Evaluating Components of International Migration: Legal Temporary Migrants

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Synopsis

On March 1, 2001, the U.S. Census Bureau issued the recommendation of the Executive Steering Committee for A.C.E. Policy (ESCAP) that the Census 2000 Redistricting Data not be adjusted based on the Accuracy and Coverage Evaluation (A.C.E.). By mid-October 2001, the Census Bureau had to recommend whether Census 2000 data should be adjusted for future uses, such as the census long form data products, post-censal population estimates, and demographic survey controls. In order to inform that decision, the ESCAP requested that further research be conducted.

Between March and September 2001, the Demographic Analysis-Population Estimates (DAPE) research project addressed the discrepancy between the demographic analysis data and the A.C.E. adjusted estimates of the population. Specifically, the research examined the historical levels of the components of population change to address the possibility that the 1990 Demographic Analysis understated the national population and assessed whether demographic analysis had not captured the full population growth between 1990 and 2000. Assumptions regarding the components of international migration (specifically, emigration, temporary migration, legal migration, and unauthorized migration) contain the largest uncertainty in the demographic analysis estimates. Therefore, evaluating the components of international migration was a critical activity in the DAPE project.

This report focuses on the evaluation of the U.S. Census Bureau's estimated stock of legal temporary migrants in 1990 and 2000. Specifically, the review process validated the estimates of temporary migrants in 1990 and created an intermediate estimate for 2000. To produce the estimate of net temporary migrants, the Census Bureau developed criteria, related to visa requirements, to identify people who were likely to be resident temporary migrants in the 1990 census. Because the preliminary data from Census 2000 were unavailable for several necessary variables for the algorithm (e.g., industry and income), data from the Census 2000 Supplementary Survey were used for the 2000 estimate.

Our evaluation resulted in a temporary migrant stock estimate of 487,453 in 1990 and 781,507 in 2000. For both dates, temporary migrants included more men than women, were likely to be non-Hispanic, and the largest numbers were between the ages of 18 and 29. Future research will focus on an evaluation of the criteria used for the algorithm, and an adaptation of the algorithm to other surveys, such as the Current Population Survey and the American Community Survey, to facilitate in the production of annual estimates of temporary migrants.

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Background

This document presents the results of the Demographic Analysis-Population Estimates Research Project's (DAPE) task team on legal temporary migration, which was responsible for evaluating whether the U.S. Census Bureau's assumed flow of legal temporary migrants during the 1990s was realistic. This evaluation involved the reproduction and verification of estimates of temporary migration used during the 1990s, as well as production of an updated 2000 estimate using newly available data. We will outline in detail the methodology used during the 1990s, discuss changes made to these methods during the DAPE evaluation, present results and limitations to the estimates, and finally suggest possible enhancements and areas for further research.

Legal temporary migrants, also known as temporary migrants, are defined by the Immigration and Nationality Act (INA) as aliens who are "admitted to the United States for a specified purpose and temporary period but not for permanent residence" (INS 2000, p. 119). They comprise a unique category of international migrants because they are not permitted to live permanently in the U.S. or to work or perform duties other than those specified by their visa, unless granted special permission by INS. Temporary migrants are admitted into the U.S. under dozens of different classes, including temporary visitors, students, temporary workers, foreign government officials, treaty traders, and North American Free-Trade Agreement (NAFTA) workers. Each class of admission has specific eligibility requirements and time limits. Tourists and temporary business visitors comprise the largest class of temporary migrants admitted by INS; in fiscal year 1998, approximately 92 percent were visitors for pleasure and business (INS 2000).

The U.S. Census Bureau produces estimates of the U.S. *resident* population; the net international migration component of the population estimates is therefore designed to exclude people who enter or leave the U.S. temporarily without actually changing their usual place of residence. Because the majority of temporary migrants are people who are touring or conducting business, and whose visas are usually only valid for six months, most temporary migrants are excluded from the Census Bureau's estimates. Instead, our estimates include those temporary migrants who could be considered residents of the U.S.; the term "temporary migrants" has this meaning throughout the remainder of this paper. These temporary migrants generally fall under the broad categories of students, temporary workers, and their spouses and children.

Data on temporary migrants in the U.S. are available from two primary sources: the Immigration and Naturalization Service and the Department of State. INS is responsible for recording each temporary admission, along with all other admissions, into the U.S. Data on temporary admissions by class and country of origin are published by INS in its annual Yearbook. The Department of State (DOS) is responsible for issuing temporary migrant visas through its consular offices to individuals living outside of the U.S., and it publishes the number and classes of visas it issues during the year. However, neither of these data sources can provide an accurate count of the population of temporary migrants in the U.S.

INS records each admission into the U.S., instead of each individual person. If the same person leaves the U.S. and then returns, he or she will be recounted, regardless of past entries. Because

many temporary migrants, especially students and temporary workers, leave and enter the U.S. more than once during the course of a year, the annual counts of temporary admissions include multiple entries of the same individual. The INS temporary admissions data are therefore a record of the number of temporary entries into the U.S., not the number of individual people (INS 2000).

Unlike the INS admissions data, the DOS visa issuance data are in fact counts of the number of individual visas, and do not include multiple counts of the same person's visa. However, not every person who is issued a visa actually uses it to enter the U.S., or necessarily uses it during the year of issuance. In addition, not all people entering the U.S. temporarily (and legally) are included in the visa issuance data from DOS. Since the establishment of the Visa Waiver Pilot Program (VWPP) with the Immigration Reform and Control Act of 1986, citizens of certain countries, most of them in Europe, are allowed to visit the U.S. temporarily without a temporary migrant visa.

Some temporary migrants are not included in either DOS or INS data. These "missed" temporary migrants include those who extend their current visa or adjust to a new temporary migrant class while remaining in the U.S. Unlike the issuance by DOS of temporary visas to foreign nationals outside of the U.S., INS approves changes of temporary migrant classes and extensions of visas. However, these adjustment data are not included in INS admissions data, and are not published. Individuals who are adjusting or extending their visa status are included in available INS data only if they leave the U.S. and then return (Lowell 1999).

Due to the limitations of both DOS and INS data, neither data source provides a "real" count of the actual number of temporary migrants who enter the U.S. each year (Lowell 1999, 2000). The DOS visa issuance data are an undercount of the number of temporary migrants in the U.S. in any year, because they do not include certain categories of temporary migrants, nor do they include visa extensions or adjustments. On the other hand, INS admissions data potentially over-count the individual temporary migrants entering the U.S. each year, because multiple entries of the same person are counted multiple times.

In order to estimate accurately the population of temporary migrants in the U.S., administrative data must be available on temporary migrants entering the country, as well as those leaving. Knowing who has left is especially important, because by definition, temporary migrants are only in the U.S. for a limited amount of time. In fact, INS does attempt to count the departures, or emigration, of temporary migrants, through the collection of Arrival/Departure Records (INS form I-94). However, due to problems with collection and recording, these data are not reliable (USGAO 1995).

Due to the limitations of admissions data and the lack of reliable data on temporary migrant departures from the U.S., the size of the population of temporary migrants at any one point in time cannot be determined using administrative data. Instead, the U.S. Census Bureau uses other data sources in combination with demographic techniques to estimate the stock and flow of temporary migrants.

Methods

Beginning in 1995, the Census Bureau began accounting for temporary migrants in the production of its national postcensal population estimates. Since then, net legal temporary migration has been included as one of several sub-components of net international migration (NIM), along with legal immigration, refugees, net residual foreign born, emigration of legal residents, net migration from Puerto Rico, and net federal citizen migration. The temporary migration component is a net component, and is therefore equal to the number of temporary migrants who enter during a year minus the number who leave during the same period of time. The equation used to estimate NIM at time t is as follows:

$$NIM_{t-1,t} = LPR_{t-1,t} - E_{t-1,t} + RE_{t-1,t} + NRFB_{t-1,t} + \mathbf{NT_{t-1,t}} + NPR_{t-1,t} + NFC_{t-1,t}$$

where $LPR_{t-1,t}$ is legal immigration during the interval from time t-1 to time t; $E_{t-1,t}$ represents the emigration of legal residents from time t-1 to time t; $RE_{t-1,t}$ represents the movement of refugees from time t-1 to time t; $NRFB_{t-1,t}$ is net residual foreign born from time t-1 to time t; $NT_{t-1,t}$ is net temporary migration from time t-1 to time t; $NPR_{t-1,t}$ is net migration from Puerto Rico from time t-1 to time t; and NFC represents net federal citizen migration between time t-1 to time t. (Other sub-components of NIM are discussed in other DAPE papers.)

In order to produce an estimate of net temporary migration, the Census Bureau developed criteria to identify people who were likely to be resident temporary migrants enumerated in the 1990 census. The intent was "to define a class of person that would be enumerated in the census, would have entered the country legally, would not have adjusted to permanent resident status, and very likely would return to country of origin after a limited stay, and without adjusting to legal permanent resident (immigrant) status" (Hollmann 1996, p. 1). Based on these criteria, which are outlined below, the Census Bureau estimated a temporary migrant population in the U.S. on April 1, 1990 by age, sex, race, and Hispanic origin.

Until 2000, the Census Bureau assumed a constant population stock of temporary residents. That is, the Bureau assumed that the population of temporary migrants would remain the same size as in 1990, and that their characteristics, including age, would remain the same. This assumption was based on the belief that temporary migrants, especially foreign students, leave the U.S. after a specific amount of time, but are replaced with new temporary migrants with similar characteristics, such as new groups of students. In addition, at the time the first estimates of temporary migrants were being produced, the Census Bureau was not interested necessarily in tracking a changing migration flow of temporary migrants. Instead, the concern with this population was that it "replaces itself in a way that precludes its natural aging within U.S. territory; moreover, it is highly selective with respect to the demographic variables" (Hollmann 1996, p.1). The Bureau did not want to inappropriately include temporary migrants in the cohort component model used to produce national estimates, because we could not expect that the same temporary migrant in age category x would be in category x+1 the following year.

After an estimate of the stock of temporary migrants in 1990 was produced, an estimate of the flow of this population had to be developed for incorporation into the equation for the component of annual net international migration (Hollmann 1996). During the course of a year,

the legal temporary migrant population loses people to emigration, death, adjustment of status to legal permanent resident, and "adjustment" to illegal status by overstaying visa time limits or violating the terms of a visa. New temporary migrants are also added to the resident population through migration, including some individuals who return to the U.S. more than once. To maintain the constant stock of temporary migrants but express it as a migration flow, the original 1990 estimated stock was projected forward one year using life tables, and then subtracted from the end-of-year temporary migrant population distribution, which was assumed to be the same as the initial distribution. The difference was the number of deaths experienced in each age/race/sex group, and therefore the number of replacement temporary migrants needed to maintain the initial population. This number was the estimated net number of temporary migrants who were added to the U.S. population during the year. (A forthcoming memorandum will provide a detailed discussion of these methods.)

For the estimates produced between 1995 and 1999, the net temporary migration flow in the national estimates remained constant. However, the increasing number of specialty workers granted H-1B visas in the latter half of the decade demanded a reevaluation of the assumption of a constant stock of temporary residents. The H-1B visa category includes highly skilled workers who meet minimum standards of education and skills; many of these temporary workers are employed in the information technology industry. In response to a demand for specialty workers in the U.S., Congress passed legislation in the fall of 2000 that increased the cap on the number of H-1B visas to 195,000 for each of the next three fiscal years (2000 through 2002) (Dewar 2000). The H-1B limit had already been raised in 1998 from 65,000 to 115,000 workers for fiscal years 1999 and 2000, in order to relieve the backlog of temporary migrant applications. These workers were not specifically identified in the original stock estimate, and more importantly, their known growth would not have been captured by the unchanging stock.

To account for the known increase in the number of H-1B visas, a separate allowance for H-1B workers was made for the national estimates produced in 2000. This allowance was produced using methods described by Lindsay Lowell (2000) in his estimates of the H-1B population. The annual stock of H-1B workers was estimated using DOS data on annual H-1B visa issuances and subtracting estimated deaths, emigration, and adjustment to legal permanent residence (more details will be provided in a forthcoming unpublished memorandum).

Once an annual stock of H-1B workers was estimated, the annual net flow was calculated as the change in stock from one year to the next. Age, race, and Hispanic origin were imputed onto the flows using INS and 1990 sample census with modified race data. These net flows were added to the original flow from the constant stock assumption to produce a revised estimate of annual net temporary migration between 1990 and 2000.

In addition to estimates of temporary migrants for the national estimates, the Census Bureau has also estimated temporary migration for Demographic Analysis (DA). DA has been used to evaluate coverage of every decennial census since 1960, by producing independent national estimates of the U.S. population. Although temporary migrants were not included in the national estimates program until the mid-1990s, estimates of foreign students had been previously produced for Demographic Analysis population estimates. The population of foreign students in the U.S. was estimated using data from the Institute of International Education (IIE), which

publishes annual counts of foreign students by country of birth. Because IIE data have no information on age, sex, race, or Hispanic origin, we allocated these characteristics based on census data on foreign-born college students (see forthcoming memorandum for further discussion of these methods).

Prior to 2000, the only temporary migrants estimated for DA were foreign students. The 2000 DA estimate (released March 2001), however, added estimates of temporary migrants used in the national estimates to the foreign student estimate. The sum of the annual net flows from 1990 through 2000 of both the 1990 stock estimate and the H-1B worker estimate was added to the difference between the 2000 and 1990 foreign student populations. The resulting estimate was used as the original 2000 DA estimate (released March 2001) of temporary migrants.

The primary goal of the DAPE project was to verify the Census Bureau's population estimates for 1990 and to create an updated 2000 estimate, by reproducing each component of the estimates. In addition to correcting any errors discovered during reproduction, the DAPE teams revised the estimates to incorporate any relevant data, where possible, that may not have been available at the time the original estimates were produced.

In our case, we decided to reproduce the 1990 stock with the original algorithm first used in 1995 to estimate temporary migrants enumerated in the 1990 census. This estimate would also be used as the updated DA estimate of temporary migrants in 1990, instead of the previous method of including only foreign students from IIE data. For the 2000 update, we re-ran the 1990 algorithm with newly available 2000 data, instead of "patching" the 1990 stock estimate with separate H-1B and foreign student estimates. These estimates were used for the final DAPE results, and their production is the focus of the remainder of this paper. However, we also verified the original estimates of the annual flow of temporary migrants, H-1B specialty workers, and foreign students. While these were not used for the DAPE population estimates, we have presented the detailed methods and results of these estimates in a forthcoming memorandum for reference purposes.

1990 Stock Estimate

The population of temporary migrants in 1990 was estimated using an algorithm of criteria developed to identify people enumerated in the 1990 census who were likely to be temporary residents. The criteria used to identify these people were based primarily on temporary visa requirements, as well as on certain assumptions about the characteristics of temporary migrants.

The first criterion used was measured by the citizenship question; a temporary migrant must have been foreign born and not a naturalized citizen on April 1, 1990. In addition, temporary migrants had to have entered the U.S. relatively recently, between 1987 and 1990. The years of entry were limited to the past three years to reflect the short-term residence of most temporary migrants; temporary migrant visas range in duration from a few months to approximately three years, with extensions available in many cases. Although many temporary migrants may still reside in the U.S. legally after three years, limiting the years of entry prevented an overestimate

of temporary migrants by including people who might in fact be legal permanent or illegal residents.

Any individual who did not meet the citizenship and year of entry criteria was excluded from the potential temporary migrant population. Those who did meet these criteria but who were married to a U.S. native or naturalized citizen, or who were a child or other relative of a householder who was a U.S. citizen were also excluded. The Census Bureau assumed that immediate relatives of citizens were most likely legal permanent residents instead of temporary migrants.

The remaining potential temporary migrants were subsequently tested to see if they could be classified into one of the following categories: college students, teachers and researchers, nurses, Jamaican agricultural workers, intracompany transferees, Canadian part-year residents ("snowbirds"), au pairs, and high school students. Spouses and children of these temporary migrants, with the exception of au pairs and high school students, were also included as temporary migrants. These categories were not exhaustive of all temporary visa types, but they represented what Census Bureau analysts believed to be the majority of temporary residents in the early 1990s.

College students (F-1 visas). Potential temporary migrants were first tested against the criteria for foreign college students. A foreign college student had to be enrolled in school and have at least a high school diploma.[1] Because law prohibits most foreign students from taking a job while studying in the U.S., individuals were not classified as foreign college students unless they also were not working full-time. We considered someone to be not working full-time if he had either 1) not currently been in the labor force, 2) worked 20 hours or less in the preceding week, or 3) been unemployed or not at work, and his salary income during the preceding year was less than $5,000.[2] The reason for the income limit of $5,000 is not clear; we assume the intention was to account for the generally lower incomes of students, but the reason for the $5,000 limit was not documented.

The DOS also issues separate temporary migrant visas (F-2s) for the spouses and children of foreign students, as it does for other classes of temporary migrants. Therefore all non-citizen spouses and children of people who were classified as college students using the above criteria were classified as college student dependents. If spouses also themselves met the criteria for college students, they were classified as college students instead of student dependents. However, if one spouse appeared to be a college student but the other was working more than 20 hours per week or had earned at least $5,000 in 1989, then neither was classified as a college student or student dependent. This prevented us from incorrectly classifying people as college students who may have actually been in the U.S. as the dependents of other temporary workers.

[1] The census question on school enrollment only asks whether a person has attended regular school or college since February 1, 1990/2000. The level or grade of school is not known, so the educational attainment variable must also be used to estimate college enrollment.

[2] Respondents report their salary income for the previous calendar year, therefore income data from the 1990 census refers to income earned in 1989.

Teachers and researchers (J-1 visas). The remaining non-citizens entering the U.S. between 1987 and 1990 were then tested for other temporary migrant categories. Teachers and researchers represented the first category; these temporary migrants had to have at least a Master's degree. They also had to have a health diagnosing (including physicians, dentists, veterinarians, and optometrists) or post-secondary teaching occupation, or had to have worked in the hospital or college and university industry.

Nurses (H-1A visas). A nurse was required to have at least some college, as well as an occupation in health assessment and training (including nurses, pharmacists, and therapists) or health service (dental assistants, orderlies, etc.). Nurses also had to work in a hospital or nursing and personal care facilities industry.

Jamaican agricultural workers (H-2A visas). Non-citizens who were born in Jamaica and had occupations as farm workers, farm worker supervisors, marine life cultivation workers, or nursery workers were assumed to be Jamaican agricultural workers. The reason for including agricultural workers only from Jamaica is unclear.

Those who did not meet the criteria for college students, teachers and researcherss, nurses, or Jamaican agricultural workers were processed through the remaining categories' criteria.

Intracompany transferees (L-1 visas). If an individual had at least a bachelor's degree, was at least 30 years old, was currently employed, and in 1989 had either no salary income or a salary income of at least $35,000, we classified him as an intracompany transferee. Intracompany transferees are primarily managers and executives of international companies, and are therefore assumed to likely be at least college graduates. The minimum age requirement appears to be arbitrary, as does the minimum salary income; $35,000 was probably assumed to be a relatively high salary at the time, but no documentation exists for this decision. While including people with incomes of $0 is peculiar, it was possibly meant to account for individuals who may have only reported income earned while living in the U.S.

Spouses and children of teachers and researchers, nurses, Jamaican agricultural workers, and intracompany transferees were assumed to be dependents of these temporary migrants, similar to student dependents. These dependents were also included in the temporary migrant population. Children who themselves met the criteria for one of these categories were classified in that category instead of as a dependent.

Non-citizens who were still not classified at this point in the algorithm processing were tested for the remaining categories: Canadian part-year residents ("snowbirds"), au pairs, and high school students.

Canadian part-year residents (B-2 visas). Householders and their relatives could be Canadian part-year residents if they were born in Canada or had a spouse who was born in Canada. The underlying assumption about these temporary migrants was that they were probably retired individuals who spent a significant part of the year living in the U.S.; therefore they (or their spouse) also must have been at least 55 years old and they could not be in the labor force. In addition to these requirements, snowbirds could not have any U.S. natives in their households.

Children were classified under this category if either their householder (parent) or the householder's spouse met the snowbird criteria. Other relatives in households could either meet these criteria themselves or live with a householder who met the criteria.

Au pairs (H-2B visas). A temporary migrant who was classified as an au pair had to be a woman between the ages of 18 and 29, been born in Europe, had to have at least a high school diploma, not be a relative to the householder, and have a private household service occupation. Her householder must have been a U.S. citizen, and there had to be at least one child related to the householder less than age 12 in the household, who was assumed to be the subject of the au pair's care taking. We believe the condition that au pairs must be born in Europe may be too restrictive. In addition, we know that au pairs do not necessarily have to live with U.S. citizens, and in fact could very possibly care for children of legal permanent residents.

High school students (F-1 visas). The last temporary migrant category was high school students. To be classified as high school students, they had to be between the ages of 14 and 18, be enrolled in school, and not be related to their householder. They had to have completed ninth grade, but be less than a high school graduate. High school students also had to be living with at least one other child aged 14 to 18, and their householder had to be a U.S. citizen.

Any non-citizen who entered between 1987 and 1990 but who could not be classified in one of the above temporary migrant categories was not counted as a temporary migrant. In addition, those who were born in certain countries were also excluded from the population of temporary migrants, because we wanted to avoid identifying people who appeared to be temporary migrants but were most likely refugees. We therefore excluded anyone born in countries that were believed to be significant sending countries of refugees to the U.S.; these included the former U.S.S.R, Afghanistan, Cambodia, Laos, Vietnam, and Cuba. Data on refugees need to be examined to determine if this assumption was appropriate.

2000 Stock Estimate

The original temporary migrant estimates for 2000 were a combination of the 1990 constant stock estimate, the H-1B allowance, and the foreign student estimate, because they were produced before any 2000 census and survey data were published. The DAPE teams, however, did have access to unpublished Census 2000 Supplementary Survey and preliminary Census 2000 sample data.

We had originally planned to use the preliminary Census 2000 sample data that was processed especially for DAPE, but data on many of the necessary variables, including income, occupation, and education, were not yet available; some of these variables had not even been coded at the time. Instead, we decided to run the 1990 algorithm on C2SS data and then apply proportions by country of birth, age, sex, race, and origin to the preliminary Census 2000 data.

The Census 2000 Supplementary Survey (C2SS) was a survey conducted in 2000 of approximately 700,000 households. It was designed so results could be compared with Census 2000 results, as a test of the future American Community Survey (ACS). Because the goal of the

DAPE project was to verify and update the 2000 estimates, we decided to use these newly available data and apply similar methodology to that used for 1990 to produce a new 2000 temporary migrant estimate.

The same algorithm from 1990 (described above) was applied to the C2SS data set to produce the 2000 estimate of temporary migrants for DAPE. Despite the fact that enhancements could have been made to the algorithm used to produce the 1990 estimate, the time and effort needed to accurately research and incorporate these changes were beyond the scope of the DAPE project.

Only a few adjustments were made to the original program used for the 1990 estimate. Occupation and industry codes have changed since the 1990 census, so those needed to be updated. We used available industry code crosswalks to convert industry codes; an occupation code crosswalk was not yet available, so we contacted analysts in the Industry, Occupation, and Statistical Information Branch to assist us with those conversions. Most occupations and industries were easily recoded; one exception was the 1990 code for private household service occupations, used to identify au pairs. Because this category no longer existed in 2000, we changed the code to "child care workers." Although this category includes workers in both private households and day care facilities, we believe it represents the most appropriate available occupation category. Another necessary adjustment was to the income criteria. We decided to simply adjust all salary income dollar amounts for inflation to 1999 dollars, using Consumer Price Index adjustment factors.[3]

Time constraints prevented the necessary research into major countries of origin for refugees during the 1990s, so we decided not to change the countries from those used for the 1990 estimate. We did extend the list, however, to include all the former republics of the Soviet Union. The final list of refugee countries for 2000 was as follows: U.S.S.R, Afghanistan, Cambodia, Laos, Vietnam, Cuba, Estonia, Latvia, Lithuania, Belarus, Moldova, Russia, Uzbekistan, Ukraine, Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, and Turkmenistan. Anyone born in these countries was excluded from the temporary migrant population in 2000.

Once we ran the algorithm and produced an estimate of temporary migrants from C2SS, we encountered some problems that forced us to change our methodology for the 2000 estimate. We intended to apply proportions of temporary migrants in C2SS to the preliminary Census 2000 sample data, but discovered that differences between the two data sets made this impossible. We calculated the proportion of non-citizens who entered between 1997 and 2000 who were temporary migrants in C2SS for each country of birth by sex by single year of age by Hispanic origin by race category.[4] These proportions were then multiplied by the number of non-citizens

[3] The reference period for salary income is different between C2SS and Census 2000. Census 2000 asked respondents to report their salary income for the previous calendar year, while in C2SS they were asked to report their salary income in the past 12 months.

[4] The C2SS race variable used excluded the some other race category but included people with two or more races. Less than one percent of the temporary migrants estimated from C2SS had multiple races. Due to the small size of this population and constraints on time, we decided to simply exclude people with more than one race from the temporary migrant estimate so that we would remain consistent with the race categories in the census data used during DAPE.

with years of entry 1997-2000 in each of these categories in the preliminary Census 2000 sample data. All DAPE teams used the same groupings of countries of birth in their evaluations, as well as the same race categories.

Theoretically, the total number of temporary migrants in each data set should have been about the same, but the Census 2000 number was almost 300,000, or about 40 percent, lower than the C2SS number. Upon comparing the distributions of the two data sets, we discovered that the counts of non-citizens entering between 1997 and 2000 in each country/sex/age/origin/race category differed significantly between the data sets. The reason for these differences is not entirely clear, but it is likely a combination of different sample sizes, weighting differences, and the fact that the Census 2000 sample data was constructed using preliminary edits and weights. The two data sets have been found to be comparable for larger groups such as the total foreign born, but such minutely detailed breakdowns of the data had not been previously examined, and so these particular differences had not been detected.

Owing to time constraints and lack of feasible alternatives, we decided to use the C2SS estimate of temporary migrants for our 2000 update, instead of applying C2SS proportions to the preliminary Census 2000 sample data. This still left us with the problem that C2SS was a survey of households, and therefore contained no estimate for temporary migrants living in group quarters. To estimate temporary migrants in group quarters in 2000, we applied proportions of temporary migrants from the 1990 group quarters population to preliminary Census 2000 data for group quarters.

In order to estimate the 2000 group quarters temporary migrants, we calculated the proportion of group quarters non-citizens (entered between 1987 and 1990) who were temporary migrants in 1990 in each category of country of birth by sex by single year of age by Hispanic origin by race. We then multiplied these proportions by the number of non-citizens entering 1997-2000 and living in group quarters in each of the same categories from preliminary Census 2000 sample data. The resulting numbers were our new estimates of temporary migrants living in group quarters in 2000. Because we used proportions to estimate only total numbers of temporary migrants by certain demographic characteristics, we were not able to estimate the implied visa categories for temporary migrants in group quarters in 2000.

The final 2000 temporary migrant estimate was produced by summing the C2SS estimate of temporary migrants in households with the Census 2000 estimate of temporary migrants in group quarters.

Results

Our evaluation resulted in a temporary migrant stock estimate of 487,453 in 1990 and 781,507 in 2000.

Tables 1 and 2 show the distribution of temporary migrants by race, sex, and age. The race categories in these tables, Black and Nonblack, are the same as those used in Demographic Analysis population estimates. In both 1990 and 2000, more temporary migrants were male

(53.5 percent in 1990 and 52.1 percent in 2000) than female (46.5 percent in 1990 and 47.9 percent in 2000), and the vast majority were Nonblack (93.3 percent and 94.1 percent, respectively).

Approximately 79 percent of temporary migrants were between ages 18-49 in both 1990 and 2000, with the largest number in the 18-29 age category. We expected these results, given the known age distributions of students and workers, who comprise the majority of temporary residents in the U.S.

A more detailed race distribution of temporary migrants in 1990 and 2000 by Hispanic origin is presented in Tables 3 and 4. Hispanics were much less likely than non-Hispanics to be temporary migrants: in 2000, about 11 percent were Hispanic, a slight decrease from 13 percent in 1990. Non-Hispanic Asians and Pacific Islanders represented the largest race group among temporary migrants with 238,180 (48.9 percent) in 1990 and 386,395 (49.4 percent) in 2000.

The distribution of temporary migrants by country of birth is shown in Table 5. More than half of all temporary migrants in 1990 and 2000 were from Asia, followed by Europe and North and Central America. These findings coincide with INS and DOS data on nationalities of temporary migrants that show a large proportion are citizens of Asian countries. The largest numbers of temporary migrants in 1990 were born in Japan, China, and Taiwan; by 2000, India had replaced Japan as the largest sender of temporary migrants.

Table 6 presents the estimated temporary migrant stock by visa category for 1990 and 2000. The majority of temporary migrants in our estimates were classified as college students, intracompany transferees, or teachers and researchers. The number of college students was lower than suggested by data from the Institute of International Education (IIE). IIE reported 386,850 foreign students in the U.S. during the 1989-1990 school year, and 514,723 for the 1999-2000 school year (IIE 2000); we estimated 232,706 students in 1990 and 292,331 in 2000. One reason for these differences is our limitation on the year of entry for temporary migrants; foreign students who had legally been in the U.S. longer than three years are not included in our estimate. The salary income criteria may also exclude too many individuals from the college student category. In addition, the 292,331 people classified as foreign college students in 2000 only included students in households from C2SS. The actual estimate of college students would be higher if group quarters were included; approximately 19 percent of the students in our 1990 estimate were living in group quarters. Therefore, we expect this estimate to increase once the final Census 2000 sample data can be used to run the temporary migrant algorithm.

Nurses were one of the only visa categories whose population decreased between 1990 and 2000. This is probably a result of the elimination in 1995 of the H-1A visa created specifically for nurses.

No people met the criteria for au pairs or high school students in either 1990 or 2000, nor was anyone classified as a Jamaican agricultural worker in 2000. The Jamaican agricultural worker category was extremely small in 1990, accounting for only 98 people. The reason no au pairs or high school students were captured is not clear. One possible explanation is that these specific types of temporary migrants might be excluded by other household members on their census

forms, because they live primarily with families who may not consider their home to be their usual place of residence. Further research into the characteristics and behaviors of different types of temporary migrants will help us explain these results and refine our methodology.

Limitations

A number of limitations were present with the data and methodologies used to estimate the temporary migrant population. The time constraint of the DAPE project was one of the primary limitations to the evaluation of the components of international migration, including temporary migrants. This time limit dictated the extent of our evaluation; while our team was able to validate the temporary migrant estimates for the 1990s, we were unable to evaluate and incorporate possible improvements to the data and methodology. That research will become the focus of future work at the Census Bureau on international migration.

Perhaps the most important and obvious limitation to our methodology is the lack of research on the reasonableness of the criteria we used to identify temporary migrants. These criteria were based on temporary visa requirements, as well as characteristics assumed to be common among certain temporary migrants in 1990. However, a thorough evaluation of these criteria has never been conducted by the Census Bureau to determine their appropriateness. The reasonableness of the salary income criteria for certain categories is especially uncertain, and the effect that adjusting these income levels, or any other criteria for that matter, would have on our results is unknown at this time. In addition, the assumption that all people from specific countries are refugees, and therefore were excluded from the temporary migrant population, needs to be evaluated. While we want to avoid counting refugees as temporary migrants, we do not want to arbitrarily exclude people from consideration as temporary migrants.

Much of the uncertainty about the criteria used to identify temporary migrants was a result of a lack of documentation. The lack of detailed accurate documentation was a common problem among all the DAPE teams. In our case, almost no documentation existed on the algorithm used to estimate temporary migrants in 1990; we therefore made assumptions about the reasons behind the chosen criteria. The DAPE project has highlighted the immediate need for comprehensive documentation of the methodologies of all estimates produced by the Census Bureau.

Another limitation is the absence in the temporary migrant algorithm of visa categories that either were created or grew substantially during the 1990s. For example, no algorithm category currently exists for H-1B specialty workers, whose population increased dramatically during the decade; likewise, treaty traders and investors, another large visa category, were also left out of our algorithm. The relatively new category for North American Free-Trade Agreement (NAFTA) workers did not exist before 1994, and therefore was not included in our algorithm, but it accounted for approximately 78,000 admissions in 1998 (INS 2000). Criteria should be developed and tested to identify temporary migrants in these visa categories for future estimates.

The data used to produce the temporary migrant estimate also have limitations. We assumed that the 1990 and 2000 censuses had full coverage of temporary migrants; that is, we assumed that

100 percent of temporary migrants were counted by the census. If temporary migrants living in the U.S. were not counted in the census, they would not be included in our estimates. This would result in an underestimate of temporary migrants. While this likely happened in 1990 and 2000, we do not know the potential undercount rate of temporary migrants, so we assume full coverage of this population in the census.

The production of the 2000 estimate involved the use of data with a number of restrictions. As described earlier, the preliminary Census 2000 sample data prepared for the DAPE project did not include all of the variables necessary to run the temporary migrant algorithm. We instead used C2SS as a proxy for Census 2000 and ran the algorithm on those data; we also applied proportions from 1990 to the available Census 2000 sample data to estimate temporary migrants in group quarters. Until we can re-run the algorithm on the final Census 2000 data and compare our results, we will not know how this affected our estimate. Although C2SS was designed to be comparable to Census 2000, any sampling or weighting differences between C2SS and Census 2000 could cause differences in the total number and/or characteristics of our estimate of temporary migrants.

Another important difference between C2SS and Census 2000 is the reference period. The reference date for Census 2000 was April 1, 2000. C2SS, on the other hand, was administered throughout 2000 without a specific reference date. This difference could have a noticeable affect on our 2000 results because C2SS included non-citizens who entered the U.S. after April 1, 2000, thereby increasing the population at risk of being included as temporary migrants. The sampling and weighting methodology for C2SS prevented us from limiting the data to only people who entered and responded before April 1, 2000. We were therefore forced to accept the limitation of including too many people in our at-risk population.

Differences in race categories between C2SS and Census 2000 could also affect our results. In order to remain consistent across data sources, certain modifications were made to the race variables in both C2SS and preliminary Census 2000 data sets. The Census Bureau's national population estimates use modified race categories that eliminate the "other race" category. Although a separate race variable was created in C2SS and Census 2000 without this category, two or more race responses were still included. These multiple race responses could not be easily incorporated into our categories of White, Black, American Indian, and Asian/Pacific Islander.

A special quasi-modified race variable was created in the preliminary Census 2000 data to eliminate the multiple race responses. Because our team was the only one using C2SS data, creating a similar variable for these data within the available time period was not a priority. However, less than one percent of temporary migrants in C2SS had two or more races, so we decided to exclude those cases from our calculations. Furthermore, inconsistencies between the race variables in the 1990 census, C2SS, and Census 2000 could affect the racial distributions of our temporary migrant estimates.

Conclusion

The DAPE team on temporary migrants successfully validated the U.S. Census Bureau's estimates of temporary migrants in 1990 and created an updated intermediate estimate for 2000. We will now begin evaluating ways to improve our temporary migrant estimates, along with the other components of international migration.

The first step in this evaluation will be to produce a revised estimate of temporary migrants in 2000 using final Census 2000 sample data, and comparing that to our intermediate DAPE 2000 estimate. We will then begin conducting a thorough evaluation of our methodology, focusing primarily on enhancing our current temporary migrant algorithm. In addition to verifying the accuracy of the criteria currently being used, we will decide also on appropriate criteria for additional visa categories, such as H-1B workers and treaty traders. Our long-term goal is to develop an updatable algorithm that could be applied annually to data from the American Community Survey (ACS) and/or the Current Population Survey (CPS).

The goal of the temporary migration DAPE team was to determine whether the Census Bureau's assumed flow of legal temporary migrants during the 1990s was realistic. Although we verified the stock estimate in 1990 and updated the 2000 estimate, a thorough evaluation of the reasonableness of these estimates was unfortunately beyond the scope of this project. We believe that our estimate in 2000 of 781,507 temporary migrants (as well as our 1990 estimate of 487,453) may be too low, given our uncertainties about the data and algorithm used.

Until now, no complete documentation existed of the methods used by the Census Bureau to produce estimates of the temporary migrant population in the U.S. We now have fully documented the process for estimating the temporary migrant population. The DAPE project has established a crucial precedent of documentation and disclosure of its methodologies that will encourage scrutiny both internally and externally; this scrutiny is essential to our work in the coming years to refine and improve our estimates of temporary migrants.

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Table 1. Temporary Migrants by DA Race, Sex, and Age: 1990

Age	All Races			Black			Nonblack		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
All ages	**487,453**	**260,742**	**226,711**	**32,842**	**16,466**	**16,376**	**454,611**	**244,276**	**210,335**
0-17	83,929	43,045	40,884	4,811	2,324	2,487	79,118	40,721	38,397
18-29	223,535	117,406	106,129	17,983	8,373	9,610	205,552	109,033	96,519
30-49	160,616	88,665	71,951	9,312	5,338	3,974	151,304	83,327	67,977
50+	19,373	11,626	7,747	736	431	305	18,637	11,195	7,442
50-64	16,102	9,782	6,320	626	380	246	15,476	9,402	6,074
65+	3,271	1,844	1,427	110	51	59	3,161	1,793	1,368

Table 2. Temporary Migrants by DA Race, Sex, and Age: 2000

Age	All Races			Black			Nonblack		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
All ages	**781,507**	**407,215**	**374,292**	**46,095**	**26,617**	**19,478**	**735,412**	**380,598**	**354,814**
0-17	127,295	64,853	62,442	5,958	3,424	2,534	121,337	61,429	59,908
18-29	331,456	157,541	173,915	29,710	18,122	11,588	301,746	139,419	162,327
30-49	283,487	162,997	120,490	8,907	3,925	4,982	274,580	159,072	115,508
50+	39,269	21,824	17,445	1,520	1,146	374	37,749	20,678	17,071
50-64	33,764	19,027	14,737	1,520	1,146	374	32,244	17,881	14,363
65+	5,505	2,797	2,708	0	0	0	5,505	2,797	2,708

Table 3. Temporary Migrants by Hispanic Origin, Race, Sex, and Age: 1990

Age	All Races			Non-Hispanic White			Non-Hispanic Black			Non-Hispanic API			Non-Hispanic AIAN			Hispanic		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
All ages	**487,453**	**260,742**	**226,711**	**156,390**	**87,233**	**69,157**	**29,017**	**14,689**	**14,328**	**238,180**	**126,987**	**111,193**	**597**	**386**	**211**	**63,269**	**31,447**	**31,822**
0-17	83,929	43,045	40,884	31,027	16,190	14,837	4,234	2,029	2,205	37,759	19,188	18,571	116	82	34	10,793	5,556	5,237
18-29	223,535	117,406	106,129	58,606	32,979	25,627	15,760	7,422	8,338	116,120	60,574	55,546	325	221	104	32,724	16,210	16,514
30-49	160,616	88,665	71,951	56,426	32,123	24,303	8,342	4,852	3,490	77,698	42,869	34,829	123	62	61	18,027	8,759	9,268
50+	19,373	11,626	7,747	10,331	5,941	4,390	681	386	295	6,603	4,356	2,247	33	21	12	1,725	922	803
50-64	16,102	9,782	6,320	7,990	4,688	3,302	578	342	236	5,979	3,944	2,035	33	21	12	1,522	787	735
65+	3,271	1,844	1,427	2,341	1,253	1,088	103	44	59	624	412	212	0	0	0	203	135	68

Table 4. Temporary Migrants by Hispanic Origin, Race, Sex, and Age: 2000

Age	All Races			Non-Hispanic White			Non-Hispanic Black			Non-Hispanic API			Non-Hispanic AIAN			Hispanic		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
All ages	**781,507**	**407,215**	**374,292**	**261,330**	**140,707**	**120,623**	**44,252**	**25,783**	**18,469**	**386,395**	**193,782**	**192,613**	**944**	**596**	**348**	**88,586**	**46,347**	**42,239**
0-17	127,295	64,853	62,442	48,361	23,985	24,376	5,562	3,228	2,334	59,382	30,119	29,263	86	36	50	13,904	7,485	6,419
18-29	331,456	157,541	173,915	87,488	43,927	43,561	28,276	17,497	10,779	172,330	77,661	94,669	774	522	252	42,588	17,934	24,654
30-49	283,487	162,997	120,490	100,089	58,584	41,505	8,894	3,912	4,982	144,361	80,791	63,570	84	38	46	30,059	19,672	10,387
50+	39,269	21,824	17,445	25,392	14,211	11,181	1,520	1,146	374	10,322	5,211	5,111	0	0	0	2,035	1,256	779
50-64	33,764	19,027	14,737	21,150	12,110	9,040	1,520	1,146	374	9,828	4,982	4,846	0	0	0	1,266	789	477
65+	5,505	2,797	2,708	4,242	2,101	2,141	0	0	0	494	229	265	0	0	0	769	467	302

Table 5. Temporary Migrants by Country of Birth: 1990 and 2000

Country	1990		2000	
	Number	Percent	Number	Percent
Total	**487,453**	**100.0**	**781,507**	**100.0**
North and Central America	**72,377**	**14.8**	**109,591**	**14.0**
Mexico	18,236	3.7	31,169	4.0
Cuba	0	0.0	0	0.0
Dominican Republic	3,458	0.7	2,135	0.3
El Salvador	3,723	0.8	1,727	0.2
Guatemala	2,021	0.4	716	0.1
Canada	23,350	4.8	58,465	7.5
Haiti	2,439	0.5	2,252	0.3
Jamaica	4,723	1.0	3,854	0.5
Trinidad & Tobago	2,486	0.5	1,262	0.2
Other North and Central America	11,941	2.4	8,011	1.0
South America	**29,470**	**6.0**	**61,765**	**7.9**
Argentina	3,535	0.7	6,972	0.9
Columbia	4,998	1.0	15,729	2.0
Ecuador	1,590	0.3	4,019	0.5
Peru	4,461	0.9	7,602	1.0
Other South America	14,886	3.1	27,443	3.5
Europe	**84,473**	**17.3**	**133,368**	**17.1**
France	8,427	1.7	13,187	1.7
Germany	11,152	2.3	27,045	3.5
Greece	2,331	0.5	1,526	0.2
Ireland	2,834	0.6	3,691	0.5
Italy	3,440	0.7	3,815	0.5
Netherlands	3,515	0.7	2,441	0.3
Poland	6,230	1.3	4,939	0.6
Portugal	894	0.2	869	0.1
Spain	4,259	0.9	4,530	0.6
U.S.S.R.	0	0.0	0	0.0
United Kingdom	19,851	4.1	29,020	3.7
Yugoslavia	1,847	0.4	6,210	0.8
Other Europe	19,693	4.0	36,095	4.6
Asia	**270,717**	**55.5**	**418,244**	**53.5**
Middle East	34,558	7.1	41,824	5.4
Iran	9,282	1.9	5,297	0.7
Israel	6,999	1.4	7,441	1.0
Other Middle East	18,277	3.7	29,086	3.7
South & East Asia	236,159	48.4	376,420	48.2
China & Taiwan	55,706	11.4	79,487	10.2
India	25,948	5.3	97,968	12.5
Japan	63,112	12.9	73,186	9.4
Korea	29,560	6.1	54,439	7.0
Philippines	18,547	3.8	14,071	1.8
Other South & East Asia	43,286	8.9	57,269	7.3
Africa	**24,529**	**5.0**	**49,088**	**6.3**
Oceania	**5,887**	**1.2**	**9,451**	**1.2**
Australia	3,908	0.8	5,734	0.7
Other Oceania	1,979	0.4	3,717	0.5

Table 6. Temporary Migrants by Visa Category: 1990 and 2000

Visa Category	1990		2000 (Household Population Only)[1]	
	Number	Percent	Number	Percent
Total	**487,453**	**100.0**	**731,001**	**100.0**
College Student	232,706	47.7	292,331	40.0
College Student Dependent	40,259	8.3	41,885	5.7
Nurse	14,901	3.1	7,899	1.1
Nurse Dependent	7,619	1.6	7,074	1.0
Teacher/Researcher	32,641	6.7	51,784	7.1
Teacher/Researcher Dependent	29,263	6.0	42,388	5.8
Jamaican Agricultural Worker	98	0.0	0	0.0
Jamaican Agric. Worker Dependent	0	0.0	0	0.0
Intracompany Transferee	50,394	10.3	121,616	16.6
Intracompany Transferee Dependent	75,561	15.5	155,529	21.3
Canadian part-year resident	4,011	0.8	10,495	1.4
Au Pair	0	0.0	0	0.0
High School Student	0	0.0	0	0.0

[1] The 2000 estimate was from the Census 2000 Supplementary Survey, which only included households.