ELUSIVE PRECISION IN A "FUZZY" WORLD: DEMOGRAPHIC ANALYSIS 2000 Jeffrey S. Passel

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Introduction

"Was Census 2000 the Best Ever?" While this question has many dimensions—some of them quite subjective—I can venture a personal opinion in trying to answer this question (which is, after all, at the heart of this session). I'd have to conclude that Census 2000 was not only outstanding, but, in many respects, it was almost certainly the best U.S. census to date. If a major purpose of a census is to provide information, then this one did. As a data user, I can say that we got Census 2000 data faster than ever before and in much more user-friendly formats.

We also got *much more* than we ever expected— 7 million more people than pre-census estimates of the potential count and even several million more folks than were though to be in the country. The results now available from Demographic Analysis (DA) tell us that the NET undercount was indeed the lowest ever and that the differential undercount (or the so-called majorityminority difference) was also the lower than ever before.¹ The survey-based coverage estimates from the Accuracy and Coverage Evaluation II (ACE II) studies show the first ever estimate of a total net **OVER**count in a U.S. census. Further, the absolute amount of error was also the smallest. In other words, the final population count is the best count of the U.S. population in terms of being closest to the underlying "truth."

However, these results do not mean that Census 2000 was perfect by any means. In fact, there are a number of somewhat troubling results from the various evaluation studies and a great deal remains unknown.

The ACE shows that Census 2000 contains a very large number of *gross* errors, with a large number of omissions being offset by a roughly equal number of duplicates and other erroneous enumerations. The most recent results from ACE-II place the total number of gross errors in Census 2000 at just over 33 million— by just over 17 million erroneous enumerations and just under 16 million omissions offset—but a net error of about 1.3 million or an estimated *over* count of 0.49 percent

(Fenstermaker 2002).² While very large, the number of gross errors represents an absolute reduction from the 1990 PES estimate of almost 37 million gross errors—16 million erroneous enumerations and a significantly larger number of omissions, exceeding 20 million (Anderson and Fienberg 2001). In terms of the relative error (in relation to population size), the reduction is larger as the US population grew by about 10 percent between the two censuses.

The reduction in net coverage error, thus, came about apparently as a result of a sizeable reduction in omissions, but a small increase in erroneous enumerations. Further, it appears that a significant chunk of the reduction in omissions occurred because the number of "whole person imputations" increased from just under 2 million in 1990 to almost 6 million in 2000. Whole person imputations occur when no information about a person is collected. For about half of the imputations, the Census is virtually certain that the individual exists and in at a specific address, but for a significant share of the imputations in 2000, the existence of the person, and in some cases their housing unit is merely inferred and is not verified. These imputations serve to reduce the number of omissions, but are clearly not error-free.

The results from the ACE and other evaluations document the improvements over 1990, but also highlight some areas where census errors seem to have *increased*, but in such a way as to *reduce* the estimated net undercount. My reluctance to declare unequivocally that 2000 is the best census relates to uncertainty about how to assess these patterns of errors and improvements, especially the high number of duplicates, without having more historical data. The only census for which we can make roughly similar assessments of the components of error is 1990. While there are improvements over 1990, some of the demographic results I present below indicate that the 1990 census represented a deterioration in quality over several previous censuses. Further, we do not have the detailed information necessary in 2000 (or 1990) to assess

¹ More on this below.

² Many of the gross errors represent very small, localized errors in geographic assignments that have no real consequences for larger geographic areas. To give a sense of the magnitude, Ericksen (2001) working with the initial ACE data at the state level, estimated about 16 million gross errors versus the Census Bureau's current assessment of about 28 million gross errors as estimated from the initial ACE.

geographic variations in coverage. Thus, while there have been clear improvements nationally, state and other subnational data may not show the same degree of improvement.

Assessing the overall quality of Census 2000 and placing it in historical context requires resorting to DA as it provides the best time series of net undercount estimates. In the remainder of this paper, I discuss Demographic Analysis-the methods and results-with particular attention to issues that affect both the accuracy and precision of the DA estimates. Three main areas-immigration, race, and residence-get the most attention. The definitions used in DA and issues of quality and precision call into question some of the most commonly cited results from DA-namely, that the racial differential in census undercount is lower in Census 2000 than in previous censuses. Finally, I discuss the implications of these issues and results for interpreting Census 2000 and for the continued use of Demographic Analysis in evaluating future censuses.

Demographic Analysis, 2000

DA is one of the two techniques used by the Census Bureau to measure coverage of Census 2000. DA involves first constructing an estimate of the population using demographic techniques applied to data from sources essentially independent of Census 2000. As described by the Census Bureau, the 2000 DA estimate is computed as:

 $P_{2000} = P_{1990} + B - D + I - E$

or,

Estimated population at the Census 2000 date (P_{2000}) equals

Population at the 1990 Census date (P₁₉₉₀) *plus* Births during 1990–2000 (B) *minus* Deaths during 1990–2000 (D) *plus* Immigrants during 1990–2000 (I) *minus* Emigrants during 1990–2000 (E).

For the 2000, the Census Bureau constructed DA estimates for the Black and the non-Black populations by sex for four age groups. Then, the estimated *net* undercount (or overcount) from DA for a group is the difference between the DA estimate and the census count:

$$U_i = P_{i, 2000} - C_{i, 2000}$$

where,

Undercount for group i (U_i) equals Estimated population in group i at the Census 2000 (P_{i, 2000}) *minus* Census 2000 count for group i (C_{i, 2000}). Unlike survey-based measures of census coverage, DA does not measure components of census undercount, such as gross omissions and erroneous enumerations, but only the *net* undercount. In addition, when comparisons are made for subgroups of the population, the DA measure includes not only coverage errors, but also reporting and classification errors. Thus, the reported DA undercounts for race groups include, as part of the census "error," differences in race reporting between Census 2000 and the historical data used to construct the DA estimate. Similarly, for age groups, the reported DA undercounts include age misreporting as part of the error. (See Passel 2001b for elaboration of material presented below.)

DA Estimation Methods for 2000. The DA estimates for 2000 consist of two main "pieces"—the population under age 65 and the population aged 65 and over. The estimates for the older group were constructed with data on the population enrolled in Medicare with a correction for underenrollment. For the population under age 65, the DA estimates begin with the DA estimates for the population under age 55 in 1990 and update the estimates with the following demographic components of population change between April 1, 1990 and April 1, 2000:

Births, adjusted for underregistration (+);
Deaths (-);
Legal immigration, except refugees (+);
Refugee arrivals (+);
Emigration of legal foreign-born residents (-);
Emigration of U.S. natives (-);
Puerto Rican migration (+);
Net change in temporary residents, i.e. nonimmigrants (+);
Net undocumented immigration (+);
Net civilian citizen migration, mainly government (+);
Net change in Armed Forces overseas (-).

Most of these components employ the same data used for the Census Bureau's on-going national estimates program with updates and refinements. (See Robinson 2001a for a description of the DA methods and Robinson 2001b for estimates of the components.)

Although this description of methods focuses on the change since 1990, the underlying method is actually a good deal more complicated because the 1990 DA estimate is based on a considerable amount of historic demographic data. For ages under 55 in 1990, the DA estimates begin with registered births for 1935–1990 corrected for underregistration using factors derived from birth registration tests conducted for 1940, 1950, and 1964–68. The corrected births are carried forward to 1990 with estimates of the same demographic components noted above covering the period from 1935 through 1990. The intermediate group, ages 55–64 in 1990 begins with corrected births from 1925–1935 for whites, the estimated 1960 population aged 25–34 for Blacks, and an interpolated population estimate in 1990 for the other races. Finally, for undocumented immigration, an estimate of the number of undocumented aliens in the country in 1990 is added, rather than estimating this component for each time interval. (See Robinson et al. 1993.)

Strengths & Limitations of DA

DA has a number of very strong features. Its estimates conform to demographic regularities that can be found in all populations. There is a logical consistency between the demographic estimates for age groups and for sex groups. Sex ratios by age, in particular, can be much more accurate and precise than population estimates, even when the two are derived with the same data. Further, the DA estimates are derived in such a way that they provide consistent historical information across censuses. The estimates can be produce very quickly-in many cases, even before the census itself. And, DA is cheap when compared with the cost of fielding, processing, and analyzing a multi-hundred thousand household survey like the ACE.

Major limitations of DA are well-known:

- DA measure *net* undercount only with measures that combine coverage *and* classification error;
- DA is increasingly relying on the census that being evaluated for some key data items for example, measuring race and immigration—thus, introducing a degree of circularity and compromising the independence of DA as an evaluative tool;
- Only limited geographic detail is available from DA, at best;
- There are no real, widely accepted measures of variability or uncertainty—quantities which, as I argue below, are much larger and more significant than in the past.

Some DA Results

DA documents a clear improvement in census coverage with a trend toward smaller percentages of

net undercount over the last seven censuses since 1940 (with the exception of 1990). Census 2000 has the best (i.e., smallest) net undercount at 0.1% or about 300,000 people. The steady improvements culminating in 2000 can be seen separately for Blacks and for the rest of the population (Figure 1). But, the difference between these two groups has not shown the same degree of improvement. The 3.1 percentage point difference is the smallest over the 1940–2000 period, but is not very much better than the 3.4 percentage point difference found for

Figure 1. DA Estimates of Percent Net Undercount, by Race & Racial Differential: 1940-2000



1940 or the 3.6 point difference for 1950. However, the coverage differential in Census 2000 is clearly better than in 1990, which had the largest differential over the whole period.

The ability to put together this time series illustrates one of the strongest features of DA in contrast with coverage measurement surveys. Whereas the surveys provide considerably more detail about census coverage, especially in terms of geographic variation, components of under- and overcounts, and for groups defined by social or economic rather than basic demographic characteristics, each coverage measurement survey is an entity unto itself. Even if every census has a coverage measurement survey, there is no necessity that results are consistent across space and time. (In fact, they tend not to be consistent because of variations in survey operations and improvements in survey and matching methods.)

Age patterns of undercount and their changes over time are also available for DA. Adults Black males have the highest undercounts of any





age-sex-race group in every census since 1940. Figures 2–1 and 2–2 show the estimated undercounts by age for Black males in each of the seven censuses from 1940 through 2000. They appear to be broadly similar in structure across the period, with high undercount rates for young children and then again for adults through about age 60. There are actually, as I read it, two clusters of patterns.

For 1940–60 (Figure 2–1), the lowest rates occur at ages 5–14. The high plateau of undercounts extends from about age 15 through ages 60–64.

A slight variant on this pattern has showed up consistently since the 1970 census. The lowest undercount rates now occur in the late teens with essentially no undercount or even a small overcount for ages 15–19. Age group 20–24 has a higher undercount, but the extended high plateau of large net undercounts doesn't really begin until ages 25–29. These high undercount levels persist past age 50 (depending on the census) and then drop to essentially a net undercount of zero by age 65.

This shift in pattern seems to be indicative of the procedures used to take each of the censuses. A full mail-out, mail-back procedure only began with the 1970 census. Under such conditions, individuals with significant attachments at more than one location—such as ages in the late teens and early 20s, including black males-are at substantial risk of being counted more than once. If a child is living at college (in a dormitory or apartment), he/she is likely to be counted at the college, as census residence rules instruct. Notwithstanding these instructions and residence rules, many parents still consider the college student a member of the family household and put him/her on the residential census form. The student is then counted twice. Enumerators, such as those used for the entire censuses of 1940-60, are more likely to correct such overcounts than are



parents filling out their own form. The same phenomenon is very likely to occur for children in the military, in jail, in prison, or living with only one

This pattern of overcounting young adults has occurred consistently over the last four censuses. In addition, the numbers at risk of multiple counts have increased over this period, accounting in part for the improvements in coverage shown by DA for ages 15–24. in Census 2000, the improvements in reducing omissions brought the potential for overcounts into focus, by leading to net *over*counts even for a group such a black males that suffers generally high levels of omissions.

Some Concerns About DA

parent.

Notwithstanding these lessons, I will focus on two broad issues affecting DA. First, the *precision* of the DA estimates has become a concern in ways that could be (and were) ignored in the past. When the net error is estimated to be only about 300,000, even small errors in the estimated components can be crucial. Moreover, with about 200 million births, tens of millions of deaths, and 40 million or so immigrants entering into the estimates, biases of mere hundreds of thousands of people seem eminently possible or even likely. Biases in these ranges swamp the estimated net undercounts shown by the DA estimates and greatly compromise certain types of interpretations.

The reliance of DA on historical data introduces a number of complications:

- Cumulation of very small biases can result in seriously degraded estimates for 2000.
- Categories, especially race categories are no longer impervious to changing interpretations

Figure 2-2. Percent Net Undercount, by Age, for Black Males: 1970-2000

(if they ever were); the historical definitions no longer agree with the current census;

• Finally, certain types of data just don't exist or are highly fragmentary.

These are generic concerns that affect many areas of DA, but they can be illustrated specific examples.

Race Differentials and Undercount

Estimates. The measurement of race has become problematic in a number of different ways. Censuses of 1980 and 1990 were taken using race definitions specified by OMB Directive No. 15 that was issued in the second half of the 1970s. This directive defined the categories and specified the type of data to be collected. Census 2000 used new OMB definitions that expanded the number of race groups specified and, more importantly, permitted individuals to chose more than one race. In addition, the racial/ethnic composition of the U.S. has changed dramatically over the 1940–2000 period, largely due to the influx of millions of new immigrants from different parts of the world. Yet, DA is still using the data collected under to old definitions (and as fare back as the 1930s for much of the data. These trends have significant effects on interpretation and measurement of race and undercount in 2000 in two areas discussed below:

- The definition and interpretation of the non-black category as "majority;"
- And, the treatment of multiple race groups or, ultimately, the correspondence between the demographic data and the census on race.

The Census Bureau has been reporting DA undercount rates for Blacks and "non-Blacks" since the 1980 Census. In analyzing these results, many researchers and commentators (myself included) are quick to interpret the Black-Not Black gap in coverage as a minority/majority differential. However, the non-Black population now includes a substantial share of people who are not "majority" (if we consider the majority to be the white, non-Hispanic population). In fact, by 2002, over one-fifth of the non-Black population was either Hispanic, Asian, or American Indian with Hispanics accounting for almost one-sixth of the non-Black population (Figure 3).

The share of the non-Black population that is not majority (i.e., not "White, not Hispanic") has risen considerably since 1940—from about 3% to 21% in 2000. In fact, the minority share has doubled since 1980, going from 10 to 20% (Figure 4, next page).

Hispanics, Asians, and American Indians-the race/ethnic groups that are part of the non-Black population—generally have significantly higher undercount rates than whites. This pattern would imply that the Black-white differential is overstated by the Black-not Black differential. What we don't know from DA, however, is "by how much?" Undercount rates for these other minority races are not available on a consistent basis for the whole series of censuses. However, in recent censuses, the survey-based measures have shown that these groups have undercounts significantly larger than the white, not Hispanic population and about the same as Blacks, or even higher. So, to approximate the Black-white differential, I did some illustrative calculations in which I assumed that non-black minorities had the same undercount rates as the Black population. The results based on these assumptions are shown in Figure 5.

Figure 3. Racial/Ethnic Composition of the Other-than-Black Population: March 2002 CPS



These results paint a very different picture of census coverage "improvement" in terms of the Black-white differential. Far from showing any improvements after 1940 (or only small deterioration, marked by slight increases in the differential undercount), the difference in net undercount actually got steadily and significantly larger through 1970, reaching 4.6 percentage points. The 1980 census was the first to show an actual improvement in the *Black-white* difference, dropping to 4.1 percentage ponts. Then, in 1990, there was a substantial reduction in quality as the estimated Black-white differential exceeded 5 percentage points. The 5.2 percentage point difference in coverage was 50 percent greater than the 3.5 percentage point difference in 1940.



Census 2000 again showed an improvement, but improving from a record low in quality (an all-time high in differential) is not a great hurdle to leap. With these new estimates, the Black-white differential in Census 2000 is *not* the 3.1 percentage points shown by DA for Black-not Black, but is actually 3.9 percentage points. Where the old result represented the lowest differential in the series, this new result is slightly *larger* than the differential in 1940 or 1950 and roughly the same as 1960 and 1980. With these new results, the 1970 and 1990 censuses stand out as worse than the others and certainly worse than their immediate predecessors. Census 2000 is a welcome break in the series, but it is not clearly "the best." (See Figure 5.)

Race Definitions. Another concern about the DA estimates for Blacks and even whites, is that the race groups used to collect data in 2000 do not necessarily correspond to the groups in the historical data used to construct the DA estimate. While this phenomenon has been recognized since 1980 (and even to a slight degree in 1970), its implications are growing. For the evaluations of 1970–1990 censuses, the DA population estimates were compared, not with the census figures by race, but with census figures classified by "modified" race. The modifications, designed to bring census figures in line with the historical race definitions of DA, largely served to assign Hispanics who failed to pick a specific race group into the major categories. With the reduction in net undercount and the growth in potential minority populations, the potential for "error" (or at least variability) is larger than the estimated undercount. Keeping in mind that the estimated DA undercount for blacks is about 1 million blacks in 2000, some key figures for 2000:



1970

1980

1990

-10%

2000

 About 1.8 million people who chose "Black" as their race also chose one or more additional races.

1960

1940

1950

- ✓ The principal options for assigning these individuals to race groups, add roughly 0.9– 1.8 million to the census "count" of "Blacks;"
- About 15 million Hispanics gave no specific race at all; at the same time, about 4% of Hispanics who gave at least one specific race chose Black. This percentage implies about 600,000 additional Hispanics might be reasonably classified as Black.
- There are other problematic components, too:
 - ✓ About 8% of blacks (or over 2 million people) are foreign-born. Yet, the data used to estimate the legal immigration component in DA are not classified by race, but by country of birth. The Census Bureau translates country of birth from INS data into race groups using the race distribution from various censuses.
 - ✓ DA now assumes no under-registration of births for the last 20 years (approximately). This assumption is probably better than the previous assumption, but is probably still not correct. The change of this assumption reduced the estimated Black population (and its undercount) by about 50,000.
 - ✓ Finally, intermarriage is increasing meaning that there are increasing numbers of children with parents of different races. We don't know exactly how these children are reported (in the absence of census data) nor do we know that they will be reported the same way in successive censuses. In

1999, more than 1 in 8 births with a Black parent had a non-Black parent. Thus, intermarriage of Blacks at this level means that about 50,000 children born each year could potentially be classified as Black, not Black, or mixed race. This phenomenon used to be less of an issue; around 1970 only about 1.5% of "Black" births had a non-Black parent.

1 Intermarriage and the resulting "mixed race" children affect all of the data to a growing degree. Almost 10 percent of marriages involving whites are mixed. When the net coverage error for the white population is estimated at 700,000 with DA and there are several million births per year to whites, the potential impact of this classification issue cannot be ignored. Among Asians and Hispanics, more than 1 in 4 marriages involves spouses of different races (Figure 6). Thus, demographic estimates of these groups are increasingly problematic. Further, data from population projections (not shown here) suggest that all of these rates will grow in the future since the intermarriage rates are higher among the 2nd and 3rd generations—groups that are growing as a share of the Asian and Hispanic populations (Suro and Passel 2003).

Figure 6. Intermarriage Rates of Women, by Age and Race/Ethnicity: March CPS 1996-1999



Immigration. The various "pieces" of the immigration components create myriad problems for DA—both the total population and race estimates. Since the 1970s, immigration has emerged as a major component of change with the number of entrants growing from about 3 million in the 1960s to more than 10 million in the 1980s and more than 14 million in the 1990.

In addition to measurement issues, a major problem for DA with this component is a conceptual one. Because of the lack of administrative data on some of the critical components of immigration, the Census itself is used to develop the measures. This introduces a degree of "circularity" into DA that turned out to be a problem in 2000 since the *non-census* sources did not adequately measure the magnitude of immigration. Not only did this lack of data and inaccurate measurement delay the DA results, circumventing the measurement problems ultimately requires making assumptions about the coverage of immigrants in Census 2000 to develop the overall measures of coverage in Census 2000 (!).

About half of the 800,000-1.1 million legal immigrants admitted by INS each year are already in the country, some legally and some illegally. Consequently, in developing the DA estimates (as well as the Census Bureau's regular population estimates), it is inappropriate to simply add the newly legal immigrants each year. Rather, it is necessary to account for status changes, say by moving people admitted as refugees into the category of legal permanent resident; since the refugees are added to the population estimate on arrival into the US, they must be removed from the INS tally before it is added to the DA estimate. Unfortunately the various INS and Census Bureau data systems available are not designed to provide the necessary information in an unambiguous way. With more than 7 million legal immigrants in the last decade, errors in classification could easily be as large as the estimated undercount.

The uncertainty surrounding estimates of undocumented immigration is almost certainly larger than the estimated 300,00 net undercount, too. My own estimate of about 8.4 million (Passel 2001a) is larger than the INS estimate of 7 million (or 7.6 million, depending on how several groups are classified). The estimates of net annual increase vary accordingly. And, there are even larger estimates by others.

An emerging component of immigration is temporary legal immigrants—such as foreign student or H-1B high tech guest workers, know to INS as "legal nonimmigrants"—also present problems for DA. The number of legal nonimmigrants admitted to the US (and continuing to live here) has grown rapidly over the last 20 years. Many of these people qualify as U.S. residents according to census residence rules (and international definitions) and, thus, should be counted in the census. Unfortunately, we don't know how many actually get counted. Worse still, we don't have the type of data on entries and exits that are needed to make good DA and population estimates. The Census Bureau estimated that there were about 700,000 legal nonimmigrants in 2000, but my own "educated guesstimate" and that of INS would put the number closer to 1.5 million. A difference this large in measuring the legal nonimmigrant population turns out to be critical when the overall DA estimate of undercount is about 300,000. Estimation error in the legal nonimmigrants could almost eliminate the entire non-black overcount.

Finally, emigration continues to be a serious measurement issue. There is currently no acceptable non-Census measure for this component and even using the census requires some heroic assumptions. The estimate of emigration during the 1990s was revised before the release of the final DA estimates by almost as much as the estimated undercount for 2000. While the decision to do so is probably correct, its empirical basis is almost nonexistent and is certainly problematic.

Residence Rules

Finally, a third issue is somewhat tangential for DA, but critical for understanding the source of many duplicates and erroneous enumerations in Census 2000—phenomena that emerged as the major source of census error in 2000.

Residence rules are either ambiguous or hard to interpret for growing numbers of people:

- Long-term, legal temporary residents (mentioned above) are increasing rapidly and their numbers may soon reach 2 million people;
- In addition, growing numbers of immigrants (admitted for "permanent residence") are not actually permanent in the United States, but move back and forth between the U.S. and their home countries.
- Among natives (and immigrants as well), there are significant numbers of people (besides movers), who are at risk of being counted in more than one location. A partial list would include: prisoners, college students in dorms and apartments away from home, retirees and others with two homes, cohabiting couples who may have two residences, long-distance commuting marriages, and children of divorces (both with and without joint custody).
- All of these populations are at all-time highs and are easily in the tens of millions. Thus, it is not at all surprising that many people got counted more than once in Census 2000.

The uncertainty surrounding all of these populations lies in the application of the residence rules in a consistent, systematic manner. In the context of a self-enumeration census, there is virtually no method for ensuring consistent treatment of individuals with ambiguous or multiple residences. Even with improved instructions on the forms in 2010 and greater review on the part of the Census Bureau, it will be essential to develop methods for dealing with potential duplicates in real-time census processing.

Implications for Demographic Analysis

Quality of DA and Census 2000. First, the potential range of variability in DA is very large much larger than in the previous censuses and much larger than the 300,000 estimated net undercount.

There will be even more uncertainty in the future. Intermarriage is likely to increase. The numbers of people who could chose more than one race is going to increase. The nature of these choices is likely to vary from census to census.

There will be more immigrants living in the country in the future. While our measures may improve in accuracy, I suspect they will still suffer from substantial imprecision.

None of these issues means that Census 2000 is not an excellent census. In terms of *net* undercount, it is clearly the best in US history. In terms of gross errors, however, its superiority is less clear.

In terms of majority-minority differentials, it is better than some—especially recent censuses—but clearly worse than others.

Would I rather use Census 2000 for my work than the 1950 census (or come other one). Of course, I prefer Census 2000—the 1950 Census by now "undercounts" the U.S. population by about 130 million people (!).

Implications for the Future of DA. So, what should we do in the future? First, DA is essential to any evaluation program. Even with its "fuzziness," DA can be used to evaluate and measure the undercount. It can explain many of the numerous anomalies that emerge in every census. It can explain changes over time and still provides a benchmark for survey-based measures. In fact, if the survey-based and DA measures diverge, it is essential that the differences be explained. The deficiencies may be in the demographic estimates or in the survey; the explanations may be demographic, statistical, or processual. The Census Bureau must conduct intensive research on a number of key components of DA immigration and racial classification are clearly areas rife for investigation.

The Census Bureau needs to expand its work on DA significantly with an eye toward greater flexibility. The Bureau should develop in-depth expertise in immigration and all of the other parts of DA. While it has extensive expertise, the Census Bureau clearly fell should on DA in 2000. It should not be necessary in the future to do a last minute revision of the magnitude that was done in 2000.

While there is always a tendency to address the problems of the last census, some of the ones facing DA must be fixed. While looking backward is necessary, we should also look to the future so as to avoid new ones.

DA's importance will actually grow in the future, notwithstanding its problems. While DA should maybe no longer be the "gold standard" for measuring coverage, there is not an obvious successor waiting in the wings.

Further, DA's first cousin—postcensal estimates—is an essential feature of the new American Community Survey (ACS). Inaccuracies of the degree experienced in the 1990s would result in significantly degraded data from the ACS in comparison with the principal alternative—the census long form.

All of the improvements needed for DA are needed for the ACS program. It's a daunting set of tasks, but essential ones for producing continuing high-quality census evaluations and high-quality survey data after the census.

REFERENCES

Anderson, Margaret J. and Steven E. Fienberg. 2001.
"Counting and estimation: Methodology for improving the quality of census—the U.S. 2000 census adjustment decision." Technical report, Department of History, University of Wisconsin-Milwaukee and Department of Statistics and Center for Automated Learning and Discovery, Carnegie Mellon University. Paper presented at the International Conference on Quality in Official Statistics, Stockholm.

Ericksen, Eugene. 2001. "An Evaluation of the 2000 Census." In *Final Report of the Census Monitoring Board, Presidential Members.* Washington, DC. September 2001 (www.cmbp.gov) Fenstermaker, D. 2002. A.C.E. Revision II: Summary of Estimated Net Coverage. DSSD Revised A.C.E. Estimates Memorandum Series PP-54. Washington, DC: U.S. Census Bureau. December 31.

Passel, Jeffrey S. 2001a. "Estimates of Undocumented Immigrants Living in the United States: 2000." Washington, DC: The Urban Institute. August.

Passel, Jeffrey S. 2001b. "An Evaluation of Demographic Analysis." In *Final Report of the Census Monitoring Board, Presidential Members.* Washington, DC. September 2001 (www.cmbp.gov)

Robinson, J. Gregory. 2001a. "Accuracy and Coverage Evaluation: Demographic Analysis Results." DSSD Census Procedures and Operations Memorandum Series B-4. Washington, DC: U.S. Census Bureau. March 2.

Robinson, J. Gregory. 2001b. "Description of the Components of Change (1990 to 2000) Used to Produce the National Postcensal Population Estimates during the 1990's." Unpublished handout. Washington, DC: U.S. Census Bureau. March 19.

Robinson, J. Gregory, Bashir Ahmed, Prithwis Das Gupta, and Karen A. Woodrow. 1993.
"Estimating Coverage in the 1990 United States Census Based on Demographic Analysis." *Journal of the American Statistical Association* 88 (423, September): 1061–1071.

Suro, Roberto and Jeffrey S. Passel. 2003. The Rise of the Second Generation: Changing Patterns in Hispanic Population Growth. Washington, DC: Pew Hispanic Center. October. (Also at http://www.pewhispanic.org/site/docs/pdf/PHC %20Projections%20final.pdf)