latest two censuses of a foreign country. The resulting estimates from both the forward and reverse survival processes were averaged to generate a single estimate of annual net emigration of U.S. born persons to the particular country. I replicated the above processes directly (see example of Australia in the Tables) for several countries, including: Australia, Brazil, Canada, France, Great Britain, Ireland, Mexico, New Zealand, Sweden, Switzerland, and Venezuela.

For our purposes, this method requires a country to have at least two consecutive censuses, preferably (but not necessarily) 10 years apart, and differentiated by age and sex. Whenever this condition was met for any particular country, it was relatively easy to estimate annual U.S. emigration by the cohort survival method. For most countries I examined, however, the necessary data was either partially or totally lacking (or not in desireable format). Details for assembling the data for countries where use of the cohort survival method was possible are given in the Appendix. in a consistent format are depicted in the Appendix.

Results of the First Phase of the Study

The U.S. native-born annual emigration estimates derived for the 11 countries with the required census data are shown in Table 1. Annual native emigration from these countries to the U.S. totalled 20,977 persons; with only slightly more female emigrants (i.e. 10,611) than male (i.e. 10,366). The age distribution of these persons showed them to be mostly young adults, many in the working and/or college level ages.

The country with the most U.S. emigrants (at least circa 1980) was found to be Mexico (8,299); second was Canada (5,825); and third Great Britain (2,820). Interestingly, our annual native emigration estimate for just the 11 countries with census data (i.e. 20,977) is already close to the total native emigration level of 27,000 persons used in our national estimates to represent native-born emigration to all countries! (Table 1).

STATE DEPARTMENT COUNTS OF U.S. RESIDENTS ABROAD

From the above we learned that the cohort survival method can provide estimates of annual U.S. born emigration whenever we have the required foreign census age and sex data on U.S. born foriegn residents. However, for many countries these data were unavailable. Consequently, for the second phase of the study, I needed to get the required information from other supplementary sources. Eventually, I learned that the U.S. Department of State annually collects data on U.S. persons living abroad, and this information enabled me to approximate the missing data and proceed to apply the cohort survival method to estimate U.S. born emigration. *Registration of U.S. Citizens Abroad.* - The U.S. Dept. of State urges U.S. residents in foreign countries to register at U.S. posts (e.g. Embassies, Consulates, etc.). The number of these registrants is reported yearly to the State Department, which subsequently issues a report stating their number and place of residence. Accordingly, I used this information to create U.S. resident data for countries with expectedly not insignificant numbers of U.S. residents.

State Department statisticians estimate that, on average, only about 60 percent of U.S. citizens abroad register at U.S. posts and that 50 percent of these U.S. citizen-registrants are actually U.S. native-born persons. Hence, for a selected group of countries with no census data on foreign residents but whom I judged non-trivial recipients of U.S. born emigrants, I used the annual State Department registration counts and their suggested proportions to broadly estimate the total number of U.S. born residents in these countries for the years 1970 and 1980. Subsequently, for these countries I chose the same age-sex patterns of U.S. residents as in countries with reported census data and similar cultural background (e.g. Canada-Australia; Mexico-Venezuela; etc.) and then applied the cohort survival method accordingly to estimate U.S. emigration. These latter estimates, obviously, are mainly dependent on the assumptions proffered by the State Department on U.S. emigrants registration levels.

Alternative assumptions about the proportions of U.S. registrants, in general, and of their native-born component in particular, would naturally generate different emigration estimates. However, after some testing I concluded that, for most countries, even dramatic changes in the State Department assumptions would not greatly affect the final estimates.

To further test the plausibility of the State Department assumptions, I applied them to countries with reported census-data on U.S. emigrants and found that the differences generated by the cohort-survival method and the State Department registration level assumptions were insignificant among countries with high numbers of census-reported U.S. born emigrants (e.g. Australia, Canada, New Zealand,etc.) but more noticeable among countries with smaller numbers of U.S. born residents.

Following are countries with no census data on foreign residents but for which I was aable to use the cohort-survival method using State

Department registration information and age-sex distributions from countries with similar cultural background: Argentina; Austria; Belgium; Colombia; Costa Rica; Dominican Republic; Germany; Greece; Guatemala; Israel; Italy; Jamaica; Japan; Netherlands; Norway; Peru; Philippines; Portugal; Saudi Arabia; Singapore; South Africa; Spain; Thailand. For more details about this approach, see the Appendix.

Results Based on State Department Assumptions

Estimates of annual U.S. native-born emigration for the combined 27 countries without the required census data are shown in Table 1. For these latter countries, the estimated total number of annual U.S. native-born emigrants was 27,204 persons; and by contrast to the group of countries with the required census data, the former had about 17 percent more males than females (14,862 males and 12,342 females).

Analysis using the State Department data showed that the country with most U.S. emigrants (at least circa 1980) was Israel (3,131), followed closely by Saudi Arabia (3,107), and then by the Philippines (2,701).

Ironically, the estimate of annual U.S. born emigration using the State Department data (i.e. 27,204) equals the total annual U.S. born emigration estimate to all countries currently used in our national estimates program!

TOTAL ESTIMATE OF ANNUAL NATIVE-BORN EMIGRATION

Summing the estimates generated by the two methods above: (1) the foreign census method, and (2) the State Dept. registrants method, we get at a total U.S. native born emigrant rate of about 48,000 persons per year; which includes 25,000 males and 23,000 females (Table 2). Broadly, The number of U.S. native-born emigrants estimated for the 11 countries with foreign census data on U.S. residents was about 21,000; and the number estimated from the State Dept. assumptions on U.S. born registrants was 27,000 persons.

By contrast, the sex ratios of both groups differed significantly; for example, the U.S. group enumerated in foreign censuses had more females than male emigrants, with a sex ratio of 0.98. But there were more males than females in the State Dept. U.S. registrant group, with a sex ratio of 1.20.

These sex differentials between the two groups may point to a weakness in our estimating-methodology. Obviously, biases of one kind or another must exist; apart from the possibility that more of one sex than the other may travel to certain countries, we may ask: do foreign resident U.S. females tend to report in a foreign country's census more readily than do men? And do U.S. men abroad have a greater tendency than women to report at U.S. foreign posts when they travel overseas? Whatever the case, the two estimates generated in this study, when summed, produce a higher annual rate of U.S. native-born emigration than that used now in our national population estimation program. (Table 2)

MAJOR ASSUMPTIONS AND CONCLUSION

Many demographic analytical studies require making at least some assumptions about part of the underlying data and on some of the processes operating on that data. The above study is obviously no exception to the fact. Often the robustness of the derived estimates rests on the "reality" of the assumptions, and the best measure of the validity of the assumptions rests on the quality of the researcher's intuition.

Major assumptions. - For this study I had to make some very broad assumptions, namely: (1) that the countries selected as major recipients of U.S. emigrants truly contained most U.S. born emigrants abroad; (2) that the foreign census data used were generally complete and accurate; (3) that the proportional age, sex, and race distributions of the U.S. born emigrants to specific countries were representative of those in other countries included in the study; and (4) that the State Dept. assumptions regarding the consular registration of U.S. nationals abroad (i.e. that 60-percent of U.S. citizens register, and that 50-percent of them are U.S. native born) were, on average, realistic and consistent through time. Other assumptions, of course, such as the selection of mortality patterns, etc., were also important but not unduly critical to the final results.

Conclusion. - At least two viable conclusions emerge from this study, namely: (1) that we can use the intercensal cohort survival method effectively with foreign census data to estimate U.S. native born emigration (provided we have sufficiently accurate foreign census data on U.S. residents abroad), and (2) that we can use available State Department data to draw inferences about the number, and patterns of movement abroad of U.S. native-born persons.

As noted before, this study has been exploratory. Yet, it shows potential for deriving sensible estimates of U.S. native born emigration rates and has advantages over current methods. However, it's main purpose has been to urge further analysis in the estimation of emigration rates. A positive response to this study would invariably lead to implementation of the above methodology to the 1980 - 1990 decade round of foreign censuses and to more current State Dept. registration data.

Important analytical steps and sequences used in this study are shown below in the attached tables.

APPENDIX

The Data

Many nations do not collect foreign resident information in their censuses or surveys; and those that do often lack this data by age, sex, and race. We can surely say that the absence of this information is one of the major obstacles in estimating U.S. emigration abroad by the above method.

The data-sources. - In my search to find as many foreign census publications as possible with the necessary data, I used four major information-sources: (1) the Bureau's main library; (2) the Bureau's Center for Information Research (CIR) library, (3) the United Nation's statistical library in New York, and (4) the library of the Population Research Center (PRC) at the University of Texas, at Austin. Generally, only the CIR and PRC

libraries contained useful information for the above study.

The CIR data-base included demographic and social data for 202 countries displayed in 92 individual tables. Only one of the tables in the data-base, table (number 40), however, was useful. It was entitled: "Population by Nationality and Sex, and Urban/Rural Residence"; this table presented data on foreign residents by citizenship and sex, but not by age.

Ultimately, I picked 87 countries with foreign-resident nationality information; but only 43 had data on U.S. residents (i.e. emigrants) and merely 15 of them the required age/sex information needed to apply the cohort survival method. Furthermore, some of the data were grossly outdated.

A major difficulty was that many countries had collected foreign born resident data by citizenship, but not by birth; and my purpose was to estimate U.S. born emigrants not just U.S. citizen emigrants (which also include foreign born persons). In general, the CIR data-base was not very useful to me.

By contrast, the PRC library at Austin, Texas, was very useful as a source of foreign census information. The library included a vast collection of foreign census and survey publications and I spent about 2 days there searching and checking publications for data on U.S. residents in foreign countries. Although I found much useful data, usable material was still sparse. For instance, I found once again that many countries had no foreign resident information whatsoever; others had only one census with the required information (I needed two for the survival method); and still other countries had two censuses, but not exactly 10 years apart. In addition, I had to adjust several age distributions which were not in the standard 5 or 10 year age-groupings. In many instances, other non-standard displays of the census information required manipulations and adjustments of the available data.

Age data. - In particular, for age distributions not in standard form, I constructed a LOTUS spreadsheet called AGSX that arranged the age-data in standard 5-year age group format. And for countries just showing U.S. foreign-resident counts but no age breakdown in their latest two censuses, I used the proportional age distribution of U.S. residents in Canada. Although we may question whether Canada has, or has not, a "typical" U.S. born emigrant age-distribution (compared to other countries), Canada was the only country with very reliable U.S. resident age data conveniently presented in standard 5-year age groups. Originally I tested the adequacy of the Canadian age-sex U.S. resident distribution to serve as a standard by comparing with the age-sex distributions of Mexico, (which has the largest number of U.S. emigrants abroad) and of Australia. Results showed that the Canadian age-sex distribution pattern was closely equivalent not only to the average age pattern of U.S. residents in Australia and Mexico but also to that in many other countries with published census data on U.S. residents.

Age Extension and Race Allocation

For countries with data on U.S. residents by age and sex, the age distributions of these persons usually did not go beyond 65 years old and over, the open-ended age interval at the initial census date (i.e. 10-years older at the terminal census date) had to be set at 55 years old and over. These age levels were used both for the countries with published foreign born resident-data and for the countries in which I had to create the required data from the State Dept. U.S. registrant assumptions. Since our national estimation and projection programs require all population estimates to reach age 85 years and over, I extended my emigration estimates to that age group by assuming the same proportional breakdown between 65 yrs. and over to 85 yrs. and over taken from the age distribution of our current estimate of total annual emigration (i.e. 160,000 persons).

For the Race breakdown of U.S. born residents abroad, I adopted the same race subdivision used in our current annual estimate of total emigration. (Tables 1 and 1A).

Estimates by age and sex for individual countries in the study are shown in Table 2.

Table 3 shows emigration estimates by sex for all countries in the study, data-sources used, type of nationality reported, and type of age-sex distribution used for the estimated U.S. emigrants.

Table 4 shows estimates of U.S. born emigrants derived from the State Department assumptions, by sex (with sex ratio used to estimate sex), and age distribution used.

Tables 5 and 6 show steps used in the application of the cohort survival method, by sex, as applied to Australia. This layout was used to derive the emigration estimates for each individual country in the study.

Life Table Selection

The cohort survival method requires, in part, the selection of a suitable mortality level to survive U.S. residents abroad from census-to-census, and I reviewed several possible representative life tables. Eventually, I chose the 1979-81 U.S. Life Table to represent U.S. emigrant-mortality for most of the countries selected. For other country-groups I used the Coale-Demeny West # 23 Life Table; and for still other countries, those whose latest censuses were in 1970 or earlier, I used the 1965 U.S. Life Table (see Tables 7,8, and 9).

DERIVATION OF ESTIMATES

Following the age and sex adjustments and life table selections for U.S. residents in the countries with available census data on these persons, I applied the cohort survival method via two separate spreadsheet arrangements, one for each of the sexes. In a single interconnected operation these spreadsheets did the following: (1) survived the initial emigrant population by age according to the indicated age-specific mortality selected; (2) reverse-survived the population estimated in the preceeding step; (3) averaged the two resulting distributions to generate a final survived population by age; and (4) calculated the differences by age group and sex between the survived population at the terminal census date and the corresponding census counts. These differences represented the estimates of net emigration of U.S. residents during the particular country's intercensal period.

Results showed total net annual U.S. emigration by age and sex, centered around 1980, for countries whose last two census had U.S. born resident data. These countries were: Australia; Brazil; Canada; France; Great Britain; Ireland; Mexico; New Zealand; Sweden; Switzerland; and Venezuela.

For countries without census data on foreign residents, I used State Department information on U.S. citizens registering at U.S. Embassies and Consulates abroad to estimate total U.S. native-born persons in the indicated countries. Subsequently, I used model age-sex distributions derived from the above countries with census data (grouped according to cultural "similarity") to represent U.S. resident age-sex distributions for the countries without census data on foreign emigrants. Hence, I was able to apply the cohort survival method to the second group of countries in the same way as I had for the countries with census data on U.S. residents.

Some additional comments. - Within the methodological framework developed for this study, we note that many other alternative estimates could have been derived by: (1) selecting alternative mortality patterns; (2) chosing different age distribution patterns; (3) making different assumptions regarding the proportions of U.S. registrants abroad, and (4) assuming different proportions of U.S. registrants abroad. However, the derived native-born emigration estimates by age, sex, and race are not implausible. For example, the countries selected in the study probably reflect those which are major magnets for U.S. emigrants and are also likely to include those which host most of U.S. emigration. And although the age/sex distribution chosen as prototypic for most U.S. emigrants abroad are not unreasonable, the quoted State Department proportions on the composition of U.S. registrants abroad have to be taken at "face value". But, even with some variations in the above assumptions, the "true" estimates will probably fall within a short range encompasing the estimates shown in the table. In particular, the race composition pattern of the U.S. born emigrant estimates was assumed the same as that used by the Census Bureau's estimates and projections staff in developing their current estimate of total annual U.S. emigration abroad.

We should note that, for some countries, the estimated emigrant age-sex groups show negative emigration; this probably means that at certain ages there is an outflow of U.S. born emigrants from the specified country. This is not inconsistent with reality and expected given the methodology (i.e. cohort survival) used to generate the estimates.

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MISCELLANEOUS SOURCES OF DATA USED

Censuses of Foreign Countries: 1965 to 1985

Australia; Brazil; Canada; France; Great Britain; Ireland; Mexico; New Zealand; Sweden; Switzerland; Venezuela.

U.S. State Department Records used from selected U.S. Posts Abroad

Argentina; Austria; Belgium; Colombia; Costa Rica; Dominican Republic; Germany; Greece; Guatemala; Italy; Israel; Jamaica; Japan; Netherlands; Norway; Peru; Phillippines; Portugal; Saudi Arabia; Singapore; South Africa; Spain; Thailand; and other.

Figure 1. Data-Sources Used to Estimate Annual Number of U.S. Emigrants (18k)

Figure 2. Estimates of Annual U.S. Born Emigrants by Age & Sex: 1980 (26k)

Figure 3. Estimated Annual U.S. Born Emigrants To Selected Areas of the World: 1980 (11k)

Figure 4. Estimated Annual U.S. Born Emigrants to Selected Countries: 1980 (12k)

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