

**Are 2000 Hispanic Data Comparable at the State Level?  
Evaluating Data Quality in 'Hispanic' and 'Non-Hispanic' States**

by  
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This paper reports the results of research and analysis undertaken by a Census Bureau contractor. It has undergone a more limited review than official Census Bureau publications. This report is released to inform interested parties of research and to encourage discussion. The views expressed in this paper are those of the author and do not necessarily represent the views of the U.S. Census Bureau. The author thanks Kevin Deardorff, Betsy Guzmán, B. Lindsey Lowell, and Roberto Ramirez, who provided assistance and/or feedback on various drafts of this research. An earlier version of this paper was presented at the Joint Statistical Meetings, American Statistical Association, New York, NY. August 2002.

Census 2000 results show that the Hispanic population grew by 57.9 percent between 1990 and 2000 (Guzmán 2001).<sup>1</sup> Discussion of the trend and the resulting implications for the United States has occurred in academic and technical settings (Guzmán 2001; Guzmán and McConnell 2002; Rodriguez 2000), and in the media (Corchado and Solis 9/19/99, Grey 2001, Hendee 1997, Krantz and Santiago 2000, Yeoman 2000).

Historically, Latinos have been concentrated in just a few states, most notably California, Texas, New York, Florida and Illinois.<sup>2</sup> The largest numeric increases of Latinos between 1990 and 2000 also occurred in those states. The percent change in the Hispanic population was more than 39.9 percent in every region of the United States over the decade. Surprisingly; however, the largest percent growth of Latinos in the four regions occurred in the South and the Midwest, with percent changes of 71.2 percent and 81.0 percent, respectively (Guzmán 2001). Indeed, Census 2000 demonstrates that the Latino population more than doubled in states such as Minnesota (166.1 percent) and more than tripled in states such as North Carolina (393.9 percent) during the decade (Guzmán 2001).

Further, Latino groups historically have had distinct settlement patterns, with Mexicans traditionally concentrated in California and Texas, Cubans in Florida, and

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<sup>1</sup> This paper uses the Office of Management and Budget's (OMB) definition of Hispanic, "a person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture regardless of race" (OMB 1997). The terms Hispanic and Latino are used interchangeably in this paper.

<sup>2</sup> This paper will refer to the 5 states with the largest Hispanic populations in 1990 (CA, TX, NY, FL, IL) as "Hispanic" or "traditional" states. Other states will be referred to as "non-traditional" states. The term "non-traditional" has generally been applied to areas that have not traditionally had many Latinos but have experienced rapid and substantial growth of the Latino population in the recent years. This understanding is employed here.

Puerto Ricans in New York and New Jersey. Here again, Census 2000 documents that Latino groups traditionally concentrated in a few areas of the United States are settling in other areas. For example, the Mexican population, historically concentrated in the Southwest, grew significantly between 1990 and 2000 in areas that have not had a significant Mexican presence.<sup>3</sup> In Florida, for instance, the number of Mexican individuals more than doubled over the decade, growing from 161,499 in 1990 to 363,925 in 2000 (Guzmán 2001). Thus, Census 2000 data indicates at least three important shifts in the Latino population between 1990 and 2000: 1) rapid changes in the Hispanic population nationally, 2) increasing proportions of Latinos living in all areas of the United States, especially in non-traditional regions of the country, and 3) shifts in the settlement patterns of established Latino groups.

A number of studies have explored these patterns.<sup>4</sup> With the release of more detailed files of decennial census data, as well as the availability of new Census Bureau data sources such as the American Community Survey (ACS), it is likely that the number and type of quantitative analyses of the explanations and outcomes of demographic shifts in the Latino populations will also accelerate. Yet to date, only a few studies (Fernandez 1995, Martin 2002, McConnell and Guzmán 2003) have examined the quality of decennial census data.<sup>5</sup> No research has explored how Census 2000 data in traditional and non-traditional Hispanic populations and states compare with Hispanic data from new data sources such as the ACS. The quality of Hispanic data is even more important

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<sup>3</sup> This paper categorizes Hispanic groups who were not the largest Hispanic population in the state in 1990 “non-traditional” Hispanic populations.

<sup>4</sup> For example, see Amato and Meyer (1996), Aponte and Siles (1994), Broadway (1995), Gouveia and Stull (1995), Hernández-León and Víctor Zúñiga. (2000), Kandel (2003), Passel and Zimmerman (2000), Skaggs *et. al.*, (n.d.).

in light of the rapid growth of Latinos in non-traditional states and the continued preference for traditional states. Similarly, examining the comparability of Hispanic data in Census 2000 and new and the ACS is vital, as there have been discussions of the ACS as the future replacement of the long form in decennial census data.

The current project compares the size of the total Latino population and specific Latino groups counted by Census 2000 with the estimates derived from the Census 2000 Supplementary Survey (C2SS), an operational feasibility test of the ACS. Census 2000 counts and C2SS estimates are compared in four states, two that historically have had large numbers of Hispanics (California and Florida) and two “non-traditional Hispanic” states (Minnesota and North Carolina) that have experienced rapid growth between 1990 and 2000. These analyses are intended to complement and expand on another project that evaluated the consistency of Hispanic data across Census Bureau data sources on a national level (McConnell and Guzmán 2003).

The research questions addressed in this paper include: Are Hispanic data in Census 2000 and C2SS consistent in each state with respect to the size of the total Latino population and Latino groups? If the quality of Hispanic data collected by Census 2000 and C2SS vary by state, does it depend on whether Hispanics traditionally have lived in the state, whether the state continues to attract many Hispanics, or whether the state has had a small but rapidly growing Hispanic population?

The analyses are expected to demonstrate that Census 2000 and C2SS Hispanic data are similar in California, Florida, Minnesota and North Carolina because the C2SS

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<sup>5</sup> However, the U.S. Census Bureau has conducted numerous studies of the quality of the data collected about the foreign born (de la Puente n.d., Rodriguez and Hagan 1991, Romero 1992, Schmidley and Robinson 1998) and migrant populations (Duany n.d., Salo 1996), which includes some Latinos.

was designed explicitly to “provide accurate estimates for the housing units and population for the 50 states and the District of Columbia” (*Accuracy of the Data* n.d.) and to “demonstrate the feasibility of collecting long form type information at the same time as, but separate from, the Decennial Census” (U.S. Census Bureau 2001). Consequently, C2SS and Census 2000 data are expected to be similar in each state, irrespective of whether the state traditionally has had a large Hispanic population or has recently experienced substantial Hispanic growth. However, if there are significant discrepancies between the data sources, the discrepancies are expected to show a particular pattern. For example, there may be more consistency about traditional Hispanic populations in “Hispanic” states than for the other possible group and state categories. This outcome is expected because as a result of past research showing that many Latinos have been missed in “Hispanic” places (e.g. Rodriguez and Hagan 1991, Romero 1992, Salo 1996), Census 2000 operations employed radio advertisements, promotional posters and community outreach to encourage Latinos to participate in the census. These efforts likely were focused on the traditional groups and areas of Latino settlement.

### **Census Bureau Data Sources**

The U.S. Census Bureau is required by the Constitution to collect information about the United States population in order to apportion House of Representative seats that are equitable by population size to each district. Information about the race, ancestry and Hispanic origin has been collected in the census for several decades.<sup>6</sup> Therefore, Census 2000 gathered data about racial and ethnic characteristics of the population. As

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<sup>6</sup> See Chapa (2000) and Rodriguez (2000) for more information about decennial census collections of Hispanic data specifically.

mentioned earlier, the C2SS is an operational sample of the ACS, a new data set that provides social, economic, and housing information about the U.S. population on a more frequent interval.<sup>7</sup>

## **Data and Methods**

The analyses employ Census 2000 and C2SS state-level data. California and Florida represent the “traditional” states, as both have relatively long histories of Latino settlement. In addition, California and Florida continue to experience large changes in the Hispanic population between 1990 and 2000, approximately 3.3 million and 1.1 million, respectively (Guzmán 2001). A predominantly Mexican origin population resides in California and a predominantly Cuban origin population lives in Florida (Guzmán 2001). Together, these states account for 38.8 percent of the total Latino population in the United States in 2000. On the other hand, North Carolina and Minnesota could be considered “non-Hispanic” states.<sup>8</sup> Minnesota experienced the largest percent change (166.1 percent) of all states in the Midwest, though the size of the growth was relatively small (approximately 89,000) (Guzmán 2001). The Midwest had the largest Hispanic percent change between 1990 and 2000 of any region in the United States. Hispanic growth in Minnesota occurred in both metropolitan and rural areas. Indeed, county-level patterns show that nine of the thirteen Minnesota counties with the largest numeric changes in the Hispanic population had populations smaller than 60,000

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<sup>7</sup> The Current Population Survey is another data set that collects demographic and employment information about the civilian non-institutionalized population of the United States; however, the sample size of this survey is too small to provide stable estimates at the state-level. Therefore, only Census 2000 and C2SS data are included in this study.

<sup>8</sup> While research does document the presence of Latinos in the Midwest (Garcia 1996, McConnell in press, Valdes 2000, Vargas 1993) and, more recently, in North Carolina (Griffith 1995b, Johnson *et al.*, 1999, Hernández-León and Zúñiga 2000).

(U.S. Census Bureau 2001). North Carolina had the highest 1990-2000 percent change for the Hispanic population in the country (393.9 percent) and large overall Hispanic population numeric change, approximately 300,000 individuals (Guzmán 2001). The Hispanic population is predominantly Mexican in both states. Thus, comparing Census 2000-C2SS estimates in a wide variety of states will test the quality of Census data in both traditional and potentially “up-and-coming” states for Latinos.

Comparisons of the data sources focused on the size of the total Hispanic population, Mexicans, Puerto Ricans, Cubans, Other Latin Americans, individuals of “Spanish origin”, and “All Other Hispanic/Latino.” The Other Latin America population includes those who listed other Central or South American countries. The “Spanish origin” group includes those who wrote in terms such as “Spaniard,” “Spanish” or “Spanish American.”<sup>9</sup> The “All Other Hispanic/Latino” category includes those who provided other responses.<sup>10</sup>

The analyses conducted in this study rely on Census 2000 100-percent data restricted to household data only in order to be comparable with C2SS data released on November 6<sup>th</sup>, 2002. In both cases, the data are limited to those who reported that they

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<sup>9</sup> The term “Spanish” appears in the Hispanic origin question; however, in this paper, those who wrote in “Spanish” are categorized as “Spanish origin.” This categorization is not the official Census procedure for those who identified as “Spanish,” but was decided upon in this paper there may be qualitative differences between those who identify as “Spanish” versus “Hispanic” or “Latino.” Please note that those who wrote in “Spanish” are the majority of the “Spanish origin” category in Census 2000: 87.9 percent in California, 74.2 percent in Florida, 86.9 percent in Minnesota, and 86.6 percent in North Carolina.

<sup>10</sup> Unfortunately, it is not possible to directly compare Census 2000 and C2SS data for every possible response category to the Hispanic Origin item, as publicly available C2SS data does not provide as much detail as Census 2000 data. For example, Census 2000 data can be disaggregated even further into those who wrote in the terms “Hispanic” or “Latino”; those who checked the box for “Yes, other Spanish/Hispanic/Latino” but did not print a group; and other not classified responses. C2SS data identifies the number of respondents who wrote in “Spaniard,” “Spanish” and “Spanish American” but does not uniquely identify panethnic responses such as “Hispanic” and “Latino,” grouping together individuals who checked the box and did not write in a group, wrote in terms such as “Hispanic,” or provided other responses.

were Spanish/Hispanic/Latino. Standard errors, 95 percent confidence intervals, and z scores are calculated to identify whether Hispanic data in C2SS are statistically significantly different from Census 2000.<sup>11</sup> The publicly available C2SS estimate of the total Hispanic population was controlled to be very similar or identical to Census 2000 numbers. Therefore, it is not possible to statistically test whether C2SS estimates of the total Hispanic population size in California, Florida and North Carolina are the same size as Census 2000 counts.

## **Results**

Table 1 presents the comparison of the Census 2000 and C2SS on a national level. An evaluation of these data, discussed in another paper (McConnell and Guzmán 2003), are provided here solely to contextualize the state-level data. As this table shows, there is significant variation between Census 2000 and the C2SS for Hispanic data of the entire nation, as well as for each region in the United States.

### Table 1 About Here

Tables 2 through 5 show Census 2000 and C2SS Hispanic data for the four states of interest. The first hypothesis tested in this paper is that Census 2000 and C2SS data demonstrate overall consistency in the counts and the percentage distribution of the total Latino population and Latino groups for every state. The results, presented in Table 2 through Table 5, provide relatively weak support for this hypothesis. Indeed, despite

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<sup>11</sup> While many of the standard errors for the C2SS data were already calculated and publicly available, others were calculated using the formulas for the standard error of sums. See *Accuracy of the Data* (n.d.) for more information.

controlling the size of the total Hispanic population in C2SS to Census 2000 counts for California, Florida and North Carolina, the analyses still document that Census 2000 and C2SS data vary significantly for the sizes of Hispanic groups. The Z scores presented in Table 2 show that there are significant discrepancies between Census 2000 and C2SS for every Latino group, with the exception of Cubans. Statistical tests confirm that there are also statistically significant differences between the two data sources in other states, including differences in the Cuban and Other Latin American data in Florida (Table 3), Spanish origin and “All Other Hispanic/Latino” data in Minnesota (Table 4), and the Mexican and “All Other Hispanic/Latino” data in North Carolina (Table 5).

Table 2 About Here

Table 3 About Here

Table 4 About Here

Table 5 About Here

However, a careful examination of the national origin composition of the Hispanic population in each state documents that the data sources are similar for the most part, except for the “All Other Hispanic/Latino” population. For instance, Census 2000 indicates that 77.2 percent of Latinos in California are of Mexican origin, which is roughly comparable to the 81.9 percent estimated by C2SS (Table 2). Similarly, Census 2000 data show that Cubans are approximately 31.1 percent of all Hispanics in Florida compared to the 32.6 percent estimate using C2SS data (Table 3). The proportions of Latinos in North Carolina who are of Mexican origin are also relatively close—65.5 percent according to Census 2000 counts and 70.0 percent according to C2SS estimates (Table 5).

Thus, statistical analyses demonstrate that there are important inconsistencies in the data sources for states with both large and small Hispanic populations, a finding that does not support the hypothesis that the data sources provide consistent information about the size of the Hispanic population and/or Hispanic groups. Nevertheless, it can be argued that the two data sources do provide roughly comparable portraits of some Hispanic groups.

The remaining research questions focus on Hispanic data quality by state and by detailed group. The results point to several interesting patterns. First, comparing the z scores, numeric differences and percent differences by state indicate that data quality does differ by state. Indeed, the number of statistically significant differences and the size and percent of the difference vary by states, with California having far more and larger differences than Minnesota. Second, variation by state does seem to be associated with whether the state has traditionally had many Latinos and has high rates of growth, or has experienced substantial increases in the Hispanic population in recent years. The results suggest that the match between Census 2000 and C2SS for Hispanic data is poorer in California and Florida than in Minnesota or North Carolina. For instance, the difference between California data is statistically significant inconsistent for nearly every Hispanic group, particularly the two largest groups: Mexicans and “All Other Hispanic/Latino.” Census 2000 counts and C2SS estimates are significantly different for the largest Hispanic groups in the state, Cubans and Other Latin Americans. On the other hand, the data seem to be more closely matched in Minnesota, other than the statistically significant variation for the size of the “All Other Hispanic/Latino” group. Data for North Carolina also seems to suggest more overlap, though again, there are relatively

small but significant gaps for the size of the Mexican and “All Other Hispanic/Latino” populations. Thus, these results show that there are state-by-state variations in the consistency between data sources, with more Census 2000-C2SS overlap in states with small but emerging Hispanic populations.

Third, the comparability of Census 2000 and C2SS seem to differ by whether the specific Latino group is traditionally found in the state or not. For instance, as mentioned earlier, there are many statistically significant differences between the data in California. Yet, the final column in Table 2 shows that for the group with the longest ties to the state, the Mexican population, the data is the most consistent. In fact, there is only a 6.1 percent difference between the two data sources for this population, which is far lower than the differences for other national origin groups in the state such as Puerto Ricans (16.7 percent) or Spanish origin individuals (55.5 percent). The pattern for Florida is more ambiguous (See Table 3). On the one hand, there is significant variation for the size of the Cuban population, the group that has been the most concentrated and traditional to the state. However, the percent difference between the data sources is only 2.9 percent. On the other hand, the inconsistencies in terms of statistical significance for individuals from Other Latin America or “All Other Hispanic/Latino” origins are far larger, 34.0 percent and 63.1 percent, respectively. This same argument could be made for North Carolina data: the percent difference for the Mexican population, 6.9 percent, is far smaller than for the other statistically significant variations in the state. Finally, Minnesota data also support this argument, as the only significant discrepancies in the Minnesota data exist for small populations such as those of Cuban, Spanish origin, or “All Other Hispanic/Latino” descent.

In sum, the results suggest that, in general, there are important and significant variations between Census 2000 and C2SS Hispanic data at the state-level. Of most concern are the discrepancies in the California data, since approximately 31.1 percent of all Latinos in the United States live in the state (Guzmán 2001). A difference of 6.1 percent in the size of the Mexican population may not sound all that large; however, consider that the numeric difference is approximately 506,000. This figure is only slightly smaller than the size of the entire Hispanic population of Minnesota and North Carolina combined. Also problematic are the discrepancies of the Cuban and Other Latin American populations in Florida, the two largest Hispanic groups in the state, and for the Mexican population in North Carolina, also the largest Hispanic group in the state. The results also document that the overlap between Census 2000 and C2SS also vary by the population within the state, with the data for some groups routinely less consistent than others. Potential explanations for these findings are outlined in the next section.

## **Discussion**

The findings for the first research question match what has been found at the national level. Indeed, a study comparing the counts and estimates of the sizes of the total Latino population and detailed groups in Census 2000, C2SS and March 2000 Current Population Survey data also concludes that there are significant differences in Hispanic data between Census 2000 and other Census data sources (McConnell and Guzmán 2003). That work outlined an extensive list of possible explanations for the

differences at the national level, therefore, this paper will focus only on the specific state-level results.<sup>12</sup>

Several factors likely account for the discrepancies between Census 2000 and C2SS for the total Hispanic population and Hispanic groups in California, Florida, Minnesota and North Carolina. Potential explanations for discrepancies across the data sources at the state level include methodological issues, such as differences in the time period and primary mode of data collection. Substantive explanations such as differences in the nativity and recency of the Hispanic population by state may also play a role in the differences by state and by Hispanic group. Each issue is discussed below.

Two methodological issues appear to be the most likely explanations of the discrepancies found between Census 2000 and C2SS for the state data. The timing of the data collection is the first one. For example, Census 2000 reports information about the U.S. population as of “Census Day,” or April 1, 2000. Therefore, even data collected about the population during follow-up procedures are adjusted to provide a complete image of the U.S. population as of that date. In contrast, C2SS was collected monthly during all twelve months of 2000. Thus, Census 2000 provides the size of the Hispanic population as of April 1<sup>st</sup> while C2SS data includes all Hispanics that were present through December 31, 2000. This difference in the date of collection might help explain why Census 2000 and C2SS data differ. The possibility that this methodological factor may also interact with a substantive change in the population to account for state-by-state differences in the Census counts and C2SS estimates will be explored later.

Another possible explanation of general differences between Census 2000 and C2SS are differences in the residence rules, or guidelines for determining whether

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<sup>12</sup> Readers who want a more general discussion should read the “Evaluating 2000 Hispanic Data” paper.

particular individuals should be considered part of a household. Census 2000 defined the residence of a person as their “usual residence” on April 1, 2000, which could eliminate those who are temporarily living elsewhere (Symens Smith 1998). The residence rules of C2SS were more inclusive, collecting data anyone who has lived in a location for more than 2 months (*Differences Between...*). Thus, residence rules could lead to individuals to have been considered part of the residence in C2SS but excluded from Census 2000.

Differential availability of the questionnaires and guides in Spanish might also be important. Both the long and short forms of the Census 2000 questionnaire and the language guide for assistance with filling out the census forms were available in Spanish. In contrast, the questionnaire used in C2SS was not available in Spanish, although a toll-free number could be called for assistance. Thus, non-English speaking Latinos might have not been included in C2SS to the same extent as in Census 2000, which could also account for variation found between the data sources.

The mode of data collection is another important methodological difference between Census 2000 and C2SS, which may have led to variation between the data sources. Census 2000 was administered primarily as a mailed questionnaire, though some telephone and in-person follow-up procedures were employed. C2SS was also administered primarily as a mailed questionnaire; however, approximately one-third of all households that did not respond to the questionnaire or to an attempted interview by telephone were contacted for in-person interviews. This procedure was implemented to decrease the likelihood that respondents included in the C2SS sample were significantly different than those who chose not to respond. Perhaps respondents who did not respond to the initial survey, especially Latinos, require extended levels of persistence due to a

lack of time and/or motivation to fill out the questionnaire, the fact that the mailed questionnaire was not in Spanish, or other issues that would cause them to be reluctant to respond to mailed questionnaires, but allow them to be included in later stages of the C2SS. Research in Houston, Texas, confirms that the one-third sampling of non-respondents result in substantially more Hispanics included in the sample than when only mailed questionnaires are employed (pers. comm. Steven Camarota).<sup>13</sup> Thus, difference in mode could account for part of the discrepancies between Census 2000 and C2SS data.

It is particularly important to discuss another important variation in the data--the large discrepancies between the Census 2000 counts and C2SS estimates of the “All Other Hispanic/Latino” population. In every state, Census counts of this population were far higher than C2SS estimates, which also coincides with the pattern found at the national level (McConnell and Guzmán 2003). This inconsistency is problematic, especially since the Census counts tend to be substantively, as well as significantly, larger than other data sets.

One could argue that there are both methodological and substantive explanations for why respondents might not identify with a particular Hispanic origin or else provide a general response (e.g., Hispanic) or a response that couldn't be classified (e.g., “Tejano”) in the decennial census. However, careful comparisons of the data suggest that the principal explanations are methodological, namely the impact of follow-up procedures and mode of data collection on Hispanic origin responses. Other explanations, such as the emergence of a “panethnic” preference among some Latinos in the decennial census specifically, were discarded because Census 2000 and C2SS both asked the same question to ascertain whether respondents were Spanish/Hispanic/Latino. Thus, if it were

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<sup>13</sup> Camarota's research is also funded by the Census Bureau.

meaningful to Latinos that they identify in a “panethnic” way, they would have answered in the same way to the same question, which would have resulted in similar counts in both data sources.

Instead, a general response was far more prevalent in Census 2000 than in C2SS, which suggests that interviewer effects played a role in Hispanic responses to C2SS. More specifically, given the follow up procedures of C2SS, more respondents of that survey had contact with field representatives either by phone or in-person compared to Census 2000.<sup>14</sup> Such contact might have influenced Latino responses, as field representatives are trained to press respondents to respond to items using the pre-assigned categories.<sup>15</sup> Respondents are prompted to select a national origin identification, which would result in fewer “panethnic” responses in administrations of the C2SS versus responses supplied by individuals in the mail-back survey of Census 2000. Consequently, this prompting might have encouraged respondents to specify a national origin rather than checking the box for “Other Hispanic” and not writing in a group, or writing in terms such as “Hispanic” or “Latino” rather than a more specific group. This would not be the case for respondents who filled out a self-administered Census form. Indeed, comparisons of the 2000 and 1990 Census Hispanic origin items, mailed to approximately 15,000 households, finds that the Census 2000 question elicits far less specific responses than the 1990 question, most likely because no examples of Hispanic groups other than Mexican, Puerto Rican, or Cuban were provided in the 2000 question compared to the 1990 question (Martin 2002). Perhaps the additional contact with

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<sup>14</sup> Census 2000 also included telephone and in-person follow-ups, but the majority of the respondents participated in Census 2000 via mailed questionnaire.

<sup>15</sup> In addition, the training and experience of field representatives working with Census 2000 and C2SS is likely to be different.

interviewers in C2SS encouraged Hispanic estimates to be more specific than in Census 2000, even though both were using the same question.

Given all of the differences between the data sources, it is interesting that the discrepancies between the data sources were not larger than they were. Here again, methodological explanations point to the reasons for this result. C2SS was designed specifically to assess the viability of collecting long-form type data on a more frequent basis, therefore, the research design is similar to Census 2000, including identical wording and order of the Hispanic origin and race questions on the forms, similar population universe, and attempts to reduce unit and item non-response. In addition, the weighting strategy used in C2SS was implemented to control the numbers to Census 2000 counts. Obviously, all of these factors could explain the overlap between C2SS estimates and Census 2000 counts.

Perhaps one of the most important explanations for why Census 2000 and C2SS were not more dissimilar, especially for the Mexican, Puerto Rican, and Cuban groups, is the wording of the Hispanic origin question.<sup>16</sup> However, other similarities likely impacted the consistency between the data sources found in this paper. For example, Census 2000 and C2SS both employed similar population universes. Census 2000 used the Decennial Master Address File (DMAF) that was constructed and updated to be the most complete list of household addresses in the United States. C2SS used the Master Address File (MAF) from the 1990 Census updated with input from the U.S. Postal

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<sup>16</sup> As mentioned earlier, Martin (2002) points to the dropping of examples in 2000 as one of the reasons for less specificity in responses to the question versus the 1990 census question.

Service and the addresses listed in Census 2000 (*Accuracy of the Data* 2000). Therefore, the sampling frames for the population universes were similar.<sup>17</sup>

In addition, Census 2000 and C2SS employed numerous strategies to reduce unit non-response. For instance, Census 2000 operations included additional telephone and personal contacts to and an extensive marketing campaign with special efforts directed towards a complete enumeration of the Latino population. In addition, Census 2000 efforts included the development of partnerships with local and national organizations such as *National Council of La Raza*. The goal of such partnerships was to publicize the importance of filling out census forms. C2SS did not have the benefit of such an extensive marketing and partnership campaign; however, it is likely that non-response in the survey was reduced because of the attention paid to Census 2000 during the year. In addition, C2SS also had follow-up techniques such as in-person and telephone interviewing to persuade non-respondents to participate. Finally, the weighting strategy used in C2SS was designed to produce estimates of the U.S. population that were similar to Census 2000 estimates. These factors likely had tremendous impact on why the discrepancies between the data sets weren't even larger.

The remaining research questions addressed in this paper focus on variation by state and by Hispanic group—namely identifying whether there was state-level variation by state and whether the patterns stemmed from whether the state is a traditional receiving area for Latinos, that is, a “Hispanic” state, compared to a non-Hispanic state and by whether the group of interest has historically been present in the state, even if in

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<sup>17</sup> There is one important difference in the population universes: Census 2000 was a complete count of the population, while C2SS was limited to the household population only. As mentioned earlier, for this reason the Census 2000 data used in this paper were limited to the household population only.

relatively small numbers.<sup>18</sup> The same methodological issues described earlier, such as time frame and date of data collection and mode of data collection, apply here. Moreover, substantive differences between the populations might explain why the data would vary for some groups or states more than others. For instance, states vary in terms of histories, the type, settlement and growth rate of Hispanic populations, and characteristics of Latinos, such as nativity, decade of the arrival of Latin American foreign born and English skills. Thus, variation in Latino populations on these factors in different states might result in differential overlap from state to state. An added complication is that there may be an interaction between methodological and substantive issues. More specifically, differences in methodology may have an even greater effect on the data *because* of the characteristics of the Hispanic population, including how they are changing over time, by particular group and by state. Thus, the specific characteristics of the Hispanic population residing in a state can interact with methodological issues to shape Census counts and C2SS estimates in different ways.

Indeed, the analyses document that that there is state-level variation between data sources. Discrepancies were especially common in the California Hispanic data and, to a lesser extent, Florida data, compared with Minnesota and North Carolina. One possible explanation includes the combination of the timing of the data collection and the growth rate of the population. As mentioned earlier, Census 2000 provides information about the U.S. population as of April 1, 2000, while C2SS estimates the U.S. population based on data collected between January and December of 2000. States with large Hispanic

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<sup>18</sup> It is difficult to assess whether the findings for the other combinations (non-traditional populations in “Hispanic” states and traditional populations in “non-Hispanic” states) are due simply to the small sample sizes of such groupings or whether other factors are influential.

populations could have experienced large numeric changes between April and December 2000; however, the impact of monthly change on the size of the total Hispanic population is likely to have been relatively small, which might make increases after April 1<sup>st</sup> less influential.

In contrast, other states had much smaller Hispanic populations but relatively substantial month-to-month change, so even relatively small numeric change between April 1<sup>st</sup>, 2000 and December 31<sup>st</sup>, 2000 could have led to higher estimates in C2SS than in Census 2000. Consequently, C2SS estimates might be higher than Census 2000, especially in the case of small populations that are growing rapidly. For instance, the Mexican population in North Carolina experienced 655.0 percent growth during the decade.<sup>19</sup> It is likely that Census 2000 counts would have documented an even larger Mexican population in North Carolina in 2000 had the data been collected for the additional eight months that were included in C2SS. Thus, different reference dates coupled with disparate rates of Hispanic population change by state might explain the larger Hispanic population estimated by C2SS compared to Census 2000 in Minnesota and North Carolina and the smaller total Hispanic numbers in California and Florida estimated by C2SS than Census 2000. It would be useful to test the impact of the mode of data collection on estimates when combined with the rapidity by which “non-traditional” populations and states are changing. Such tests are needed with populations that are large enough to achieve statistical significance.

Coverage of Hispanics, or their inclusion in counts or estimates, can also be affected simultaneously by research design and characteristics of the population.

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<sup>19</sup> Based on the author’s calculations using numbers provided by the U.S. Census Bureau (1992) and Guzmán (2001).

Extensive research documents that coverage error often results from mobility, language barriers, concealment, and irregular housing and housing arrangements (Brownrigg and Martin 1989; de la Puente *et al* n.d.). Consequently, it can be very difficult to accurately count or estimate populations such as foreign-born Latinos (de la Puente n.d., Rodriguez and Hagan 1991, Romero 1992, Salo 1996).

This difficulty might lead to different coverage rates in some states than others given that some states have significantly more foreign born Latinos than others. Indeed, C2SS data confirm that contemporary immigration continues to affect the composition of Hispanics in some states more than others, with much higher percentages of recently-arrived individuals among the Latin American foreign-born in non-traditional states compared with “Hispanic” states. For example, C2SS estimates indicate that substantial proportions of Latinos in every state in 2000 were born in Latin America: 44.0 percent in California, 49.8 percent in Minnesota, 64.2 percent in North Carolina and 74.2 percent in Florida (U.S. Census Bureau 2002a). Thus, the fact that 44.0 percent of all Latinos in California and 74.2 percent of all Latinos in Florida are foreign born suggests that collecting data from such large populations would be far more difficult in states with smaller and more concentrated Latino populations, such as in North Carolina and Minnesota. More inconsistencies across data sources in California and Florida would be likely, as the availability of the forms or language guides in Spanish in Census 2000 or the multiple attempts of C2SS to include households might have differential impacts on the enumeration of Hispanic groups in different states. This would occur because individuals who are not proficient in English might be discouraged from participating in

C2SS by the lack of materials in Spanish compared to those who are more proficient in English.

Consequently, coverage rates of foreign and native-born Hispanics in Census 2000 likely vary by state, which could be associated with state-level discrepancies between the data sources. Revised preliminary estimates indicate that the net undercount of Hispanics in Census 2000 was 1.25 percent (Kostanich 2002), lower than the 5 percent undercount of Hispanics in 1990 (U.S. Census Bureau 2002b). Undercount rates of Hispanics in Census 2000 by state have not been published; however, estimates from the 1990 Census show differential Hispanic undercount by state: 2.5 percent in Minnesota, 4.9 percent in California, 5.0 percent in Florida, and 6.6 percent in North Carolina (U.S. Census Bureau 2002b). It is possible that the Hispanic undercount varied in Census 2000, as well.<sup>20</sup> One assessment of 1990 Census data for young Hispanics found extensive under-enumeration of young Hispanics in “Hispanic” states (e.g., California, New Mexico, New Jersey) and over-coverage in states with small Hispanic populations in 1990 (e.g., Ohio, Maine, Georgia) (Fernandez 1995). This could have happened in Census 2000. However, C2SS data estimates of the total Hispanic population have been controlled to be similar to Census 2000 counts, which means that the variation between the two data sources would have to be reflected in Hispanic group data rather than for the size of the entire Hispanic population. While it is beyond the scope of this study to identify the exact impact of the undercount of Census, given that C2SS is not a totally independent estimate, the fact that C2SS consistently counted higher numbers of some national origin groups in some states than others (e.g., Mexicans in California, Cubans in

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<sup>20</sup> Census 2000 final response rates for the states included in this study also varied: from a low of 63 percent in Florida to a high of 75 percent in Minnesota (U.S. Census Bureau n.d.).

Florida) than Census 2000 suggests that differential coverage of the Hispanic population in Census 2000 could account for state variation between Census 2000 and C2SS.<sup>21</sup>

Another potential explanation of the finding that more discrepancies are statistically significant in California compared to the other states and for some groups (e.g., Mexicans) over others may be due simple to a simple statistical issue. Given the large absolute size of the Hispanic populations in that state, compared with the other states, more contrasts might have been statistically significant. In contrast, it is possible that many of the comparisons for states such as Minnesota and North Carolina did not achieve significance due to sample size, but had the sample size been larger, differences would have been statistically significant.

To conclude, methodological factors such as residence rules and mode and date of collection may explain why there are statistically significant differences at the state-level between Census 2000 and C2SS with respect to the size of the total Hispanic population and Hispanic groups. Conversely, methodological similarities such as the wording of the Hispanic origin question, population universe, weighting strategies and attempts to reduce non-response might also explain why the discrepancies were not larger than they are. Finally, the interaction of methodological factors and characteristics of Latinos in California, Florida, North Carolina and Minnesota such as the rate of population growth, nativity, recency of arrival might help explain the variation between Census 2000 counts and C2SS estimates by state and by group within states.

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<sup>21</sup> The comparisons of Census 2000 and C2SS Hispanic data undertaken in this paper certainly cannot identify the extent to which Latinos were undercounted in Census 2000; nevertheless, the results can identify *prima facie* whether Census 2000 Hispanic data are systemically higher or lower than C2SS estimates.

## **Conclusion**

This paper provides at least three insights: 1) The existence of important statistical variation between Census 2000 and C2SS for the counts of Latinos and detailed groups in California, Florida, North Carolina and Minnesota, especially for the “All Other Hispanic/Latino” group and for the largest groups in important states, and 2) more inconsistencies in “Hispanic” states than in “non-Hispanic” states, 3) however, it is also fair to say that the differences in the largest groups, with the exception of the “All Other Hispanic/Latino” group, are large but not overwhelming. Important methodological and substantive factors such as sample size, dates and mode of data collection, follow-up procedures, coverage issues, nativity, and English fluency of the population may account for the findings.

It was not possible to test the individual impacts of each factor on the findings. However, this paper does make an important contribution to existing evaluations of Hispanic data collected by the Census Bureau. For example, it’s the first work to systematically compare Census 2000 and C2SS Hispanic data at the sub-national level. Assessing the comparability between two such important data sources is useful, especially in both traditionally “Hispanic states and in states that appear to be attracting many more Latinos in recent years.

Numerous implications can be drawn from the study. First, despite the fact that many of the comparisons of Census 2000-C2SS Hispanic data show statistically significant differences, the results for the Mexican, Puerto Rican and Cuban groups are actually relatively encouraging. It appears that the careful attempts to match the research design of C2SS with Census 2000 procedures, as well as the additional operations to

promote the inclusion of those who were missed in first stage of data collection, are at least partially rewarded. However, the differences between the two data sources is significant, most notably for the “All Other Hispanic/Latino” group in all states and for the largest groups for “Hispanic” states. Consequently, these results document that data from Census 2000 and C2SS are not interchangeable. Perhaps of most concern are the gaps between data for the “All Other Hispanic/Latino” and the “Other Latin America” populations. Thus, the findings suggests that data users should think carefully about the impact of the unique methodological aspects on the quality of the state data before choosing to use one data set over the other. Researchers who plan to use Census 2000 data to study either group should be especially careful. In any event, additional evaluations of Hispanic data, especially the relationship between methodological issues and responses to the Hispanic origin question, are warranted.

Second, this study indicates that evaluations of the quality of racial and ethnic data collected by the Census Bureau should be conducted at both the national and sub-national level. For example, without a study of this kind, users of California Hispanic data would be unaware of the extent to which Census 2000 figures and C2SS estimates differ for this state. Similarly, those interested in using Census Bureau data sources to study Latin American groups in Florida other than Mexicans and Puerto Ricans would want to know how Census 2000 data compares with other Census data sources.

Third, given the growing research interest in the Latino experience in “non-traditional” areas of the United States (Amato and Meyer 1996, Aponte and Siles 1994, Broadway 1995, Charvat-Burke and Goudy 1999, Millard *et al.*,; Corchado and Solis 9/19/99, Gouveia and Stull 1995, Gouveia and Saenz 1999, Griffith 1995, Hendee 1997,

Hernández-León 2000, Hyde and Leiter 2000, Krantz and Santiago 2000, McConnell in press, Passel and Zimmerman 2000, Skaggs *et. al.*, n.d., Suro and Singer 2002), the quality of Hispanic data in non-traditional areas is likely to become an even larger concern than it has in the past. Unfortunately, it was not possible to make a definitive conclusion about the quality of Hispanic data in “non-Hispanic” states, because of the small sample sizes of C2SS in Minnesota and North Carolina. Nevertheless, the findings provide at least initial information about the extent to which Census 2000 and other Census Bureau data sources overlap and/or differ.

In sum, this analysis is a contribution to the general knowledge about the quality of Hispanic data in Census Bureau data sources. However, more studies of this kind are needed. Future research should identify the match between Census 2000 and other Census Bureau data sources with respect to important characteristics of the Hispanic population, such as nativity, decade of arrival, language fluency, income, and education level. Further, studies of data quality should expand to include more states and important metropolitan areas for Latinos, such as Chicago, Los Angeles, San Francisco, New York City and Miami. Finally, additional systematic studies of the impact of methodological and substantive issues on the quality of the Hispanic data should be undertaken.

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Table 1. Hispanic Population by Type and Region: 2000

	Census 2000		C2SS					Z Score
	Number	Percent	Estimate	Percent	Lower Bound	Upper Bound	Standard Error	
Hispanic Population	34,592,553	100.0	34,474,440	100.0	34,450,688	34,498,192	12,118	9.75
Mexican	20,265,643	58.6	21,607,506	62.7	21,430,313	21,784,700	90,405	-14.84
Puerto Rican	3,312,878	9.6	3,465,784	10.1	3,385,218	3,546,350	41,105	-3.72
Cuban	1,214,059	3.5	1,236,511	3.6	1,189,418	1,283,604	24,027	-0.93
Other Hispanic	9,799,973	28.3	8,164,639	23.7	7,995,679	8,333,599	86,204	18.97
Hispanics by Region								
Midwest	3,064,756	8.9	3,009,444	8.7	2,988,989	3,029,899	10,436	5.30
Northeast	5,112,846	14.8	5,091,077	14.8	5,083,770	5,098,384	3,728	5.84
South	11,353,391	32.8	11,317,107	32.8	11,302,531	11,331,683	7,437	4.88
West	15,061,560	43.5	15,056,812	43.7	15,055,726	15,057,898	554	8.57

Source: Census 2000: U.S. Census Bureau, Census 2000 Summary File 1, limited to household population only.

C2SS data: U.S. Census Bureau, Demographic Surveys Division. November 6, 2002.

Table 2. Hispanic Population by Type, California: 2000

	Census 2000		C2SS					Z score	Numeric Diff.	Percent Diff.
	Number	Percent	Estimate	Percent	Lower Bound	Upper Bound	Standard Error			
Hispanic Population	10,773,996	100.0	10,773,995	100.0	n/a	n/a	n/a	n/a	1	0.0
Mexican	8,312,998	77.2	8,818,969	81.9	8,732,100	8,905,838	44,321	-11.42	505,971	6.1
Puerto Rican	137,480	1.3	160,503	1.5	140,274	180,732	10,321	-2.23	23,023	16.7
Cuban	70,615	1.0	63,167	0.6	51,107	75,227	6,153	1.21	7,448	10.5
Other Latin America	736,145	6.8	983,969	9.1	914,227	1,053,711	35,583	-6.96	247,824	33.7
Spanish Origin	182,082	1.7	283,090	2.6	251,182	314,998	16,279	-6.20	101,008	55.5
All Other Hispanic/Latino	1,334,676	12.4	464,297	4.3	420,051	508,543	22,574	38.56	870,379	65.2

Source: Census 2000: U.S. Census Bureau, Census 2000 Summary File 1, limited to household population only.

C2SS data: U.S. Census Bureau, Demographic Surveys Division. November 6, 2002.

Table 3. Hispanic Population by Type, Florida: 2000

	Census 2000		C2SS					Z	Numeric	Percent
	Number	Percent	Estimate	Percent	Lower Bound	Upper Bound	Standard Error	Score	Diff.	Diff.
Hispanic Population	2,632,944	100.0	2,632,946	100.0	n/a	n/a	n/a	n/a	2	0.0
Mexican	348,722	13.2	347,457	13.2	304,775	390,139	21,777	0.06	1,265	0.4
Puerto Rican	474,274	18.0	465,279	17.7	431,035	499,523	17,471	0.51	8,995	1.9
Cuban	819,434	31.1	858,665	32.6	820,294	897,036	19,577	-2.00	39,231	4.8
Other Latin America	569,762	21.6	763,254	29.0	714,119	812,389	25,069	-7.72	193,492	34.0
Spanish Origin	53,514	2.0	62,927	2.4	52,752	73,102	5,191	-1.81	9,413	17.6
All Other Hispanic/Latino	367,238	13.9	135,364	5.1	120,301	150,427	7,685	30.17	231,874	63.1

Source: Census 2000: U.S. Census Bureau, Census 2000 Summary File 1, limited to household population only.

C2SS data: U.S. Census Bureau, Demographic Surveys Division. November 6, 2002.

Table 4. Hispanic Population by Type, Minnesota: 2000

	Census 2000		C2SS					Z Score	Numeric Diff.	Percent Diff.
	Number	Percent	Estimate	Percent	Lower Bound	Upper Bound	Standard Error			
Hispanic Population	140,023	100.0	125,581	100.0	109,467	141,695	8,221	1.76	14,442	10.3
Mexican	93,582	66.8	88,159	70.2	73,156	103,162	7,655	0.71	5,423	5.8
Puerto Rican	6,367	4.5	7,421	5.9	3,431	11,411	2,036	-0.52	1,054	16.6
Cuban	2,402	1.7	960	0.8	0	1,963	512	2.82	1,442	60.0
Other Latin America	13,616	9.7	12,206	9.7	7,150	17,262	2,580	0.55	1,410	10.4
Spanish Origin	3,502	2.5	9,284	7.4	4,005	14,563	2,693	-2.15	5,782	165.1
All Other Hispanic/Latino	20,554	14.7	7,551	6.0	3,304	11,798	2,167	6.00	13,003	63.3

Source: Census 2000: U.S. Census Bureau, Census 2000 Summary File 1, limited to household population only.

C2SS data: U.S. Census Bureau, Demographic Surveys Division. November 6, 2002.

Table 5. Hispanic Population by Type, North Carolina: 2000

	Census 2000		C2SS				Standard Error	Z Score	Numeric Diff.	Percent Diff.
	Number	Percent	Estimate	Percent	Lower Bound	Upper Bound				
Hispanic Population	368,922	100.0	368,922	100.0	n/a	n/a	n/a	n/a	0	0.0
Mexican	241,566	65.5	258,122	70.0	242,987	273,257	7,722	-2.14	16,556	6.9
Puerto Rican	29,455	8.0	39,727	10.8	28,090	51,364	5,937	-1.73	10,272	34.9
Cuban	6,961	1.9	9,890	2.7	4,780	15,000	2,607	-1.12	2,929	42.1
Other Latin America	45,242	12.3	48,645	13.2	35,729	61,561	6,590	-0.52	3,403	7.5
Spanish Origin	6,129	1.7	3,916	1.1	1,415	6,417	1,276	1.73	2,213	36.1
All Other Hispanic/Latino	39,569	10.7	8,622	2.3	4,253	12,991	2,229	13.88	30,947	78.2

Source: Census 2000: U.S. Census Bureau, Census 2000 Summary File 1, limited to household population only.

C2SS data: U.S. Census Bureau, Demographic Surveys Division. November 6, 2002.