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MEMORANDUM FOR ACS Research and Evaluation Advisory Group
(email list "ACSO RE Advisory Group List")

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Subject: Understanding Inconsistencies in Occupancy Status Between the 2010 Census and the 2010 American Community Survey 1-Year Estimates

Attached is the final American Community Survey Research and Evaluation report for "Understanding Inconsistencies in Occupancy Status Between the 2010 Census and the 2010 American Community Survey 1-Year Estimates".

This report supplements a previous study that found, among other things, inconsistent occupancy status classifications for addresses that both the 2010 Census and the 2010 ACS recorded as housing units. This report determines if a single factor accounted for all or most inconsistent classifications and which characteristics are associated with high or low rates of inconsistency. The 2020 Census will find these conclusions and historical background valuable when planning future decennial evaluations.

If you have any questions about this report, please contact David Raglin (301-763-4226) or Samantha Fish (301-763-7542).

Attachment

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JULY 24, 2013

Understanding Inconsistencies in Occupancy Status Between the 2010 Census and the 2010 American Community Survey 1-Year Estimates

FINAL REPORT

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EXECUTIVE SUMMARY

Objective

This report supplements the American Community Survey (ACS) Research and Evaluation study by Anderson and Hefter (2011) that found, among other things, inconsistent occupancy status classifications for addresses that both the 2010 Census and the 2010 ACS recorded as housing units. The objective of this research was to determine if a single factor accounted for all or most inconsistent classifications or if multiple factors appeared to contribute. We summarized the relationships of geography, population and housing characteristics, and operational factors with inconsistent statuses to see, for example, if inconsistencies were more likely to occur in certain areas or in cases enumerated/interviewed by certain methods. The 2020 Census will find these conclusions and historical background valuable when planning future decennial evaluations.

Methodology

We linked the 2010 ACS microdata to the final 2010 Census universe by address identification numbers (MAFID). We restricted our universe to the ACS sample addresses in the January through June panels that both the Census and the ACS classified as housing units to limit effects of time differences between the dates of ACS interview and Census enumeration. Each linked address was weighted by its probability for ACS sample selection.

We calculated net and gross difference rates by a series of characteristics to measure inconsistency. These rates in combination with the number of housing units represented by those characteristics determine how much of an influence the factors have on the total proportion of inconsistently classified units. Sampling errors are associated with each estimate in this report, and all differences discussed are statistically significant.

Results

From the operational factors and population and housing characteristics we looked at, we did not find a single factor, or a short list of factors, that accounted for all or most of the total inconsistencies in the universe. Although we did find some of the factors to have a higher likelihood of inconsistency than others, they do not account for most of the national level inconsistency. Differential classifications occur in all parts of the country and among all housing and population groups. The characteristics and methods associated with moderate and lower levels of inconsistency involve the largest proportion of housing units across the nation.

A higher proportion of mobile populations, multi-unit residential structures and mobile homes, and units interviewed in certain modes of Census and ACS data collection were classified inconsistently compared with other groups. However, a greater total number of housing units without those characteristics were inconsistently classified at the national level. Similarly, while there were areas in the country with higher proportions of inconsistency (e.g. Fort Myers, FL; Miami, FL; Punta Gorda, FL; Atlanta, GA; and Philadelphia, PA), there were more total inconsistently classified housing units outside of areas like these. Eliminating the inconsistent classifications from only the groups with the highest inconsistency rates would have a minimal impact on the national difference.

This reminds us that we need to pay close attention to the data collection methods and training even for populations and areas that have been historically easiest to enumerate/interview. We need to develop more effective methods to reduce error in housing status classifications. Further research is needed to determine the best approach. Given that both the Census and the ACS are tasked with producing high quality estimates for low levels of geography, we need to see what changes in data collection would improve the accuracy of all housing unit statuses.

This study alone cannot determine the primary reason(s) for inconsistency in occupancy status. As mentioned, the housing unit classification results vary among small areas, so the reason(s) involved may vary too. We also recognize that the time between Census enumeration and ACS interview (sometimes two months or more) was long enough for some housing units such that a real change in occupancy status may have occurred. In addition, Census enumerations took place in spring 2010 while a large wave of foreclosures swept the nation. A multivariate analysis would provide additional information to better understand classification inconsistencies.

INTRODUCTION

In 2010, the American Community Survey (ACS) collected data simultaneously with the decennial census. Comparisons of the number of vacant and occupied housing units in the 2010 Census and the 2010 ACS 1-year estimates for the U.S. show statistically significant differences. Other statistics derived from these measures are statistically different at the national and state levels, too (Griffin, 2011). For example, the national ACS vacancy rate of 13.1 percent, ± 0.1 percentage points, is greater than the 2010 Census vacancy rate of 11.4 percent. While it may seem contradictory that the 2010 Census and ACS results would vary, there are several reasons why this may be (Cresce, 2011; Griffin, 2011).

In a study that compared the final statuses of addresses in the full 2010 ACS sample with their outcomes in the 2010 Census, Anderson and Hefter (2011) found differences in the Census and ACS frames in addition to inconsistency in occupancy statuses for addresses that both programs had recorded as housing units. The inconsistently classified housing units were marked occupied in the Census and vacant in the ACS twice as often as those marked vacant in the Census and occupied in the ACS. This is one of the main reasons for a higher ACS vacancy rate.

This report supplements those findings by studying inconsistent classifications by geography, population and housing characteristics, and operational factors associated with the 2010 Census and ACS data collections. To improve the interpretation of the results, we designed this analysis so that the time differences between the dates of Census enumeration and ACS interview are limited.

BACKGROUND

Similar Results from Census 2000

Last decade, the Census Bureau observed a similar phenomenon when a series of evaluations compared the decennial census results to the Census 2000 Supplementary Survey (C2SS) estimates. The Census Bureau designed the C2SS to demonstrate the operational feasibility of using continuous sampling methods in a national setting, and the C2SS later became what we know today as the ACS. The C2SS national vacancy rate and the vacancy rates for 40 states were higher than the Census 2000 rates (Love, 2001a). In the same report, data from the 21 C2SS test sites indicated that lower vacancy rates from the census might be widespread at the county level.

From the start of the ACS development program, the Bureau recognized that ACS data collection methods favored the identification of units as occupied rather than vacant (Census Bureau, 2004). The ACS collects panel data on a three month interviewing schedule in which housing units have two months to change status from vacant to occupied, but only one month in which to be interviewed as vacant (see Census Bureau [2004] for more detail). Thus, those familiar with the ACS expected differences between the vacancy rates, but with the ACS rate being lower than the Census' (Census Bureau, 2004). This is the opposite of what we found in 2010 and 2000.

Census 2000 coverage measurement evaluations and subsequent research suggested that Census 2000 may have overstated the nation's occupancy rate by misclassifying vacant units as occupied (Barrett, 2001; Love, 2001a; and Love, 2001b). Love's first evaluation found the Census count of occupied units too high and the Census count of vacant units too low (Love, 2001a). She also found that both

the 1999 and 2000 independent housing unit estimates implied that the census housing unit files contained too few vacant units and too many occupied units.

Historical Methodology

Gross vacancy rates measure the proportion of total housing units that are vacant. Gross vacancy rates from past decennial censuses have fluctuated considerably from their advent in 1940 (Love, 2001). Figure 1 shows the percentage point change in the gross vacancy rate by decade. The decade-to-decade differences range from -3.0 percentage points to 2.8 percentage points.

Figure 1. Percentage Point Difference in the National Gross Vacancy Rate by Decade
Source: 1950 – 2010 Census

Varying vacancy rates reflect differences of actual changes in the U.S. housing unit inventory as well as changes in the definition of a vacant unit and enumeration procedures. Definitions and procedures have differed from census to census, and a change in definition or methodology may result in a change in the relationship of the number of occupied to vacant housing units, thus raising or lowering the gross vacancy rate. For example, the Census did not count vacant mobile homes until 1980 (Love, 2001). Below we provide some historical information regarding census housing unit definitions and data collection method changes that influenced the 2010 Census.

Housing Unit Definitions

For many censuses, the Census program has considered occupied units (excluding group quarters) to be any place that someone claims as their usual living quarters. Tents, caves, boats, boxes, and similar non-traditional shelters identified by a person as his or her usual residence become occupied housing units in the census. The Census does not consider the vacant versions of these types of units to be housing units and thus does not count them. In the ACS, the survey samples valid housing unit

addresses from the Census Master Address File, which does not include these alternative occupied shelters.

Past studies made it clear that identifying vacant housing units is often very subjective. Each census, enumerators and survey interviewers face difficulties in determining whether a vacant structure qualifies as a housing unit by program definition (Census Bureau, 1973). For example, questions arose about whether to omit some vacant units because they were unfit for habitation or nonresidential units. In addition, enumerators frequently had to determine whether units of new construction were available for occupancy at the time of the census.

Enumeration Procedures

In the 1970 Census, most housing units in or near large metropolitan areas were enumerated by mail for the first time. This created differences in the timing of occupied housing unit enumerations (most within a few weeks of Census Day) and vacant housing units enumerations (most two months later in follow up operations) (Love, 2001). The 1970 Census nonresponse follow up for mail areas determined occupancy status as of the day of their visit (*not* April 1), and current residents were enumerated if they had not been enumerated at their Census Day address (Census Bureau, 1974). These procedures involve "de facto" enumeration.

Differences in the timing of enumeration for occupied and vacant units continue each census due to differences in the timing of data collection operations. Additionally, beginning in the 1990 Census, follow up procedures used "de jure" enumeration methods. This means enumerators classified housing units according to their occupancy status on Census Day (instead of on the day of enumeration), and households that moved to a unit after Census Day were counted at their previous address, unless they were already counted there on Census Day (Census Bureau, 1990). This enumeration methodology differs from that of the 1970 and 1980 censuses, and has been used in each decade since the 1990 Census.

Coverage Improvement & Evaluation Studies

Events including the Supreme Court's one-man-one-vote decision in 1962 and the subsequent court decisions and legislative changes stemming from it greatly increased the need to precisely count the population (Census Bureau, 1975; Census Bureau, 1976). New requirements made it essential that the Bureau develop procedures to ensure each person is counted only once and at the right place.

As a result, the Census Bureau adopted special coverage improvement programs for the 1970 Census. One of the coverage improvement programs implemented was the National Vacancy Check, which sampled housing units determined by census takers to be nonseasonal vacants. The Bureau then weighted the preliminary 1970 Census counts to account for misclassified housing units based on the results from the sample sent to the National Vacancy Check.

The 1970 National Vacancy Check converted 11.4 percent of the nonseasonal vacant units to occupied housing units (Census Bureau, 1974). An independent study of the 1970 Census measured the validity of the adjustments made to the census counts based on the National Vacancy Check results. The study found that the National Vacancy Check corrected the majority of misclassifications—e.g. occupied units misclassified as vacant and vacant units misclassified as occupied (Census Bureau, 1973).

Starting in 1980, the census added a comprehensive review of all units classified as vacant or nonexistent to improve the country's enumeration coverage. This check, called the Unit Status Review, converted about 10.1 percent of vacant or nonexistent units to occupied housing units (U.S. Census Bureau, 1985). A postcensal evaluation of the check concluded that about 2.9 percent of the units incorrectly remained vacant and about 1.8 percent were erroneously converted to occupied (U.S. Census Bureau, 1985).

Census evaluation studies each decade since 1980 supported the decision to include coverage follow-up operations in the 2010 Census. The 2010 Census's Vacant Delete Check reviewed the status for a subset of housing units classified as vacant or nonexistent in the Non-Response Follow Up operation and updated the final enumerations accordingly.[1] This operation converted about 18.6 percent of the housing units initially eligible for the Vacant Delete Check to occupied (Heimel et al, 2011). Note that this vacancy check included nonexistent units like the 1980 Unit Status Review, whereas the 1970 National Vacancy Check sampled only nonseasonal vacants.

The Census Bureau, however, did not evaluate the occupancy status conversions made by the 2010 Vacant Delete Check. Past postcensal evaluations like the independent study of the 1970 National Vacancy Check and the Evaluation of the 1980 Coverage Improvement Program provided the only means for determining the validity of occupancy status corrections made by follow up operations. The last evaluation like this that the Bureau conducted, called the Housing Unit Coverage Studies (HUCS), followed the Census 2000. Although the the 2010 Census Coverage Measurement (CCM) survey was to measure the data quality of the 2010 Census, the CCM did not include an evaluation for occupancy status misclassifications.

The 2010 Census Coverage Measurement (CCM) survey was designed primarily to measure the Census' coverage of people, while it also measured coverage of housing units, the under- or over-count of the number of housing units. Several reports including Mule (2012a, 2012b) summarize these results. Unlike the 2000 Housing Unit Coverage Study, the 2010 CCM did not produce estimates of the percent of enumerated occupied units that should have been classified as vacant nor the percent of enumerated vacant units that should have been classified as occupied.

2010 Census Methodology

The 2010 Census and the ACS have different data collection methods based on their program objectives. Understanding these methods and how they differ is necessary to understand the difference in Census and ACS results. This section provides an introduction and explanation of the methods used for the 2010 Census.

The purpose of the decennial census is to enumerate the entire U.S. population, which means to determine the number of people in the U.S. and where they live on April 1, 2010 (Census Day)[2]. The 2010 Census used several methods of self-response and field interviewing to conduct the enumeration. The census mailed most housing units a questionnaire, but assigned some units in rural or remote areas

[1] The VDC also included some housing units not interviewed in NRFU.
[2] April 1, 2010 is the reference date for people living in housing units. People residing in group quarters were counted where they lived most of the time.

for in-person enumeration only. The Mailout/Mailback and Update Leave (UL) operations delivered paper questionnaires to households while the Update Enumerate (UE), Remote Update Enumerate (RUE), and Remote Alaska (RA) operations enumerated households in-person.

Addresses that did not respond back by mail after receiving their initial paper questionnaire may have been subject to a second mail out[3]. If the Census did not receive a response, the housing unit would be contacted by an enumerator in the Nonresponse Follow-Up (NRFU) operation. In the NRFU, enumerators visited housing units to determine them as occupied, vacant, or nonexistent on Census Day. Enumerators also interviewed any housing units they encountered that were not included on the address list for their work area. Whole households that had a usual residence elsewhere or that moved in after Census Day served as proxies for the enumeration at their address. Census takers gave these individuals the opportunity to complete an interview for where they lived on April 1st.

Since 1980, the census required occupancy status verification for most units initially classified as vacant or nonexistent. The Vacant Delete Check (VDC) was a separate operation that began after Local Census Offices (LCOs) completed their NRFU workloads. In this operation, enumerators verified, for units that did not have an alterative verification, the occupancy status of addresses identified during NRFU as vacant-regular or nonexistent units.[4] Pre-defined rules, as used in Census 2000, determined the final occupancy status for housing units with differing outcomes in NRFU versus VDC (see Heimel, et. al [2011] for more information).

The VDC workload also included blank mail returns[5], cases added by VDC enumerators, and new addresses identified too late for inclusion in NRFU. Collectively these cases represented about 35.2 percent of the VDC workload, and many of them were only ever enumerated through the VDC. For more information about the NRFU and VDC operations, please see the 2010 Census Nonresponse Follow Up Operations Assessment Report (Heimel, et. al, 2011).

Other Census operations accommodated households that said they had not received a Census form, were not enumerated in-person, or needed some assistance: telephone questionnaire assistance (TQA), Fulfillment, and Be Counted. TQA helped respondents over the phone with any questions they had and allowed them to complete an interview over the phone. Fulfillment mailed out questionnaires in English and non-English languages at the request of a respondent, and respondents that felt they were missed or did not have a usual place of residence completed Be Counted Forms, which were available in common community locations. Less than one percent of the final Census population count came from TQA, Be Counted, or Fulfillment.

The entire 2010 Census data collection spanned from January 2010 to early September 2010. The Census mailed paper questionnaires in March 2010. The NRFU and VDC operations started around May and July 2010, respectively.[6] The Census received most mail returns in March or April (from occupied units), while the NRFU and VDC operations identified vacant units one to three months later.

[3] Second mailings were sent out for certain parts of the country.
[4] Alternative verifications include notice from the United State Post Office that an address is Undeliverable As Addressed.
[5] A paper questionnaire that was initially accepted as a completed response but was later found to not include enough information to be counted as an accepted response.
[6] NRFU started in mid-April in areas that are near colleges and universities.

2010 ACS Methodology

In contrast to the Census, the ACS is a continuous survey that measures population and housing characteristics of large and small areas across the U.S. The ACS eliminated the need for the 2010 Census to have a long form. The Census Bureau has collected ACS data continuously since 2000, initially with a national sample of about 800,000 addresses and expanded to an annual 3 million address sample in 2005.

The annual ACS sample is divided into 12 monthly sample panels. The 2010 panels consisted of three sequential data collection modes, each taking a month for completion, that occurred in the following order: mail, telephone, and personal visit.[7] Each calendar month a new panel starts so that in any month of the year all data collection operations run simultaneously (see Table 1).[8]

Table 1. Data Collection for the 2010 ACS Panels
Source: American Community Survey Design and Methodology Handbook

		Calendar Month							
		Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10
Panel	Jan-10	Mail	Telephone	Personal Visit					
	Feb-10		Mail	Telephone	Personal Visit				
	Mar-10			Mail	Telephone	Personal Visit			
	Apr-10				Mail	Telephone	Personal Visit		
	May-10					Mail	Telephone	Personal Visit	
	Jun-10						Mail	Telephone	Personal Visit

Thus, the panel represents the month during which the contact process was begun (ie. the month to which cases are assigned for collection), not necessarily the month in which data are collected or tabulated.

Sample cases with a United States Postal Service mailable addresses that did not respond by mail and had a landline telephone number were eligible for Computer Assisted Telephone Interviewing (CATI). Telephone center staff completed as many phone interviews as possible before the remaining cases were considered for Computer Assisted Personal Visit Interviewing (CAPI). The ACS subsamples roughly one-third of all sample addresses without a completed mail or CATI interview for CAPI.

Traditionally, the ACS interviews most vacant units in the last mode of data collection (the CAPI mode). This is because generally no one was home to respond to mail or telephone contact attempts and CAPI interviewers seek knowledgeable respondents in the field to obtain the interview. The ACS also interviews a small number of vacant units by telephone follow-up after receipt of a mail questionnaire or in CATI, if a valid telephone number exists for the sample address. For more

[7] Late mail returns are accepted throughout all data collection modes.
[8] In 2013, the ACS included an Internet mode of data collection for a total of four data collection operations.

information about the 2010 ACS methods, please see the ACS Design and Methodology Report (Census Bureau, 2009).

RESEARCH QUESTIONS

1. How often were ACS sample cases classified as housing units in both the Census and in the ACS?

2. What are the Census and ACS distributions of occupancy status for ACS sample cases classified as housing units in both the Census and the ACS?

3. How consistent are the Census and ACS occupancy statuses at the national level for housing units?

4. How does inconsistency in occupancy status vary by:
   a. Geography?
   b. Area characteristics and population segmenations?
   c. Housing unit characteristics?
   d. Data collection operations?
   e. In-person enumeration/interview methods?

5. Do certain characteristics explain the majority of inconsistency in occupancy status for addresses determined to be housing units in both programs?

METHODOLOGY

We use methods similar to those by Anderson and Hefter (2011). This report compared the final statuses of addresses in the full 2010 ACS sample with the final 2010 Census outcomes.

They linked the 2010 ACS microdata and the final Census universe (defined by the Census' One Hundred Percent Detail File) using the Master Address File identification number (MAFID) on each file. The Master Address File is the Census Bureau's official inventory of known living quarters (housing units and group quarters) and some nonresidential addresses in the United States and Puerto Rico. Each MAF record has a unique identifier, called a MAFID, which allows users of MAF data to track an individual MAF record over time.

Linking by MAFID identifies most, but not all, address matches. Bates (2012) found that only 355,000 addresses had differing MAFIDs in the 2010 ACS sample versus the 2010 Census records. Thus, matching addresses by linking with MAFID has a minor limitation because, in a few cases, true matches cannot be paired by using MAFID alone.

Anderson and Hefter weighted each ACS sample address according to its probability of selection in the ACS sample design. The weight, however, does not account for nonresponse and other statistical adjustments made to the official ACS estimates. This is a minor limitation because the 2010 ACS had a 97.5 percent response rate.[9] See Anderson and Hefter (2011) for full details on their methodology.

We describe the methods used for our analysis below. The main differences in our methods from those used in Anderson and Hefter (2011) are that we limit the 2010 ACS sample addresses to those interviewed during the time of Census enumerations, we use unedited Census data instead of the final Census data, and we include additional Census and ACS information on our linked file in order to

[9] This response rate is weighted for sample selection and is reported on the ACS webpage under the Methodology tab.

analyze inconsistencies in occupancy status by geography, population and housing characteristics, and operational factors.

Universe

Our universe of interest is the 2010 ACS sample addresses from the January through June panels that the Census and the ACS both classified as housing units. We chose to limit the ACS sample addresses to the January through June panels because the ACS interviewed these cases during the January through August calendar months, which is when the Census enumerated most of the United States.

We created a dataset with these records by limiting the ACS sample to the January through June panel cases and then linking those addresses to the Census housing unit files using MAFID. After linking the ACS and Census records by MAFID, we flagged sample addresses that both the Census and the ACS classified as housing units. This subset of flagged cases makes up our universe of interest. The next subsection specifies the files we used.

Files

The ACS sample data come from the 2010 ACS 1-year edited housing unit microdata, which reflect characteristics prior to the changes made for disclosure avoidance. Other files provide additional ACS operational data and paradata for addresses classified as housing units in the ACS. These items come from the sampling file, the control file, Technology Management Office files, and extracts from the Master Address File.

The 2010 Census data we use are unedited and come from the Housing Unit Census Unedited File (HU CUF). We chose to use the unedited data because the characteristics of interest are not available on the final edited file. The Auxiliary Data Capture File and the Census Operational File provide us with additional Census operational data and paradata.

We linked the ACS sample data (limited to the January through June panels) and 2010 Census data by MAFID to create a linked dataset from which we flag the addresses classified as housing units in both the Census and in the ACS. From this flagged subset, we produce cross tabulations of occupancy status for a series of partitions of the data (e.g., by state). We calculate net difference rates and gross differences rates based on their cross tabulations. Calculation of these rates is discussed in a later sub-section.

Weighting

We weight each sample address in the universe to account for sample selection in the ACS. This allows us to estimate inconsistent housing status classifications for our universe of interest. This weighting technique does not take into account additional adjustments for unit nonresponse or population controls. We weighted all estimates contained in the report this way.

Sampling errors are associated with each estimate, and we calculate these for the net and gross difference rates. In general, ACS estimates for a smaller group versus a larger group will have larger sampling errors, all else being equal. For example, the net and gross difference rates for the District of Columbia have larger margins of error than the net and gross difference rates for the state of Florida

mostly due to their size differences. All of the differences discussed in this paper are statistically significant.

Geographic Levels

We analyze program outcomes at the national level, by U.S. State, and for the District of Columbia (we excluded Puerto Rico because mailability there differs substantially from that in the United States). We also tabulate results by Regional Census Center (RCC) and Local Census Office (LCO). Regional Census Centers (RCCs) were temporary offices established to manage the 2010 Census within certain geographical jurisdictions. The Census established 12 RCCs in the cities where permanent Census Bureau regional offices were located. The 12 RCCs managed 494 LCOs that supervised decennial operations in specific geographic areas. Each LCO conducted a variety of census operations. Please see the 2010 Census Nonresponse Followup Operations Assessment for information about the census field management (Heimel et. al., 2011).

Area Characteristics and Population Segmentations

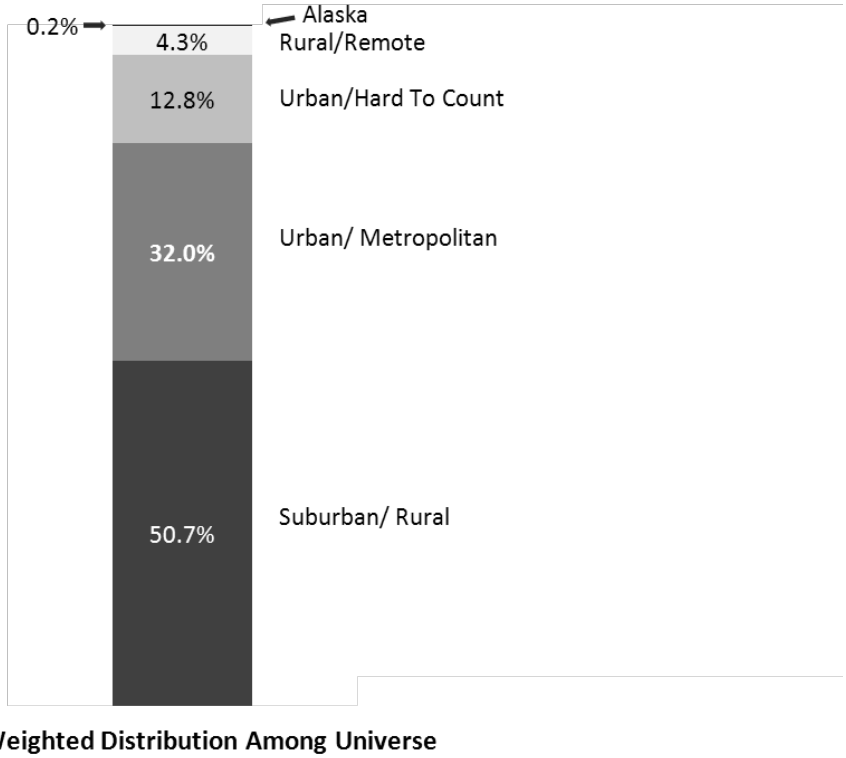
Two by-products from the preparations for the 2010 Census identify areas with expected response patterns and unique methods of data collection: LCO types and Census segmentation groups. First we explain LCO types. Field staff created "LCO types" to organize LCOs by each office's anticipated main method of data collection for the census. These categories indicate differences between LCOs that the census had to consider when planning its field operations (Johanson, et. al., 2011). For example, some remote areas in Alaska strictly required field enumeration instead of traditional questionnaire mail out. Table 2 shows the Census data collection operations involved with each LCO type.

Table 2. Census Data Collection Operations by LCO Type
Source: Johanson et al. (2011)

Census Data Collection Operations	Urban/ Hard To Count	Urban/ Metropolitan	Suburban/ Rural	Rural/ Remote	Alaska
Urban Update/Leave	✔	✔			
Mailout/ Mailback	✔	✔	✔	✔	✔
Update/ Leave		✔	✔	✔	✔
Update/ Enumerate			✔	✔	✔
Rural Update/ Enumerate				✔	✔
Rural Alaska					✔

There are five LCO types: Rural/Remote, Alaska, Suburban/Rural, Urban/Metropolitan, and Urban/Hard to Count. The largest LCO type represents about 51 percent of the universe, and the smallest represents only about 0.2 percent. The following figure shows the weighted distribution of LCO type among our universe of housing units.

Figure 2. Weighted Distribution of LCO Types among Universe
Source: 2010 Census & 2010 January – June ACS panels



Second, the Census Bureau used cluster analysis to create a set of "Census segmentation groups" to aid in the design and implementation of the 2010 Census Integrated Communications Program, a targeted marketing campaign to boost response. Bates and Mulry (2011) found these segmentations to be highly correlated with the initial mail response in both the 2010 Census and the ACS. Many factors distinguish each group:

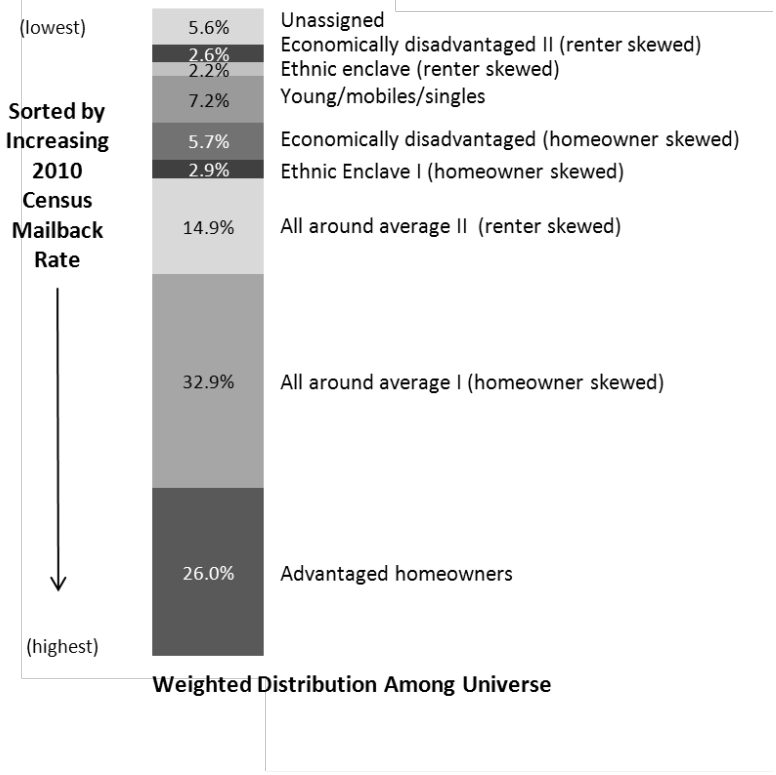
- percent of vacant units,
- percent of multifamily units (density of housing units),
- percent of renter occupied units,
- percent of units with more than 1.5 persons per room (crowding),
- percent of nonspousal units,
- percent of units without telephone,
- percent of people below poverty level,
- percent of units receiving public assistance,
- percent of people unemployed,
- percent of linguistically isolated households,
- percent of people that moved within last year, and
- percent of adults without a high school education.

The original eight segmentation groups represent varying proportions of the housing unit population. In our universe, the largest segmentation group represents about 33 percent of the universe, and the

smallest only about 2 percent. For information regarding the original eight segmentation groups, please see the full report by Bates and Mulry (2011).

We also include a none-of-the-above category called the "Unassigned" group because some ACS sample cases did not map onto the 2000 Census geography or there was no segmentation associated with the geographic entity. Figure 3 shows the distribution of the eight segmentation groups across our universe sorted by increasing Census 2010 mail participate rates (i.e. check-in rates).

Figure 3. Weighted Distribution of the Segmentation Groups among Universe
Source: 2010 Census & 2010 January – June ACS panels, Bates & Mulry (2011)



Program Definitions of Occupancy Status

Both the Census and the ACS programs define what it means to be a housing unit and how to categorize occupancy status. This analysis uses final classifications from both interviewed and noninterviewed units. Interviewed units reflect the 2010 Census and ACS data collection methods described in their interviewer training manuals. We tallied noninterviewed ACS cases as occupied housing units because the ACS weighting methodology treats them as occupied during the nonresponse adjustment. In the Census, the final housing classification for noninterviews is imputed.

Clark (2011) identified the similarities and differences between the training materials used to identify occupancy status by interviewers in the 2010 Census and the 2010 ACS. She found that the occupancy status criteria were generally similar, although some minor differences do exist. The differences relate to reference periods, residency rules, question wording, respondent eligibility, and the incentives in place for interviewers. Clark (2011) concluded that these differences may have slightly contributed to

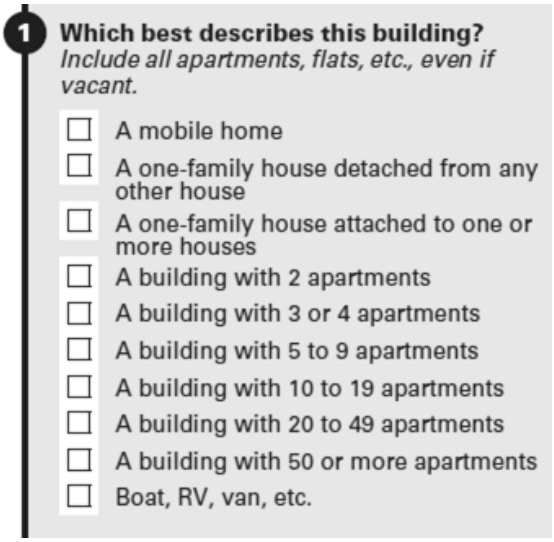
the differences between the Census and ACS results, but none of them explained the differences in their entirety.

Housing Unit Characteristics

From the linked Census and ACS files, we assess the characteristics of inconsistently classified housing units. These characteristic data come from recoded operational and paradata variables. Some of the variables are only available for a particular subset of our universe. These are noted when it is the case. The following paragraphs explain each characteristic.

Structure Type
The ACS asks respondents what type of structure they live in. This question allows us to subdivide the housing inventory into one-family attached or detached homes, buildings of varying unit sizes, mobile homes, and other types. Figure 4 shows this question from the 2010 ACS paper form.

Figure 4. 2010 ACS Structure Type Question from the Paper Questionnaire
Source: ACS-1(2010)KFI



Duration of Vacancy
The ACS collects information on the duration of vacancy for vacant housing units identified in the CAPI operation. The ACS does not collect these data in any other operation, so this variable is only available for a subset of our universe (although CAPI is the source of most ACS vacant housing units). See Figure 5 for this item. These data come from the ACS TMO files.

Figure 5. 2010 ACS CAPI Duration of Vacancy Question
Source: 2010 ACS CAPI Specifications

Q: How many months has this unit been vacant?

- Less than 1 month
- 1 up to 2 months
- 2 up to 4 months
- 4 up to 6 months
- 6 up to 12 months
- 12 up to 24 months
- 24 or more months

We look at duration of vacancy instead of time difference between Census enumeration and ACS interview because, with the January through June panels selected, only a small number of ACS sample addresses have the chance to be interviewed as vacant before March (when the majority of Census mail activities began).

Tenure

Both the Census and the ACS collect data for occupied housing units on tenure (whether residents own or rent). Figures 6 and 7 show these items as they appear on the Census and ACS questionnaires. We recoded variables on the Housing Unit Census Unedited File to obtain Census tenure data. The ACS tenure data come directly from the edited microdata files.

Figure 6. 2010 Census Tenure Question from the Paper Questionnaire
Form: D-61(1-15-2009)

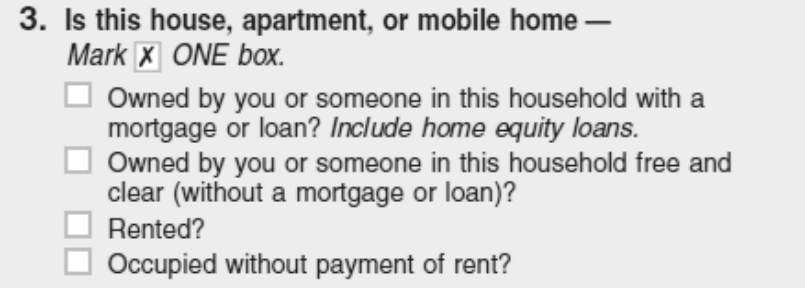
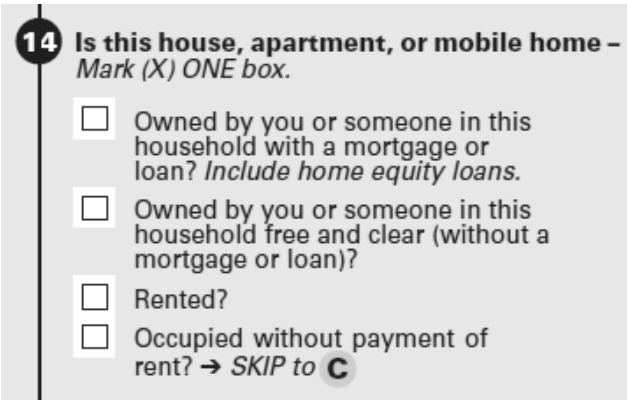


Figure 7. 2010 ACS Tenure Question from the Paper Questionnaire
Source: ACS-1(2010)KFI

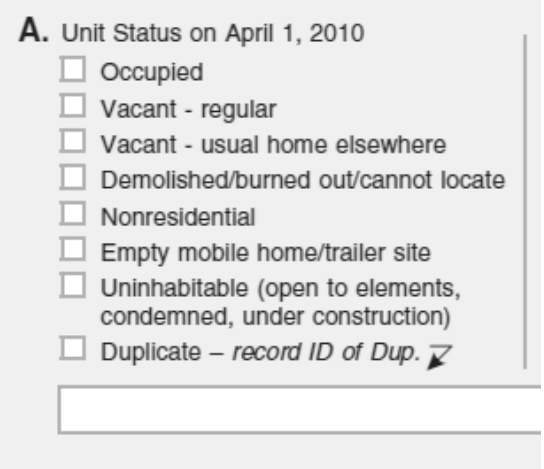


Vacancy Type

The ACS and the Census both collect information on vacant housing units. However, the vacancy data collected and collection methods differ slightly between programs. The Census initially classifies vacant units as "regular" or "usual home elsewhere" and then determines a more specific vacancy type. The category "usual home elsewhere" identifies housing units that are temporarily occupied on Census Day entirely by people with a usual residence elsewhere. The "regular" is a catchall category for units not temporarily occupied.

Figure 8 shows the Census housing unit status question from the enumerator questionnaire. Census enumerators obtain this information during field interviews and record it on the paper enumerator questionnaire. We tabulate these data from the Census Auxiliary Files.

Figure 8. 2010 Census Housing Unit Status Question on the Enumerator Questionnaire
Source: Form D-1(E)



The 2010 Census asks further for all vacant units identified as "regular" or "usual home elsewhere" if they are for rent; rented, but not occupied; for sale; sold, but not occupied; for seasonal, recreational, or occasional use; for migrant workers; or other. This follow up question uses the same answer categories as the ACS vacancy type question. However, in our analysis, we review the initial vacancy classification from the census.

In the ACS, vacant units and temporarily occupied units in which all occupants are staying at the address for less than two months report a type of vacancy to identify their housing market classification. Interviewers ask them about seven different subdivisions. Figure 9 shows the ACS type of vacancy question. ACS interviewers collect this information using automated instruments and we tabulate it from the microdata files.

Figure 9. 2010 ACS Vacancy Type Question
Source: 2010 ACS Automated Instrument Specifications

Q: Is this unit… ?

- For rent
- Rented, not occupied
- For sale only
- Sold, not occupied
- For seasonal, recreational or occasional use
- For migrant workers
- Other vacant

Operational Characteristics

Final Operation

We identify the final data collection operation for each housing unit in our universe. For the 2010 Census, we refer to the data collection operation that took a household's official enumeration as the "final operation". This usually refers to the last operation of contact. For the Census, this involves recoding the check-in dates and flags for various operations on the Operational File and using them to create a new recode that identifies for the final data collection associated with each address. We established a recode because sometimes the information in the Census files was conflicting or missing. In addition, the NRFU and VDC operations used the same check-in date field, so making distinctions between which operation was referenced was difficult and, in some cases, impossible. Thus, the Census final operation recode is imperfect, but accomplishes accurate results for our level of analysis. If a census address has multiple responses, a selection algorithm determines which response provided the most complete enumeration.

In the ACS, the final operation means the operation/mode of the most complete return. Like the Census, if in the ACS a housing unit submits multiple returns, a selection algorithm choses the most complete interview. Each year a small percentage of the ACS sample responds by more than one mode. The ACS final operation variable, on the other hand, was much easier to identify. There is a flag for it on the ACS microdata files. It represents the operation of the selected return chosen by the ACS selection algorithm.

Case History

Since we look at the final data collection operation for housing units, we also look at their data collection history for further detail. Case history refers to the chronological order of the data collection operations in which each case was eligible, ending with the operation of final response ("final operation"). We created a case history recode for both the Census and ACS programs by using the check-in dates associated with specific operations. Again, the Census operational data have some minor issues that make it difficult to identify timing correctly.

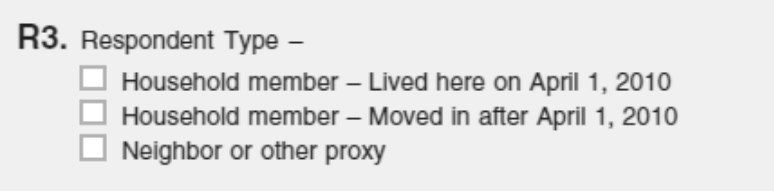
We recoded case history in the Census to focus on the sequence of eligibility for the following operations: Mail, NRFU, VDC, UE/RA/RUE, and Other. The catchall category termed "Other" encompasses the Be Counted returns, TQA interviews, and Fulfillment returns. Also, the "Mail" category includes Update/Leave mail returns. The ACS case history recode focuses on the sequence of eligibility for the ACS mail, TQA, CATI, and CAPI modes.

In-Person Enumeration Paradata

Response Source

The Census and the ACS allow different types of respondents. In the 2010 Census, if a household member that lived at the address on April 1, 2010 was not available, or if the housing unit was vacant or flagged for deletion, then the enumerator could interview a proxy (Heimel, et. al., 2011). Valid proxies were household respondents that moved into the address after April 1, a neighbor, or someone else who said they were informed about the status of the address on April 1. Census enumerators identified the respondent type for each interview they conducted (see Figure 10).

Figure 10. 2010 Census Response Source Question on the Enumerator Questionnaire
Source: Form D-1(E)



In the ACS, almost all responses for occupied housing units come from a household respondent.[10] ACS respondents must be household members who are at least 15 years old. Neighbors, friends, postal workers, etc. may not act as a proxy for occupied or temporarily occupied units. However, in the case of vacant units, ACS interviewers may use knowledgeable respondents such as property mangers, owners, or real estate agents. CAPI interviewers record whether they use a proxy respondent or their own observation to classify a vacant housing unit. This information is only available for ACS vacant housing units interviewed in the CAPI mode.

Number of Total Census Contacts
The 2010 Census recorded how often they contacted each household, regardless of operation. This information is stored on the Census Auxiliary File. Using these data, we are able to identify how many total Census contacts made by an enumerator through out the 2010 Census (this could include multiple interviews).

Metrics

We use two main statistics to assess inconsistency in occupancy status between the Census and the ACS: the gross difference rate and the net difference rate. Historically the Census Bureau uses these statistics to measure response error based on survey reinterviews— errors that may be caused by the respondent, the interviewer, or consequences of the data collection methods that lead to incorrect data (Census Bureau, 1993a). Since the comparison of occupancy status between the 2010 Census to the ACS is not a reinterview, these metrics take on a different meaning in this application. We describe them in context in the next few paragraphs. The following table is referenced for their calculations:

Table 2. Table Used For Assessment Measures

		ACS		
		Occupied	**Vacant**	**Total**
Census	**Occupied**	a	b	a+b
	Vacant	c	d	c+d
	Total	a+c	b+d	n

[10] The only exceptions are for household members who have difficulty answering for themselves, such as an elderly person. In those rare instances, a caregiver may answer for them.

The gross difference rate is defined as (c+b)/n, multiplied by 100. That is the sum of the off-diagonals divided by the total. It measures the proportion of all housing units classified differently between the Census and the ACS. The gross difference rate may range from 0 to 100 percent, with the higher percentage indicating more of the total housing units were inconsistently classified.

The net difference rate is (b-c)/n, multiplied by 100. This measures the percentage point difference in vacancy rates between programs— the Census vacancy rate subtracted from the ACS vacancy rate. The net difference rate may range from -100 to 100 percent. A positive rate indicates a higher vacancy rate in the ACS, and a negative rate indicates a higher vacancy rate in the Census. The magnitude of the rate identifies the percentage point difference in vacancy rates.

Applying the net difference rate may not make sense for some characteristics that we wish to measure inconsistency across. For example, in the Census there is the mail out operation, which only enumerates occupied housing units. This creates a housing unit population whose only possible occupancy status misclassification is in the direction of occupied in the Census and vacant in the ACS. When the incoming housing unit population we wish to measure inconsistency across is highly skewed like this, we choose only to reference the gross difference rate.

RESULTS

1. How often were ACS sample cases classified as housing units in both the Census and the ACS?

To answer this question, we restricted the analysis to the January through June ACS panels because this data collection period closely corresponds with the timing of Census enumeration activities. We found that the Census and the ACS both classified approximately 94.0 percent of the weighted sample addresses as housing units. This indicates that only one of the programs or neither program classified the other 6.0 percent of the weighted sample addresses as housing units.

The chief reason for this difference is that the ACS and Census stem from the same frame, but at different points in time. Prior to the 2010 Census, several update operations added addresses to the Master Address File (MAF). However, the version of the MAF used for the main 2010 ACS sample did not reflect Address Canvassing results and other census operations (Group Quarters validation and Non-Response Follow Up, for example).[11] In contrast, the 2010 Census frame included all these updates. Thus, deleted addresses identified by some of the census update operations were still in scope for the ACS.

A report by Bates (2012) shows that a majority of the addresses that were included in the ACS and deleted by the Census were deleted by the Address Canvassing operation (although other operations deleted them too). Since the task of Address Canvassing was to look at the full list of address on the MAF and determine if any represented the same unit, many of the addresses deleted by the operation were duplicate addresses. Duplicate addresses include instances like “101 Main Street” which is now “101 Elm Street” or a rural address listed as both a description and a 911-style address.

[11] ACS uses MAF data twice a year to support ACS sampling, data collection, and tabulation. ACS uses the MAF extract files delivered in the July to create the main phase sampling frame for the following year. January extracts are used to create a supplemental phase sampling frame for the same year.

The 2010 ACS did not always identify duplicate addresses in its sample because either both addresses were not in sample or a mail return came in for one of the addresses while the other address was sent for telephone or personal visit follow up. The ACS is not a full enumeration; it was not designed to catch duplicate addresses. ACS interviewers were able to identify duplicate addresses only when both of the sample addresses were assigned to the same interviewer.

Anderson and Hefter (2011) also looked at how often both programs classified the ACS sample addresses as a housing unit. Their tabulations summarize differences from the full year of ACS results, unlike the January through June panels analyzed here. They found that 92.1 percent of the sample addresses were housing units in both programs. This rate is about 2 percentage points lower than our estimate, which one might expect since comparison with the full 2010 ACS includes additional cases with large lag times between their Census enumeration and ACS interview.

The remainder of this report focuses on the occupancy status among the January through June ACS sample addresses classified as housing units in both operations. (This is the 94.0 percent of the sample identified earlier.) We refer to these units simply as "housing units" in the later sections.

2. What are the Census and ACS distributions of occupancy status for ACS sample cases classified as housing units in both the Census and the ACS?

Measuring the vacancy rate according to the Census and ACS results and the cross distribution of occupancy status between programs shows how the outcomes of the programs differ. These statistics are specifically measured among the January through June ACS sample addresses classified as housing units in both operations, referred to as simply "housing units" in the remaining text. Using this universe, we are able to exclude the sample addresses that the Census update operations deleted (see results for research question #1).

Table 3 shows the weighted distribution of occupancy status for each program as well as the cross tabulations. The results represent the Census and ACS outcomes for cases that the ACS interviewed close to the time of 2010 Census activities.

Table 3. Weighted Distribution of Occupancy Status– U.S.
Source: 2010 Census & 2010 January – June ACS panels

		ACS		Row Total (Census Total)
		Occupied	Vacant	
Census	Occupied	51,958,741 86.0%	2,305,380 3.8%	54,264,121 89.8%
	Vacant	1,391,146 2.3%	4,794,457 7.9%	6,185,603 10.2%
Column Total (ACS Total)		53,349,887 88.3%	7,099,837 11.7%	60,449,724 100%

The last row and last column in the table show the weighted occupancy and vacancy rates using ACS versus Census results among housing units. According to Census outcomes, the vacancy rate is 10.2 percent; using the ACS outcomes, it is about 11.7 percent. Both of these measures are nominally less than their respective program results: the 2010 Census vacancy rate was 11.4 percent and the 2010 ACS 1-Year vacancy rate was 13.1 ±0.1 percent. Lower vacancy rates in our analysis are explained by the universe we chose. We excluded cases affected by frame differences between the Census and the ACS, as discussed in research question #1, and we subset the ACS sample to the January through June panel cases.

Next, look to the center square in Table 3, which shows the cross distribution of occupancy status among housing units. Note that the Census and ACS classified a majority of housing units similarly; however, the programs classified 2.3 percent as vacant in the Census and occupied in the ACS and 3.8 percent as occupied in the Census and vacant in the ACS. The Census and ACS inconsistently classified more housing units as Census occupied/ ACS vacant than vice versa. In total, the Census and the ACS classified 6.1 percent of housing units differently.

The cross tabulations in Anderson and Hefter (2011) were similar. Their results show 7.8 percent of housing units inconsistently classified: 3.0 percent were vacant in the Census and occupied in the ACS and 4.9 percent were occupied in the Census and vacant in the ACS. These numbers are not exactly the same because Anderson and Hefter used the full year of the 2010 ACS results.

3. How consistent are the Census and ACS occupancy statuses at the national level for housing units in both programs?

We chose to use the gross difference rate and the net difference rate to assess the degree of inconsistency of occupancy status between the Census and the ACS. We define both measures below, starting with gross difference rate.

The gross difference rate identifies the total percentage of housing units with inconsistent occupancy statuses between programs. It is the sum of cases classified as Census occupied/ ACS vacant and Census vacant/ ACS occupied. For example, in the first results section we noted the Census and ACS inconsistently classified 6.1 percent of housing units; this is the gross different rate at the national level. The gross difference rate is a weighted estimate, so there is a margin of error associated with it, which is 0.1 percentage points at the national level.

The net difference rate, however, measures the net effect or the percentage of housing units inconsistently classified more one way versus the other. A positive net difference rate means there were more Census occupied/ ACS vacant units and a negative net difference means there were more Census vacant/ ACS occupied units. As an example, Table 3 showed that the Census classified 3.8 percent of housing units as occupied that the ACS classified as vacant. In addition, the Census classified 2.3 percent of housing units as vacant that the ACS classified as occupied. This nets to 1.5 percent of housing units classified as Census occupied/ ACS vacant (2.3 percent subtracted from 3.8 percent). The margin of error for the national level net difference rate is 0.1 percentage points.

Both of these measures share unique perspectives regarding the inconsistency of occupancy status. A 6.1 percent gross difference rate indicates the overall level of inconsistency associated with classifying the occupancy status of housing units. Some of this discrepancy attributes to real changes in status or

situations classified differently under the Census versus the ACS rules. Clark (2011) reports on the challenges and the similarities and differences of the methods used to classify addresses as occupied and vacant in the Census versus the ACS.

On the other hand, the 1.5 percent net difference rate means that the Census and the ACS inconsistently classified housing units more often as Census occupied/ ACS vacant than vice versa. If the programs inconsistently classified housing units both ways equally, this would have resulted in a zero net difference rate. Baumgarder (2011) concluded that the different residency concepts used in the ACS and the decennial census (criteria for considering when a respondent is also a resident) yield very small differences in occupancy status even at lower levels of geography. Thus, the fact that the Census and the ACS inconsistently classified more housing units as Census occupied/ ACS vacant than vice versa at the national level may be linked with factors other than differences in residency rules.

4a. How does inconsistency in occupancy status vary by geography?

We measured whether inconsistency in occupancy status is unique to certain areas or uniformly distributed across the nation. A geographic clustering of high inconsistency could suggest data collection problems exclusive to a certain area or potential management challenges. A relatively even distribution, in contrast, would mean that inconsistency in classification of occupancy status in the Census and the ACS was evident throughout the nation.

Tabulating gross and net difference rates by Regional Census Center (RCC), U.S. State, and Local Census Office (LCO) provide measures of inconsistency at increasingly smaller levels of geography. RCCs are larger than U.S. States, and states are larger than LCOs. (There were 12 RCCs and 494 LCOs set up across the country during the 2010 Census.)

Figures 11 through 13 show the gross and net difference rates by RCC, U.S. State, and LCO sorted by descending net difference rate. The diamond shape markers indicate the gross difference rate and the open circle markers indicate the net difference rate. Margins of error are included for both measures. As a reminder, the gross difference rate demonstrates the overall percent of inconsistent classifications among housing units. A positive net difference rate means there is a higher vacancy rate in the ACS or that more housing units, as a percentage of the total, are classified as occupied by the Census and vacant by the ACS than vice versa.

Figure 11. Weighted Measures of Occupancy Status Inconsistency– RCC (sorted by descending net difference rate)
Source: 2010 Census & 2010 January – June ACS panels

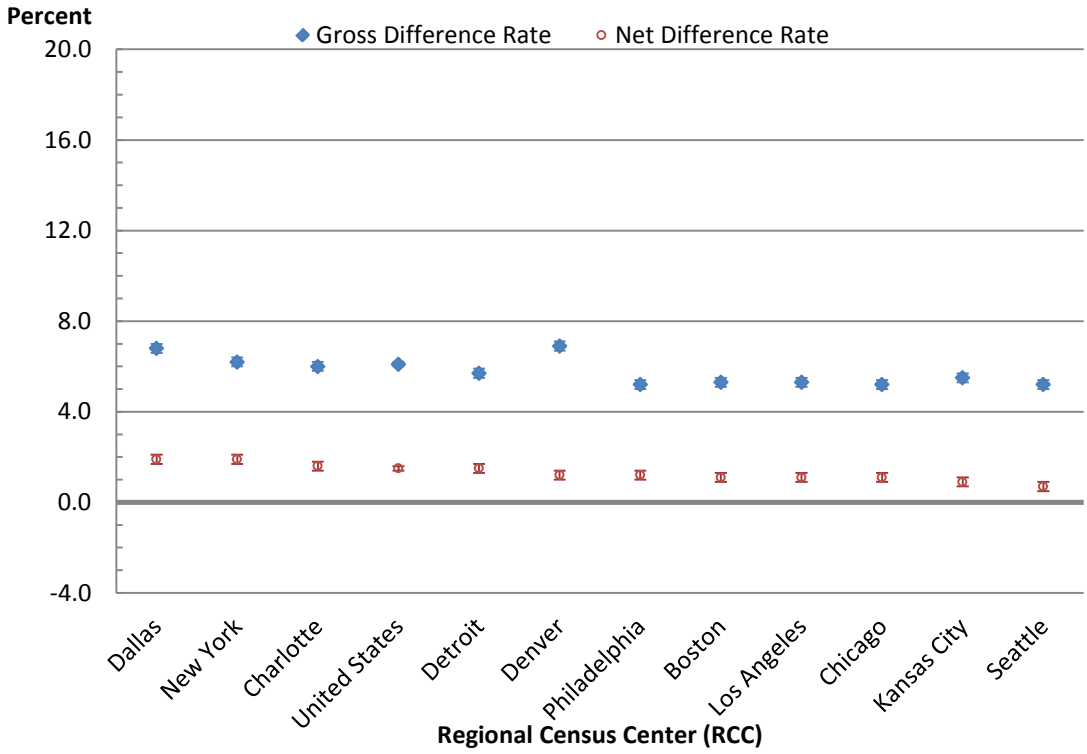


Figure 12. Weighted Measures of Occupancy Status Inconsistency – U.S. State (sorted by descending net difference rate)
Source: 2010 Census and the 2010 January through June ACS panels

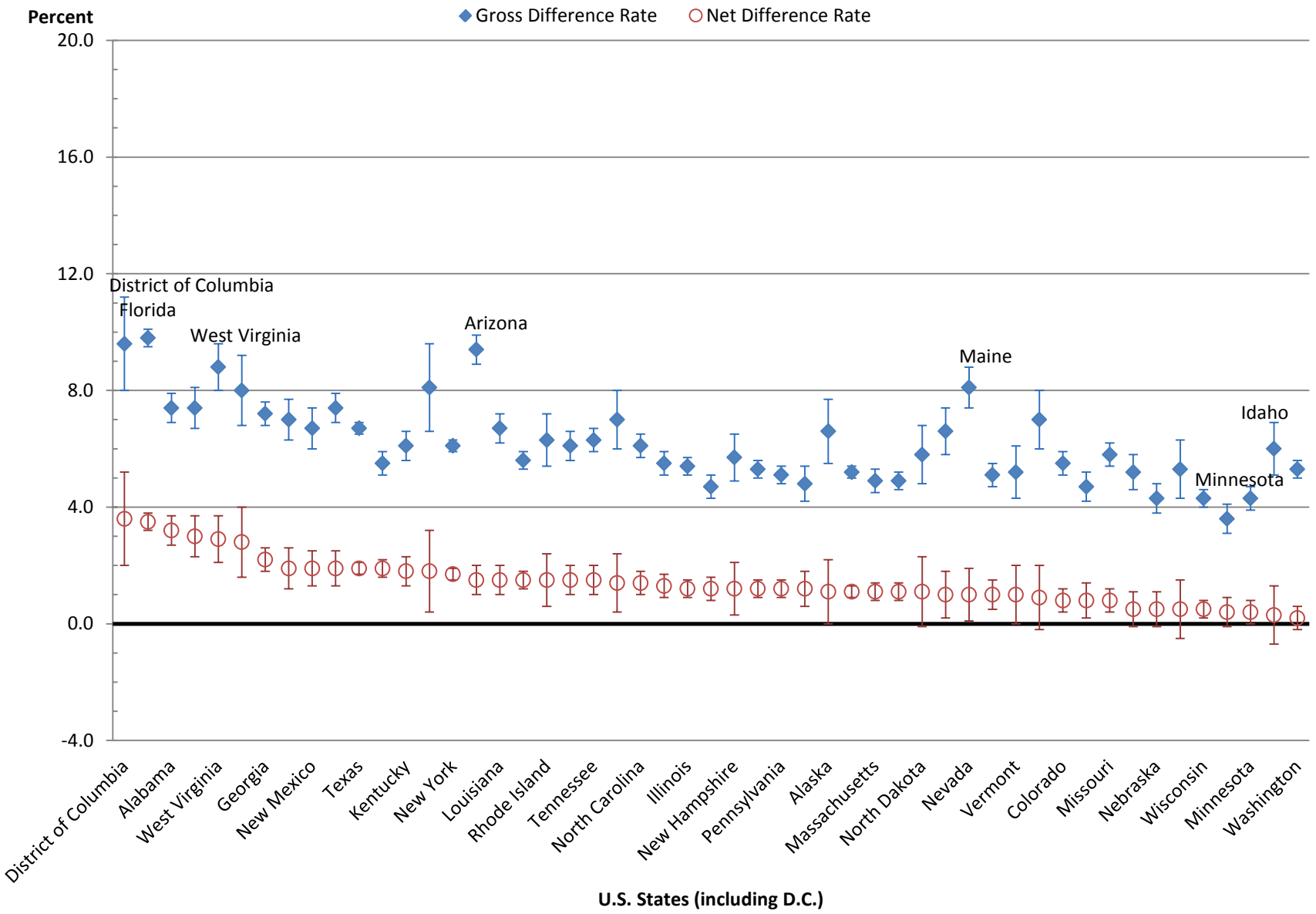
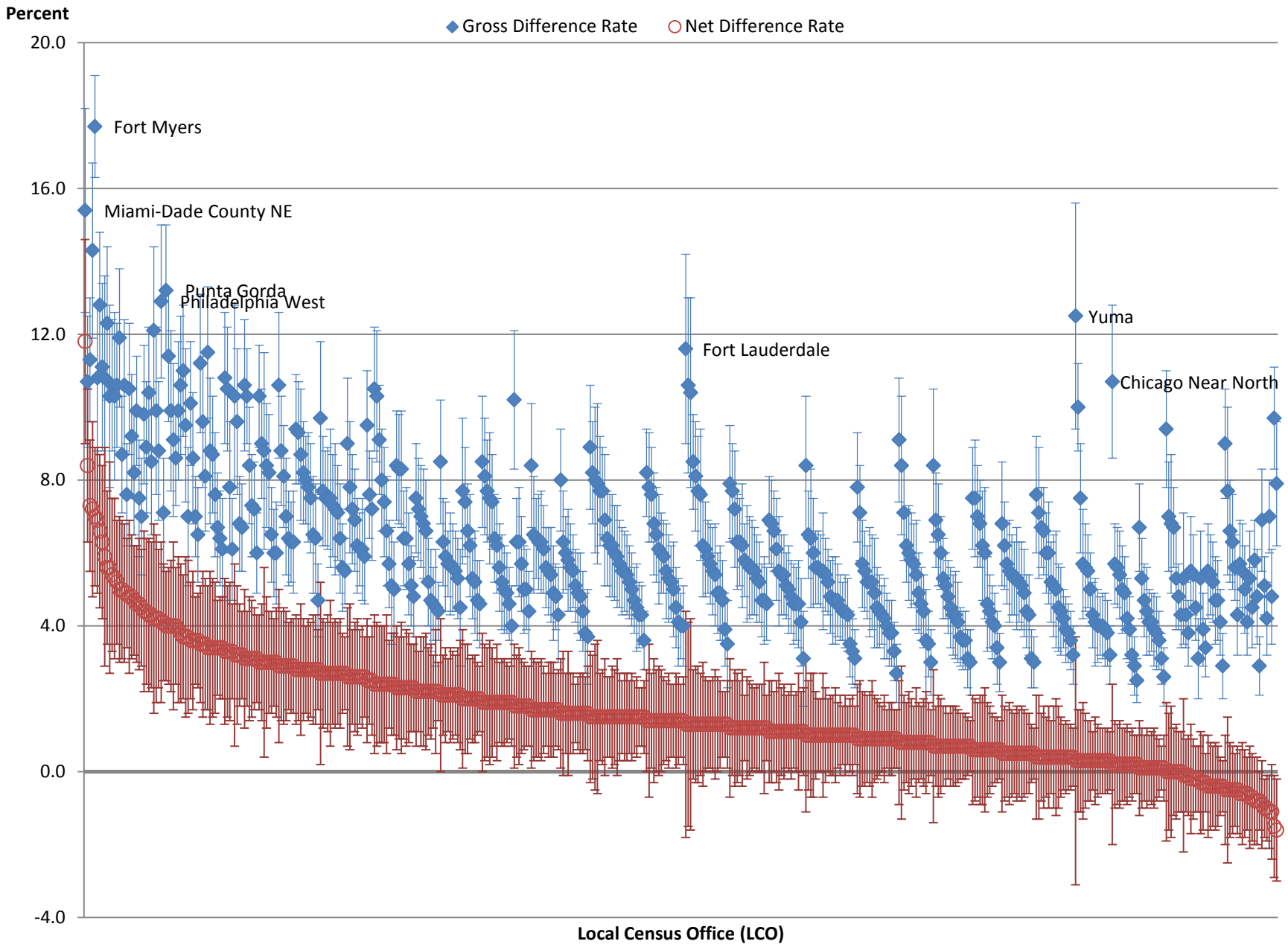


Figure 13. Weighted Measures of Occupancy Status Inconsistency– LCO (sorted by descending net difference rate)
Source: 2010 Census and the 2010 January through June ACS panels



From the charts, you may see that the gross difference rate and the net difference rate follow similar trends. Generally, geographic areas with higher net difference rates tend to have higher gross difference rates. In addition, these figures demonstrate that inconsistency in occupancy status becomes increasingly greater at smaller levels of geography. The range in gross and net difference rates by LCO is much greater than the range of the rates by RCC or even by state. In Figures 12 and 13, we identified selected areas with some of the highest gross difference rates.

The net difference rates by LCO range from about -1.6 percent to about 11.8 percent and the gross difference rates range from about 2.5 percent to about 17.7 percent. LCOs with high gross difference rates generally have high net difference rates such as Fort Myers, FL; Miami-Dade County, FL; Miami East, FL; Punta Gorda, FL; Philadelphia West, PA; Atlanta East, GA; and New York East, NY. A few, however, have low net difference rates with slightly larger margins of error (e.g., Fort Lauderdale,FL; Yuma, AZ; and Chicago Near North, IL). LCOs with low gross difference rates and low net difference rates include Ames, IA; Camden, NJ; and Oshkosh, WI.

Inconsistency in occupancy status is apparent nationwide with pockets of higher inconsistency in various locations. For full summaries of these results by RCC, state, and LCO, please see Appendix A.

4b. How does inconsistency in occupancy status vary by area characteristics and population segmentations?

This question targets the relationship between factors that reflect response behavior tendencies and inconsistent classifications of occupancy status. Certain types of respondents and the characteristics of the places they live may be associated with higher levels of inconsistencies. Two variables that are by-products from the preparations for the 2010 Census can help answer this question: Local Census Office (LCO) types and Census segmentation groups.

The methodology section of this report discusses LCO types and Census segmentation groups in detail (please refer back for more information). Rates by LCO type focus on inconsistencies by the type of area, while the rates by segmentation group look at inconsistencies by populations known to have various response behaviors. Also, keep in mind that the individual LCO types and segmentation groups represent widely varying proportions of the housing unit universe.

Table 4 shows gross and net difference rates by LCO type sorted by most to least remote. Margins of error are included.

Table 4. Weighted Measures of Occupancy Status Inconsistency— LCO Type (sorted by most to least remote)
Source: 2010 Census and the 2010 January through June ACS panels

	Gross Difference Rate		Net Difference Rate	
Local Census Office Type	Percent	Margin of Error	Percent	Margin of Error
United States	6.1	0.1	1.5	0.1
Urban/Hard to Count	7.5	0.2	2.3	0.2
Urban/Metropolitan	5.5	0.1	1.2	0.1
Suburban/Rural	6.1	0.1	1.5	0.1
Rural/Remote	6.8	0.3	1.1	0.3
Alaska	6.6	1.1	1.1	1.1

This table shows that the net difference rate is highest for the Urban/Hard to Count area (2.3 percent). Although the Rural/Remote and Alaska types have gross difference rates similar to that of the Urban/Hard to Count location, their net difference rates are smaller (1.1 percent each). Thus, the Urban/Hard to Count areas have more housing units inconsistently classified as Census occupied/ ACS vacant than vice versa.

Table 5 shows the same metrics by segmentation group. The table displays the groups sorted by ascending rate of participation in the 2010 Census, as listed in Bates and Mulry (2011). However, we do not have a participation rate for the "Unassigned" group, so its gross and net difference rates are shown in the bottom line of the table. We display margins of error for all estimates.

Table 5. Weighted Measures of Occupancy Status Inconsistency— Segmentation Groups
(sorted by ascending rate of participation in the 2010 Census)
Source: 2010 Census, the 2010 January through June ACS panels, and Bates & Mulry (2011)

	Gross Difference Rate		Net Difference Rate	
Census Segmentation Group	Percent	Margin of Error	Percent	Margin of Error
United States	**6.1**	**0.1**	**1.5**	**0.1**
Econ. Disadvantaged Renter skewed	9.3	0.3	3.5	0.4
Single/Unattached/Mobile	9.4	0.3	3.0	0.3
Econ. Disadvantaged Homeowner skewed	7.6	0.3	2.5	0.2
Ethnic Enclave Homeowner skewed	6.1	0.4	1.9	0.4
Ethnic Enclave Renter skewed	7.5	0.4	1.9	0.4
Average Renter skewed	7.0	0.2	1.6	0.2
Average Homeowner skewed	5.7	0.1	1.3	0.1
Advantaged Homeowners	3.7	0.1	0.8	0.1
Unassigned	9.4	0.3	1.4	0.3

Aside from the Unassigned group, the highest gross difference rates are seen for the Single/Unattached/Mobile and the Economically Disadvantaged Renter Skewed groups (both above 9.0 percent). These two groups also have the highest net difference rates (about 3.0 percent or higher). In contrast, the Advantaged Homeowners group had the lowest gross difference rate and the lowest net difference rate (3.7 percent and 0.8 percent, respectively). Differences between these populations that likely attribute to differences in their frequency of inconsistent classifications include how often the residents move, the type of housing units they live in, their level of responsiveness to Bureau programs, and the overall level of vacant units.

4c. How does inconsistency in occupancy status vary by housing unit characteristics?

Debriefing sessions with ACS interviewers in 2011 revealed that certain types of housing units, particularly vacant housing units, are hard to accurately classify. They mentioned difficulty in gaining access into gated communities, determining if units in multi-unit structures or abandoned houses were

occupied or vacant, and finding knowledgeable respondents (Clark, 2011). The ACS collects information on housing unit structure type and the duration of vacancy for vacant units. Both the Census and the ACS also collect a detailed occupancy status and vacancy status, which identify tenure for occupied housing units (owned versus rented) or vacancy type for vacant housing units (if seasonal, for rent, for sale, etc.). Analyzing inconsistency by these characteristics may lead to further insight about the types of housing units that the ACS and the Census inconsistently classified.

Table 6 shows gross and net difference rates for housing units by housing unit structure, as collected by the ACS. These nine categories of housing types account for more than 97 percent of the housing unit universe. The table omits lines for units identified as ACS noninterviews and "other" (boats, RVs, vans, etc.), which make up a small portion of the universe, because their rates are unstable due to small sample sizes.

Table 6. Weighted Measures of Occupancy Status Inconsistency— Housing Unit Structure (sorted by relative size)
Source: 2010 Census, the 2010 January through June ACS panels, and Bates & Mulry (2011)

	Gross Difference Rate		Net Difference Rate	
ACS Building Type	Percent	Margin of Error	Percent	Margin of Error
United States	**6.1**	**0.1**	**1.5**	**0.1**
Detached one-family house	4.2	0.1	1.0	0.1
Attached one-family house	5.6	0.3	1.2	0.3
Mobile home	8.3	0.3	2.6	0.3
Building with 2 apartments	9.7	0.4	3.3	0.4
Building with 3 to 4 apartments	10.5	0.3	2.9	0.4
Building with 5 to 9 apartments	11.3	0.3	3.4	0.4
Building with 10 to 19 apartments	12.1	0.4	4.1	0.4
Building with 20 to 49 apartments	10.9	0.4	3.9	0.5
Building with 50+ apartments	8.7	0.3	2.0	0.4

Table 6 shows that mobile homes and all sizes of multi-unit structures have higher gross difference rates than single-family homes. Buildings with 10 to 19 apartments have the highest gross difference rates (12.1 percent), while Detached Single-Family Homes have the lowest (4.2 percent). Net difference rates are also higher among mobile homes and multi-units when compared with single family homes; however, Buildings with 50+ apartments have a statistically lower net difference rate than other sizes of multi-unit structures. Thus, rates of inconsistency are higher for mobile homes and multi-unit structures, and the Census was more likely to classify housing units of these types occupied when the ACS classified them as vacant.

Both programs capture whether residents rent or own (known as "tenure") or why the unit is vacant. The following tables explore inconsistency among occupied units by tenure first and then inconsistency among vacant units by reason.

Table 7 shows how often the ACS classified as vacant, housing units that the Census classified as occupied. The first line in the table displays this statistic for all Census occupied units and the proceeding lines display it by Census tenure. The table lists tenure categories in the order that they appear in the Census questionnaire. Because we worked with unedited Census data, some cases did not specify their tenure type or selected multiple tenure categories. We note these responses as "Not specified" in the last line of the table. Additionally, we omit cases with an imputed Census status, although rare, from this table.

Table 7. Percent of Census Occupied Housing Units Classified as ACS Vacant by Census Tenure
Source: 2010 Census, the 2010 January through June ACS panels

Census Tenure	Percent Classified as Vacant in the ACS	Margin of Error
All Census Occupieds	4.2	<0.1
Owned with a mortgage	1.8	0.1
Owned free and clear	3.1	0.1
Rented	6.9	0.1
Occupied without payment of rent	7.5	0.5
Not specified	10.4	0.5

The ACS classified Census rented housing units to be vacant more often than Census owned housing units. Roughly 6.9 percent of "Rented" and 7.5 percent of "Occupied without payment of rent" Census occupied units were classified as vacant in the ACS. This is larger than the 1.8 percent of Census owners with a mortgage and 3.1 percent of Census owners owning free and clear that the ACS classified as vacant. We expected higher inconsistency in occupancy status for renters since they are typically more mobile (in regards to their primary residence) than are homeowners. In addition, the ACS classified as vacant roughly 10.4 percent of the "Not specified" Census occupied units. These housing units marked multiple tenure categories or omitted their owner/renter status, which may be an indication that they are harder to classify for various reasons.

Table 8 summarizes the same statistics for ACS occupied housing units. It shows how often the Census classified as vacant, housing units that the ACS classified as occupied. The table lists tenure types in the same order as asked in the ACS questionnaire.

Table 8. Percent of ACS Occupied Housing Units Classified as Census Vacant by ACS Tenure
Source: 2010 Census, the 2010 January through June ACS panels

ACS Tenure	Percent Classified as Vacant in the Census	Margin Of Error
All ACS Occupieds	2.6	<0.1
Owned with a mortgage	1.3	<0.1
Owned free and clear	2.1	0.1
Rented	4.5	0.1
Occupied without payment of rent	4.4	0.4

This table shows that the Census classified ACS rented housing units to be vacant more often than ACS owned housing units. This is similar to the results from the previous table. Roughly 4.5 percent of "Rented" and 4.4 percent of "Occupied without payment of rent" ACS occupied units were classified as vacant in the Census. This is greater than the 1.3 percent of ACS owners with a mortgage and 2.1 percent of ACS owners owning free and clear that the Census classified as vacant.

Table 9 shows how often the ACS classified as occupied, housing units that the Census classified as vacant. The first line in the table displays this statistic for all Census vacant units and the proceeding lines display it for three Census unit types. The first two types listed, "Vacant- regular" and "Vacant- usual home elsewhere", are categories from the Census enumerator questionnaire. The last type, "Not Specified", is our own recode. We recoded units with a missing vacancy type as "Not specified", which represent about 0.2 percent of vacants in our universe. Housing units that enumerators initially recorded as uninhabitable, duplicate, demolished, unable to locate, and nonresidential but were later categorized as vacant are omitted from the table because their margin of error was too large. Additionally, we omit cases with an imputed Census status, which are rare.

Table 9. Percent of Census Vacant Housing Units Classified as ACS Occupied by Census Unit Type
Source: 2010 Census, the 2010 January through June ACS panels

Census Vacancy	Percent Classified as Occupied in the ACS	Margin of Error
All Census Vacants	22.5	<0.1
Vacant- regular	24.7	0.4
Vacant- Ususal home elsewhere	15.7	0.4
Not specified	42.6	4.4

Notice the variation in the percentages of units classified as occupied by the ACS. The ACS classified "Vacant- regular" units as occupied more often than "Vacant- usual home elsewhere" units (about 15.7 percent versus 24.7 percent, respectively), but classified about 42.6 percent of "Not specified" Census vacant housing units as occupied as well. We expected a higher rate of inconsistency for "Vacant- regular" units than "Vacant- usual home elsewhere" units since "Vacant- regular" units may be involved in situations less common than the types of situations that "Usual home elsewhere" units are involved. It is curious that the ACS classified "Not specified" units as occupied much more often than the "Vacant- regular" units.

Table 10 shows how often the Census classified as occupied, housing units that the ACS classified as vacant. This is similar to the previous table, but with respect to vacancy units in the ACS instead of in the Census. The table lists all seven ACS vacancy types asked about in the ACS interview. We sort the data by ascending percent of ACS vacant units classified as occupied by the Census.

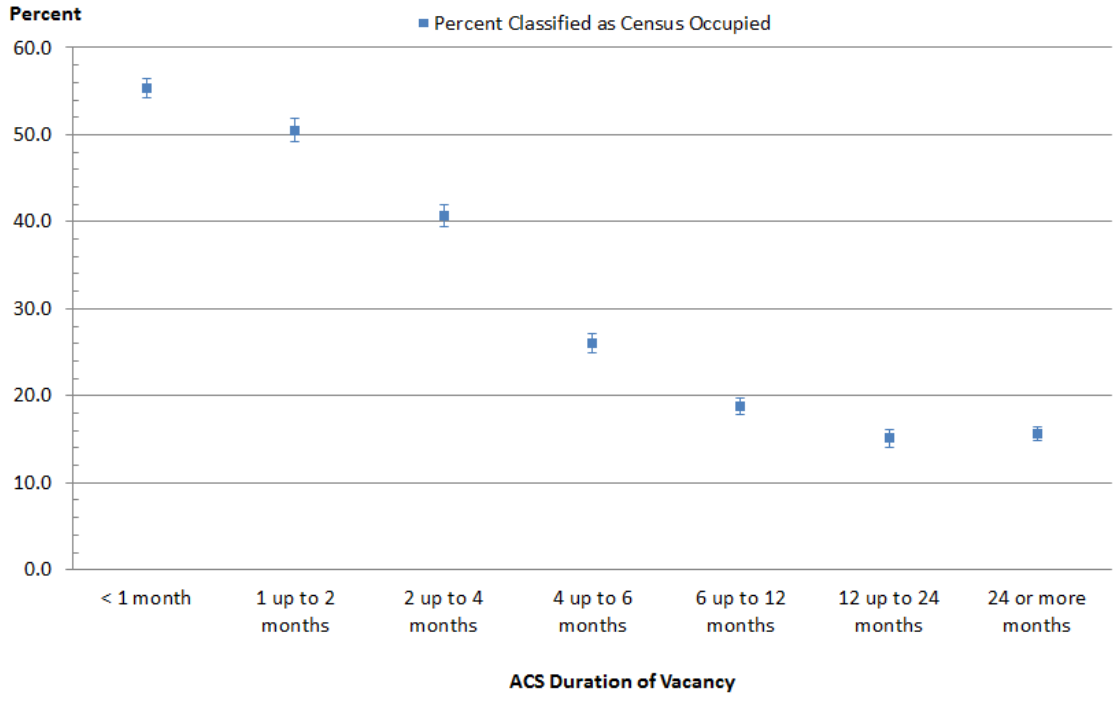
Table 10. Percent of ACS Vacant Housing Units Classified as Census Occupied by ACS Vacancy Type
Source: 2010 Census, the 2010 January through June ACS panels

ACS Vacancy Type	Percent Classified as Occupied in the Census	Margin Of Error
All ACS Vacants	32.5	<0.1
For sale	21.0	0.9
For seasonal, recreational, or occasional use	23.7	0.6
Other vacant	31.3	0.7
Sold, not occupied	32.0	1.7
For rent	45.6	0.9
For migrant workers	46.7	9.6
Rented, not occupied	67.9	1.9

Among vacancy types, there is a wide range in the percent of ACS vacant units classified as occupied by the Census. The Census classified about 45.6 percent of the ACS vacant units that are "For rent" as occupied. ACS vacants that are "For migrant workers" and "Rented, not occupied" have higher inconsistency rates (46.7 percent and 67.9 percent, respectively) than ACS vacant units that are "For Sale" or "For seasonal, recreational, or occasional use" (about 21.0 percent and 23.7 percent, respectively). Looking at inconsistency in occupancy status by tenure and type of vacancy, it appears that there is greater inconsistency for housing units in the rental market. Whether either program ultimately classified them as occupied or vacant, rented units or units for rent always seemed to have the highest rates of inconsistency.

Figure 14 shows the percent of ACS vacant housing units classified as Census occupied by duration of vacancy reported in the ACS. We display the results by increasing length of vacancy.

Figure 14. Percent of ACS Vacant Housing Units Classified as Census Occupied by Duration of ACS Vacancy
Source: 2010 Census and the 2010 January through June ACS panels



There appears to be a strong relationship between the length of vacancy identified by the ACS and the percent classified as occupied by the Census. As duration increases, the rate of inconsistent classifications decreases. For example, the Census classified as occupied 55.4 percent of the housing units that the ACS classified as vacant for "Less than 1 month", while Census classified as occupied only 15.7 percent of the housing units that the ACS classified as vacant for "24 or more months". It is possible that higher levels of differential classification of housing units with shorter duration of vacancies are due to the greater impact differential timing of Census enumeration and ACS interview has on them. It is also likely that recent changes in vacancy status are harder to determine than those that have been standing vacant for long periods.

4d. How does inconsistency in occupancy status vary by data collection operations?

Despite the many differences between the Census and the ACS methodology (explained in the background section), both programs primarily identify vacant housing units in person during their nonresponse follow up operations. This section shows how rates of inconsistency in occupancy status vary by the data collection operations within the two programs.

Several recodes of operational variables from both programs help answer this question. From the 2010 Census, we recoded the final field operation in which a case was worked and the case history leading up to the final field operation. Similarly for the ACS, there is an operational variable for the final interview mode and we recoded the data collection history. For more information on how these recodes were set and the sources of operational data, please see the methodology section of this report.

Tables 11 and 12 display gross difference rates by final operation for each program. We sort both tables by ascending general time of the operations. Margins of error are included for all estimates. For the Census, the recoded value "Other" includes the Be Counted, Telephone Questionnaire Assistance, and Coverage Follow Up operations.

Table 11. Gross Difference Rates— Census Final Operation (sorted by ascending general time of final operation)
Source: 2010 Census and the 2010 January through June ACS panels

	Gross Difference Rate	
Census Final Operation	Percent	Margin of Error
United States	6.1	0.1
UE/RA/RUE	10.8	0.8
Mail	2.7	0.1
Other	6.9	0.3
NRFU	9.6	0.1
VDC	30.3	0.6

As shown in the table, the gross difference rate for Census data collection operations ranges from 2.7 percent to 30.3 percent. Final enumerations from the mail operations, which enumerated only occupied housing units, had the lowest gross difference rate. About 2.7 percent of the final

enumerations from the Census mail operations were all classified as occupied in the Census and vacant in the ACS. On the other hand, final enumerations from the VDC operation, which were addresses previously identified as vacant or deleted units, had the highest gross difference rate (30.3 percent). Of the inconsistently classified addresses that were enumerated in the VDC, most were classified as vacant in the Census and occupied in the ACS. This is opposite from the classification differences of final enumerations in the mail operations.

For a moment, consider that Table 11 sorts the Census operations by their relative time of implementation. The UE/RA/RUE operations started early in 2010 before Census questionnaires were distributed for the mail operations. Most census mail forms were distributed on or before Census Day, April 1, 2010. In general, the Other and NRFU operations followed the mail operations, and the VDC operation followed the NRFU operation. The VDC enumerations were among the last interviews administered in the 2010 Census. (See the background section on 2010 Census methodology for more information.)

Keeping this in mind and viewing the fluctuation of gross difference rates in the table, you may notice that there seems to be a relation between higher rates of inconsistency and Census operations with final enumerations conducted further from Census Day (earlier or later). This relationship could be influenced by the time difference between Census Day and the final enumeration, but also by factors associated with the types of households that are eligible for each operation.

Table 12. Gross Difference Rates— ACS Final Operation (sorted by ascending general time of final operation)
Source: 2010 Census and the 2010 January through June ACS panels

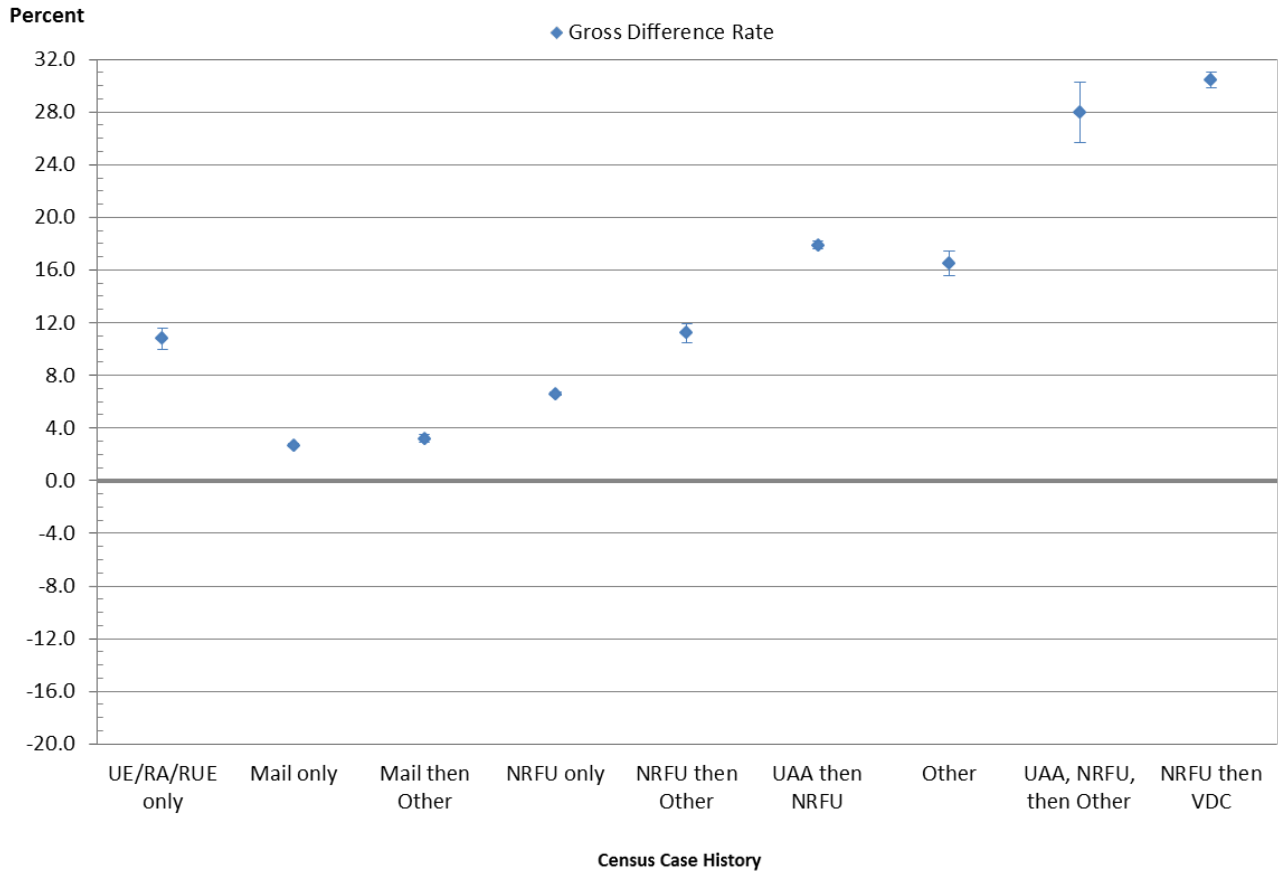
ACS Final Operation	Gross Difference Rate	
	Percent	Margin of Error
United States	6.1	0.1
Mail	1.7	0.0
CATI	3.3	0.1
CAPI	12.5	0.1
Noninterview	5.0	0.4

Table 12 shows gross difference rates by final ACS data collection operation. Unlike the 2010 Census operations, the ACS operations occur continually each month for a new sample panel. Thus, it less likely that the date of interview influences these gross difference rates by operation.

Looking at the table you may notice that the CAPI operation has the highest gross difference rate (12.5 percent). CAPI includes many nonrespondents from the mail and CATI modes along with sample addresses that were ineligible for mail. Additionally, the ACS identifies almost all vacant housing units in CAPI. The 12.5 percent of ACS CAPI final interviews classified inconsistently between programs were classified most often as occupied in the Census and vacant in the ACS. These results indicate greater inconsistency among sample addresses that respond in follow up operations.

To get a closer view of how rates of inconsistency in occupancy status vary by collection methodology, we look at the gross difference rates by Census and ACS case history. Figure 15 shows the Census case history for housing units sorted by ascending general time of the final enumeration operation. Margins of error are included for all estimates. Recall that the Census value "Other" includes the Be Counted, Telephone Questionnaire Assistance, and Coverage Follow Up operations. The ACS value "Other" introduced in the chart represents data collection histories not represented by the other categories.

Figure 15. Gross Difference Rates— Census Case History
(sorted by ascending general time of final operation)
Source: 2010 Census and the 2010 January through June ACS panels



Census enumerations completed by mail have relatively low gross difference rates (as discussed previously). On the other hand, census case histories such as "UAA then NRFU", "UAA, NRFU, then Other", and "NRFU then VDC" had some of the highest gross difference rates (17.9 percent, 28.0 percent, and 30.4 percent respectively). This chart visually shows how inconsistency relates to the timing and nature of the Census operations, as described earlier.

Figure 16. Gross Difference Rates— ACS Case History
(sorted by ascending general time of final operation)
Source: 2010 Census and the 2010 January through June ACS panels

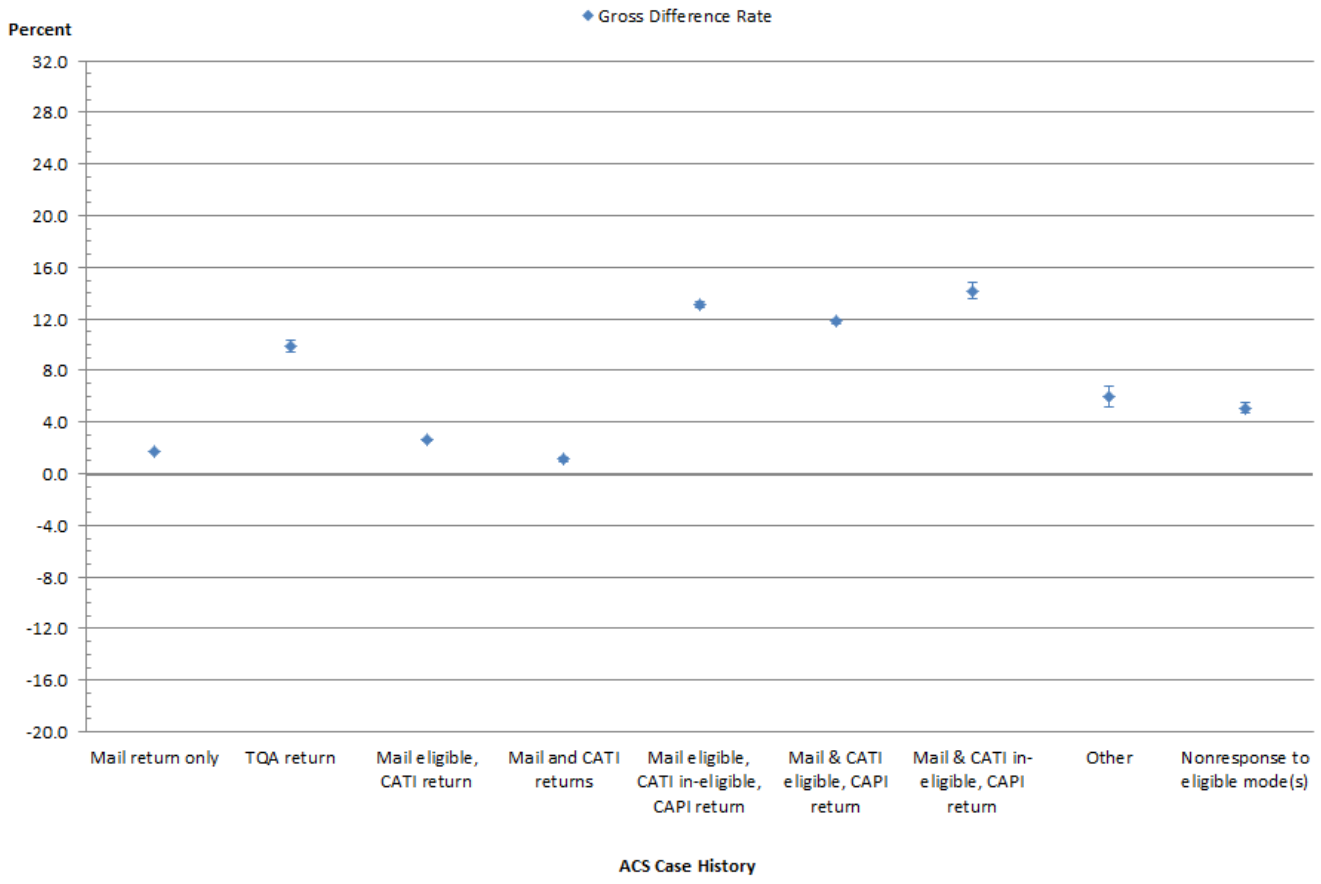


Figure 16 shows gross difference rates by ACS case history. Unlike in the Census, this graph shows no obvious pattern of inconsistency related to the generally timing final operation. However, it appears that ACS mail and CATI returns have relatively low gross difference rates (2.6 percent or less), while returns from CAPI have higher gross difference rates (11.8 percent or greater). This suggests greater inconsistency in occupancy status among sample cases interviewed in the CAPI operation. This is likely a consequence of the types of housing units/ households interviewed in CAPI.

4e. How does inconsistency in occupancy status vary by in-person enumeration/interview methods?

Differences in specific methods used in the field to obtain enumerations/interviews, such as proxy respondents or interviewer persistency, could contribute to inconsistencies between the Census and the ACS. For instance, if the source of information about a vacant unit came from the property's listing agent versus a distant neighbor, the information from the real estate agent may be more accurate.

Paradata from the ACS and Census personal interviewing modes allow us to look at measures of inconsistency by the source of response (who responded for the household) for in-person enumerations/interviews and the total number of contact attempts made in the Census per household. Information regarding the number of contacts in the ACS' CAPI mode was not readily available, so we limited our assessment to the Census variable.

The Census enumerators collected respondent source data for all in-person enumerations (primarily those conducted in the NRFU, VDC, and UE/RA/RUE operations) regardless of whether the unit is occupied or vacant. Enumerators used proxy respondents at their discretion. For more information on the Census respondent source variable, refer back to the methodology section. Table 13 shows the gross and net difference rates by Census respondent source for in-person enumerations. We sort the results by descending net difference rate.

Table 13. Weighted Measures of Occupancy Status Inconsistency— Census Respondent Source
Source: 2010 Census and the 2010 January through June ACS panels

	Gross Difference Rate		Net Difference Rate	
Census Respondent Source	Percent	Margin of Error	Percent	Margin of Error
United States	6.1	0.1	1.5	0.1
Household member on Apr 1st	5.5	0.1	4.9	0.1
Proxy, neighbor or other	17.8	0.2	-5.7	0.3
Proxy, in-mover	47.3	1.3	-40.2	1.3

Respondents who were household members on April 1st, 2010 were the only sources with a positive net difference rate (4.9 percent). This means that when the source was a household member, the Census and the ACS inconsistently classified housing units more often as Census occupied/ ACS vacant than vice versa (which is the same trend observed nationally). On the other hand, when the source was an in-mover the Census and the ACS inconsistently classified housing units more often as Census vacant/ ACS occupied than vice versa. About 47.3 percent of enumerations with proxy respondents were inconsistently classified as Census vacant/ ACS occupied. This is a large proportion, but is likely due to real change in occupancy status between the time of Census enumeration and ACS interview or could indicate that the in-movers were not well informed of the previous occupancy at their address.

In the ACS, interviewers conduct most occupied housing unit interviews with a household respondent who is at least 15 years of age. The ACS does not allow proxy respondents except in rare circumstances or for vacant interviews (see the methodology section for more detail). Thus, the ACS only collects the source of response for vacant housing units during CAPI. Interviewers must first try to locate a knowledgeable respondent such as a landlord or apartment manger or, if they cannot then, they may classify the unit vacant by "observation only". Table 14 shows measures of inconsistency by type of proxy for vacant units.

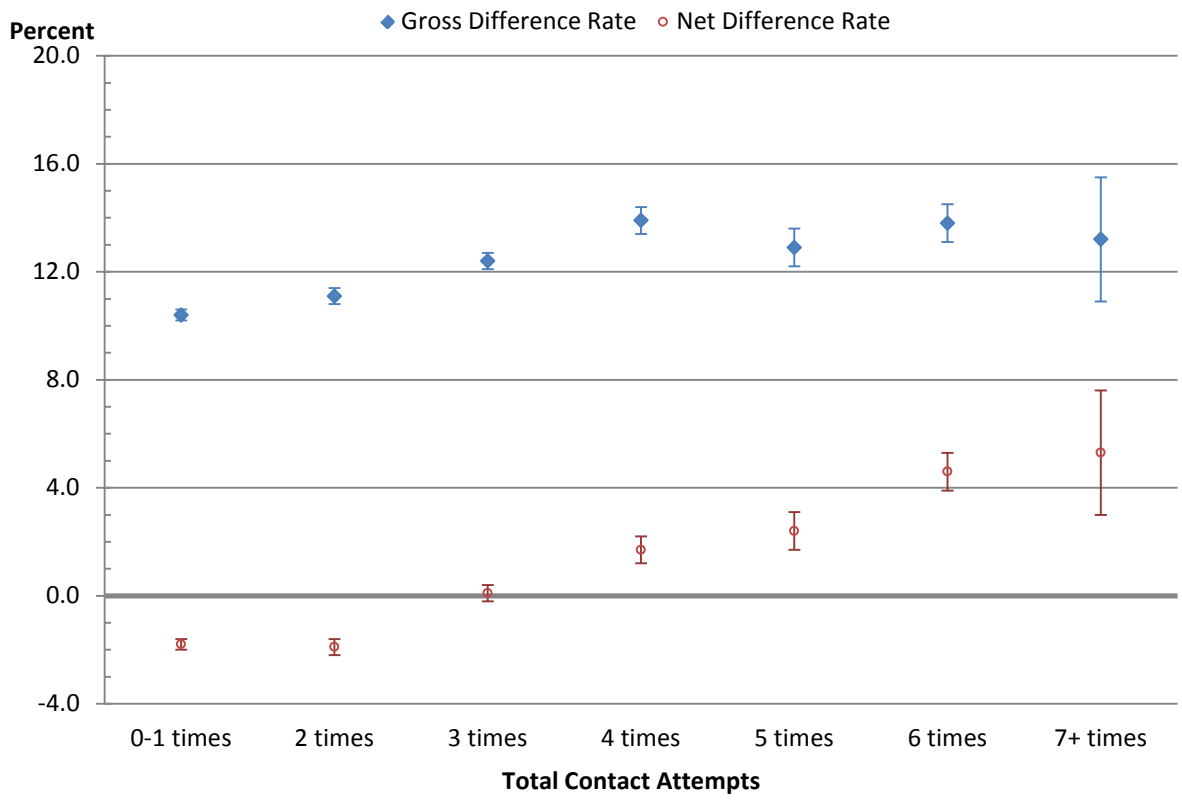
Table 14. Percent of ACS Vacant Housing Units Classified as Census Occupied by ACS Response Source
Source: 2010 Census and the 2010 January through June ACS panels

ACS Respondent Source	Percent Classified as Occupied in the Census	Margin of Error
All ACS Vacants	**32.5**	**<0.1**
Interviewer Observation Only	32.5	1.4
Proxy Respondent	32.2	0.5
Noninterview	5.0	0.4

The percent of ACS vacant housing units classified as occupied in the Census is not statistically different for vacant units interviewed with a proxy respondent than by those interviewed by observation only. The Census classifies ACS vacant housing units, whether interviewed by proxy or observation alone, inconsistently about 32.5 percent of the time.

We also measure inconsistency in occupancy status by the number of total census contact attempts made per address. We summarize this information in Figure 17 for cases with final enumerations from the NRFU, VDC, and UE/RA/RUE operations. The graph sorts results by increasing number of total contact attempts.

Figure 17. Weighted Measures of Occupancy Status Inconsistency— Census Total Contact Attempts
Source: 2010 Census and the 2010 January through June ACS panels



As the number of total contact attempts per address increases, the net difference rates and, to some degree, the gross difference rates increase. About 10.4 percent of the final enumerations with 0-1 visits were classified inconsistently, while about 13.8 percent of the final enumerations with 6 visits were classified inconsistently. This suggests more total contact attempts have a higher likelihood to be inconsistently classified and are more often inconsistently classified as Census occupied/ ACS vacant than vice versa. There are many possible explanations for this. One reason may be that vacant housing units have a greater chance of becoming occupied units the longer it takes for a final enumeration that the address was in multiple Census Bureau enumeration operations.

5. Do certain characteristics explain the majority of inconsistency in occupancy classification for addresses determined to be housing units in both programs?

We cannot conclude from high inconsistency rates alone that a given characteristic component accounts for a large portion of inconsistent classifications. The reason for this is that their distributions vary across housing units. For example, the smallest LCO type represents about 0.2 percent of housing units in our universe while the largest represents about 51 percent. To answer whether certain characteristics explain most of the inconsistency, we must observe their frequency among all housing units in combination with their rates of inconsistency.

The first column in Table 15 displays the distribution of our entire study universe across five characteristics (LCO type, segmentation group, ACS building type, Census case history, and ACS case history). For example, about 12.8 percent of our study universe come from the LCO type "Urban/Hard to Count". The second column displays the distribution of inconsistently classified housing units among our study universe across the same five characteristics. ("Inconsistently classified housing units" refers to the sum of housing units classified as Census occupied / ACS vacant or Census vacant/ ACS occupied. This is the total number of inconsistently classified housing units, not the net affect.) For example, about 15.7 percent of the inconsistently classified housing units were in "Urban/Hard to Count" LCOs. Sampling errors are associated with each percentage, although we did not calculate them here.

Table 15 highlights the lines of characteristic components accounting for about more than 25 percent of the total inconsistently classified housing units. In addition, for ease of reference, the far right column restates the national level gross difference rate among our study universe for each characteristic.

Table 15. Distribution of Characteristics among Inconsistently Classified Housing Units
Source: 2010 Census and the 2010 January through June ACS panels

	Distribution Among Universe (%)	Distribution Among Inconsistently Classified HUs (%)	Gross Difference Rate	
			Percent	Margin of Error
LCO Type				
United States	100.0	100.0	6.1	0.1
Urban/Hard to Count	12.8	15.7	7.5	0.2
Suburban/Rural	50.7	50.7	6.1	0.1
Urban/Metropolitan	32.0	28.6	5.5	0.1
Rural/Remote	4.3	4.8	6.8	0.3
Alaska	0.2	0.2	6.6	1.1
Segmentation Groups				
United States	100.0	100.0	6.1	0.1
Econ. Disadvantaged Renter skewed	2.6	4.0	9.3	0.3
Single/Unattached/Mobile	7.2	11.0	9.4	0.3
Econ. Disadvantaged Homeowner skewed	5.7	7.1	7.6	0.3
Ethnic Enclave Homeowner skewed	2.9	2.9	6.1	0.4
Ethnic Enclave Renter skewed	2.2	2.7	7.5	0.4
Average Renter skewed	14.9	17.0	7.0	0.2
Average Homeowner skewed	32.9	30.9	5.7	0.1
Advantaged Homeowners	26.0	15.7	3.7	0.1
Unassigned	5.6	8.6	9.4	0.3
ACS Building Type*				
United States	100.0	100.0	6.1	0.1
Detached one-family house	60.9	41.4	4.2	0.1
Attached one-family house	5.8	5.3	5.6	0.3
Mobile home	5.8	7.9	8.3	0.3
Building with 2 apartments	3.7	5.9	9.7	0.4
Building with 3 to 4 apartments	4.3	7.3	10.5	0.3
Building with 5 to 9 apartments	4.7	8.7	11.3	0.3
Building with 10 to 19 apartments	4.4	8.7	12.1	0.4
Building with 20 to 49 apartments	3.5	6.2	10.9	0.4
Building with 50+ apartments	4.8	6.8	8.7	0.3
Census Case History				
United States	100.0	100.0	6.1	0.1
UE/RA/RUE only	0.9	1.5	10.8	0.8
Mail only	59.2	25.8	2.7	0.1
Mail then Other	2.6	1.3	3.2	0.3
NRFU only	23.8	25.9	6.6	0.1
NRFU then Other	1.1	2.1	11.2	0.7
UAA then NRFU	8.2	24.0	17.9	0.3
Other	0.7	2.0	16.5	0.9
UAA, NRFU, then Other	0.2	0.9	28.0	2.3
NRFU then VDC	3.3	16.4	30.4	0.6
ACS Case History				
United States	100.0	100.0	6.1	0.1
Mail return only	49.9	13.8	1.7	0.0
TQA return	0.7	1.2	9.9	0.5
Mail eligible, CATI return	6.8	2.9	2.6	0.1
Mail and CATI returns	1.1	0.2	1.1	0.2
Mail eligible, CATI in-eligible, CAPI return	20.2	43.3	13.1	0.2
Mail & CATI eligible, CAPI return	17.5	33.6	11.8	0.2
Mail & CATI in-eligible, CAPI return	1.3	3.0	14.2	0.6
Other only	0.3	0.3	6.0	0.8
Nonresponse to eligible mode(s)	2.2	1.8	5.1	0.4

* The table omits lines in the ACS Building Type section for ACS noninterviews and "other" (boats, RVs, vans, etc.), which makes up a small portion of housing units, because they have unstable rates due to sample size.

Note: Each of the first two columns sum to 100 percent by characteristic, although rounding error may affect the total.

From the table it appears that some components with relatively low inconsistency account for substantial proportions of the housing units classified inconsistently. For example, the Census enumerations conducted by the mail and NRFU operations only have low gross difference rates, yet they account for about 51.7 percent of the gross inconsistently classified housing. Another example is that 63.6 percent of the inconsistently classified housing units came from the Average Homeowner, Average Renter, and Advantaged Homeowner segmentation groups, which had low gross and net difference rates compared to the Single/Unattached/Mobile and Economically Disadvantaged Renter skewed groups.

This demonstrates that any characteristic component that makes up a majority of the housing units in the universe has the ability to make up a large majority of the inconsistently classified units with even a low rate of inconsistency. Additionally, these results suggest there are many characteristics associated with inconsistent occupancy status classifications. There does not appear to be one unique component driving inconsistencies at the national level, and many of these characteristics are related.

CONCLUSIONS

From the operational factors and population and housing characteristics we looked at, we did not find a single factor, or a short list of factors, that accounted for all or most of the total inconsistencies in the universe. Although we did find some of the factors to have a higher likelihood of inconsistency than others, they do not account for most of the national level inconsistency. Differential classifications occur in all parts of the country and among all housing and population groups. The characteristics and methods associated with moderate and lower levels of inconsistency involve the largest proportion of housing units across the nation.

A higher proportion of mobile populations, multi-unit residential structures and mobile homes, and units interviewed in certain modes of Census and ACS data collection were classified inconsistently compared with other groups. However, a greater total number of housing units without those characteristics were inconsistently classified at the national level. Similarly, while there were areas in the country with higher proportions of inconsistency (e.g. Fort Myers, FL; Miami, FL; Punta Gorda, FL; Atlanta, GA; and Philadelphia, PA), there were more total inconsistently classified housing units outside of areas like these. Eliminating the inconsistent classifications from only the groups with the highest inconsistency rates would have a minimal impact on the national difference.

This reminds us that we need to pay close attention to the data collection methods and training even for populations and areas that have been historically easiest to enumerate/interview. We need to develop more effective methods to reduce error in housing status classifications. Further research is needed to determine the best approach. Given that both the Census and the ACS are tasked with producing high quality estimates for low levels of geography, we need to see what changes in data collection would improve the accuracy of all housing unit statuses.

This study alone cannot determine the primary reason(s) for inconsistency in occupancy status. As mentioned, the housing unit classification results vary among small areas, so the reason(s) involved may vary too. We also recognize that the time between Census enumeration and ACS interview (sometimes two months or more) was long enough for some housing units such that a real change in occupancy status may have occurred. In addition, Census enumerations took place in spring 2010

while a large wave of foreclosures swept the nation. A multivariate analysis would provide additional information to better understand classification inconsistencies.

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APPENDIX A. Measures of Inconsistency by RCC, State, and LCO

Table 1. Weighted Measures of Occupancy Status Inconsistency— RCC
Source: 2010 Census & 2010 January - June ACS panels

Regional Census Center	Gross Difference Rate		Net Difference Rate	
	Percent	Margin of Error	Percent	Margin of Error
United States	6.1	0.1	1.5	0.1
Atlanta	8.8	0.2	3.1	0.2
Boston	5.3	0.2	1.1	0.2
Charlotte	6.0	0.2	1.6	0.2
Chicago	5.2	0.2	1.1	0.2
Dallas	6.8	0.2	1.9	0.2
Denver	6.9	0.2	1.2	0.2
Detroit	5.7	0.2	1.5	0.2
Kansas City	5.5	0.2	0.9	0.2
Los Angeles	5.3	0.2	1.1	0.2
New York	6.2	0.2	1.9	0.2
Philadelphia	5.2	0.2	1.2	0.2
Seattle	5.2	0.2	0.7	0.2

Table 2. Weighted Measures of Occupancy Status Inconsistency— U.S. State and the District of Columbia
Source: 2010 Census & 2010 January - June ACS panels

State	Gross Difference Rate		Net Difference Rate	
	Percent	Margin of Error	Percent	Margin of Error
United States	6.1	0.1	1.5	0.1
Alabama	7.4	0.5	3.2	0.5
Alaska	6.6	1.1	1.1	1.1
Arizona	9.4	0.5	1.5	0.5
Arkansas	7.0	0.7	1.9	0.7
California	5.2	0.2	1.1	0.2
Colorado	5.5	0.4	0.8	0.4
Connecticut	4.7	0.5	0.8	0.6
Delaware	8.0	1.2	2.8	1.2
District of Columbia	9.6	1.6	3.6	1.6
Florida	9.8	0.3	3.5	0.3
Georgia	7.2	0.4	2.2	0.4
Hawaii	7.0	1.0	0.9	1.1
Idaho	6.0	0.9	0.3	1.0
Illinois	5.4	0.3	1.2	0.3
Indiana	5.5	0.4	1.3	0.4
Iowa	3.6	0.5	0.4	0.5
Kansas	5.2	0.6	0.5	0.6
Kentucky	6.1	0.5	1.8	0.5
Louisiana	6.7	0.5	1.5	0.5
Maine	6.6	0.8	1.0	0.8
Maryland	4.7	0.4	1.2	0.4
Massachusetts	4.9	0.4	1.1	0.3
Michigan	5.6	0.3	1.5	0.3
Minnesota	4.3	0.4	0.4	0.4
Mississippi	7.4	0.7	3.0	0.7
Missouri	5.8	0.4	0.8	0.4
Montana	7.0	1.0	1.4	1.0
Nebraska	4.3	0.5	0.5	0.6
Nevada	8.1	0.7	1.0	0.9
New Hampshire	5.7	0.8	1.2	0.9
New Jersey	4.9	0.3	1.1	0.3
New Mexico	6.7	0.7	1.9	0.6
New York	6.1	0.2	1.7	0.2
North Carolina	6.1	0.4	1.4	0.4
North Dakota	5.8	1.0	1.1	1.2
Ohio	5.3	0.3	1.2	0.3
Oklahoma	7.4	0.5	1.9	0.6
Oregon	5.1	0.4	1.0	0.5
Pennsylvania	5.1	0.3	1.2	0.3
Rhode Island	6.3	0.9	1.5	0.9
South Carolina	6.1	0.5	1.5	0.5
South Dakota	5.3	1.0	0.5	1.0
Tennessee	6.3	0.4	1.5	0.5
Texas	6.7	0.2	1.9	0.2
Utah	4.8	0.6	1.2	0.6
Vermont	5.2	0.9	1.0	1.0
Virginia	5.5	0.4	1.9	0.3
Washington	5.3	0.3	0.2	0.4
West Virginia	8.8	0.8	2.9	0.8
Wisconsin	4.3	0.3	0.5	0.3
Wyoming	8.1	1.5	1.8	1.4

Table 3. Weighted Measures of Occupancy Status Inconsistency—LCO
Source: 2010 Census & 2010 January – June ACS panels

RCC	Local Census Office (LCO)	Gross Difference Rate		Net Difference Rate	
		Percent	Margin of Error	Percent	Margin of Error
United States		6.1	0.1	1.5	0.1
Atlanta	Albany	6.2	1.4	1.3	1.7
Atlanta	Alpharetta	6.6	1.5	2.4	1.9
Atlanta	Apopka	9.9	1.5	4.6	1.6
Atlanta	Athens	10.8	2.0	6.9	2.0
Atlanta	Atlanta North	12.1	2.3	4.2	2.6
Atlanta	Atlanta South	9.1	2.1	4.0	2.3
Atlanta	Augusta	8.9	1.7	1.5	1.8
Atlanta	Birmingham	7.2	1.3	3.1	1.4
Atlanta	Brooksville	8.1	1.5	1.3	1.6
Atlanta	Broward County	8.2	1.2	1.4	1.4
Atlanta	Clearwater	8.7	1.8	2.8	1.8
Atlanta	Cocoa	8.1	1.4	2.9	1.6
Atlanta	Columbus	7.6	1.4	4.9	1.5
Atlanta	Dalton	6.1	1.4	1.1	1.4
Atlanta	Daytona Beach	12.8	2.0	6.6	2.1
Atlanta	Decatur	7.5	1.3	2.7	1.4
Atlanta	Delray Beach	9.3	1.4	2.8	1.4
Atlanta	Douglasville	5.7	1.5	0.3	1.6
Atlanta	Duluth	4.8	1.0	1.1	1.3
Atlanta	Fort Lauderdale	11.6	2.6	1.3	3.1
Atlanta	Fort Myers	17.7	1.4	7.0	1.9
Atlanta	Gadsden	7.5	1.5	2.8	1.3
Atlanta	Gainesville, FL	6.7	1.5	3.4	1.3
Atlanta	Gainesville, GA	8.4	1.5	2.3	1.7
Atlanta	Hialeah	5.1	1.1	2.3	1.2
Atlanta	Hillsborough County	9.0	1.5	3.0	1.6
Atlanta	Hollywood	9.4	1.6	0.0	1.9
Atlanta	Homestead	7.5	1.5	2.2	1.5
Atlanta	Huntsville	5.6	1.2	1.9	1.1
Atlanta	Jacksonville North	7.0	1.4	2.2	1.5
Atlanta	Jacksonville South	6.5	1.3	1.4	1.4
Atlanta	Lakeland	10.3	1.3	3.1	1.3
Atlanta	Macon	8.4	1.6	3.1	1.7
Atlanta	Marietta	5.7	1.2	-0.6	1.2
Atlanta	Miami East	14.3	2.4	7.2	2.4
Atlanta	Miami South	11.1	2.3	6.3	2.1
Atlanta	Miami-Dade County Northeast	15.4	2.8	11.8	2.8
Atlanta	Mobile	7.8	1.5	2.8	1.4
Atlanta	Montgomery	5.2	1.4	2.0	1.2
Atlanta	Ocala	9.4	1.5	2.8	1.5
Atlanta	Orlando	8.6	1.8	3.6	1.9
Atlanta	Pensacola	8.5	1.3	1.3	1.5
Atlanta	Phenix City	7.6	1.7	3.4	1.8
Atlanta	Pompano Beach	9.1	1.7	0.8	1.7
Atlanta	Port St. Lucie	11.5	1.8	3.4	1.7

RCC	Local Census Office (LCO)	Gross Difference Rate		Net Difference Rate	
		Percent	Margin of Error	Percent	Margin of Error
United States		6.1	0.1	1.5	0.1
Atlanta	Punta Gorda	13.2	1.8	4.0	1.5
Atlanta	Sanford	11.3	1.7	7.3	1.8
Atlanta	Sarasota	11.4	1.8	4.0	1.6
Atlanta	Savannah	7.7	1.5	1.3	1.6
Atlanta	Shelby County	8.2	1.6	3.0	1.4
Atlanta	St. Petersburg	8.4	1.7	3.0	1.8
Atlanta	Stockbridge	6.8	1.3	3.2	1.4
Atlanta	Tallahassee	9.1	1.5	2.4	1.6
Atlanta	Tampa	7.2	1.5	2.6	1.3
Atlanta	Tuscaloosa	10.7	1.8	8.4	2.1
Atlanta	Waycross	5.1	1.6	2.4	1.4
Atlanta	West Palm Beach	10.6	1.7	5.2	1.7
Boston	Albany	6.7	1.2	3.2	1.2
Boston	Augusta	6.7	1.2	0.1	1.3
Boston	Bangor	5.7	1.4	2.3	1.5
Boston	Batavia	4.3	1.0	1.0	0.8
Boston	Beverly	5.5	1.3	-0.4	1.4
Boston	Boston North	7.5	1.9	2.7	2.0
Boston	Boston South	7.0	1.9	3.7	2.1
Boston	Bridgeport	5.8	1.3	0.8	1.2
Boston	Buffalo	7.4	1.3	1.9	1.5
Boston	Burlington	5.2	0.9	1.0	1.0
Boston	Concord	4.6	1.0	2.2	1.0
Boston	Elmira	6.4	1.1	1.7	1.3
Boston	Glens Falls	5.4	1.1	-0.2	1.1
Boston	Hartford	4.7	1.2	1.2	1.8
Boston	Lowell	3.6	0.8	0.4	0.9
Boston	Medford	4.5	1.2	1.5	1.1
Boston	New Bedford	4.5	1.1	0.7	1.1
Boston	New Britain	3.8	1.0	0.1	0.9
Boston	New Haven	4.9	1.1	1.3	1.3
Boston	Newburgh	5.5	1.5	-0.2	1.5
Boston	Norwich	4.7	1.0	1.2	1.2
Boston	Pittsfield	3.1	0.8	0.5	0.8
Boston	Portland	6.9	1.2	1.1	1.4
Boston	Portsmouth	7.0	1.5	0.0	1.6
Boston	Poughkeepsie	4.5	1.1	0.9	1.1
Boston	Providence	8.3	1.6	2.3	1.8
Boston	Rochester	4.3	0.9	1.5	0.8
Boston	Springfield	4.4	1.0	0.6	1.2
Boston	Syracuse	5.1	0.9	0.7	1.1
Boston	Utica	5.7	1.2	2.4	1.2
Boston	Waltham	3.3	0.8	0.9	0.8
Boston	Warwick	5.3	1.2	1.2	1.2
Boston	Waterbury	4.2	0.8	0.4	0.9

RCC	Local Census Office (LCO)	Gross Difference Rate		Net Difference Rate	
		Percent	Margin of Error	Percent	Margin of Error
United States		6.1	0.1	1.5	0.1
Boston	Watertown	6.5	1.4	0.7	1.4
Boston	Worcester	5.1	0.9	1.1	1.0
Boston	Yarmouth	10.3	1.8	2.4	1.7
Charlotte	Alexandria	8.2	1.7	4.7	1.5
Charlotte	Anderson	5.9	1.5	2.1	1.3
Charlotte	Asheboro	3.5	1.2	1.3	1.2
Charlotte	Asheville	7.9	1.7	-1.6	1.4
Charlotte	Ashland	9.6	1.8	3.5	2.0
Charlotte	Beaufort	6.8	1.4	1.4	1.7
Charlotte	Blacksburg/Christiansburg	7.6	1.8	1.3	1.4
Charlotte	Boone	8.4	2.1	0.7	2.1
Charlotte	Bowling Green	5.6	1.2	2.1	1.2
Charlotte	Charleston	8.0	1.4	2.4	1.6
Charlotte	Charlotte	6.9	1.3	0.7	1.1
Charlotte	Charlottesville	6.2	1.3	2.6	1.6
Charlotte	Chattanooga	6.2	1.3	1.9	1.6
Charlotte	Chesapeake	5.6	1.2	1.6	1.1
Charlotte	Columbia, SC	6.3	1.4	1.7	1.4
Charlotte	Columbia, TN	5.5	1.5	1.1	1.6
Charlotte	Concord	5.2	1.5	0.9	1.3
Charlotte	Cookeville	7.4	1.5	2.0	1.5
Charlotte	Covington	5.6	1.4	1.2	1.3
Charlotte	Durham	6.1	1.5	1.4	1.5
Charlotte	Fairfax	3.2	0.8	0.2	1.0
Charlotte	Fayetteville	7.1	1.3	2.7	1.4
Charlotte	Florence	7.5	1.4	0.6	1.5
Charlotte	Fredericksburg	3.7	1.3	1.6	1.3
Charlotte	Gastonia	4.8	1.3	-1.1	1.3
Charlotte	Greensboro	6.4	1.5	2.7	1.5
Charlotte	Greenville, NC	6.2	1.4	2.0	1.1
Charlotte	Greenville, SC	4.6	1.0	0.8	1.0
Charlotte	Henrico County	3.8	1.1	1.6	1.0
Charlotte	Hickory	4.0	1.1	1.9	1.2
Charlotte	Hopkinsville	4.6	1.0	1.1	1.1
Charlotte	Jackson	6.4	1.3	2.3	1.4
Charlotte	Johnson City	6.1	1.2	1.7	1.2
Charlotte	Knoxville	5.3	1.3	-0.3	1.4
Charlotte	Lexington	6.3	1.2	2.1	1.1
Charlotte	Lexington County	5.7	1.6	1.2	1.4
Charlotte	Louisville	4.9	1.1	1.6	1.0
Charlotte	Manassas	4.8	0.9	1.7	1.0
Charlotte	Memphis	7.8	1.5	1.4	2.1
Charlotte	Murfreesboro	5.7	1.2	0.9	1.3
Charlotte	Nashville	6.5	1.2	1.0	1.5
Charlotte	Newport News	5.3	1.2	1.4	1.3

RCC	Local Census Office (LCO)	Gross Difference Rate		Net Difference Rate	
		Percent	Margin of Error	Percent	Margin of Error
United States		6.1	0.1	1.5	0.1
Charlotte	Raleigh	5.7	0.9	2.1	1.0
Charlotte	Richmond	10.8	2.8	5.9	3.0
Charlotte	Roanoke	5.5	1.1	0.9	1.3
Charlotte	Rock Hill	4.4	1.1	1.6	1.1
Charlotte	Rocky Mount	5.3	1.1	0.7	1.1
Charlotte	Shelby County	6.5	1.3	3.0	1.4
Charlotte	Somerset	7.5	1.8	1.9	1.7
Charlotte	Virginia Beach	5.3	1.1	2.0	1.2
Charlotte	Wilmington	6.3	1.4	2.9	1.3
Charlotte	Winston-Salem	5.9	1.4	1.5	1.6
Chicago	Anderson	5.2	1.1	0.4	1.0
Chicago	Bloomington	5.4	1.1	1.5	1.2
Chicago	Carbondale	5.5	0.9	2.7	1.0
Chicago	Champaign	5.6	1.2	2.7	1.1
Chicago	Chicago Central	8.0	2.0	1.5	2.0
Chicago	Chicago Far North	5.5	1.3	1.4	1.1
Chicago	Chicago Far South	8.9	1.8	4.4	2.0
Chicago	Chicago Far Southwest	7.3	1.4	3.1	1.6
Chicago	Chicago Near North	10.7	2.1	0.2	2.2
Chicago	Chicago Near South	8.4	1.9	1.0	2.1
Chicago	Chicago Northwest	7.1	1.3	0.9	1.6
Chicago	Chicago West	10.6	2.0	2.9	2.1
Chicago	DuPage County	3.6	0.8	1.5	1.0
Chicago	Eau Claire	4.0	0.9	0.9	0.8
Chicago	Edwardsville	3.9	1.0	0.3	0.9
Chicago	Elgin	4.4	1.0	0.9	1.0
Chicago	Evansville	4.6	1.2	2.0	0.9
Chicago	Fort Wayne	4.3	0.9	-0.1	1.0
Chicago	Gary	4.9	1.1	1.9	1.1
Chicago	Green Bay	4.0	0.8	0.3	0.9
Chicago	Indianapolis	9.7	2.1	2.7	2.5
Chicago	Joliet	3.0	0.9	0.7	0.7
Chicago	Kenosha	3.0	0.7	0.5	0.7
Chicago	Lafayette	4.7	1.0	0.1	0.9
Chicago	Lemont	4.3	1.1	0.5	1.1
Chicago	Madison	4.4	0.8	1.0	0.8
Chicago	Marion County	8.1	1.5	3.5	1.8
Chicago	Matteson	7.0	1.6	4.5	1.6
Chicago	Milwaukee	6.4	1.9	1.0	1.7
Chicago	Oshkosh	3.1	0.7	0.1	0.6
Chicago	Palatine	4.4	1.2	0.1	1.1
Chicago	Rock Island	3.6	0.8	0.1	0.8
Chicago	Rockford	5.3	1.0	0.5	1.1
Chicago	South Bend	6.2	1.4	1.5	1.1
Chicago	Springfield	4.8	0.9	0.0	1.1

RCC	Local Census Office (LCO)	Gross Difference Rate		Net Difference Rate	
		Percent	Margin of Error	Percent	Margin of Error
United States		6.1	0.1	1.5	0.1
Chicago	Superior	7.0	1.0	-1.1	1.0
Chicago	Vernon Hills	4.5	1.1	-0.7	1.2
Chicago	West Allis	5.4	1.1	1.1	1.3
Dallas	Abilene	7.4	1.5	2.4	1.6
Dallas	Amarillo	4.7	1.1	2.0	1.0
Dallas	Austin	6.7	1.1	0.4	1.2
Dallas	Baton Rouge	7.3	1.4	2.7	1.4
Dallas	Beaumont	8.1	1.6	1.9	1.6
Dallas	Bedford	4.1	0.8	0.1	1.0
Dallas	College Station	10.4	1.8	4.3	2.1
Dallas	Conroe	6.8	1.7	0.5	1.6
Dallas	Corpus Christi	9.2	1.7	4.8	1.7
Dallas	Corsicana	6.0	1.3	1.5	1.3
Dallas	Dallas Central	10.6	2.4	1.3	2.8
Dallas	Dallas North	7.5	1.6	0.6	1.4
Dallas	Dallas South	5.2	1.2	2.2	1.2
Dallas	Denton	6.8	1.2	0.6	1.5
Dallas	Edinburg	8.4	1.7	1.7	1.6
Dallas	El Paso	5.0	1.3	1.4	1.0
Dallas	Fort Worth	5.0	1.2	0.2	1.0
Dallas	Hammond	6.0	1.8	0.6	1.7
Dallas	Harlingen	10.6	1.8	5.4	2.1
Dallas	Harris County E	6.2	1.4	1.5	1.4
Dallas	Harris County NW	6.0	1.0	0.7	1.3
Dallas	Harrison County	9.5	2.1	3.7	2.2
Dallas	Houma	5.0	1.2	-0.6	1.2
Dallas	Houston Central	8.8	2.7	3.0	2.6
Dallas	Houston South	6.4	1.3	3.4	1.4
Dallas	Houston SW	9.9	1.9	3.9	2.0
Dallas	Houston West	7.6	1.6	0.4	1.7
Dallas	Jackson	5.5	1.2	1.5	1.0
Dallas	Lafayette	6.3	1.4	1.6	1.7
Dallas	Lake Charles	5.7	1.4	2.1	1.3
Dallas	Laredo	8.4	1.9	0.8	2.1
Dallas	Longview	6.8	1.2	1.1	1.4
Dallas	Meridian	7.5	1.4	2.7	1.6
Dallas	Mesquite	4.6	1.1	1.1	1.0
Dallas	Midland	7.0	1.1	3.6	1.2
Dallas	Monroe	6.4	1.5	2.8	1.5
Dallas	New Orleans	10.6	1.8	3.1	1.9
Dallas	Plano	5.0	1.0	1.5	1.2
Dallas	San Angelo	9.8	1.9	4.4	2.2
Dallas	San Antonio Central	6.1	1.4	3.3	1.3
Dallas	San Antonio North	5.9	1.3	2.6	1.1
Dallas	San Antonio South	5.5	1.2	1.2	1.1

RCC	Local Census Office (LCO)	Gross Difference Rate		Net Difference Rate	
		Percent	Margin of Error	Percent	Margin of Error
United States		6.1	0.1	1.5	0.1
Dallas	Sherman	6.3	1.3	1.2	1.5
Dallas	Shreveport	7.2	1.6	1.2	1.6
Dallas	Southaven	6.6	1.4	2.2	1.6
Dallas	Sugar Land	6.0	1.2	3.0	1.2
Dallas	Texas City	6.3	1.2	1.2	1.3
Dallas	Tupelo	8.7	1.6	5.0	1.9
Dallas	Victoria	6.9	1.8	1.5	1.6
Dallas	Waco	8.6	1.3	4.0	1.6
Dallas	Williamson County	6.0	1.1	1.4	1.4
Denver	Albuquerque	5.5	1.0	1.0	1.0
Denver	Aurora	4.9	1.2	0.5	1.2
Denver	Billings	6.5	1.6	1.7	1.4
Denver	Bismarck	5.6	1.3	1.2	1.2
Denver	Casper	8.5	2.0	4.3	2.0
Denver	Cheyenne	7.7	2.3	-0.5	2.0
Denver	Colorado Springs	5.4	1.1	-0.4	1.2
Denver	Denver	5.3	1.1	0.1	1.1
Denver	Fargo	6.0	1.5	1.0	1.7
Denver	Flagstaff	10.2	1.9	1.8	1.7
Denver	Grand Junction	11.2	1.9	3.5	1.6
Denver	Great Falls	8.5	1.7	2.1	2.1
Denver	Greeley	4.1	1.1	0.7	1.0
Denver	Henderson	7.8	1.5	0.9	1.5
Denver	Lakewood	3.6	0.8	0.7	0.9
Denver	Las Cruces	6.5	1.6	2.8	1.5
Denver	Las Vegas	10.5	1.7	2.4	1.9
Denver	Lincoln	4.1	0.9	-0.4	0.8
Denver	Missoula	6.2	1.5	0.6	1.5
Denver	North Las Vegas	7.7	1.4	1.9	1.5
Denver	North Platte	5.5	1.2	1.7	1.3
Denver	Ogden	4.3	1.2	0.7	1.1
Denver	Omaha	3.5	0.9	0.8	1.1
Denver	Phoenix Central	9.0	1.8	2.6	1.9
Denver	Phoenix NE	8.3	1.5	2.3	1.4
Denver	Phoenix NW	10.1	1.7	3.6	1.6
Denver	Phoenix SE	10.0	1.2	0.3	1.4
Denver	Phoenix SW	9.7	1.4	-1.5	1.4
Denver	Provo	4.4	1.0	1.0	1.1
Denver	Pueblo	6.0	1.4	0.4	1.4
Denver	Rapid City	5.3	1.4	0.0	1.3
Denver	Reno	6.9	1.4	-0.9	1.2
Denver	Salt Lake City	5.5	1.0	1.6	1.1
Denver	Santa Fe	7.7	1.5	1.5	1.2
Denver	Sioux Falls	5.2	1.3	0.9	1.6
Denver	Tucson (Rural)	8.8	1.5	2.9	1.5

RCC	Local Census Office (LCO)	Gross Difference Rate		Net Difference Rate	
		Percent	Margin of Error	Percent	Margin of Error
United States		6.1	0.1	1.5	0.1
Denver	Tucson (Urban)	7.6	1.3	1.4	1.3
Denver	Westminster	4.0	1.1	1.4	1.2
Denver	Window Rock	11.9	1.9	5.0	2.0
Denver	Yuma	12.5	3.1	0.3	3.4
Detroit	Akron	4.0	0.9	1.4	1.0
Detroit	Battle Creek	5.0	1.1	1.8	1.1
Detroit	Beckley	10.5	1.7	3.3	1.8
Detroit	Bowling Green	3.0	0.9	0.8	0.9
Detroit	Canton	4.8	1.0	1.0	1.1
Detroit	Charleston	6.1	1.0	2.6	1.3
Detroit	Cincinnati Central	10.3	2.5	5.6	2.9
Detroit	Cincinnati Suburban	5.5	1.0	0.3	1.1
Detroit	Clermont County	5.4	1.3	1.7	1.3
Detroit	Cleveland East	10.8	1.8	3.3	2.0
Detroit	Cleveland South	5.1	1.0	1.6	0.8
Detroit	Cleveland West	7.7	1.5	2.7	1.5
Detroit	Columbus Central	9.9	2.2	4.0	1.8
Detroit	Columbus Suburban	5.7	1.3	1.8	1.3
Detroit	Dayton	4.3	1.1	0.7	1.1
Detroit	Dearborn	5.4	1.1	0.5	1.2
Detroit	Detroit East	7.8	1.8	3.3	1.9
Detroit	Detroit West	10.5	1.8	4.8	2.1
Detroit	Flint	5.6	1.1	1.7	1.0
Detroit	Grand Rapids	4.8	1.2	1.6	1.1
Detroit	Kalamazoo	6.4	1.3	2.9	1.2
Detroit	Lansing	6.0	1.1	3.1	1.2
Detroit	Livonia	5.7	1.1	0.8	1.0
Detroit	Macomb County	3.7	0.8	0.7	0.9
Detroit	Mansfield	4.3	1.1	-0.5	1.2
Detroit	Marquette	6.0	1.1	0.4	1.1
Detroit	Morgantown	10.3	1.4	3.0	1.3
Detroit	Mount Pleasant	5.9	1.0	1.3	1.2
Detroit	Muskegon	6.0	1.0	1.6	1.1
Detroit	Newark	4.5	0.9	1.0	1.1
Detroit	Painesville	4.3	0.9	0.3	0.8
Detroit	Pontiac	4.5	0.9	-0.2	0.9
Detroit	Springfield	5.2	1.1	-0.4	1.1
Detroit	Steubenville	5.2	1.3	1.9	1.2
Detroit	Toledo	6.0	1.3	0.8	1.4
Detroit	Traverse City	7.7	1.2	1.5	1.3
Detroit	Warren	5.0	1.2	1.9	1.2
Kansas City	Ames	2.9	0.8	0.2	0.8
Kansas City	Anoka County	3.6	0.8	0.7	0.9
Kansas City	Bemidji	5.1	0.8	-1.0	0.8
Kansas City	Blue Springs	5.7	1.1	0.5	1.2

RCC	Local Census Office (LCO)	Gross Difference Rate		Net Difference Rate	
		Percent	Margin of Error	Percent	Margin of Error
United States		6.1	0.1	1.5	0.1
Kansas City	Cape Girardeau	7.1	1.3	0.8	1.3
Kansas City	Cedar Rapids	3.0	0.8	0.6	0.8
Kansas City	Columbia	7.2	1.4	2.2	1.1
Kansas City	Des Moines	3.9	1.0	1.3	0.9
Kansas City	Duluth	5.6	1.1	0.2	1.1
Kansas City	Enid	5.2	1.0	1.5	1.0
Kansas City	Fayetteville-Springdale	8.2	1.4	2.8	1.4
Kansas City	Hays	4.7	1.1	-0.4	1.1
Kansas City	Jonesboro	5.7	1.1	0.2	1.2
Kansas City	Kansas City, KS	5.9	1.0	1.4	1.2
Kansas City	Kansas City, MO	7.1	1.8	0.4	1.7
Kansas City	Lawton	9.5	1.5	2.5	1.7
Kansas City	Little Rock	7.2	1.4	2.5	1.5
Kansas City	McAlester	7.7	1.3	1.2	1.3
Kansas City	Minneapolis	7.2	1.8	2.7	1.5
Kansas City	Minneapolis West	3.4	0.8	-0.3	0.8
Kansas City	Oklahoma City	8.0	1.4	1.6	1.5
Kansas City	Pine Bluff	6.4	1.2	1.9	1.2
Kansas City	Rochester	3.9	0.9	0.4	1.0
Kansas City	Shakopee	3.2	0.8	0.4	0.8
Kansas City	Sioux City	4.1	0.9	-0.6	1.0
Kansas City	Springfield	5.8	1.0	1.2	0.9
Kansas City	St. Joseph	5.6	1.0	1.0	1.0
Kansas City	St. Louis City	10.4	2.6	1.3	2.9
Kansas City	St. Louis County North	3.9	0.9	0.2	0.9
Kansas City	St. Louis County South	3.9	1.0	0.1	1.1
Kansas City	St. Paul	4.3	0.8	0.9	0.9
Kansas City	Topeka	4.9	1.0	0.2	1.0
Kansas City	Tulsa	7.6	1.2	2.5	1.2
Kansas City	Waterloo	4.1	1.0	0.6	1.0
Kansas City	Wichita	5.0	1.0	0.3	1.1
Los Angeles	Bakersfield	5.4	1.2	0.2	1.2
Los Angeles	Burbank	4.7	1.2	1.0	1.3
Los Angeles	Chula Vista	6.9	1.4	2.6	1.5
Los Angeles	Culver City	5.1	1.4	0.4	1.4
Los Angeles	Diamond Bar	5.0	1.3	2.4	1.4
Los Angeles	East Los Angeles	4.3	1.3	1.7	1.1
Los Angeles	El Cajon	6.3	1.1	2.9	1.3
Los Angeles	Escondido	4.9	1.1	0.8	1.1
Los Angeles	Fresno	5.5	1.4	0.5	1.4
Los Angeles	Fresno North	6.1	1.4	2.6	1.4
Los Angeles	Fullerton	2.9	0.9	-0.4	0.7
Los Angeles	Glendora	3.4	1.0	0.6	0.9
Los Angeles	Hollywood	6.2	1.7	1.2	1.6
Los Angeles	Honolulu	5.6	1.2	0.3	1.3

RCC	Local Census Office (LCO)	Gross Difference Rate		Net Difference Rate	
		Percent	Margin of Error	Percent	Margin of Error
United States		6.1	0.1	1.5	0.1
Los Angeles	Huntington Beach	3.8	0.9	0.9	1.0
Los Angeles	Inglewood	3.1	1.3	1.1	1.2
Los Angeles	Long Beach	5.5	1.1	1.5	1.2
Los Angeles	Los Angeles Downtown	6.8	1.9	0.0	1.8
Los Angeles	Los Angeles West Central	5.8	1.4	1.6	1.7
Los Angeles	Newport Beach	5.0	1.2	1.1	1.1
Los Angeles	Norwalk	3.5	0.9	1.0	1.0
Los Angeles	Palm Springs	11.0	1.8	3.7	1.7
Los Angeles	Pasadena	4.4	1.0	0.8	1.2
Los Angeles	Redlands	6.8	1.5	2.2	1.5
Los Angeles	Riverside	6.3	1.2	1.8	1.4
Los Angeles	Salinas	4.4	1.2	0.4	1.1
Los Angeles	San Bernardino	4.9	1.5	0.9	1.2
Los Angeles	San Diego	6.6	1.2	0.4	1.4
Los Angeles	Santa Ana	5.5	1.2	1.3	1.3
Los Angeles	Santa Clarita	4.1	1.2	1.1	1.1
Los Angeles	Santa Maria	4.8	1.3	-0.8	1.2
Los Angeles	South Gate	4.6	1.3	0.6	1.3
Los Angeles	Torrance	4.8	1.1	2.3	1.2
Los Angeles	Van Nuys	4.2	1.1	0.9	1.2
Los Angeles	Ventura	3.1	1.1	-0.2	0.9
Los Angeles	Visalia	5.1	1.2	0.5	1.3
Los Angeles	Vista	6.4	1.3	1.5	1.1
Los Angeles	Waianae	8.2	1.4	1.5	1.7
Los Angeles	West San Fernando Valley	4.2	1.1	0.2	1.1
New York	Bergen County North	4.5	1.2	0.4	1.4
New York	Bergen County South	5.0	1.6	0.4	1.6
New York	Bronx Northeast	5.4	1.5	0.8	1.5
New York	Bronx Northwest	4.5	1.6	2.1	1.5
New York	Bronx Southeast	4.7	1.4	2.2	1.3
New York	Bronx Southwest	4.5	1.6	2.2	1.7
New York	Brooklyn Central	7.9	1.6	1.2	1.9
New York	Brooklyn East	7.1	1.5	4.1	1.6
New York	Brooklyn Northeast	10.6	1.8	4.9	1.9
New York	Brooklyn Northwest	6.1	1.4	3.4	1.4
New York	Brooklyn South	9.0	1.5	-0.5	1.5
New York	Essex County East	6.5	1.3	3.6	1.3
New York	Hudson County North	7.7	2.0	2.0	1.9
New York	Hudson County South	8.8	2.0	3.4	2.1
New York	Middlesex/Union County	4.3	0.8	1.5	0.8
New York	Morris/Somerset/Sussex/Warren County	4.4	0.8	2.2	0.8
New York	Nassau County Northeast	4.1	1.2	1.4	1.2
New York	Nassau County Southwest	3.3	0.9	1.0	1.1
New York	New York Central	9.6	2.0	3.2	1.9
New York	New York East	12.3	2.1	5.6	2.1

RCC	Local Census Office (LCO)	Gross Difference Rate		Net Difference Rate	
		Percent	Margin of Error	Percent	Margin of Error
United States		6.1	0.1	1.5	0.1
New York	New York North	3.6	1.4	0.8	1.4
New York	New York West	10.6	1.9	3.8	1.9
New York	Passaic County/Essex County West	5.7	1.2	1.5	1.2
New York	Queens Northeast	6.3	1.5	1.8	1.6
New York	Queens Northwest	6.0	1.4	3.0	1.5
New York	Queens Southeast	5.4	1.4	1.3	1.5
New York	Queens Southwest	6.6	1.3	2.0	1.5
New York	Richmond County	5.5	1.6	1.0	1.7
New York	Rockland County/Westchester County	4.9	1.3	1.3	1.2
New York	Suffolk County East	7.5	1.5	0.3	1.4
New York	Suffolk County West	3.8	0.9	0.9	1.0
New York	Westchester County South	5.2	1.1	0.5	1.2
Philadelphia	Allentown	4.7	1.1	1.3	0.9
Philadelphia	Altoona	5.3	1.4	0.5	1.3
Philadelphia	Baltimore East	8.5	1.8	1.9	1.9
Philadelphia	Baltimore West	7.8	1.8	2.6	2.0
Philadelphia	Beaver Falls	4.6	1.0	1.2	0.9
Philadelphia	Camden	2.5	0.6	0.2	0.8
Philadelphia	Catonsville	3.1	0.8	0.7	0.8
Philadelphia	DC East	8.8	1.9	4.2	1.9
Philadelphia	DC West	10.3	2.5	3.2	2.5
Philadelphia	Easton	7.5	1.6	4.6	1.8
Philadelphia	Erie	4.8	1.0	0.7	0.9
Philadelphia	Feasterville	4.6	1.0	1.9	1.0
Philadelphia	Folcroft	3.8	0.8	0.4	0.9
Philadelphia	Frederick	4.7	1.2	1.0	1.1
Philadelphia	Freehold	4.7	1.2	-0.4	1.2
Philadelphia	Greensburg	5.5	1.1	2.1	1.1
Philadelphia	Harrisburg	4.4	1.1	1.8	1.1
Philadelphia	Johnstown	4.0	0.9	0.3	0.9
Philadelphia	Lancaster	3.2	0.8	0.3	0.8
Philadelphia	LaPlata	4.1	1.2	0.3	1.2
Philadelphia	Largo	8.0	1.2	2.8	1.2
Philadelphia	New Castle	5.3	1.1	2.1	1.3
Philadelphia	Norristown	4.0	1.0	0.3	1.0
Philadelphia	Northfield	7.0	1.4	0.6	1.3
Philadelphia	Philadelphia Central	10.3	2.3	5.3	2.2
Philadelphia	Philadelphia Frankford	7.0	1.6	2.9	1.5
Philadelphia	Philadelphia West	12.9	2.1	4.1	2.2
Philadelphia	Pittsburgh	8.7	1.6	3.4	1.9
Philadelphia	Rockville	2.6	0.8	0.1	0.9
Philadelphia	Scranton	6.7	1.1	0.0	1.2
Philadelphia	State College	4.5	1.1	1.4	1.3
Philadelphia	Toms River	6.3	1.3	-0.5	1.2
Philadelphia	Towson	4.4	1.0	0.5	1.1

RCC	Local Census Office (LCO)	Gross Difference Rate		Net Difference Rate	
		Percent	Margin of Error	Percent	Margin of Error
United States		6.1	0.1	1.5	0.1
Philadelphia	Trenton	2.7	0.8	0.9	0.8
Philadelphia	Williamsport	4.7	1.0	1.0	0.9
Philadelphia	York	2.9	0.8	-0.8	0.8
Seattle	Anchorage	6.6	1.1	1.1	1.1
Seattle	Beaverton	5.2	1.0	0.9	1.2
Seattle	Bellevue	3.9	1.0	-0.3	1.3
Seattle	Bend	6.2	1.2	0.5	1.3
Seattle	Boise	5.8	1.1	-0.8	1.2
Seattle	Concord	4.7	0.9	1.5	1.0
Seattle	Elk Grove	3.8	0.9	0.3	0.9
Seattle	Eugene	5.0	1.2	1.8	1.2
Seattle	Eureka	7.9	2.2	1.5	2.1
Seattle	Everett	5.6	0.9	-0.5	1.0
Seattle	Fairfield	6.3	1.3	1.7	1.3
Seattle	Idaho Falls	6.4	1.4	2.3	1.6
Seattle	Oakland	5.3	1.8	-0.1	2.1
Seattle	Olympia	5.7	1.1	1.3	1.2
Seattle	Palo Alto	4.3	0.9	0.0	1.1
Seattle	Placerville	6.2	1.0	0.8	1.1
Seattle	Pleasanton	3.8	0.9	-0.1	1.1
Seattle	Portland	5.4	1.1	1.1	1.2
Seattle	Redding	5.2	1.1	1.2	1.2
Seattle	Richland	5.6	1.0	1.0	1.2
Seattle	Sacramento	6.6	1.4	-0.5	1.3
Seattle	Salem	4.0	0.9	0.6	0.9
Seattle	San Francisco East	9.9	2.3	4.2	2.3
Seattle	San Francisco West	4.6	1.2	1.1	1.6
Seattle	San Jose	3.1	0.8	1.0	0.8
Seattle	San Leandro	4.9	1.3	1.7	1.3
Seattle	Santa Clara	4.7	1.0	2.8	1.1
Seattle	Santa Rosa	4.1	0.9	0.1	0.9
Seattle	Seattle	5.3	1.3	-0.7	1.4
Seattle	Silverdale	5.5	1.3	-0.6	1.4
Seattle	Spokane	6.1	1.3	1.3	1.3
Seattle	Stockton	5.2	1.0	1.4	1.0
Seattle	Tacoma	5.4	1.0	1.0	1.3
Seattle	Tukwila	4.2	1.0	-1.0	0.9