



UNITED STATES DEPARTMENT OF COMMERCE
Economics and Statistics Administration
U.S. Census Bureau
Washington, DC 20233-0001

February 8, 2019

2018 AMERICAN COMMUNITY SURVEY RESEARCH AND EVALUATION REPORT
MEMORANDUM SERIES # ACS18-RER-02

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Subject: Preliminary Research for Replacing or Supplementing the
Acreage, Number of Rooms and Bedrooms, Tenure, Property
Value, & Real Estate Taxes Questions on the American
Community Survey with Administrative Records

Attached is the Center for Economic Studies (CES) Research and Evaluation report, "Preliminary Research for Replacing or Supplementing the Acreage, Number of Rooms and Bedrooms, Tenure, Property Value, & Real Estate Taxes Questions on the American Community Survey with Administrative Records." This evaluation assessed the potential for using commercial vendor data sourced from county and municipal property tax records to replace or supplement the acreage, number of rooms and bedrooms, tenure, property value, and real estate taxes questions on the American Community Survey (ACS). If you have any questions about this report, please contact Sonya R. Porter at 301-763-6038, Nikolas Pharris-Ciurej at 301-763-8924, or Michaela Dillon at 301-763-3567.

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Preliminary Research for Replacing or Supplementing the Acreage, Number of Rooms and Bedrooms, Tenure, Property Value, & Real Estate Taxes Questions on the American Community Survey with Administrative Records

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1. EXECUTIVE SUMMARY

As detailed in the report, “Agility in Action: A Snapshot of Enhancements to the American Community Survey” (U.S. Census Bureau, 2015), the Census Bureau is investigating ways to reduce the difficulty and length of the American Community Survey (ACS) using administrative records. The ACS questions under investigation include acreage, number of rooms and bedrooms, tenure, property value and real estate tax. This research will provide information on whether an identified administrative records source has data of sufficient coverage and quality to allow the removal of the questions on the ACS. Alternatively, the administrative record source may only serve as a supplement to data provided by respondents to fill in missing responses or enhance editing routines. A Census Bureau team will use this report and conduct additional research to make recommendations on how best to integrate administrative sources into the ACS.

This report explores the linkage of local property tax data compiled by a third-party commercial vendor from tax year 2014 to the ACS sample collected in the 2014 sample year. This research assesses the presence of comparable property tax data, and the agreement of this vendor data with ACS unedited, fully reported responses. The linking of the 2014 ACS (2.27 million households) to the property tax vendor data (92.48 million households) by Master Address File Identification Number (MAFID) resulted in a linkage rate of 64.17 percent of ACS households.

Across ACS topics, the rates at which ACS records link to non-missing information within vendor data vary considerably. Vendor data provides information on housing unit acreage, property value and real estate tax at particularly high rates—94.58 percent, 99.61 percent and 96.97 percent, respectively. On the other hand, the vendor data provides little useful information on tenure at the level of detail in the ACS questionnaire. According to vendor data, tenure status is unknown for 87.53 percent of linked ACS households. Vendor data provides non-missing information for the number of rooms and bedrooms at a level of 43.91 percent and 61.15 percent, respectively.

Additionally, the agreement between the linked data varies, and provides insight into the way that householders answer housing questions. When ACS records link to non-missing vendor data, the agreement rates are as follows for each topic: acreage (92.42 percent), number of rooms (30.75 percent), number of bedrooms (70.83 percent), property value (3.78 percent), and real estate tax (12.93 percent).

There are some limitations that influence the quality of linked data and its suitability for ACS item replacement or imputation. Due to differences in the objectives and methods of collecting the data, it is difficult for vendor data to conceptually align with the ACS data. For instance, government records often focus on aggregate measures of property versus individual housing units that occupy a parcel of land or building. Also, local authorities collect information from the property owner, whereas the ACS surveys the occupant. These differences raise concerns that characteristics that vary by housing unit may not align with the same information collected by tax records. A difference in values across ACS and administrative records is most prevalent among renters in multi-family buildings. Lastly, while the Census Bureau seeks to obtain the most recently available data from the vendor, there is a lag between when the data is initially collected, aggregated and processed, and then made available for implementation in the ACS.

The benefit of administrative records comes from the provision of non-missing information, agreement with survey values, and conceptual alignment of measured data. Property tax data provides very high linkage rates to non-missing data for the acreage, property value, and real estate tax ACS topics. Among these topics, acreage displays a high agreement and conceptual alignment between the survey response and administrative record values. For these reasons, acreage seems to be an ideal candidate for item replacement via administrative records. Among the remaining topics where one or more of the evaluating criterion are not met, such as the prevalence of missing data among the bedrooms topic, the administrative data may still be useful for imputation purposes due to general agreement when linked to valid administrative data values.

2. BACKGROUND

Stemming from concerns about the burden that American Community Survey (ACS) participation places on respondents, the Census Bureau is looking for ways to reduce the difficulty and length of the survey with administrative records. We have identified sources of both federal and commercial data that may potentially alleviate the need to ask certain questions altogether or for a subset of the ACS sample. Work is underway to acquire new sources and assess the quality of the agreement and coverage of these sources. Data from other agencies are under review to potentially replace ACS content, including the Internal Revenue Service to provide income information and the Social Security Administration for pension and disability information. The American Community Survey Office (ACSO) is consulting with stakeholders, including Congress, regarding the appropriateness of direct substitution.

Recently, the ACSO contracted with the National Opinion Research Center (NORC) to report on the availability of data sources, as well as the potential issues with those sources, as candidates for replacing/supplementing data currently collected by the ACS. Using this report (Ruggles, 2015) as well as their experience, the Center for Economic Studies (CES) identified several topics for further study based on the availability of data and likelihood of successful matching and analysis. These topics include:

- Year built
- Part of Condominium
- Tenure
- Property value
- Real estate taxes
- Have mortgage/mortgage amount
- Second mortgage/HELOC and payment
- Income in the past 12 months
- Residence one year ago
- Number of rooms/bedrooms
- Facilities
- Fuel type
- Acreage

For each topic, CES will acquire and link the administrative records to survey data, provide a report or memo describing the quality and coverage of the data source, and compare the administrative record value to ACS fully reported and imputed responses. CES will document the linked file and put the research extract in the Data Management System (DMS) for future research.

This research is intended to be a first look at the various topics to document the coverage, quality, and availability of external data sources for potential ACS integration. This research will enable ACS to evaluate the potential of the replacement data sources, identify challenges, and provide direction for further research. It is an exploratory investigation of the feasibility of replacing ACS data with administrative records.

Next, the ACSO will create teams for each ACS topic identified as a potential candidate for records usage based on the results from the first phase of research. Each team will include statistical researchers, subject matter experts, and data processors that together can identify and research issues related to records usage.

The teams will make recommendations on whether each question is a good candidate for removal with the use of external data sources in its place. This recommendation will be based on an assessment of the implications of implementing such a change, considering data quality, reliability, alignment of reference periods, break in series, and the limitations of the data source affecting the suitability for use. The team will document and evaluate various options for integrating the records. For instance, for some topics, records may be better suited in assisting with imputation whereas for other topics the records may be used for direct substitution of a survey question (for all or a subset of the ACS respondent pool).

Moreover, the ACSO will gauge reactions to our intention to use external data sources from data users, stakeholders, and the public. We will review current ACS mail materials to ensure proper transparency, as well as publicly share our vision in public forums such as the ACS Data Users Conference, meetings of the Association of Public Data Users (APDU), the Population Association of America (PAA), the Joint Statistical Meetings (JSM), the American Association of Public Opinion Research (AAPOR), and other public venues.

3. LITERATURE REVIEW

The report, “Review of Administrative Data Sources Relevant to the American Community Survey (Ruggles, 2015),” provides a review of data sources that could be used to replace or improve specific questions on the ACS. Its purpose is to support the work of the ACS Content Review (Chappell and Obenski, 2014) by providing additional input on potential data sources that might be used to strengthen the survey, improve its content, or reduce the burden associated with its collection. While several studies emphasize the coverage of administrative records for persons, there is a subset of the literature focusing on the availability and quality of data suitable for household-level questions and surveys. For example, the 2010 American Community Survey Match Study (Luque and Bhaskar, 2014) assesses the coverage of person and address administrative records data from twenty federal and third party data sources, finding that records provide substantial coverage for persons and addresses in the 2010 ACS (92.1 and 92.7 percent respectively).

Brummet (2014) assessed the linkage rate of a commercial dataset sourced from county and municipal property tax records to the 2009 American Housing Survey (AHS) and found lower coverage rates, highlighting unique patterns in housing data that any successful integration of third-party sources should consider. In particular, the linkage rate tends to vary by structure type and subsequently tenure. Commercial data linked to 78.97 percent of AHS single-family housing units and 14.81 percent of multi-unit housing structures. The large difference in linkage rates highlights constraints on the ability of property tax records to describe significant portions of the country's households, most likely due to misalignment in the objectives for collecting housing data. For the purposes of taxation, local governments often record data at aggregate levels, capturing the entire structure and/or parcel of land rather than the housing units within. Availability of more detailed information on individual housing units depends on the mandate of state and local laws. Timing is also a documented issue when linking to tax records which may suffer from inaccuracies due to differences in the frequency of taxation across locations, and lags in the data collection process of recent construction for example.

Using the same commercial data as Brummet (2014), Seeskin (2016) adjusted for the aforementioned issues by focusing on single-family, owner-occupied homes and found 69.1 percent of households in the 2010 ACS link to a commercial data record with non-missing information. Seeskin (2016) showed the distribution of property tax values is similar to those reported in the ACS, and that slightly greater variation occurs in the tails. Additionally, the linked data has a Pearson correlation of 0.724, indicating a strong, positive linear relationship between the linked property tax values. While property tax data is not perfect, studies such as Zanutto and Zaslavsky (2002) support the use of tax records for imputation and nonresponse adjustments. According to Manski (2007), use of this data in models of nonresponse can be further improved by relaxing the assumption that missing data is randomly distributed.

There is evidence that the quality of the linked data varies systematically along several dimensions. Bond et al. (2014) noted that some groups are less likely to be linked. These groups include young children, minorities, residents of group quarters, recent movers, low-income individuals, and the unemployed. Furthermore, Seeskin (2016) found that when households within these demographics do link they are more likely to link to missing information. For example, the odds of a household in poverty linking to available property tax data are 79 percent of that for households not in poverty. Likewise, the odds of rural households linking are 33.7 percent of that for non-rural households. The probability of linking to missing information decreases with higher educational attainment.

Other research has identified some factors within survey methodology that exacerbate differences between respondent and third party data values. The interaction of these results cautions one to be observant of biases in estimates of subjective topics like property value. Kiel and Zabel (1999) and Benitez-Silva et al. (2008) observed survey responses to home value tend to be higher, particularly among recent movers and those who purchased their home during an economic boom. Pudney (2008) and Manski and Molinari (2010) discussed the tendency of respondents to round their estimates of home value to whole numbers. Surveys themselves often seek responses within bin categories aggregated to hundreds or thousands of dollars. Linked data among recent movers display relatively better agreement with tax data, which is a short run result. However, over time it is important to recognize that local authorities operate on consistent measures of property value like assessed value which measures and weights housing

characteristics differently than the constantly fluctuating housing market value (Kingkade, 2013). Lastly, disagreement in linked data can vary across survey response modes. Seeskin (2016) calculated the percentage difference between ACS and commercial tax data values among linked households and found the interquartile range of these values is lowest (16.6) for questionnaire respondents and highest (29.1) for CATI respondents.

4. ACS BACKGROUND: Acreage, Number of rooms and bedrooms, Tenure, Property value, Real estate tax

The housing section of the 2014 ACS includes questions on acreage number of rooms and bedrooms, tenure status, property value, and real estate tax associated with a housing unit. The remainder of this section describes the content of the ACS regarding these topics. The ACS is conducted via multiple data collection methods including: paper, internet, computer-assisted telephone interview (CATI), and computer-assisted personal interview (CAPI).¹ Descriptions of the paper survey follow.²

4.1 Acreage

Question 4 reads, “How many acres is this house or mobile home on?” There are three checkboxes with acceptable answers. The first checkbox reads “Less than 1 acre → *SKIP to question 6.*” The second checkbox reads “1 to 9.9 acres.” The third checkbox reads “10 or more acres.”

4 How many acres is this house or mobile home on?

☐ Less than 1 acre → *SKIP to question 6*

☐ 1 to 9.9 acres

☐ 10 or more acres

The ACS instruction guide directs the respondent to “complete this question if you live in a one-family house or in a mobile home;” and to “include only land that you own or rent.” It defines the number of acres as “the acreage on which the house or mobile home is located;” including “adjoining land you rent for your use.”

4.2 Number of rooms and bedrooms

Question 7 has two parts. Part a asks, “How many separate rooms are in this house, apartment, or mobile home?” Rooms are defined as “separated by built-in archways or walls that extend out at least 6 inches and go from floor to ceiling.” The count should include bedrooms and kitchens, etc. Respondents should exclude bathrooms, porches, balconies, foyers, halls, or unfinished basements. A two-digit space is provided for the respondent to write-in the number of rooms in the home.

7 a. How many separate rooms are in this house, apartment, or mobile home?
Rooms must be separated by built-in archways or walls that extend out at least 6 inches and go from floor to ceiling.

- **INCLUDE** bedrooms, kitchens, etc.
- **EXCLUDE** bathrooms, porches, balconies, foyers, halls, or unfinished basements.

Number of rooms

b. How many of these rooms are bedrooms?
Count as bedrooms those rooms you would list if this house, apartment, or mobile home were for sale or rent. If this is an efficiency/studio apartment, print “0”.

Number of bedrooms

¹ CATI was discontinued as a non-response follow-up mode in 2017; however it was in use in the 2014 ACS, the year of data which is used in the analysis in this report.

² Each method uses the same question wording and response formatting. However, the internet instrument does not make specific mention of apartments and mobile homes. Also, the CATI and CAPI instructions are more thorough for questions with continuous and/or estimated responses. For example, under the property value question, the interviewer is instructed as follows: “If respondent doesn’t know exact value, ask for a range and then pick the midpoint.”

Part b reads, “How many of these rooms are bedrooms?” The respondent should, “count as bedrooms those rooms you would list if this house, apartment, or mobile home were for sale or rent.” Additionally, respondents are instructed to, “include all rooms intended to be used as bedrooms in this house apartment, or mobile home, even if they are currently being used for other purposes.” For efficiency and studio apartments without a separate bedroom, the number of bedrooms should be zero. As in part a, a two-digit space is provided to write-in the number of bedrooms. The ACS instruction guide indicates that the response to 7b must be smaller than the number of rooms reported in 7a.

4.3 Tenure

Question 17 inquires about the tenure status of the housing unit. The ACS instruction guide clarifies that the housing unit is owned if the owner or co-owner lives in it. Four checkboxes with acceptable answers are provided. The first checkbox reads, “Owned by you or someone in this household with a mortgage or loan? *Include home equity loans.*” The second checkbox reads, “Owned by you or someone in this household free and clear (without a mortgage or loan)?” It is appropriate to choose the first checkbox if the unit, “is mortgaged or there is a contract to purchase,” it. Respondents that own and reside in a mobile home should choose checkbox 1 if the land is mortgaged. For owners of any housing type, if the unit is owned and the land is rented, appropriately choose one of the “owned” categories.

17 Is this house, apartment, or mobile home - Mark (X) ONE box.

☐ Owned by you or someone in this household with a mortgage or loan? *Include home equity loans.*

☐ Owned by you or someone in this household free and clear (without a mortgage or loan)?

☐ Rented?

☐ Occupied without payment of rent? → SKIP to C on the next page

The third checkbox reads, “Rented?” A unit is considered rented if, “any money rent is paid, even if the rent is paid by people who are not members of your household, or paid by a federal, state, or local government agency”.

The fourth checkbox reads, “Occupied without payment of rent? →SKIP to C on the next page.” The fourth checkbox is the appropriate answer when, “the unit **is not** owned or being bought by a member of [the] household,” and “money rent **is not** paid or contracted.” Additionally, the unit “may be owned by friend or relatives who live elsewhere and who allow you to occupy [the] house, apartment, or mobile home without charge. A house or apartment may be provided as part of wages or salary. Examples are: caretaker’s or janitor’s house or apartment; parsonages; tenant farmer or sharecropper houses for which the occupants do not pay rent; or military housing.”

4.4 Property value

Question 19 asks homeowners, “About how much do you think this house and lot, apartment, or mobile home (and lot, if owned) would sell for if it were for sale?” A seven-digit space is provided for the respondent to write in the amount in U.S. dollars.

19 About how much do you think this house and lot, apartment, or mobile home (and lot, if owned) would sell for if it were for sale?

Amount - Dollars

\$.00

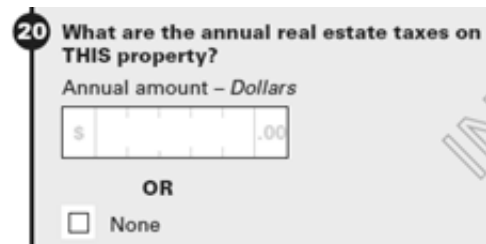
The instruction guide instructs the respondent to:

“Enter your best estimate of the value of the property; that is, how much you think the property would sell for if it were on the market. If this is a house, include the value of the house, the land it is on, and any other structures on the same property. If the house is owned but the land is rented, estimate the combined value of the house and the land. If this is a condominium unit, estimate the value for the condominium, including your share of the common elements. If this is a mobile home, include the value of the mobile home and the value of the land only if you own the land.”

4.5 Real estate tax

Question 20 asks homeowners, “What are the annual real estate taxes on THIS property?” The respondent may either write the dollar amount in the five-digit space provided, or mark the checkbox for “None” to indicate no real estate taxes are collected on the property in question.

The instruction guide directs the respondent to, “report taxes for all taxing jurisdictions (city or town, county, state, school district, etc.) even if they are included in your mortgage payment, not yet paid or paid by someone else, or are delinquent. DO NOT include taxes past due from previous years.”



20 What are the annual real estate taxes on THIS property?

Annual amount – Dollars

\$.00

OR

☐ None

5. RESEARCH QUESTIONS

The research questions consist of the following:

1. How often does this administrative records source contain data that can be used to replace or supplement the respondent-provided response?

After linking 2014 ACS data to the 2014 vendor tax data, research question #1 is addressed by calculating the percentage of 2014 ACS households that can be linked with vendor data records.

2. To what extent is the construct in the administrative records identical or similar to the construct as measured by the ACS questions?

The results section describes and compares key vendor data variables to the topical ACS items covered in this report in order to evaluate conceptual agreement and suitability of the vendor property tax data for ACS supplementation.

3. How often do the housing unit data from the administrative records source(s) agree with the responses from ACS householders by major subpopulation and housing characteristics?

For each topic, the results on response agreement are presented in two tables. The first set of results are detailed cross-tabulations of response values between the ACS and vendor data. The second table evaluates the relationship in responses across several demographic and housing characteristics. Next, the Methodology section discusses the criteria used for evaluating agreement in values within MAFID-linked data.

6. METHODOLOGY

MAFID-match Process and Data Description:

Public property tax records are the administrative source used for data on resident tenure, housing unit acreage, number of rooms and bedrooms, property value, and real estate taxes. These data are compiled by a third party data aggregator. They represent data for 2014, the most recent year of data currently available to the Census Bureau at the time of the analysis. It is compared to unedited, fully reported values in the 2014 ACS.³

In order to answer the research questions, external data source records are linked to the ACS by MAFID – a number associated with each record in the Master Address File (MAF). The MAF is a database containing the address or location description of every building (residential or non-residential) known to the Census Bureau, along with geographic information. ACS responses already have MAFIDs. The third party data, where possible, have MAFIDs appended to each address. Analysis is restricted to ACS households linked to the external data by MAFID. Our analysis shows counts of ACS unswapped and unweighted records. Note that all results have been reviewed to ensure that no confidential information is disclosed.

Table 1: Vendor Data MAFID-Match Rate across ACS Households

	ACS	Vendor data
Total Observations	5,325,044 (persons)	112,620,085 (housing units)
# Households/Housing Units	2,273,701	112,620,085
Households with MAFID	2,273,701	92,482,246
# Unique MAFIDs	-	90,303,407
Households with MAFID Match	1,458,986	1,458,986
<i>Linkage Rate Across ACS Households</i>	<i>64.17%</i>	

Source: 2014 American Community Survey and administrative property tax data.

It is worthwhile to note differences in units of measurement between the ACS and the vendor data. The ACS sample is based upon a selection of household addresses from the Census Bureau's Master Address File (MAF). Observations are at the person-level since data is collected for each member within the household. Records are aggregated to the household level by identifying all individuals living within the same household via a unique identifier called CMID. Table 1 shows that the 2014 ACS contains over 5 million person-level observations divided among 2.2 million households.

Vendor data provides property tax data for over 112 million housing structures in the United States. While 100 percent of the ACS has valid MAFID assignment, only 82.12 percent of the vendor data records are assigned a MAFID via Census' internal matching process.⁴ It was appropriate to use vendor data records with unique MAFID values during the MAFID match to

³ Note the ACS does not collect information to verify that the respondent is the householder. Therefore, it is possible the respondent is not the most knowledgeable individual for some housing questions.

⁴ According to Brummet (2014), this particular commercial dataset has a lower MAF-match rate for several reasons. In particular, this dataset has higher rates of missing information in key address fields that are used to match it to the MAF. Also, this dataset contains slightly more records than average (relative to the AHS) with longer street names. The MAF-match rate decreases significantly for street names longer than two words. Lastly, just over half of the addresses in multi-unit buildings are missing apartment numbers.

the ACS, as certain property-level descriptions do not vary across households within the same structure. The vendor data contains 90,303,407 unique MAFIDs that were linked to the 2,273,701 households within the ACS. Matches were found for 1,458,986 ACS households, yielding a MAFID match rate of 64.17 percent.⁵

This research compares the ACS respondent-provided data to the third party data to analyze the potential for the third-party data to replace or supplement the resident tenure, housing unit acreage, property value, real estate taxes, and number of rooms and bedrooms questions on the ACS. The focus of this initial research is to evaluate the ability to match the administrative records to ACS records and to evaluate the quality and distribution of the data on MAFID-matched housing units via linkage rates for all six topics covered in this report.

Criteria for Evaluating Agreement:

In addition to identifying coverage via the MAFID linkage rate, a second objective of this research is to evaluate agreement in values between linked ACS and vendor data values. The first set of results on agreement are reported via a cross-tabulation comparison of the ACS and vendor data values. Topics with clearly defined categorical response values, such as the acreage and tenure questions, are compared with vendor data based on ACS categories outlined in the questionnaire. The number of rooms, bedrooms, property value, and real estate topics require some manipulation since they are open-ended responses within the ACS. Counts of rooms ten and above and bedrooms five and above are collapsed into one group.⁶ For property value and real estate tax, where the responses are in large continuous monetary terms, the responses are divided into ten groups based on ACS decile cutoffs for comparison.

The second set of results show the coverage and agreement rates of the linked data over several householder demographic and geographic categories. Aside from the tenure question, the responses across each topic are numeric and can be compared in terms of inequalities. Once again, the total rooms, bedrooms, property value, and real estate tax topics utilize special agreement criteria. For these topics, two sets of constraints are imposed on the data in order to evaluate agreement. The first is relatively stringent, representing exact value matches. For the total rooms and bedrooms topics, this means the ACS and vendor data values are equal if they both report the same number. For property value and real estate tax, since the probability of both datasets reporting the same dollar amount is low, “exact match” means allowing the vendor data value to differ up to one percent from the ACS value.

The second set of constraints are relatively relaxed to account for conceptual differences in the definitions of a room or bedroom, as well as to consider the wider effect of uncertainty in the survey response for property value and taxes. Therefore, up to a one-room difference between the ACS value and the vendor data value constitutes equality for the total rooms and bedrooms topics. For the property value and real estate tax topics, the vendor data value may differ up to

⁵ The terms “match rate” and “linkage rate” are used interchangeably throughout this report to signify the MAFID-match rate.

⁶ Top-coded groups for the total number of rooms and bedrooms topics represent 9.89 and 6.03 percent of linked ACS cases with non-missing values.

five percent from the ACS value. Otherwise, the MAFID-matched vendor value is designated as less than or greater than the ACS value.

Lastly, all reported results are point estimates of agreement by response and demographics. The discussion of results describes broad relative relationships among point estimates as well as highlights any notable patterns. The results make no claims of statistical significance, as the appropriate tests were not included in the analysis.

7. LIMITATIONS

There are some limitations that influence the quality of linked data and its suitability for ACS item replacement or imputation. First, for some multi-unit structures, government property tax records often focus on aggregate measures of property structures rather than individual units within the structure. Second, local authorities collect information from the property owner, whereas the ACS surveys a unit resident, who may be the owner, renter, or non-paying occupant. Due to these factors, there is room for error in the agreement results. In particular, characteristics that vary by housing unit may not align with the same information collected by tax records. A secondary analysis of single-family and owner-occupied housing units is included in an attempt to adjust for this error. Previous research on linkage rates by MAFID to external data show increased coverage and higher quality responses for these particular housing types.

Third, differences in objectives and collection methods used by local authorities impede the ability to obtain quality matches in value that approach the same level of detail and context presented in the ACS questionnaire. Along the same vein, differences in the timing of data collection may be an issue as there is inevitably a lag between when the data is initially collected, aggregated and processed, and then made available to ACS for implementation in the survey. Similarly, the property value used to determine owed tax could vary across locations. The vendor data contains three distinct property values that may be used to calculate one's tax obligation: assessed, market, and appraised. To mitigate these issues, data files were chosen where the time frame between the ACS and property tax data aligns as close as possible to the year 2014.⁷ In addition, the variable total value is used in the analysis of property value. This variable assigns the maximum, non-missing values among the assessed, market, and appraised values for each record into one variable to approximate the most consistent measure of property value. Since it is highly impractical to expect the same collection practices across each local government in the U.S., one might partially attribute disagreement between linked data to administrative and methodological heterogeneity.

8. RESULTS

The analysis is restricted to ACS households that link to a vendor property tax record by MAFID, resulting in 1,458,986 (64.17 percent) total records. Table 2 displays the rate at which the vendor data provides non-missing and missing data for ACS records across the six topics of this report. Given the nature of government records, it is expected that the high degree of non-missing information occurs for structure-level items that directly determine tax obligations.

⁷ The tax year for about 8% of the sample is pre-2013, 48%--2013, 40%--2014, and 4%--2015.

Table 2: Linkage Rate by Non-Missing and Missing Vendor Data among MAFID-Matched Observations

ACS topic	Count, ACS records linked to non-missing vendor data	% of ACS households linked to non-missing vendor data	Count, ACS records linked to missing vendor data	% of ACS households linked to missing vendor data
Acreage	1,379,902	94.58%	79,084	5.42%
Number of Rooms	640,572	43.91%	818,414	56.09%
Number of Bedrooms	892,147	61.15%	566,839	38.85%
Tenure	181,927	12.47%	1,277,059	87.53%
Total Property Value	1,453,366	99.61%	5,620	0.39%
Real Estate Tax	1,414,802	96.97%	44,184	3.03%

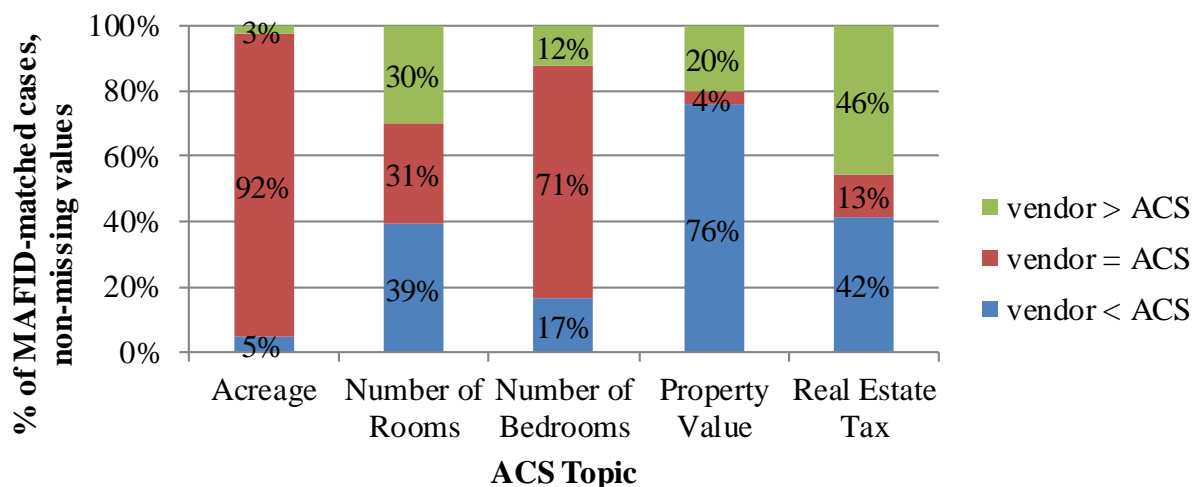
Source: 2014 American Community Survey and administrative property tax data.

Note: Rows sum to total MAFID-matched observations.

Number of ACS households = 1,458,986

The highest linkage rates to non-missing data—90 percent and higher—occurs with property value, real estate tax, and acreage. Vendor data provides the least information on tenure, with a 12.47 percent linkage rate to non-missing data.

Figure 1: Relative Relationship between Vendor and ACS Data Values, Missing Values Removed



Source: 2014 American Community Survey and administrative property tax data.

Figure 1, using stringent agreement criteria, provides the rates at which the vendor data agrees, is greater than and less than the values provided in the ACS. Tenure status is not included in Figure 1, as the ACS question on this topic does not elicit a numeric response. These percentages exclude MAFID-matched records with missing values in either data source. Acreage has the

highest rate of agreement at 92.42 percent, followed by number of bedrooms (under exact match criteria) at 70.83 percent. Property value (within 1 percent difference) has the lowest agreement rate with vendor data, which is most often less than the reported ACS value (76.01 percent). Vendor data displays similar behavior for the number of rooms (under exact match criteria) topic—39.49 percent of the time the vendor data value is below the linked ACS value. Real estate tax vendor data most frequently exceeds the reported ACS value (45.55 percent).⁸

Agreement rates improve significantly under the relaxed equality conditions where linked data on the number of (bed)rooms can differ by one and the property value and real estate tax values can differ by up to five percent. The primary difference as shown in Figure 2 in the appendix is the number of bedrooms topic has the highest rate of agreement among linked cases with non-missing data (94.83 percent). The relative relationships among the remaining topics are the same as under the restricted equality conditions.

The remainder of the results are presented by ACS topic. In each section, the results of research questions 2 and 3 are presented and discussed as described in the methodology section. Furthermore, as mentioned in the limitations section, additional subsample analysis was conducted on linked single-family, owner-occupied housing units. Generally, linkage rates are comparable between the two samples. The subsample links to non-missing information less frequently than the full sample. Consequently, agreement rates slightly improve across various respondent and housing characteristics. The formal results are presented in the appendix.

8.1 Tenure

8.1.1 Cross-Tabulation of ACS and Vendor Data Tenure Responses

Vendor information on tenure is particularly poor given that there are several hundred thousand linked cases with missing information. The metadata for one particular variable within the vendor data indicates there is information as to whether the unit is owner-occupied.⁹ However, among all linked cases the vendor data only provides values corresponding to an absentee owner. Used as a proxy for tenure status, this information indicates 12.47 percent of linked ACS households have an absentee owner and therefore, may be a rental unit.¹⁰ This rate is comparable to the 12.15 percent rental rate among the unedited ACS data.¹¹ Even though the absence of an owner does not guarantee the presence of a renter, the cross-tabulation results show considerable agreement among linked households designated as rented within the ACS. The agreement rate

⁸ When accounting for the initial match rates to non-missing information for each topic presented in Table 2, the adjusted agreement rates (initial match rate x agreement rate in Figure 1) are as follows: acreage—87.41%, number of rooms—13.50%, number of bedrooms—43.31%, property value—3.77%, and real estate tax—12.54%. The same calculation may be done for values in Table 20 and Figure 2 in the appendix. In both cases, relative relationships and general conclusions on the performance of vendor data are consistent with those presented and discussed in the main text based upon unadjusted agreement rates.

⁹ The vendor data codebook provides the following values for its “absentee_owner” variable: A (absentee—mail and situs not=), M (situs address taken from mail), O (owner occupied), and S (situs from sale—occupied), and T (situs from sale—absentee), and Y (absentee). Situs is the designated location of the property for legal purposes or taxation.

¹⁰ To calculate this percentage in Table 3, divide the sum of absentee column by the sample size.

¹¹ To calculate this percentage, divide the matched ACS count for “rented” by the sample size.

among ACS renters is 62.19 percent based upon the value in the shaded cell in Table 3.¹² However, linkage to missing information dilutes the overall agreement rate on tenure status to 9.46 percent.

Other vendor variables provide relevant information to determine if an owner or tenant resides at the address such as corporate ownership and vacancy status.¹³ However, those responses link to the ACS records 3.48 percent and 0.33 percent of the time, respectively. Table 3 provides the cross-tabulation of responses between ACS and vendor data on absentee owner status. Vendor data does not provide information that approximates the level of detail requested by the ACS. This table concludes our discussion of vendor data performance on tenure.

Table 3: ACS Tenure (2014, Unedited) by Vendor Data

ACS Tenure	Linked ACS Count (Total)	Vendor Tenure	
		Absentee (situated ≠ mail)	NA
Owned with a mortgage	807,382	34,077	773,305
		[4.22]	[95.78]
Owned without a mortgage	415,038	22,737	392,301
		[5.48]	[94.52]
Rented	177,229	110,226	67,003
		[62.19]	[37.81]
Occupied without payment of rent	23,648	8,256	15,392
		[34.91]	[65.09]
Own—imputed ¹⁴	1,375	92	1,283
		[6.69]	[93.31]
NA	34,314	6,539	27,775
		[19.06]	[80.94]
Total	1,458,986	181,927	1,277,059

Source: 2014 American Community Survey and administrative property tax data.

¹² Divide the shaded value by the matched ACS count for “rented.”

¹³ These variables were used as proxies for information on non-owner occupied housing units.

¹⁴ This value is imputed from logical skip directions in the 2014 ACS questionnaire where the respondent is told to answer the following questions “if you or any member of this household OWNS or IS BUYING this house, apartment, or mobile home.”

8.2 Acreage:

8.2.1 Cross-Tabulation of ACS and Vendor Data Acreage Responses

Table 4: ACS Acreage (2014, Unedited) by Vendor Data

ACS Acreage	Linked ACS Count (Row total)	Vendor Acreage							
		Less than 1 acre		1 to 9.99 acres		10 or more acres		NA	
		N	Row %	N	Row %	N	Row %	N	Row %
			Col. %		Col. %		Col. %		Col. %
Less than 1 acre	1,030,397	956,069	92.79	24,777	2.40	3,526	0.34	46,025	4.47
			88.27		10.27		6.34		58.20
1 to 9.99 acres	259,438	52,959	20.41	194,107	74.82	5,244	2.02	7,128	2.75
			4.89		80.46		9.44		9.01
10 or more acres	56,717	1,883	3.32	9,590	16.91	43,844	77.3	1,400	2.47
			0.17		3.98		78.89		1.77
NA	112,434	72,177	64.19	12,767	11.36	2,959	2.63	24,531	21.82
			6.66		5.29		5.32		31.02
Column total	1,458,986	1,083,088		241,241		55,573		79,084	

Source: 2014 American Community Survey and administrative property tax data.

The vendor data are collapsed into analogous categories similar to the ACS. Of the linked cases, 83.52 percent have the same response value in the ACS and the vendor data.¹⁵ Across response categories, the highest rate of agreement occurs with acreage values less than one (92.79 percent). The ACS links to non-missing vendor data 94.58 percent of the time (Table 2). Subsequently, vendor data can assign a non-missing value for 78.18 percent of linked ACS cases reporting a missing value for acreage.¹⁶

8.2.2 Agreement in Acreage across Subpopulation and Housing Characteristics

Households with male householders have a slightly higher agreement rate in responses than those with female householders (82.78 vs. 80.89 percent).¹⁷ Agreement increases with age and reaches a maximum of 84.76 percent among households with 45-49 year old householders before declining across the remaining age groups. Across races, households with White householders possess the highest rate of agreement at 82.66 percent and households with Black/African American householders the lowest at 74.91 percent. All other racial groups, except American Indian or Alaska Native (AIAN), round to 80 percent agreement. The difference in agreement between households of Hispanic and non-Hispanic ethnicities is small. The responses of households with householders born in the United States agree with vendor data more frequently than those for households with foreign-born householders at 82.12 percent. Likewise, responses among owners present greater agreement at 83.51 percent.¹⁸

Geographically, vendor data agrees with ACS responses at a higher rate for households in metropolitan areas (83.36 percent) than in micropolitan (77.97 percent) and rural (73.16 percent) areas. Across states, agreement rates range from 57.94 percent in North Dakota to 89.59 percent in Utah. When linked records do not agree between ACS and vendor data, the vendor data tends to understate ACS values. Data for South Dakota deviates from that trend as vendor data overstates (17.61 percent) the acreage value more frequently than it understates it (2.95 percent). States that show relatively equal rates of overstating and understating the ACS value include California, Hawaii, Montana, Nebraska, New Mexico, Oklahoma, Vermont, and Washington.¹⁹ Kansas has the lowest rate of missing values in linked vendor data (5.24 percent) while North Dakota has the highest (36.57 percent).²⁰

¹⁵ This percentage is calculated as the sum of the shaded diagonal values in Table 4 divided by the total number of matched ACS cases in this study, 1,458,986. For replicate tables on single-family, owner-occupied homes in the appendix, the denominator is 1,163,748.

¹⁶ This percentage is calculated as the sum of missing ACS values matched to non-missing vendor data divided by the total count of missing value ACS observations. Alternatively, subtract the row percentage where ACS and vendor data is missing from 100. These values are found in the bottom row of Table 4.

¹⁷ Percentages describing the agreement rate between vendor data and ACS values are ratios of the count where vendor=ACS divided by number of cases in the referenced demographic or geographic category.

¹⁸ Within the tenure results, “other” refers to householders that do not own the property, but occupy without payment of rent. In the MSA results, “other” simply refers to housing units that are neither in metro- or micropolitan areas. However, this does not necessarily mean all these units are considered rural as defined by the ACS.

¹⁹ For this comparison, the absolute value of the difference between the values of the vendor<ACS and vendor>ACS columns is less than one percent.

²⁰ These percentages are calculated by dividing the number of cases where vendor data is missing in each state by the total cases in that state.

Table 5: ACS Acreage Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Sex (of householder)						
Male	734,368	50.33	4.27	82.78	2.26	10.69
Female	724,618	49.67	4.56	80.89	2.34	12.22
Age (of householder)						
15-19	4,996	0.34	4.00	69.42	2.88	23.70
20-24	24,767	1.70	4.24	72.53	3.17	20.05
25-29	61,389	4.21	3.94	78.42	2.33	15.31
30-34	92,148	6.32	3.81	81.87	2.03	12.29
35-39	102,736	7.04	3.93	83.70	1.98	10.39
40-44	120,138	8.23	4.34	84.50	2.02	9.14
45-49	134,175	9.20	4.56	84.76	2.00	8.68
50-54	161,192	11.05	4.59	84.25	2.18	8.98
55-59	169,278	11.60	4.58	83.82	2.19	9.42
60-64	158,886	10.89	4.47	83.25	2.29	9.98
65-69	140,640	9.64	4.46	81.94	2.40	11.20
70 and older	288,258	19.76	4.63	77.13	2.75	15.49
Race (of householder)						
White alone	1,234,819	84.64	4.22	82.66	2.42	10.70
Black or African American alone	115,528	7.92	7.43	74.91	1.76	15.90
American Indian or Alaska Native alone	7,656	0.52	5.45	76.37	4.13	14.05
Asian alone	52,518	3.60	2.66	79.94	1.23	16.17
Native Hawaiian or Pacific Islander alone	1,109	0.08	4.24	79.89	1.44	14.43
Some Other Race alone	25,478	1.75	3.58	80.41	1.23	14.79
Two or More Races	21,878	1.50	4.22	80.37	1.84	13.57
Hispanic or Latino (of any race)	121,348	8.32	3.25	80.94	1.31	14.50
Not Hispanic or Latino	1,337,638	91.68	4.52	81.92	2.39	11.17

Table 5: ACS Acreage Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Place of birth (of householder)						
Native	1,316,859	90.26	4.54	82.12	2.41	10.93
Foreign born	142,127	9.74	3.30	79.28	1.25	16.18
Tenure						
Owned	1,253,034	85.88	4.47	83.51	2.11	9.91
Rented	182,272	12.49	3.80	71.47	3.13	21.60
Other	23,680	1.62	6.04	73.21	5.94	14.81
MSA						
Metro	1,164,649	79.83	3.85	83.36	1.64	11.15
Micro	162,317	11.13	6.46	77.97	4.58	10.99
Other	132,020	9.05	6.88	73.16	5.32	14.64
State						
Alabama	23,009	1.58	9.82	77.87	4.54	7.76
Alaska	2,583	0.18	5.77	82.00	2.44	9.79
Arizona	26,475	1.81	2.15	87.80	0.91	9.14
Arkansas	14,968	1.03	6.31	68.69	4.98	20.02
California	138,572	9.5	2.04	84.05	1.32	12.58
Colorado	26,320	1.80	2.47	85.21	1.10	11.23
Connecticut	16,182	1.11	4.78	76.38	1.56	17.28
Delaware	4,837	0.33	4.07	86.05	1.34	8.54
District of Columbia	2,108	0.14	2.99	67.65	0.00	29.36
Florida	79,843	5.47	2.74	79.51	1.28	16.46
Georgia	37,984	2.60	8.67	80.99	3.47	6.87
Hawaii	3,646	0.25	1.59	64.67	1.21	32.53
Idaho	7,311	0.50	3.75	80.63	2.43	13.19
Illinois	63,667	4.36	3.29	74.45	1.28	20.97
Indiana	34,712	2.38	5.54	87.22	1.98	5.26
Iowa	25,826	1.77	3.86	81.19	2.09	12.86
Kansas	18,113	1.24	5.17	88.28	1.31	5.24
Kentucky	21,641	1.48	5.92	76.19	3.51	14.38
Louisiana	19,975	1.37	5.48	60.14	6.69	27.68
Maine	1,387	0.10	5.26	74.69	3.97	16.08
Maryland	27,871	1.91	3.98	87.32	0.97	7.73
Massachusetts	26,539	1.82	5.18	75.74	1.25	17.83
Michigan	67,364	4.62	5.13	81.24	3.04	10.58
Minnesota	48,619	3.33	4.48	81.60	3.19	10.73
Mississippi	10,920	0.75	7.47	70.51	6.34	15.68
Missouri	31,525	2.16	4.12	82.07	2.46	11.35

Table 5: ACS Acreage Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Montana	5,017	0.34	2.91	88.74	2.09	6.26
Nebraska	14,121	0.97	3.14	84.41	3.74	8.70
Nevada	11,902	0.82	1.60	86.78	0.39	11.23
New Hampshire	7,376	0.51	3.74	79.19	2.60	14.47
New Jersey	34,557	2.37	3.41	84.54	1.07	10.98
New Mexico	7,581	0.52	3.42	78.99	2.98	14.62
New York	67,711	4.64	4.40	83.17	1.56	10.87
North Carolina	44,760	3.07	7.45	81.52	4.71	6.32
North Dakota	4,001	0.27	3.32	57.94	2.17	36.57
Ohio	61,343	4.20	4.95	86.10	1.42	7.54
Oklahoma	24,367	1.67	4.29	78.78	4.19	12.74
Oregon	17,329	1.19	2.69	86.21	1.07	10.02
Pennsylvania	76,674	5.26	4.69	84.89	1.70	8.72
Rhode Island	4,122	0.28	3.83	80.20	0.82	15.14
South Carolina	21,120	1.45	6.55	73.95	5.41	14.09
South Dakota	4,310	0.30	2.95	61.88	17.61	17.56
Tennessee	30,887	2.12	8.29	80.60	4.00	7.11
Texas	95,335	6.53	4.17	86.52	1.48	7.83
Utah	11,964	0.82	2.77	89.59	0.75	6.89
Vermont	4,134	0.28	2.88	83.84	3.65	9.63
Virginia	39,163	2.68	4.94	82.16	2.19	10.71
Washington	32,324	2.22	2.80	86.23	2.20	8.78
West Virginia	6,023	0.41	5.91	80.26	2.56	11.27
Wisconsin	48,254	3.31	5.28	81.46	3.42	9.84
Wyoming	2,614	0.18	2.95	86.76	1.95	8.34

Source: 2014 American Community Survey and administrative property tax data.

8.3 Number of Rooms:

8.3.1 Cross-Tabulation of ACS and Vendor Data Number of Rooms Responses

Table 6: ACS Number of Rooms (2014, Unedited) by Vendor Data

ACS Number of Rooms	Linked ACS Count	Vendor Number of Rooms										
		1	2	3	4	5	6	7	8	9	10+	NA
1	2,996	47	217	213	179	154	108	55	50	23	50	1,900
		[1.57]	[7.24]	[7.11]	[5.97]	[5.14]	[3.60]	[1.84]	[1.67]	[0.77]	[1.67]	[63.42]
2	8,458	25	216	852	936	646	252	102	70	29	61	5,269
		[0.30]	[2.55]	[10.07]	[11.07]	[7.64]	[2.98]	[1.21]	[0.83]	[0.34]	[0.72]	[62.30]
3	37,496	75	236	2,445	4,013	3,624	2,257	937	504	150	225	23,030
		[0.20]	[0.63]	[6.52]	[10.70]	[9.67]	[6.02]	[2.50]	[1.34]	[0.40]	[0.60]	[61.42]
4	125,495	129	283	1,812	16,824	16,018	8,041	3,230	2,019	669	926	75,544
		[0.10]	[0.23]	[1.44]	[13.41]	[12.76]	[6.41]	[2.57]	[1.61]	[0.53]	[0.74]	[60.20]
5	276,555	183	315	1,324	12,516	51,793	31,607	11,130	4,630	1,704	2,138	159,215
		[0.07]	[0.11]	[0.48]	[4.53]	[18.73]	[11.43]	[4.02]	[1.67]	[0.62]	[0.77]	[57.57]
6	312,159	178	235	922	6,880	34,918	56,161	24,216	9,542	3,160	2,808	173,139
		[0.06]	[0.08]	[0.30]	[2.20]	[11.19]	[17.99]	[7.76]	[3.06]	[1.01]	[0.90]	[55.47]

Table 6: ACS Number of Rooms (2014, Unedited) by Vendor Data (continued)

ACS Number of Rooms	Linked ACS Count	Vendor Number of Rooms										
		1	2	3	4	5	6	7	8	9	10+	NA
7	241,629	118	134	483	3,298	17,334	31,985	31,277	15,777	5,343	3,874	132,006
		[0.05]	[0.06]	[0.20]	[1.36]	[7.17]	[13.24]	[12.94]	[6.53]	[2.21]	[1.60]	[54.63]
8	178,092	101	101	284	1,642	8,826	17,030	18,449	21,051	7,910	5,670	97,028
		[0.06]	[0.06]	[0.16]	[0.92]	[4.96]	[9.56]	[10.36]	[11.82]	[4.44]	[3.18]	[54.48]
9	103,376	52	48	160	734	4,013	8,111	9,149	11,249	7,850	5,885	56,125
		[0.05]	[0.05]	[0.15]	[0.71]	[3.88]	[7.85]	[8.85]	[10.88]	[7.59]	[5.69]	[54.29]
10+	141,085	88	61	178	732	3,987	7,924	10,020	13,833	10,507	17,385	76,370
		[0.06]	[0.04]	[0.13]	[0.52]	[2.83]	[5.62]	[7.10]	[9.80]	[7.45]	[12.32]	[54.13]
NA	31,645	43	78	159	968	2,896	3,208	2,134	1,577	736	1,058	18,788
		[0.14]	[0.25]	[0.50]	[3.06]	[9.15]	[10.14]	[6.74]	[4.98]	[2.33]	[3.34]	[59.37]
Column total	1,458,986	1,039	1,924	8,832	48,722	144,209	166,684	110,699	80,302	38,081	40,080	818,414

Source: 2014 American Community Survey and administrative property tax data.

Note: Values in brackets are row percentages associated with above cross-tabulation frequency.

The response values from the vendor data are collapsed into categories similar to those used in tabulations for the ACS. Of the linked cases, 15.34 percent have the same response value in the ACS and the vendor data.²¹ Across response categories, the highest rate of agreement occurs with missing values (59.37 percent), followed by total room values equal to five (18.73 percent). When allowing the agreement rate to include linked records with a one-room difference between ACS and vendor data values, six rooms has the highest rate of agreement (36.93 percent).²² The ACS links to non-missing vendor data 43.91 percent of the time (Table 2). Subsequently, vendor data can assign a non-missing value for 40.63 percent of linked ACS cases reporting a missing value for total rooms.²³

8.3.2 Agreement in Number of Rooms across Subpopulation and Housing Characteristics

Table 7 assesses agreement based on exact value matches between the ACS and vendor data. Households with female householders have a slightly higher agreement rate in responses than those with male householders (13.87 percent vs. 12.60 percent). By age, agreement reaches a maximum of 14.31 percent among households with householders aged 70 and older. Across races, households with Native Hawaiian or Pacific Islander (NHPI) householders possess the highest rate of agreement at 16.86 percent and households with White householders the lowest at 13.06 percent. The difference in agreement between households of Hispanic and non-Hispanic ethnicities is small. Responses of households with householders born in the United States agree with vendor data more frequently than those with foreign-born householders at 13.26 percent versus 12.98 percent. Responses among households with renter householders present greater agreement at 14.75 percent than the levels of agreement observed for owners (13.02 percent) or others (12.57 percent).

Geographically, vendor data agrees with ACS responses from households in metropolitan areas at a higher rate of 14.28 percent compared to nonmetropolitan areas. Across states, agreement rates range from 0.17 percent in New Jersey to 40.55 percent in Connecticut. For eight states—Alaska, Arizona, California, Hawaii, Idaho, Illinois, Nevada and Utah—vendor data tends to overstate ACS values when cases do not agree between ACS and vendor data. The rates where vendor data over- and understates ACS values are similar for eight states—Arkansas, Kentucky, Louisiana, New Jersey, New Mexico, North Dakota, Oregon and Texas. Rhode Island has the lowest rate of missing values in linked vendor data (3.25 percent) while Maryland and Vermont have the highest (100 percent).

²¹ Overall agreement rate is the sum of the shaded diagonal values divided by the total number of matched ACS cases in this study, 1,458,986. For replicate tables on single-family, owner-occupied homes in the appendix, the denominator is 1,163,748.

²² The sum of row percentages in columns 5, 6, and 7 of row 6. Calculate the rate for one-room difference for each response by summing the row percentage directly preceding, within and following the shaded cell.

²³ This percentage is calculated as the sum of missing ACS values matched to non-missing vendor data divided by the total count of missing value ACS observations. Alternatively, subtract the row percentage where ACS and vendor data is missing from 100. These values are found in the bottom row.

Table 7: ACS Number of Rooms Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—Exact Match

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Sex (of householder)						
Male	734,368	50.33	17.07	12.60	13.09	57.24
Female	724,618	49.67	16.91	13.87	12.52	56.71
Age (of householder)						
15-19	4,996	0.34	12.61	11.59	12.95	62.85
20-24	24,767	1.70	13.94	13.45	15.18	57.44
25-29	61,389	4.21	15.50	13.83	15.11	55.55
30-34	92,148	6.32	16.78	13.63	14.22	55.38
35-39	102,736	7.04	17.48	12.95	13.93	55.64
40-44	120,138	8.23	17.87	12.53	13.61	55.98
45-49	134,175	9.20	18.33	12.46	12.99	56.23
50-54	161,192	11.05	18.16	12.64	12.61	56.59
55-59	169,278	11.60	17.92	12.92	12.16	57.00
60-64	158,886	10.89	17.68	13.01	12.13	57.17
65-69	140,640	9.64	17.02	13.33	11.64	58.01
70 and older	288,258	19.76	14.96	14.31	12.27	58.46
Race (of householder)						
White alone	1,234,819	84.64	17.38	13.06	11.97	57.59
Black or African American alone	115,528	7.92	16.15	14.21	12.61	57.03
American Indian or Alaska Native alone	7,656	0.52	15.79	13.17	12.41	58.63
Asian alone	52,518	3.60	11.43	13.77	28.71	46.09
Native Hawaiian or Pacific Islander alone	1,109	0.08	15.06	16.86	27.41	40.67
Some Other Race alone	25,478	1.75	13.99	15.14	18.82	52.04
Two or More Races	21,878	1.50	16.71	13.90	15.51	53.89

Table 7: ACS Number of Rooms Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—Exact Match (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor >ACS	vendor is missing
Ethnicity (of householder)						
Hispanic or Latino (of any race)	121,348	8.32	13.73	13.43	15.63	57.21
Not Hispanic or Latino	1,337,638	91.68	17.28	13.21	12.55	56.96
Place of birth (of householder)						
Native	1,316,859	90.26	17.55	13.26	11.95	57.25
Foreign born	142,127	9.74	11.80	12.98	20.78	54.44
Tenure						
Owned	1,253,034	85.88	17.51	13.02	12.34	57.13
Rented	182,272	12.49	13.80	14.75	16.03	55.41
Other	23,680	1.62	13.72	12.57	12.67	61.04
MSA						
Metro	1,164,649	79.83	17.75	14.28	13.97	53.99
Micro	162,317	11.13	15.29	10.39	8.70	65.61
Other	132,020	9.05	12.34	7.42	7.57	72.67
State						
Alabama	23,009	1.58	26.08	16.12	10.98	46.83
Alaska	2,583	0.18	10.45	9.18	18.82	61.56
Arizona	26,475	1.81	21.79	22.93	27.27	28.01
Arkansas	14,968	1.03	0.90	0.47	0.29	98.34
California	138,572	9.50	17.76	19.53	25.83	36.88
Colorado	26,320	1.80	29.31	15.29	17.44	37.96
Connecticut	16,182	1.11	30.19	40.55	25.15	4.12
Delaware	4,837	0.33	34.67	26.55	22.27	16.52
District of Columbia	2,108	0.14	39.85	26.85	29.32	3.98
Florida	79,843	5.47	4.57	2.29	2.49	90.66
Georgia	37,984	2.60	23.34	14.16	13.18	49.32
Hawaii	3,646	0.25	24.16	29.21	39.74	6.88
Idaho	7,311	0.50	5.51	2.89	6.96	84.64
Illinois	63,667	4.36	5.93	5.11	7.89	81.07
Indiana	34,712	2.38	32.60	22.18	31.07	14.15
Iowa	25,826	1.77	32.43	21.01	20.93	25.63
Kansas	18,113	1.24	48.47	28.21	17.56	5.76
Kentucky	21,641	1.48	5.79	4.18	5.73	84.30
Louisiana	19,975	1.37	1.65	1.25	2.07	95.03

Table 7: ACS Number of Rooms Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—Exact Match (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Maine	1,387	0.10	17.30	14.20	9.73	58.76
Maryland	27,871	1.91	0.00	0.00	0.00	100.00
Massachusetts	26,539	1.82	31.75	35.65	23.83	8.78
Michigan	67,364	4.62	9.21	5.61	5.78	79.40
Minnesota	48,619	3.33	15.12	8.44	13.27	63.17
Mississippi	10,920	0.75	26.55	17.14	16.36	39.95
Missouri	31,525	2.16	21.08	14.75	10.64	53.52
Montana	5,017	0.34	47.04	18.90	21.45	12.62
Nebraska	14,121	0.97	23.21	9.74	7.24	59.82
Nevada	11,902	0.82	20.02	24.98	24.58	30.42
New Hampshire	7,376	0.51	23.36	23.64	14.06	38.94
New Jersey	34,557	2.37	0.67	0.17	0.15	99.02
New Mexico	7,581	0.52	0.51	0.22	0.18	99.08
New York	67,711	4.64	11.08	7.24	6.38	75.30
North Carolina	44,760	3.07	16.59	11.84	9.36	62.21
North Dakota	4,001	0.27	3.20	1.27	2.90	92.63
Ohio	61,343	4.20	38.53	30.73	19.71	11.04
Oklahoma	24,367	1.67	24.52	19.10	18.63	37.75
Oregon	17,329	1.19	4.28	1.77	4.26	89.68
Pennsylvania	76,674	5.26	28.81	23.30	14.06	33.83
Rhode Island	4,122	0.28	33.67	38.26	24.82	3.25
South Carolina	21,120	1.45	8.87	6.54	7.23	77.36
South Dakota	4,310	0.30	12.44	4.71	4.73	78.12
Tennessee	30,887	2.12	10.22	9.69	7.81	72.29
Texas	95,335	6.53	8.56	7.83	8.89	74.72
Utah	11,964	0.82	22.50	10.54	44.69	22.27
Vermont	4,134	0.28	0.00	0.00	0.00	100.00
Virginia	39,163	2.68	32.79	24.26	20.98	21.97
Washington	32,324	2.22	12.40	3.54	3.12	80.94
West Virginia	6,023	0.41	26.61	19.18	10.73	43.48
Wisconsin	48,254	3.31	4.66	4.86	3.29	87.19
Wyoming	2,614	0.18	20.28	6.20	5.70	67.83

Source: 2014 American Community Survey and administrative property tax data.

In Table 8, agreement rates on average double in size when identifying agreement based on a one-room difference between ACS and vendor data values. Many of the patterns from the exact value agreement persist. However, under these relaxed criteria households with householders in their late twenties display the highest agreement with vendor data at 30.40 percent. Across races,

households with AIAN householders has the lowest rate of agreement at 28.47 percent. Households with foreign-born householders' responses agree with vendor data more frequently than households with householders born in the United States at 29.02 percent. Lastly, four states—Arizona, Idaho, Illinois and Nevada—previously displaying a greater likelihood of vendor data overstating the ACS value, now show roughly equal rates of under- and over-stating ACS values. Similarly, vendor data values for South Carolina switches from frequently understating the ACS value to being equally likely to under- or over-state the ACS value.

Table 8: ACS Number of Rooms Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—1-Room Difference

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Sex (of householder)						
Male	734,368	50.33	9.13	27.79	5.84	57.24
Female	724,618	49.67	8.55	29.57	5.17	56.71
Age (of householder)						
15-19	4,996	0.34	5.30	25.92	5.92	62.85
20-24	24,767	1.70	6.28	29.40	6.89	57.44
25-29	61,389	4.21	7.39	30.40	6.65	55.55
30-34	92,148	6.32	8.58	29.74	6.31	55.38
35-39	102,736	7.04	9.34	28.71	6.31	55.64
40-44	120,138	8.23	9.84	28.06	6.12	55.98
45-49	134,175	9.20	10.16	27.74	5.87	56.23
50-54	161,192	11.05	10.06	27.78	5.57	56.59
55-59	169,278	11.60	9.73	28.06	5.22	57.00
60-64	158,886	10.89	9.35	28.44	5.04	57.17
65-69	140,640	9.64	8.73	28.54	4.71	58.01
70 and older	288,258	19.76	6.89	29.68	4.97	58.46
Race (of householder)						
White alone	1,234,819	84.64	9.16	28.27	4.98	57.59
Black or African American alone	115,528	7.92	7.79	29.89	5.29	57.03
American Indian or Alaska Native alone	7,656	0.52	7.72	28.47	5.17	58.63
Asian alone	52,518	3.60	5.40	32.43	16.08	46.09
Native Hawaiian or Pacific Islander alone	1,109	0.08	6.40	40.31	12.62	40.67
Some Other Race alone	25,478	1.75	6.24	32.95	8.77	52.04
Two or More Races	21,878	1.50	8.54	30.47	7.10	53.89

Table 8: ACS Number of Rooms Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—1-Room Difference (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Ethnicity (of householder)						
Hispanic or Latino (of any race)	121,348	8.32	6.33	29.23	7.23	57.21
Not Hispanic or Latino	1,337,638	91.68	9.07	28.62	5.35	56.96
Place of birth (of householder)						
Native	1,316,859	90.26	9.19	28.63	4.92	57.25
Foreign born	142,127	9.74	5.58	29.02	10.96	54.44
Tenure						
Owned	1,253,034	85.88	9.30	28.34	5.23	57.13
Rented	182,272	12.49	6.00	31.18	7.40	55.41
Other	23,680	1.62	6.56	26.71	5.69	61.04
MSA						
Metro	1,164,649	79.83	9.16	30.83	6.02	53.99
Micro	162,317	11.13	8.10	22.65	3.63	65.61
Other	132,020	9.05	6.99	17.02	3.32	72.67
State						
Alabama	23,009	1.58	13.56	35.93	3.69	46.83
Alaska	2,583	0.18	5.07	23.04	10.34	61.56
Arizona	26,475	1.81	10.08	51.04	10.87	28.01
Arkansas	14,968	1.03	0.54	1.04	0.08	98.34
California	138,572	9.50	8.07	43.19	11.86	36.88
Colorado	26,320	1.80	18.18	36.45	7.41	37.96
Connecticut	16,182	1.11	12.06	74.16	9.66	4.12
Delaware	4,837	0.33	17.57	57.23	8.68	16.52
District of Columbia	2,108	0.14	22.01	62.86	11.15	3.98
Florida	79,843	5.47	2.71	5.55	1.08	90.66
Georgia	37,984	2.60	13.22	31.96	5.50	49.32
Hawaii	3,646	0.25	12.48	63.63	17.00	6.88
Idaho	7,311	0.50	3.17	8.04	4.14	84.64
Illinois	63,667	4.36	3.17	12.05	3.71	81.07
Indiana	34,712	2.38	17.94	52.79	15.12	14.15
Iowa	25,826	1.77	18.36	46.34	9.68	25.63
Kansas	18,113	1.24	27.18	60.44	6.63	5.76
Kentucky	21,641	1.48	3.22	9.79	2.69	84.30

Table 8: ACS Number of Rooms Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—1-Room Difference (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Louisiana	19,975	1.37	0.81	3.09	1.07	95.03
Maine	1,387	0.10	9.37	28.41	3.46	58.76
Maryland	27,871	1.91	0.00	0.00	0.00	100.00
Massachusetts	26,539	1.82	14.25	67.98	9.00	8.78
Michigan	67,364	4.62	4.96	12.83	2.81	79.40
Minnesota	48,619	3.33	9.20	20.75	6.88	63.17
Mississippi	10,920	0.75	13.92	39.80	6.34	39.95
Missouri	31,525	2.16	11.05	32.05	3.39	53.52
Montana	5,017	0.34	29.70	48.77	8.91	12.62
Nebraska	14,121	0.97	14.87	22.70	2.61	59.82
Nevada	11,902	0.82	8.83	51.46	9.28	30.42
New Hampshire	7,376	0.51	11.24	45.08	4.75	38.94
New Jersey	34,557	2.37	0.52	0.41	0.06	99.02
New Mexico	7,581	0.52	(D)	0.57	(D)	99.08
New York	67,711	4.64	5.86	16.15	2.69	75.30
North Carolina	44,760	3.07	8.72	25.64	3.43	62.21
North Dakota	4,001	0.27	2.00	3.57	1.80	92.63
Ohio	61,343	4.20	18.74	63.29	6.93	11.04
Oklahoma	24,367	1.67	11.78	42.94	7.53	37.75
Oregon	17,329	1.19	2.69	5.07	2.56	89.68
Pennsylvania	76,674	5.26	14.26	47.08	4.83	33.83
Rhode Island	4,122	0.28	14.60	71.40	10.75	3.25
South Carolina	21,120	1.45	4.55	14.38	3.70	77.36
South Dakota	4,310	0.30	8.54	11.39	1.95	78.12
Tennessee	30,887	2.12	4.77	20.06	2.88	72.29
Texas	95,335	6.53	4.02	17.50	3.77	74.72
Utah	11,964	0.82	14.83	30.36	32.55	22.27
Vermont	4,134	0.28	0.00	0.00	0.00	100.00
Virginia	39,163	2.68	17.85	52.14	8.05	21.97
Washington	32,324	2.22	8.58	9.07	1.40	80.94
West Virginia	6,023	0.41	14.05	38.83	3.64	43.48
Wisconsin	48,254	3.31	2.11	8.98	1.72	87.19
Wyoming	2,614	0.18	14.46	15.26	2.45	67.83

Source: 2014 American Community Survey and administrative property tax data.
Results are suppressed (D) where necessary for disclosure avoidance.

8.4 Number of Bedrooms:

8.4.1 Cross-Tabulation Agreement of ACS and Vendor Data Number of Bedrooms Responses

Table 9: ACS Number of Bedrooms (2014, Unedited) by Vendor Data

ACS Number of Bedrooms	Linked ACS Count	Vendor Number of Bedrooms					
		1	2	3	4	5+	NA
0	5,276	382	578	1,309	466	114	2,427
		[7.24]	[10.96]	[24.81]	[8.83]	[2.16]	[46.00]
1	35,050	11,048	5,358	2,957	852	278	14,557
		[31.52]	[15.29]	[8.44]	[2.43]	[0.79]	[41.53]
2	267,398	4,109	110,131	36,823	6,720	1,535	108,080
		[1.54]	[41.19]	[13.77]	[2.51]	[0.57]	[40.42]
3	712,281	1,794	38,726	349,731	34,590	4,943	282,497
		[0.25]	[5.44]	[49.10]	[4.86]	[0.69]	[39.66]
4	323,525	452	7,068	60,849	128,632	10,254	116,270
		[0.14]	[2.18]	[18.81]	[39.76]	[3.17]	[35.94]
5+	86,166	140	1,264	10,469	18,781	25,042	30,470
		[0.16]	[1.47]	[12.15]	[21.80]	[29.06]	[35.36]
NA	29,290	319	2,731	8,224	3,718	1,760	12,538
		[1.09]	[9.32]	[28.08]	[12.69]	[6.01]	[42.81]
Column total	1,458,986	18,244	165,856	470,362	193,759	43,926	566,839

Source: 2014 American Community Survey and administrative property tax data.

Note: Values in brackets are row percentages as associated with above cross-tabulation frequency.

The response values from the vendor data are collapsed into categories similar to those used in tabulations of the ACS. While the unedited ACS data reports zero bedrooms as a valid response, the vendor data reports a minimum of one bedroom. In 43.67 percent of the linked cases, the

response value is the same in both the ACS and the vendor data.²⁴ Across response categories, the highest rate of agreement occurs with total bedroom values equal to three (49.10 percent). When allowing the agreement rate to include linked records with a one-bedroom difference between ACS and vendor data values, four bedrooms have the highest rate of agreement (61.35 percent).²⁵ The ACS links to non-missing vendor data 61.15 percent of the time (Table 2). Subsequently, vendor data can assign a non-missing value for 57.19 percent of linked ACS cases reporting a missing value for total bedrooms.²⁶

8.4.2 Agreement in Number of Bedrooms across Subpopulation and Housing Characteristics

Table 10 assesses agreement based on exact value matches between the ACS and vendor data. Households with female householders have a slightly higher agreement rate in responses than households with male householders (42.97 percent vs. 42.03 percent). Across age groups, the highest figure in the table is 45.39 percent for households with 30-34 year old householders. Across races, the table shows the highest agreement rate is 55.00 percent for households with NHPI householders and the lowest rate of 40.44 percent for households with Black householders. Compared to non-Hispanic householders, households with Hispanic householders agree with vendor data values more frequently at 46.18 percent versus 42.16 percent. Households with foreign-born householders agree more frequently with vendor data at 48.27 percent versus 41.87 percent for U.S.-born householders. Responses among renters present greater agreement at 43.94 percent compared to owner (42.42 percent) and “other” (35.46 percent) householders.

Geographically, vendor data agrees with ACS responses from householders in metropolitan (vs. micropolitan and rural) areas at a higher rate of 46.17 percent. Across states, agreement rates range from 0.71 percent in New Jersey to 74.22 percent in Connecticut. For four states—Alaska, Hawaii, Nevada and Rhode Island—vendor data tends to overstate ACS values. Rhode Island has the lowest rate of missing values in linked vendor data (2.94 percent) while Arizona, Maryland and Vermont have the highest (100 percent).

²⁴ Overall agreement rate is the sum of the shaded diagonal values divided by the total number of matched ACS cases in this study, 1,458,986. For replicate tables on single-family, owner-occupied homes in the appendix, the denominator is 1,163,748.

²⁵ The sum of row percentages in columns 3, 4, and 5 of row 4. Calculate the rate for one-bedroom difference for each response by summing the row percentage directly preceding, within and following the shaded cell.

²⁶ This percentage is calculated as the sum of missing ACS values matched to non-missing vendor data divided by the total count of missing value ACS observations. Alternatively, subtract the row percentage where ACS and vendor data is missing from 100. These values are found in the bottom row.

Table 10: ACS Number of Bedrooms Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—Exact Match

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Sex (of householder)						
Male	734,368	50.33	9.85	42.03	7.88	40.24
Female	724,618	49.67	10.20	42.97	7.08	39.76
Age (of householder)						
15-19	4,996	0.34	13.45	35.55	6.39	44.62
20-24	24,767	1.70	10.76	40.38	8.07	40.79
25-29	61,389	4.21	9.75	45.00	7.43	37.83
30-34	92,148	6.32	11.00	45.39	6.49	37.12
35-39	102,736	7.04	12.14	44.41	6.08	37.36
40-44	120,138	8.23	12.29	43.61	6.40	37.71
45-49	134,175	9.20	11.76	42.72	6.69	38.84
50-54	161,192	11.05	10.95	42.16	7.19	39.70
55-59	169,278	11.60	9.92	42.23	7.59	40.26
60-64	158,886	10.89	9.32	42.15	7.92	40.61
65-69	140,640	9.64	8.88	41.55	8.19	41.38
70 and older	288,258	19.76	7.63	41.10	8.61	42.66
Race (of householder)						
White alone	1,234,819	84.64	9.96	42.06	7.40	40.59
Black or African American alone	115,528	7.92	9.55	40.44	7.39	42.61
American Indian or Alaska Native alone	7,656	0.52	10.89	41.29	7.84	39.98
Asian alone	52,518	3.60	10.57	53.35	8.44	27.64
Native Hawaiian or Pacific Islander alone	1,109	0.08	15.60	55.00	10.01	19.39
Some Other Race alone	25,478	1.75	12.54	47.10	9.40	30.96
Two or More Races	21,878	1.50	11.52	46.25	7.84	34.39

Table 10: ACS Number of Bedrooms Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—Exact Match (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Ethnicity (of householder)						
Hispanic or Latino (of any race)	121,348	8.32	12.07	46.18	8.45	33.30
Not Hispanic or Latino	1,337,638	91.68	9.84	42.16	7.39	40.61
Place of birth (of householder)						
Native	1,316,859	90.26	9.90	41.87	7.36	40.87
Foreign born	142,127	9.74	11.15	48.27	8.62	31.97
Tenure						
Owned	1,253,034	85.88	10.08	42.42	7.05	40.45
Rented	182,272	12.49	9.84	43.94	10.21	36.01
Other	23,680	1.62	8.34	35.46	9.51	46.68
MSA						
Metro	1,164,649	79.83	10.44	46.17	7.77	35.62
Micro	162,317	11.13	9.14	32.24	6.83	51.79
Other	132,020	9.05	7.44	22.69	5.71	64.17
State						
Alabama	23,009	1.58	4.16	19.06	3.92	72.86
Alaska	2,583	0.18	7.55	35.39	11.46	45.61
Arizona	26,475	1.81	0.00	0.00	0.00	100.00
Arkansas	14,968	1.03	0.39	1.58	0.24	97.78
California	138,572	9.50	11.97	69.45	11.06	7.53
Colorado	26,320	1.80	24.85	58.09	9.78	7.28
Connecticut	16,182	1.11	10.97	74.22	11.42	3.39
Delaware	4,837	0.33	15.15	58.92	9.14	16.79
District of Columbia	2,108	0.14	17.84	65.13	12.67	4.36
Florida	79,843	5.47	10.19	55.06	7.80	26.95
Georgia	37,984	2.60	14.71	45.99	8.23	31.07
Hawaii	3,646	0.25	12.29	61.46	17.55	8.69
Idaho	7,311	0.50	12.65	47.12	12.86	27.37
Illinois	63,667	4.36	3.67	17.13	3.09	76.11
Indiana	34,712	2.38	16.86	58.00	11.60	13.53
Iowa	25,826	1.77	13.63	48.33	12.95	25.09
Kansas	18,113	1.24	17.09	66.68	10.94	5.28
Kentucky	21,641	1.48	8.13	28.88	4.68	58.32
Louisiana	19,975	1.37	0.93	3.88	0.74	94.45

Table 10: ACS Number of Bedrooms Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—Exact Match (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Maine	1,387	0.10	8.72	35.04	7.79	48.45
Maryland	27,871	1.91	0.00	0.00	0.00	100.00
Massachusetts	26,539	1.82	13.98	67.73	14.20	4.09
Michigan	67,364	4.62	3.99	17.63	2.72	75.66
Minnesota	48,619	3.33	14.36	43.92	9.72	32.00
Mississippi	10,920	0.75	6.45	21.31	4.08	68.17
Missouri	31,525	2.16	11.44	39.79	5.61	43.16
Montana	5,017	0.34	22.44	54.59	17.04	5.92
Nebraska	14,121	0.97	22.98	50.10	8.65	18.26
Nevada	11,902	0.82	10.17	69.32	11.77	8.74
New Hampshire	7,376	0.51	13.90	70.17	11.89	4.04
New Jersey	34,557	2.37	0.09	0.71	0.04	99.17
New Mexico	7,581	0.52	2.57	11.20	1.87	84.36
New York	67,711	4.64	9.87	40.15	8.62	41.37
North Carolina	44,760	3.07	11.60	53.00	8.87	26.53
North Dakota	4,001	0.27	6.05	10.90	2.35	80.70
Ohio	61,343	4.20	13.59	70.00	9.98	6.43
Oklahoma	24,367	1.67	12.26	50.68	9.60	27.46
Oregon	17,329	1.19	14.88	61.31	11.52	12.29
Pennsylvania	76,674	5.26	11.10	49.29	8.70	30.91
Rhode Island	4,122	0.28	12.08	69.77	15.21	2.94
South Carolina	21,120	1.45	9.64	40.84	6.47	43.05
South Dakota	4,310	0.30	10.70	20.09	4.80	64.41
Tennessee	30,887	2.12	4.94	18.94	4.06	72.06
Texas	95,335	6.53	8.34	37.00	6.49	48.17
Utah	11,964	0.82	24.38	42.75	10.85	22.02
Vermont	4,134	0.28	0.00	0.00	0.00	100.00
Virginia	39,163	2.68	14.01	61.55	8.88	15.57
Washington	32,324	2.22	16.67	59.93	11.47	11.92
West Virginia	6,023	0.41	10.71	38.39	7.55	43.35
Wisconsin	48,254	3.31	1.56	12.55	2.45	83.44
Wyoming	2,614	0.18	13.20	22.04	3.67	61.09

Source: 2014 American Community Survey and administrative property tax data.

Response rates improve significantly when identifying agreement based on a one-room difference between ACS and vendor data values. Many of the patterns from the exact value agreement persist. However, most states (30 total) now show equal likelihood of over- or understating the ACS value.

Table 11: ACS Number of Bedrooms Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—1-Room Difference

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Sex (of householder)						
Male	734,368	50.33	1.61	56.63	1.51	40.24
Female	724,618	49.67	1.67	57.16	1.41	39.76
Age (of householder)						
15-19	4,996	0.34	2.86	50.44	2.08	44.62
20-24	24,767	1.70	1.96	54.46	2.79	40.79
25-29	61,389	4.21	1.52	58.63	2.02	37.83
30-34	92,148	6.32	1.84	59.51	1.53	37.12
35-39	102,736	7.04	2.17	59.10	1.37	37.36
40-44	120,138	8.23	2.17	58.83	1.30	37.71
45-49	134,175	9.20	2.08	57.75	1.33	38.84
50-54	161,192	11.05	1.79	57.12	1.38	39.70
55-59	169,278	11.60	1.61	56.73	1.41	40.26
60-64	158,886	10.89	1.47	56.48	1.45	40.61
65-69	140,640	9.64	1.30	55.92	1.40	41.38
70 and older	288,258	19.76	1.14	54.72	1.47	42.66
Race (of householder)						
White alone	1,234,819	84.64	1.65	56.41	1.36	40.59
Black or African American alone	115,528	7.92	1.38	54.25	1.76	42.61
American Indian or Alaska Native alone	7,656	0.52	1.88	56.40	1.74	39.98
Asian alone	52,518	3.60	1.61	68.75	2.01	27.64
Native Hawaiian or Pacific Islander alone	1,109	0.08	4.06	73.85	2.71	19.39
Some Other Race alone	25,478	1.75	2.22	63.40	3.43	30.96
Two or More Races	21,878	1.50	2.03	61.60	1.98	34.39

Table 11: ACS Number of Bedrooms Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—1-Room Difference (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Ethnicity (of householder)						
Hispanic or Latino (of any race)	121,348	8.32	2.06	62.05	2.59	33.30
Not Hispanic or Latino	1,337,638	91.68	1.60	56.43	1.36	40.61
Place of birth (of householder)						
Native	1,316,859	90.26	1.62	56.15	1.36	40.87
Foreign born	142,127	9.74	1.84	63.80	2.40	31.97
Tenure						
Owned	1,253,034	85.88	1.66	56.77	1.11	40.45
Rented	182,272	12.49	1.52	58.71	3.76	36.01
Other	23,680	1.62	1.51	49.65	2.17	46.68
MSA						
Metro	1,164,649	79.83	1.64	61.20	1.54	35.62
Micro	162,317	11.13	1.69	45.27	1.25	51.79
Other	132,020	9.05	1.59	33.20	1.04	64.17
State						
Alabama	23,009	1.58	0.50	26.19	0.45	72.86
Alaska	2,583	0.18	1.51	49.05	3.83	45.61
Arizona	26,475	1.81	0.00	0.00	0.00	100.00
Arkansas	14,968	1.03	(D)	(D)	(D)	97.78
California	138,572	9.50	1.52	88.48	2.48	7.53
Colorado	26,320	1.80	6.28	84.83	1.60	7.28
Connecticut	16,182	1.11	1.32	92.10	3.19	3.39
Delaware	4,837	0.33	2.15	79.78	1.28	16.79
District of Columbia	2,108	0.14	3.08	89.90	2.66	4.36
Florida	79,843	5.47	1.16	70.76	1.14	26.95
Georgia	37,984	2.60	2.40	65.30	1.23	31.07
Hawaii	3,646	0.25	2.77	83.10	5.43	8.69
Idaho	7,311	0.50	2.83	66.54	3.26	27.37
Illinois	63,667	4.36	0.63	22.72	0.54	76.11
Indiana	34,712	2.38	3.00	81.59	1.88	13.53
Iowa	25,826	1.77	2.68	69.74	2.48	25.09
Kansas	18,113	1.24	3.91	88.28	2.53	5.28
Kentucky	21,641	1.48	1.46	39.59	0.63	58.32
Louisiana	19,975	1.37	0.12	5.32	0.11	94.45

Table 11: ACS Number of Bedrooms Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—1-Room Difference (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Maine	1,387	0.10	1.51	48.38	1.66	48.45
Maryland	27,871	1.91	0.00	0.00	0.00	100.00
Massachusetts	26,539	1.82	2.18	89.62	4.12	4.09
Michigan	67,364	4.62	0.62	23.23	0.50	75.66
Minnesota	48,619	3.33	3.07	63.31	1.63	32.00
Mississippi	10,920	0.75	0.86	30.40	0.57	68.17
Missouri	31,525	2.16	1.88	54.09	0.87	43.16
Montana	5,017	0.34	6.02	83.70	4.37	5.92
Nebraska	14,121	0.97	6.10	73.95	1.69	18.26
Nevada	11,902	0.82	1.10	88.33	1.83	8.74
New Hampshire	7,376	0.51	1.98	91.74	2.24	4.04
New Jersey	34,557	2.37	(D)	(D)	(D)	99.17
New Mexico	7,581	0.52	0.32	14.89	0.44	84.36
New York	67,711	4.64	1.55	54.87	2.22	41.37
North Carolina	44,760	3.07	1.40	70.98	1.09	26.53
North Dakota	4,001	0.27	2.12	16.67	0.50	80.70
Ohio	61,343	4.20	1.93	89.31	2.33	6.43
Oklahoma	24,367	1.67	1.36	69.91	1.27	27.46
Oregon	17,329	1.19	2.65	82.52	2.54	12.29
Pennsylvania	76,674	5.26	1.61	65.84	1.64	30.91
Rhode Island	4,122	0.28	1.65	89.30	6.11	2.94
South Carolina	21,120	1.45	1.15	54.94	0.86	43.05
South Dakota	4,310	0.30	3.09	31.51	1.00	64.41
Tennessee	30,887	2.12	0.62	26.59	0.73	72.06
Texas	95,335	6.53	0.83	50.05	0.95	48.17
Utah	11,964	0.82	10.29	64.97	2.72	22.02
Vermont	4,134	0.28	0.00	0.00	0.00	100.00
Virginia	39,163	2.68	1.87	81.36	1.21	15.57
Washington	32,324	2.22	3.01	83.12	1.95	11.92
West Virginia	6,023	0.41	1.54	53.68	1.43	43.35
Wisconsin	48,254	3.31	0.22	15.24	1.10	83.44
Wyoming	2,614	0.18	5.28	33.05	0.57	61.09

Source: 2014 American Community Survey and administrative property tax data.
Results are suppressed (D) where necessary for disclosure avoidance.

8.5 Property Value:

8.5.1 Cross-Tabulation of ACS and Vendor Data Property Value Responses

Table 12: Calculated Decile Ranges for ACS Unedited Property Value Responses

Decile	Decile Cutoff	Adjusted Range	Percent of ACS Linked Cases
1	0	[0-50,000)	8.07
2	50,004	[50,000-85,000)	8.00
3	85,000	[85,000-118,000)	7.38
4	118,024	[118,000-14,999)	7.71
5	150,000	[14,999-175,000)	8.03
6	175,009	[175,000-211,000)	7.67
7	211,100	[211,000-270,000)	7.86
8	270,070	[270,000-350,000)	8.67
9	350,009	[350,000-500,000)	7.39
10	500,003	[500,000+]	7.31

Source: 2014 American Community Survey and administrative property tax data.

Note: The percentages do not sum to 100% as missing values are excluded from the calculation of deciles. The use of open intervals for the adjusted range indicate the inclusion of values up to, but not including, the upper endpoint.

Both the ACS and vendor data responses are collapsed into ten groups according to the range of ACS values as shown in Table 12.²⁷ In Table 13, 28.72 percent of the linked ACS cases have vendor values in the same ACS decile category.²⁸ Across response categories, the highest rate of agreement occurs with property values less than \$50,000 in decile 1 (59.76 percent). The ACS links to non-missing vendor data 99.61 percent of the time (Table 2). Subsequently, vendor data can assign a non-missing value for 99.40 percent of linked ACS cases reporting a missing value for property value.²⁹

²⁷ For the topics property value and real estate tax, where the responses are in large continuous monetary terms, responses are divided into ten groups approximating decile cutoffs for comparison. The adjusted range simply rounds the decile cutoff value to the nearest thousand.

²⁸ Overall agreement rate is the sum of the shaded diagonal values divided by the total number of matched ACS cases in this study, 1,458,986. This calculation is repeated for each ACS topic. For replicate tables on single-family, owner-occupied homes in the appendix, the denominator is 1,163,748.

²⁹ To find vendor coverage of ACS missing values, subtract the row percentage where ACS and vendor data is missing from 100. These values are found in the bottom row.

Table 13: ACS Property Value Deciles (2014, Unedited) by Vendor Data

ACS Property Value	Linked ACS Count	Vendor Property Value										
		1	2	3	4	5	6	7	8	9	10	NA
1	117,710	70,340	17,189	7,479	5,732	3,432	3,502	3,715	2,615	1,852	1,138	716
		[59.76]	[14.60]	[6.35]	[4.87]	[2.92]	[2.98]	[3.16]	[2.22]	[1.57]	[0.97]	[0.61]
2	116,743	44,860	56,065	12,024	1,897	526	298	180	124	165	220	384
		[38.43]	[48.02]	[10.30]	[1.62]	[0.45]	[0.26]	[0.15]	[0.11]	[0.14]	[0.19]	[0.33]
3	107,617	22,065	32,181	41,791	7,925	1,524	828	434	211	115	208	335
		[20.50]	[29.90]	[38.83]	[7.36]	[1.42]	[0.77]	[0.40]	[0.20]	[0.11]	[0.19]	[0.31]
4	112,415	15,137	17,949	36,135	35,180	5,174	1,590	548	178	75	102	347
		[13.47]	[15.97]	[32.14]	[31.29]	[4.60]	[1.41]	[0.49]	[0.16]	[0.07]	[0.09]	[0.31]
5	117,195	12,450	13,698	20,351	35,407	24,368	7,828	2,016	391	179	169	338
		[10.62]	[11.69]	[17.37]	[30.21]	[20.79]	[6.68]	[1.72]	[0.33]	[0.15]	[0.14]	[0.29]
6	111,886	9,202	8,923	11,456	19,203	24,110	28,404	8,290	1,379	347	225	347
		[8.22]	[7.98]	[10.24]	[17.16]	[21.55]	[25.39]	[7.41]	[1.23]	[0.31]	[0.20]	[0.31]

Table 13: ACS Property Value Deciles (2014, Unedited) by Vendor Data (continued)

ACS Property Value	Linked ACS Count	Vendor Property Value										
		1	2	3	4	5	6	7	8	9	10	NA
7	114,727	7,817	6,119	6,842	10,459	13,284	28,806	35,175	5,064	654	191	316
		[6.81]	[5.33]	[5.96]	[9.12]	[11.58]	[25.11]	[30.66]	[4.41]	[0.57]	[0.17]	[0.28]
8	126,441	9,779	4,365	5,331	5,947	6,990	14,568	37,138	35,566	5,945	463	349
		[7.73]	[3.45]	[4.22]	[4.70]	[5.53]	[11.52]	[29.37]	[28.13]	[4.70]	[0.37]	[0.28]
9	107,783	9,381	3,031	2,682	3,093	2,627	4,971	12,503	28,344	36,992	3,889	270
		[8.70]	[2.81]	[2.49]	[2.87]	[2.44]	[4.61]	[11.60]	[26.30]	[34.32]	[3.61]	[0.25]
10	106,697	7,080	3,638	2,667	2,168	1,585	2,165	3,939	7,360	22,539	53,266	290
		[6.64]	[3.41]	[2.50]	[2.03]	[1.49]	[2.03]	[3.69]	[6.90]	[21.12]	[49.92]	[0.27]
NA	319,772	95,982	58,873	41,211	30,346	17,461	18,227	18,855	14,052	11,816	11,021	1,928
		[30.02]	[18.41]	[12.89]	[9.49]	[5.46]	[5.70]	[5.90]	[4.39]	[3.70]	[3.45]	[0.60]
Column total	1,458,986	304,093	222,031	187,969	157,357	101,081	111,187	122,793	95,284	80,679	70,892	5,620

Source: 2014 American Community Survey and administrative property tax data.

Note: Values in brackets are row percentages associated with above cross-tabulation frequency.

8.5.2 Agreement in Property Value across Subpopulation and Housing Characteristics

Table 14 shows agreement based on 1-percent difference value matches between the ACS and vendor data. There is no significant difference in agreement between households with male and female householders. By age, the table shows the highest agreement (3.22 percent) occurs among households with householders age 70 or older. Across races, households with White householders possess the highest rate of agreement at 3.03 percent and those with householders of some other race alone the lowest at 1.83 percent. Households with non-Hispanic householders agree with vendor data values more frequently than households with Hispanic householders (3.02 percent vs. 2.15 percent), as do those with householders born in the United States relative to householders born outside the U.S. (2.99 percent vs. 2.48 percent). Responses among owners agree 3.40 percent of the time, which is a greater agreement rate than that for renters and householders of other tenure status.

Geographically, vendor data agrees with ACS responses from householders in metropolitan and micropolitan at an almost equal rate around 3 percent. Across states, agreement rates range from 0.12 percent in Delaware to 8.39 percent in Utah. Vendor data tends to be overstate ACS values when linked cases do not agree. Minnesota has the lowest rate of missing values in linked vendor data (14.64 percent) while Nevada has the highest (33.00 percent).

Table 14: ACS Property Value Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked By MAFID to Vendor Data—1 Percent Difference

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Sex (of householder)						
Male	734,368	50.33	61.76	2.97	15.78	19.50
Female	724,618	49.67	56.53	2.92	15.67	24.88
Age (of householder)						
15-19	4,996	0.34	22.22	1.02	7.49	69.28
20-24	24,767	1.70	29.60	1.41	7.78	61.21
25-29	61,389	4.21	47.12	2.30	9.58	41.01
30-34	92,148	6.32	55.53	2.59	10.39	31.49
35-39	102,736	7.04	58.34	2.68	11.65	27.33
40-44	120,138	8.23	60.37	2.86	13.48	23.30
45-49	134,175	9.20	61.71	2.91	15.10	20.28
50-54	161,192	11.05	61.89	3.05	16.36	18.71
55-59	169,278	11.60	62.81	2.96	17.16	17.07
60-64	158,886	10.89	63.10	3.13	17.63	16.14
65-69	140,640	9.64	63.68	3.19	17.30	15.83
70 and older	288,258	19.76	56.68	3.22	19.24	20.87
Race (of householder)						
White alone	1,234,819	84.64	60.80	3.03	16.11	20.06
Black or African American alone	115,528	7.92	45.62	2.43	13.99	37.96
American Indian or Alaska Native alone	7,656	0.52	47.86	2.08	15.14	34.93
Asian alone	52,518	3.60	61.92	2.98	13.19	21.91
Native Hawaiian or Pacific Islander alone	1,109	0.08	42.29	2.07	15.15	40.49
Some Other Race alone	25,478	1.75	45.40	1.83	11.87	40.90
Two or More Races	21,878	1.50	52.30	2.40	13.77	31.53

Table 14: ACS Property Value Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked By MAFID to Vendor Data—1 Percent Difference (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Ethnicity (of householder)						
Hispanic or Latino (of any race)	121,348	8.32	50.51	2.15	12.84	34.50
Not Hispanic or Latino	1,337,638	91.68	59.95	3.02	15.99	21.05
Place of birth (of householder)						
Native	1,316,859	90.26	59.37	2.99	16.04	21.60
Foreign born	142,127	9.74	57.23	2.48	12.84	27.45
Tenure						
Owned	1,253,034	85.88	68.22	3.40	17.94	10.44
Rented	182,272	12.49	3.27	0.10	1.74	94.88
Other	23,680	1.62	9.97	0.65	6.27	83.11
MSA						
Metro	1,164,649	79.83	60.04	2.97	15.00	21.99
Micro	162,317	11.13	56.08	2.96	18.10	22.86
Other	132,020	9.05	55.20	2.70	19.19	22.91
State						
Alabama	23,009	1.58	51.05	3.41	21.99	23.54
Alaska	2,583	0.18	52.61	6.81	18.97	21.60
Arizona	26,475	1.81	66.33	0.76	6.59	26.32
Arkansas	14,968	1.03	49.60	2.37	20.54	27.49
California	138,572	9.50	60.45	1.69	10.26	27.60
Colorado	26,320	1.80	63.96	2.67	12.21	21.16
Connecticut	16,182	1.11	76.31	0.51	5.81	17.37
Delaware	4,837	0.33	75.54	(D)	(D)	20.49
District of Columbia	2,108	0.14	57.12	2.23	12.38	28.27
Florida	79,843	5.47	63.36	1.13	9.08	26.44
Georgia	37,984	2.60	54.65	3.15	15.96	26.24
Hawaii	3,646	0.25	36.40	4.09	27.26	32.25
Idaho	7,311	0.50	52.47	3.05	20.60	23.88
Illinois	63,667	4.36	76.69	0.18	3.48	19.65
Indiana	34,712	2.38	51.54	3.68	24.39	20.38
Iowa	25,826	1.77	51.97	4.29	24.56	19.19
Kansas	18,113	1.24	49.29	4.89	23.98	21.84
Kentucky	21,641	1.48	53.32	6.86	18.30	21.52
Louisiana	19,975	1.37	65.79	0.73	5.84	27.64

Table 14: ACS Property Value Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked By MAFID to Vendor Data—1 Percent Difference (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Maine	1,387	0.10	49.24	4.69	31.36	14.71
Maryland	27,871	1.91	60.61	3.43	16.64	19.32
Massachusetts	26,539	1.82	57.21	3.87	21.76	17.16
Michigan	67,364	4.62	73.70	0.37	5.43	20.50
Minnesota	48,619	3.33	58.84	4.89	21.63	14.64
Mississippi	10,920	0.75	58.17	1.20	14.29	26.34
Missouri	31,525	2.16	63.25	1.35	11.88	23.51
Montana	5,017	0.34	47.28	2.79	26.37	23.56
Nebraska	14,121	0.97	56.20	4.55	19.99	19.26
Nevada	11,902	0.82	62.28	0.27	4.45	33.00
New Hampshire	7,376	0.51	51.91	6.24	26.75	15.10
New Jersey	34,557	2.37	58.06	4.42	21.34	16.18
New Mexico	7,581	0.52	62.66	1.32	11.27	24.76
New York	67,711	4.64	63.12	3.46	14.65	18.76
North Carolina	44,760	3.07	41.73	5.77	25.29	27.21
North Dakota	4,001	0.27	66.48	2.57	15.52	15.42
Ohio	61,343	4.20	55.27	3.70	20.24	20.79
Oklahoma	24,367	1.67	53.82	2.72	14.74	28.72
Oregon	17,329	1.19	57.08	2.47	17.08	23.38
Pennsylvania	76,674	5.26	67.76	1.66	11.47	19.10
Rhode Island	4,122	0.28	56.96	4.39	20.38	18.27
South Carolina	21,120	1.45	49.01	3.93	23.30	23.75
South Dakota	4,310	0.30	60.86	2.71	19.70	16.73
Tennessee	30,887	2.12	49.59	4.39	22.58	23.44
Texas	95,335	6.53	52.08	4.23	19.99	23.69
Utah	11,964	0.82	59.18	4.11	19.23	17.48
Vermont	4,134	0.28	42.96	8.39	32.75	15.89
Virginia	39,163	2.68	53.82	5.18	20.22	20.78
Washington	32,324	2.22	63.58	2.60	12.34	21.48
West Virginia	6,023	0.41	72.16	0.22	5.10	22.53
Wisconsin	48,254	3.31	49.31	5.51	29.20	15.98
Wyoming	2,614	0.18	55.93	2.68	19.32	22.07

Source: 2014 American Community Survey and administrative property tax data.

Results are suppressed (D) where necessary for disclosure avoidance.

In Table 15, agreement rates improve significantly when identifying agreement based on a five-percent difference between ACS and vendor data values. Many of the patterns from the one-percent value difference persist. However, under these relaxed criteria households with male

householders have a slightly higher agreement rate than households with female householders (10.83 percent vs. 10.29 percent). Households with householders in their early fifties display the highest agreement with vendor data at 11.08 percent. Across races, Households with Asian householders have the highest rate of agreement at 11.36 percent. Households in metropolitan (vs. micropolitan or rural) areas agree slightly more frequently at 10.77 percent. Lastly, Vermont has the highest rate of agreement.

Table 15: ACS Property Value Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data---5 Percent Difference

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Sex (of householder)						
Male	734,368	50.33	57.07	10.83	12.61	19.50
Female	724,618	49.67	52.14	10.29	12.69	24.88
Age (of householder)						
15-19	4,996	0.34	20.58	3.82	6.33	69.28
20-24	24,767	1.70	27.35	5.13	6.31	61.21
25-29	61,389	4.21	42.91	8.94	7.15	41.01
30-34	92,148	6.32	50.73	10.16	7.62	31.49
35-39	102,736	7.04	53.22	10.73	8.73	27.33
40-44	120,138	8.23	55.41	10.93	10.36	23.30
45-49	134,175	9.20	56.78	11.06	11.88	20.28
50-54	161,192	11.05	57.12	11.08	13.08	18.71
55-59	169,278	11.60	58.02	11.03	13.87	17.07
60-64	158,886	10.89	58.51	10.98	14.36	16.14
65-69	140,640	9.64	59.19	10.89	14.08	15.83
70 and older	288,258	19.76	52.74	10.21	16.18	20.87
Race (of householder)						
White alone	1,234,819	84.64	56.10	10.92	12.93	20.06
Black or African American alone	115,528	7.92	42.52	7.73	11.80	37.96
American Indian or Alaska Native alone	7,656	0.52	44.02	8.23	12.83	34.93
Asian alone	52,518	3.60	56.84	11.36	9.89	21.91
Native Hawaiian or Pacific Islander alone	1,109	0.08	39.13	7.48	12.89	40.49
Some Other Race alone	25,478	1.75	42.53	6.79	9.78	40.90
Two or More Races	21,878	1.50	48.38	8.83	11.26	31.53

Table 15: ACS Property Value Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data---5 Percent Difference (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Ethnicity (of householder)						
Hispanic or Latino (of any race)	121,348	8.32	47.13	7.91	10.46	34.50
Not Hispanic or Latino	1,337,638	91.68	55.30	10.80	12.85	21.05
Place of birth (of householder)						
Native	1,316,859	90.26	54.77	10.70	12.92	21.60
Foreign born	142,127	9.74	53.23	9.22	10.10	27.45
Tenure						
Owned	1,253,034	85.88	62.98	12.19	14.39	10.44
Rented	182,272	12.49	3.09	0.45	1.58	94.88
Other	23,680	1.62	9.35	1.92	5.62	83.11
MSA						
Metro	1,164,649	79.83	55.34	10.77	11.90	21.99
Micro	162,317	11.13	51.87	10.20	15.06	22.86
Other	132,020	9.05	51.68	9.10	16.30	22.91
State						
Alabama	23,009	1.58	45.52	12.87	18.07	23.54
Alaska	2,583	0.18	43.55	21.64	13.20	21.60
Arizona	26,475	1.81	65.11	2.70	5.86	26.32
Arkansas	14,968	1.03	45.17	10.15	17.20	27.49
California	138,572	9.50	57.45	6.72	8.24	27.60
Colorado	26,320	1.8	58.78	10.65	9.40	21.16
Connecticut	16,182	1.11	75.43	1.93	5.27	17.37
Delaware	4,837	0.33	75.54	(D)	(D)	20.49
District of Columbia	2,108	0.14	52.66	9.77	9.30	28.27
Florida	79,843	5.47	61.55	4.17	7.84	26.44
Georgia	37,984	2.60	50.51	10.04	13.22	26.24
Hawaii	3,646	0.25	30.77	15.00	21.97	32.25
Idaho	7,311	0.50	47.23	12.11	16.78	23.88
Illinois	63,667	4.36	76.40	0.69	3.26	19.65
Indiana	34,712	2.38	44.81	15.18	19.62	20.38
Iowa	25,826	1.77	44.67	16.59	19.55	19.19
Kansas	18,113	1.24	41.05	18.70	18.41	21.84
Kentucky	21,641	1.48	46.19	17.85	14.44	21.52
Louisiana	19,975	1.37	64.59	2.71	5.06	27.64

Table 15: ACS Property Value Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data---5 Percent Difference (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Maine	1,387	0.10	43.40	15.72	26.17	14.71
Maryland	27,871	1.91	55.51	11.85	13.32	19.32
Massachusetts	26,539	1.82	49.35	16.98	16.51	17.16
Michigan	67,364	4.62	73.21	1.27	5.01	20.50
Minnesota	48,619	3.33	52.48	15.21	17.68	14.64
Mississippi	10,920	0.75	55.46	5.90	12.31	26.34
Missouri	31,525	2.16	60.17	6.43	9.88	23.51
Montana	5,017	0.34	41.60	12.56	22.28	23.56
Nebraska	14,121	0.97	49.30	15.95	15.49	19.26
Nevada	11,902	0.82	61.43	1.50	4.07	33.00
New Hampshire	7,376	0.51	44.16	20.34	20.40	15.10
New Jersey	34,557	2.37	52.13	14.69	17.01	16.18
New Mexico	7,581	0.52	59.68	5.99	9.58	24.76
New York	67,711	4.64	59.01	10.58	11.64	18.76
North Carolina	44,760	3.07	34.17	18.96	19.66	27.21
North Dakota	4,001	0.27	63.11	9.27	12.20	15.42
Ohio	61,343	4.20	49.33	13.68	16.19	20.79
Oklahoma	24,367	1.67	48.50	11.11	11.67	28.72
Oregon	17,329	1.19	52.00	10.77	13.85	23.38
Pennsylvania	76,674	5.26	65.70	5.38	9.82	19.10
Rhode Island	4,122	0.28	49.42	16.72	15.60	18.27
South Carolina	21,120	1.45	42.72	14.77	18.75	23.75
South Dakota	4,310	0.30	55.71	11.28	16.29	16.73
Tennessee	30,887	2.12	42.95	15.45	18.16	23.44
Texas	95,335	6.53	45.30	15.62	15.38	23.69
Utah	11,964	0.82	52.19	15.68	14.65	17.48
Vermont	4,134	0.28	34.83	22.86	26.42	15.89
Virginia	39,163	2.68	45.36	18.33	15.53	20.78
Washington	32,324	2.22	59.49	9.24	9.78	21.48
West Virginia	6,023	0.41	71.79	0.78	4.90	22.53
Wisconsin	48,254	3.31	40.76	20.40	22.85	15.98
Wyoming	2,614	0.18	50.69	11.78	15.46	22.07

Source: 2014 American Community Survey and administrative property tax data.
Results are suppressed (D) where necessary for disclosure avoidance.

8.6 Real Estate Tax:

8.6.1 Cross-Tabulation of ACS and Vendor Data Real Estate Tax Responses

Table 16: Calculated Decile Ranges for ACS Unedited Real Estate Tax Responses

Decile	Original Decile Cutoff	Adjusted Decile Range	Percent of ACS Linked Cases
1	0	[0-450)	7.72
2	451	[450-850)	7.73
3	850	[850-1,200)	8.49
4	1,201	[1,200-1,600)	7.39
5	1,600	[1,600-2,000)	7.11
6	2,001	[2,000-2,600)	7.51
7	2,601	[2,600-3,500)	8.69
8	3,488	[3,500-4,500)	6.56
9	4,501	[4,500-6,800)	7.49
10	6,832	[6,800+]	7.64

Source: 2014 American Community Survey and administrative property tax data.

Note: The percentages do not sum to 100% as missing values are excluded from the calculation of deciles. The use of open intervals for the adjusted range indicate the inclusion of values up to, but not including, the upper endpoint.

Both the ACS and vendor data responses are collapsed into rough decile categories according to the range of ACS values as shown in Table 16. In Table 17, 43.45 percent of the linked ACS cases have vendor values in the same ACS decile category.³⁰ Across response categories, the highest rate of agreement occurs with tax values greater than or equal to \$6,800 in decile 10 (81.1 percent). According to Table 2, the ACS links to non-missing vendor data 96.97 percent of the time. Subsequently, vendor data can assign a non-missing value for 96.70 percent of linked ACS cases reporting a missing value for property value.³¹

³⁰ Overall agreement rate is the sum of the shaded diagonal values divided by the total number of matched ACS cases in this study, 1,458,986. For replicate tables on single-family, owner-occupied homes in the appendix, the denominator is 1,163,748.

³¹ To find vendor coverage of ACS missing values, subtract the row percentage where ACS and vendor data is missing from 100. These values are found in the bottom row.

Table 17: ACS Real Estate Tax Deciles (2014, Unedited) by Vendor Data

ACS Real Estate Tax	Linked ACS Count	Vendor Property Tax										
		1	2	3	4	5	6	7	8	9	10+	NA
1	112,627	61,350	16,082	6,533	4,628	2,985	2,787	2,410	1,376	1,109	633	12,734
		[54.47]	[14.28]	[5.80]	[4.11]	[2.65]	[2.47]	[2.14]	[1.22]	[0.98]	[0.56]	[11.31]
2	112,835	16,894	65,324	13,539	5,826	2,872	2,002	1,526	616	478	143	3,615
		[14.97]	[57.89]	[12.00]	[5.16]	[2.55]	[1.77]	[1.35]	[0.55]	[0.42]	[0.13]	[3.20]
3	123,930	5,915	18,837	54,844	21,020	8,155	5,924	3,068	1,360	767	428	3,612
		[4.77]	[15.20]	[44.25]	[16.96]	[6.58]	[4.78]	[2.48]	[1.10]	[0.62]	[0.35]	[2.91]
4	107,881	2,549	6,267	13,199	50,379	17,071	7,652	4,981	1,668	976	357	2,782
		[2.36]	[5.81]	[12.23]	[46.7]	[15.82]	[7.09]	[4.62]	[1.55]	[0.90]	[0.33]	[2.58]
5	103,674	1,634	3,577	5,934	13,118	44,094	19,873	7,850	2,996	1,491	441	2,666
		[1.58]	[3.45]	[5.72]	[12.65]	[42.53]	[19.17]	[7.57]	[2.89]	[1.44]	[0.43]	[2.57]
6	109,557	1,050	1,763	2,824	5,005	9,645	57,384	22,286	4,546	2,273	517	2,264
		[0.96]	[1.61]	[2.58]	[4.57]	[8.80]	[52.38]	[20.34]	[4.15]	[2.07]	[0.47]	[2.07]

Table 17: ACS Real Estate Tax Deciles (2014, Unedited) by Vendor Data (continued)

ACS Real Estate Tax	Linked ACS Count	Vendor Property Tax										
		1	2	3	4	5	6	7	8	9	10+	NA
7	126,820	938	1,214	1,959	3,462	4,733	14,407	69,843	21,179	5,805	1,117	2,163
		[0.74]	[0.96]	[1.54]	[2.73]	[3.73]	[11.36]	[55.07]	[16.7]	[4.58]	[0.88]	[1.71]
8	95,699	469	496	734	1,096	1,623	3,768	13,811	52,117	18,831	1,559	1,195
		[0.49]	[0.52]	[0.77]	[1.15]	[1.70]	[3.94]	[14.43]	[54.46]	[19.68]	[1.63]	[1.25]
9	109,238	432	416	460	777	877	1,960	4,427	11,165	76,719	10,988	1,017
		[0.40]	[0.38]	[0.42]	[0.71]	[0.80]	[1.79]	[4.05]	[10.22]	[70.23]	[10.06]	[0.93]
10	111,527	729	803	907	1,114	938	1,153	1,894	2,242	10,553	90,446	748
		[0.65]	[0.72]	[0.81]	[1.00]	[0.84]	[1.03]	[1.70]	[2.01]	[9.46]	[81.10]	[0.67]
NA	345,198	42,730	50,747	41,458	39,052	31,040	34,019	34,278	22,551	22,457	15,478	11,388
		[12.38]	[14.70]	[12.01]	[11.31]	[8.99]	[9.85]	[9.93]	[6.53]	[6.51]	[4.48]	[3.30]
Column total	1,458,986	134,690	165,526	142,391	145,477	124,033	150,929	166,374	121,816	141,459	122,107	44,184

Source: 2014 American Community Survey and administrative property tax data.

Note: Values in brackets are row percentages associated with above cross-tabulation frequency.

8.6.2 Agreement in Real Estate Tax across Subpopulation and Housing Characteristics

Table 18 assesses agreement based on 1-percent difference value matches between the ACS and vendor data. Households with male householders display slightly higher agreement with vendor data than households with female householders (9.96 percent vs. 9.19 percent). Agreement increases with age reaching a maximum of 12.59 percent among households with householders aged 70 years or more. Across races, households with Asian householders possess the highest rate of agreement at 12.17 percent and those with householders of some other race alone the lowest at 5.11 percent. Householders with non-Hispanic householders agree with vendor data values more frequently at 9.88 percent, as do those with native householders at 9.60 percent. Responses among owners present greater agreement at 11.10 percent.

Geographically, vendor data agrees with ACS responses from households in metropolitan areas at a rate of 9.86 percent. Across states, agreement rates range from 2.06 percent in Texas to 18.38 percent in Wisconsin. For twenty states, vendor data tends to overstate ACS values. These states include Arizona, California, Connecticut, Delaware, Florida, Hawaii, Iowa, Kansas, Louisiana, Maine, Maryland, Massachusetts, New Mexico, Oregon, Pennsylvania, Rhode Island, South Dakota, Texas, Virginia and Washington. New Hampshire has the lowest rate of missing values in linked vendor data (13.33 percent) while Kansas has the highest (48.99 percent).

Table 18: ACS Real Estate Tax Coverage and Agreement Rates by Householder And Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—1 Percent Difference

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Sex (of householder)						
Male	734,368	50.33	32.27	9.96	35.01	22.76
Female	724,618	49.67	29.24	9.19	32.47	29.10
Age (of householder)						
15-19	4,996	0.34	8.57	1.34	10.97	79.12
20-24	24,767	1.70	12.37	2.64	15.82	69.17
25-29	61,389	4.21	20.97	5.20	24.73	49.10
30-34	92,148	6.32	26.10	6.43	28.81	38.65
35-39	102,736	7.04	28.24	7.03	31.14	33.59
40-44	120,138	8.23	30.19	7.51	33.79	28.51
45-49	134,175	9.20	31.72	8.18	35.31	24.80
50-54	161,192	11.05	33.01	9.00	35.74	22.26
55-59	169,278	11.60	34.04	10.04	35.86	20.05
60-64	158,886	10.89	34.11	11.31	36.09	18.49
65-69	140,640	9.64	33.96	12.05	36.11	17.88
70 and older	288,258	19.76	30.43	12.59	34.62	22.37
Race (of householder)						
White alone	1,234,819	84.64	31.55	10.02	34.67	23.75
Black or African American alone	115,528	7.92	26.46	5.28	25.18	43.08
American Indian or Alaska Native alone	7,656	0.52	28.03	6.74	25.40	39.82
Asian alone	52,518	3.60	28.06	12.17	36.75	23.02
Native Hawaiian or Pacific Islander alone	1,109	0.08	19.48	5.77	29.04	45.72
Some Other Race alone	25,478	1.75	21.96	5.11	28.38	44.55
Two or More Races	21,878	1.50	27.24	7.39	29.30	36.08

Table 18: ACS Real Estate Tax Coverage and Agreement Rates by Householder And Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—1 Percent Difference (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Ethnicity (of householder)						
Hispanic or Latino (of any race)	121,348	8.32	23.67	6.32	32.21	37.79
Not Hispanic or Latino	1,337,638	91.68	31.41	9.88	33.89	24.83
Place of birth (of householder)						
Native	1,316,859	90.26	31.04	9.60	33.78	25.58
Foreign born	142,127	9.74	28.19	9.40	33.50	28.92
Tenure						
Owned	1,253,034	85.88	35.58	11.10	38.73	14.59
Rented	182,272	12.49	0.77	0.13	2.81	96.28
Other	23,680	1.62	6.66	1.79	8.28	83.26
MSA						
Metro	1,164,649	79.83	29.88	9.86	35.07	25.19
Micro	162,317	11.13	33.00	8.99	29.61	28.40
Other	132,020	9.05	35.82	7.82	27.17	29.19
State						
Alabama	23,009	1.58	32.24	10.37	18.97	38.42
Alaska	2,583	0.18	32.33	8.56	24.47	34.65
Arizona	26,475	1.81	28.00	5.50	34.81	31.69
Arkansas	14,968	1.03	34.31	5.57	22.33	37.79
California	138,572	9.50	21.66	13.17	35.67	29.49
Colorado	26,320	1.80	37.66	12.52	24.03	25.80
Connecticut	16,182	1.11	25.12	6.79	50.39	17.70
Delaware	4,837	0.33	30.18	7.44	31.28	31.09
District of Columbia	2,108	0.14	27.56	11.34	28.23	32.87
Florida	79,843	5.47	28.86	6.70	36.34	28.09
Georgia	37,984	2.60	40.36	9.95	20.09	29.60
Hawaii	3,646	0.25	18.02	7.52	35.49	38.97
Idaho	7,311	0.50	33.06	8.95	29.26	28.74
Illinois	63,667	4.36	40.10	14.13	25.98	19.80
Indiana	34,712	2.38	34.53	4.24	35.40	25.83
Iowa	25,826	1.77	30.90	11.88	36.09	21.13
Kansas	18,113	1.24	20.05	7.04	23.92	48.99
Kentucky	21,641	1.48	36.02	4.25	31.21	28.52
Louisiana	19,975	1.37	14.32	4.66	51.45	29.57

Table 18: ACS Real Estate Tax Coverage and Agreement Rates by Householder And Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—1 Percent Difference (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Maine	1,387	0.10	22.57	7.21	56.45	13.77
Maryland	27,871	1.91	31.13	11.63	33.91	23.33
Massachusetts	26,539	1.82	21.97	6.35	53.79	17.89
Michigan	67,364	4.62	54.31	2.17	7.91	35.61
Minnesota	48,619	3.33	37.77	16.14	30.14	15.95
Mississippi	10,920	0.75	32.00	7.80	20.18	40.02
Missouri	31,525	2.16	35.48	15.10	23.64	25.78
Montana	5,017	0.34	32.77	13.18	27.85	26.21
Nebraska	14,121	0.97	33.48	13.48	26.68	26.35
Nevada	11,902	0.82	30.71	8.30	21.88	39.11
New Hampshire	7,376	0.51	37.01	10.20	39.47	13.33
New Jersey	34,557	2.37	34.11	12.97	38.49	14.43
New Mexico	7,581	0.52	28.43	11.69	31.26	28.62
New York	67,711	4.64	37.54	5.59	36.48	20.39
North Carolina	44,760	3.07	31.36	12.38	29.23	27.04
North Dakota	4,001	0.27	49.86	5.50	26.14	18.50
Ohio	61,343	4.20	32.46	14.89	28.79	23.86
Oklahoma	24,367	1.67	30.51	13.23	22.30	33.96
Oregon	17,329	1.19	22.12	8.95	44.56	24.38
Pennsylvania	76,674	5.26	23.51	3.34	53.39	19.75
Rhode Island	4,122	0.28	25.50	8.71	46.48	19.31
South Carolina	21,120	1.45	39.35	12.18	21.64	26.83
South Dakota	4,310	0.30	24.48	9.28	26.13	40.12
Tennessee	30,887	2.12	34.36	13.31	25.92	26.40
Texas	95,335	6.53	14.61	2.06	57.78	25.54
Utah	11,964	0.82	31.39	13.44	32.18	22.99
Vermont	4,134	0.28	35.41	5.20	14.13	45.26
Virginia	39,163	2.68	27.62	10.02	34.39	27.97
Washington	32,324	2.22	26.30	14.94	33.36	25.40
West Virginia	6,023	0.41	34.04	3.89	33.67	28.41
Wisconsin	48,254	3.31	33.90	18.38	33.17	14.54
Wyoming	2,614	0.18	39.86	6.39	28.08	25.67

Source: 2014 American Community Survey and administrative property tax data.

In Table 19, agreement rates improve significantly when identifying agreement based on a five-percent difference between ACS and vendor data values. Many of the patterns from the exact value agreement persist. However, under these relaxed criteria households with householders aged 65-69 display the highest agreement with vendor data at 29.11 percent. Across races,

households with NHPI householders have the lowest rate of agreement at 13.80 percent. Households with foreign-born householders agree more frequently with vendor data at a rate of 25.18 percent. Michigan has the lowest agreement rate across states (6.18 percent) and New Jersey the highest (45.28 percent). Vendor data most frequently overstates ACS tax values in twenty-one states, though some states switch their position from the one-percent results. Specifically, vendor data for Florida switches from frequently understating ACS values to overstating them. Vendor data for Indiana and Utah switches from being equally likely to under- or overstate the ACS value to displaying a greater frequency of overstating. Lastly, New Jersey vendor data switches from a higher frequency of understating ACS to being greater.

Table 19: ACS Real Estate Tax Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data---5 Percent Difference

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Sex (of householder)						
Male	734,368	50.33	24.81	25.91	26.52	22.76
Female	724,618	49.67	22.85	23.04	25.01	29.10
Age (of householder)						
15-19	4,996	0.34	7.19	4.08	9.61	79.12
20-24	24,767	1.70	10.26	7.03	13.54	69.17
25-29	61,389	4.21	16.93	14.14	19.83	49.10
30-34	92,148	6.32	20.73	17.74	22.89	38.65
35-39	102,736	7.04	22.17	19.87	24.37	33.59
40-44	120,138	8.23	23.45	21.89	26.15	28.51
45-49	134,175	9.20	24.40	23.60	27.21	24.80
50-54	161,192	11.05	25.44	24.92	27.38	22.26
55-59	169,278	11.60	26.18	26.64	27.13	20.05
60-64	158,886	10.89	26.03	28.54	26.94	18.49
65-69	140,640	9.64	26.11	29.11	26.90	17.88
70 and older	288,258	19.76	23.67	27.86	26.10	22.37
Race (of householder)						
White alone	1,234,819	84.64	24.33	25.58	26.33	23.75
Black or African American alone	115,528	7.92	22.29	13.84	20.79	43.08
American Indian or Alaska Native alone	7,656	0.52	22.94	16.77	20.47	39.82
Asian alone	52,518	3.60	19.68	30.79	26.51	23.02
Native Hawaiian or Pacific Islander alone	1,109	0.08	15.78	13.80	24.71	45.72
Some Other Race alone	25,478	1.75	17.68	14.19	23.57	44.55
Two or More Races	21,878	1.50	21.93	18.88	23.11	36.08

Table 19: ACS Real Estate Tax Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data---5 Percent Difference (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Ethnicity (of householder)						
Hispanic or Latino (of any race)	121,348	8.32	18.80	17.25	26.15	37.79
Not Hispanic or Latino	1,337,638	91.68	24.29	25.14	25.74	24.83
Place of birth (of householder)						
Native	1,316,859	90.26	24.13	24.41	25.87	25.58
Foreign born	142,127	9.74	21.08	25.18	24.83	28.92
Tenure						
Owned	1,253,034	85.88	27.55	28.38	29.48	14.59
Rented	182,272	12.49	0.66	0.36	2.69	96.28
Other	23,680	1.62	5.55	4.19	6.99	83.26
MSA						
Metro	1,164,649	79.83	22.74	25.53	26.54	25.19
Micro	162,317	11.13	26.64	21.46	23.51	28.40
Other	132,020	9.05	30.06	18.98	21.77	29.19
State						
Alabama	23,009	1.58	26.10	20.36	15.13	38.42
Alaska	2,583	0.18	25.55	21.76	18.04	34.65
Arizona	26,475	1.81	22.82	16.26	29.22	31.69
Arkansas	14,968	1.03	31.83	10.20	20.18	37.79
California	138,572	9.50	15.01	29.09	26.41	29.49
Colorado	26,320	1.80	30.22	25.76	18.22	25.80
Connecticut	16,182	1.11	16.77	30.76	34.77	17.70
Delaware	4,837	0.33	25.99	19.54	23.38	31.09
District of Columbia	2,108	0.14	22.77	22.20	22.15	32.87
Florida	79,843	5.47	22.62	28.35	20.93	28.09
Georgia	37,984	2.6	33.71	21.82	14.87	29.60
Hawaii	3,646	0.25	15.50	14.40	31.13	38.97
Idaho	7,311	0.50	26.81	21.46	22.99	28.74
Illinois	63,667	4.36	28.94	34.89	16.38	19.80
Indiana	34,712	2.38	29.27	13.88	31.02	25.83
Iowa	25,826	1.77	21.77	30.43	26.67	21.13
Kansas	18,113	1.24	14.60	17.99	18.42	48.99
Kentucky	21,641	1.48	31.10	19.12	21.26	28.52
Louisiana	19,975	1.37	12.03	8.78	49.62	29.57

Table 19: ACS Real Estate Tax Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data---5 Percent Difference (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Maine	1,387	0.10	16.73	25.52	43.98	13.77
Maryland	27,871	1.91	22.41	29.78	24.48	23.33
Massachusetts	26,539	1.82	13.80	27.57	40.74	17.89
Michigan	67,364	4.62	51.86	6.18	6.35	35.61
Minnesota	48,619	3.33	28.73	33.31	22.01	15.95
Mississippi	10,920	0.75	26.89	16.33	16.77	40.02
Missouri	31,525	2.16	26.37	30.39	17.46	25.78
Montana	5,017	0.34	23.56	30.32	19.91	26.21
Nebraska	14,121	0.97	24.30	31.50	17.85	26.35
Nevada	11,902	0.82	22.92	22.45	15.52	39.11
New Hampshire	7,376	0.51	24.31	37.41	24.96	13.33
New Jersey	34,557	2.37	19.63	45.28	20.66	14.43
New Mexico	7,581	0.52	21.45	25.81	24.11	28.62
New York	67,711	4.64	30.18	18.89	30.54	20.39
North Carolina	44,760	3.07	24.10	28.53	20.34	27.04
North Dakota	4,001	0.27	45.64	15.12	20.74	18.50
Ohio	61,343	4.2	24.53	29.68	21.93	23.86
Oklahoma	24,367	1.67	23.31	26.27	16.46	33.96
Oregon	17,329	1.19	15.03	32.61	27.98	24.38
Pennsylvania	76,674	5.26	18.57	16.18	45.50	19.75
Rhode Island	4,122	0.28	18.29	24.31	38.09	19.31
South Carolina	21,120	1.45	32.44	24.50	16.23	26.83
South Dakota	4,310	0.30	17.17	23.11	19.61	40.12
Tennessee	30,887	2.12	27.89	25.49	20.23	26.40
Texas	95,335	6.53	11.83	9.09	53.53	25.54
Utah	11,964	0.82	21.72	32.39	22.90	22.99
Vermont	4,134	0.28	30.38	14.32	10.04	45.26
Virginia	39,163	2.68	21.41	23.29	27.33	27.97
Washington	32,324	2.22	18.83	30.50	25.27	25.40
West Virginia	6,023	0.41	28.37	19.03	24.19	28.41
Wisconsin	48,254	3.31	21.10	43.92	20.44	14.54
Wyoming	2,614	0.18	31.52	21.42	21.38	25.67

Source: 2014 American Community Survey and administrative property tax data.

9. CONCLUSION

This report describes the agreement of 2014 vendor data to various housing related topics collected in the ACS in order to evaluate the coverage and quality of administrative record data for survey item replacement or supplementation. ACS topics of interest include tenure, acreage, number of rooms, number of bedrooms, property value, and real estate tax.³² The vendor data consists of housing unit level administrative data from local government property tax records.

The linkage rate between the ACS and vendor data is 64.17 percent of all 2014 ACS households. Across topics, linkage to non-missing values in the vendor data is remarkably high for the acreage (94.58%), property value (99.61%) and real estate tax (96.97%) variables.

Unfortunately, vendor data on tenure does not provide enough information to compare to ACS data. Only 12.47 percent of linked records have non-missing vendor data on tenure. Missing vendor data is also an issue for the number of rooms and bedrooms topics, providing valuable information for 43.91 and 61.15 percent of linked households, respectively.

Differences in measurement constructs and data collection methods affect conceptual alignment between the ACS and administrative record sources. For example, vendor data does not always provide a sufficient amount of detail to align with responses outlined in the ACS questions. When valid information is available, conceptual alignment is typically sufficient such that vendor data only requires minimal recoding to mimic ACS responses. Additionally, differences in data collection methods and objectives across locations lead to conceptual variation in reported property and tax values. In particular, there are three different property values (assessed, market, and appraised) to choose from in the vendor data. None of these measures is fully populated across the linked sample, but together provide enough non-missing information to cover over 90 percent of observations. Also, the analysis must be careful to consider the impact of state and local government records reporting aggregate measures of property associated with a parcel of land or building rather than values for individual housing units as requested by the ACS. Lastly, as discussed above, local authorities collect parcel of land or building information from owner-based transactional data sources (e.g. mortgage or deed filings, foreclosures) whereas the ACS surveys the occupant of a housing unit, which may result in differing responses.

Focusing on agreement between ACS responses and vendor data values, overall agreement rates (including ACS missing responses) for each topic are as follows: 83.52%-acreage, 15.34%-total rooms, 43.67%-bedrooms, 28.72%-property value, and 43.45%-real estate tax.³³ It is worthwhile to note that agreement rates are higher among linked cases without missing values. In this case, ACS acreage and number of bedrooms data agrees with vendor values 92.42 and 70.83 percent of the time, respectively. Despite missing data, vendor data may still be valuable for use in an imputation scheme for the number of bedrooms topic. As it displays higher agreement among valid vendor data values. Agreement rates for the other topics remain relatively low after removing missing values.

³² Analysis also conducted on single-family, owner-occupied subsample. Results reported in the appendix.

³³ The text also includes results where agreement rates are evaluated across major subpopulation groups and household location.

Administrative property tax records display potential for supplementation and imputation purposes. As evidenced by the linkage rates to non-missing data, property tax data performs exceptionally well for ACS topics directly related to the calculation of property owner tax obligations such as acreage, property value and real estate tax. In addition, inherent confidence in the source of the data, local governments, strengthens the perceived utility in this administrative data. The maximum benefit of administrative records comes from the provision of non-missing information, agreement with survey values, and conceptual alignment of measured data. The vendor data displays each of these qualities for one topic in this report, acreage. Therefore, acreage seems to be an ideal candidate for item replacement via administrative records.

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11. APPENDIX: Supplemental Tables and Subsample Analysis of Single-Family, Owner-Occupied Housing Units

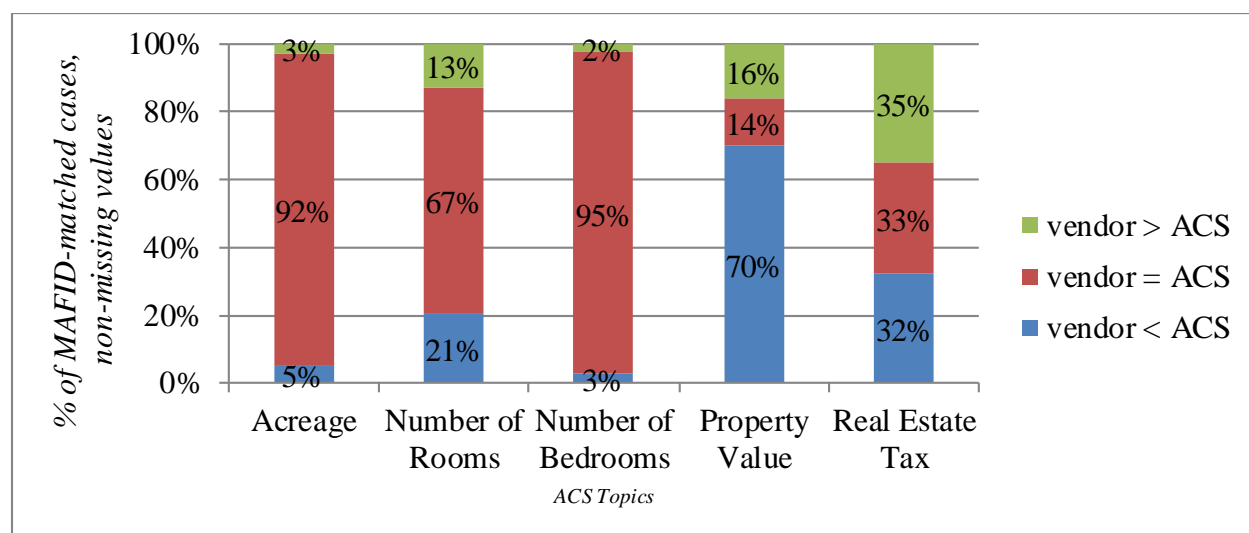
Table 20: Linkage Rate by Non-Missing and Missing Vendor Data among MAFID-Matched Observations; Single-Family, Owner-Occupied Subsample

ACS topic	Count, ACS records linked to non-missing vendor data	% of ACS households linked to non-missing vendor data	Count, ACS records linked to missing vendor data	% of ACS households linked to missing vendor data
Acreage	1,125,501	96.71%	38,247	3.29%
Number of Rooms	524,235	45.05%	639,513	54.95%
Number of Bedrooms	720,014	61.87%	443,734	38.13%
Tenure	50,928	4.38%	1,112,820	95.62%
Total Property Value	1,160,534	99.72%	3,214	0.28%
Real Estate Tax	1,130,851	97.17%	32,897	2.83%

Source: 2014 American Community Survey and administrative property tax data.

Note: Rows sum to total single-family, detached MAFID-matched obs. (#ACS households) = 1,163,748

Figure 2: Relative Relationship between Vendor and ACS Data Values, Missing Values Removed (Relaxed Equality Criteria)



Source: 2014 American Community Survey and administrative property tax data.

11.1 Acreage

11.1.1 Cross-Tabulation of ACS and Vendor Data Acreage Responses

Table 21: ACS Acreage (2014, Unedited) by Vendor Data; Single-Family, Owner-Occupied Subsample

ACS Acreage	Linked ACS Count (Row total)	Vendor Acreage							
		Less than 1 acre		1 to 9.99 acres		10 or more acres		NA	
		N	Row %	N	Row %	N	Row %	N	Row %
			Col. %		Col. %		Col. %		Col. %
Less than 1 acre	1,030,397	805,933	94.14	17,620	2.06	1,889	0.22	3,0683	3.58
			91.35		8.89		4.19		80.22
1 to 9.99 acres	259,438	43,255	19.68	168,054	76.46	3,741	1.70	4,731	2.15
			4.90		84.76		8.31		12.37
10 or more acres	56,717	1,411	2.91	8,185	16.87	38,161	78.63	774	1.59
			0.16		4.13		84.73		2.02
NA	112,434	31,604	80.39	4,402	11.20	1,246	3.17	2,059	5.24
			3.58		2.22		2.77		5.38
Column total	1,458,986	1,083,088		241,241		55,573		79,084	

Source: 2014 American Community Survey and administrative property tax data.

11.1.2 Agreement in Acreage across Subpopulation and Housing Characteristics

Table 22: ACS Acreage Coverage and Agreement Rates By Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked By MAFID to Vendor Data; Single - Family, Owner-Occupied Subsample

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Sex (of householder)						
Male	601,832	51.71	4.35	87.52	1.97	6.17
Female	561,916	48.29	4.75	86.39	2.03	6.83
Age (of householder)						
15-19	2,181	0.19	5.78	84.55	2.75	6.92
20-24	9,627	0.83	5.38	86.16	2.19	6.26
25-29	34,875	3.00	4.21	88.50	1.72	5.57
30-34	61,650	5.30	3.89	89.63	1.57	4.91
35-39	73,911	6.35	3.97	89.80	1.57	4.66
40-44	92,247	7.93	4.42	89.54	1.63	4.41
45-49	107,952	9.28	4.62	89.21	1.69	4.48
50-54	133,293	11.45	4.67	88.56	1.85	4.92
55-59	143,015	12.29	4.62	88.00	1.89	5.48
60-64	136,180	11.70	4.54	87.32	2.06	6.08
65-69	121,234	10.42	4.53	86.32	2.18	6.97
70 and older	247,418	21.26	4.79	82.05	2.55	10.62
Race (of householder)						
White alone	1,006,378	86.48	4.33	87.36	2.10	6.21
Black or African American alone	78,693	6.76	8.32	80.42	1.41	9.85
American Indian or Alaska Native alone	5,144	0.44	5.81	80.93	3.32	9.93
Asian alone	41,199	3.54	2.78	89.79	1.18	6.25
Native Hawaiian or Pacific Islander alone	686	0.06	3.50	88.92	1.46	6.12
Some Other Race alone	16,529	1.42	3.88	88.44	0.89	6.79
Two or More Races	15,119	1.30	4.38	87.76	1.44	6.42

Table 22: ACS Acreage Coverage and Agreement Rates By Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked By MAFID to Vendor Data; Single - Family, Owner-Occupied Subsample (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Ethnicity (of householder)						
Hispanic or Latino (of any race)	83,571	7.18	3.39	88.46	1.06	7.09
Not Hispanic or Latino	1,080,177	92.82	4.63	86.86	2.07	6.44
Place of birth (of householder)						
Native	1,057,774	90.89	4.64	86.81	2.09	6.46
Foreign born	105,974	9.11	3.54	88.58	1.10	6.78
Tenure						
Owned	1,163,748	100.00	4.54	86.97	2.00	6.49
MSA						
Metro	931,414	80.04	3.98	89.08	1.44	5.50
Micro	128,102	11.01	6.62	81.02	3.98	8.38
Other	104,232	8.96	7.01	75.46	4.58	12.95
State						
Alabama	18,381	1.58	10.16	79.27	3.93	6.64
Alaska	2,066	0.18	5.57	89.59	2.18	2.66
Arizona	20,177	1.73	2.21	92.08	0.84	4.88
Arkansas	10,933	0.94	6.54	73.02	4.01	16.44
California	103,615	8.90	2.02	91.47	1.18	5.33
Colorado	20,460	1.76	2.51	93.04	0.93	3.52
Connecticut	13,556	1.16	5.18	85.22	1.54	8.06
Delaware	4,062	0.35	3.84	90.25	1.18	4.73
District of Columbia	1,341	0.12	4.25	88.14	0.00	7.61
Florida	55,550	4.77	2.84	91.18	1.05	4.92
Georgia	28,851	2.48	8.76	84.65	2.82	3.77
Hawaii	2,133	0.18	1.69	93.20	0.56	4.55
Idaho	5,670	0.49	3.84	84.76	1.90	9.49
Illinois	52,025	4.47	3.52	81.35	1.27	13.86
Indiana	29,028	2.49	5.65	88.95	1.68	3.73
Iowa	21,932	1.88	4.00	84.26	1.68	10.05
Kansas	14,743	1.27	5.17	89.83	1.23	3.77
Kentucky	16,919	1.45	6.01	80.48	3.09	10.42
Louisiana	14,908	1.28	5.84	64.43	6.52	23.22
Maine	1,139	0.10	5.09	80.51	3.34	11.06
Maryland	23,666	2.03	4.00	91.36	0.80	3.84

Table 22: ACS Acreage Coverage and Agreement Rates By Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked By MAFID to Vendor Data; Single - Family, Owner-Occupied Subsample (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Massachusetts	21,737	1.87	5.87	86.41	1.29	6.43
Michigan	56,802	4.88	5.19	83.67	2.91	8.23
Minnesota	42,758	3.67	4.57	84.87	2.88	7.68
Mississippi	8,513	0.73	7.86	71.54	5.52	15.08
Missouri	25,532	2.19	4.14	85.97	2.08	7.81
Montana	4,030	0.35	2.70	91.64	1.64	4.02
Nebraska	11,981	1.03	3.12	86.46	3.32	7.09
Nevada	8,114	0.70	1.63	94.37	0.38	3.62
New Hampshire	6,093	0.52	3.79	87.67	2.28	6.25
New Jersey	29,824	2.56	3.54	90.66	1.02	4.78
New Mexico	5,706	0.49	3.08	83.30	2.68	10.94
New York	55,844	4.80	4.54	90.72	1.37	3.36
North Carolina	33,986	2.92	7.45	85.57	3.64	3.34
North Dakota	3,493	0.30	3.41	60.32	2.00	34.27
Ohio	50,998	4.38	5.04	88.96	1.36	4.64
Oklahoma	18,399	1.58	4.46	80.22	3.48	11.84
Oregon	12,708	1.09	2.64	93.70	0.59	3.07
Pennsylvania	64,755	5.56	4.76	88.68	1.45	5.11
Rhode Island	3,387	0.29	4.22	88.72	0.77	6.29
South Carolina	15,844	1.36	6.68	79.77	4.89	8.66
South Dakota	3,671	0.32	3.08	64.42	17.79	14.71
Tennessee	24,201	2.08	8.62	83.81	3.29	4.28
Texas	75,645	6.50	4.18	89.91	1.18	4.73
Utah	10,097	0.87	2.72	94.11	0.63	2.54
Vermont	3,471	0.30	3.00	90.03	3.34	3.63
Virginia	31,612	2.72	5.16	87.06	1.71	6.06
Washington	24,810	2.13	2.77	92.48	1.43	3.33
West Virginia	4,980	0.43	5.86	81.81	2.17	10.16
Wisconsin	41,556	3.57	5.37	84.99	2.94	6.69
Wyoming	2,046	0.18	3.18	91.69	1.52	3.62

Source: 2014 American Community Survey and administrative property tax data.

11.2 Number of Rooms

11.2.1 Cross-Tabulation of ACS and Vendor Data Number of Rooms Responses

Table 23: ACS Number of Rooms (2014, Unedited) by Vendor Data; Single-Family, Owner-Occupied Subsample

ACS Number of Rooms	Linked ACS Count	Vendor Number of Rooms										
		1	2	3	4	5	6	7	8	9	10+	NA
1	830	(D)	(D)	22	43	75	58	35	17	(D)	19	537
		[(D)]	[(D)]	[2.65]	[5.18]	[9.04]	[6.99]	[4.22]	[2.05]	[(D)]	[2.29]	[64.70]
2	2,755	(D)	40	87	303	314	147	47	22	(D)	(D)	1,763
		[(D)]	[1.45]	[3.16]	[11.00]	[11.40]	[5.34]	[1.71]	[0.80]	[(D)]	[(D)]	[63.99]
3	16,693	24	64	522	1,464	2,022	1,523	669	294	76	70	9,965
		[0.14]	[0.38]	[3.13]	[8.77]	[12.11]	[9.12]	[4.01]	[1.76]	[0.46]	[0.42]	[59.70]
4	71,659	49	127	750	8,865	10,007	5,815	2,408	1,145	438	371	41,684
		[0.07]	[0.18]	[1.05]	[12.37]	[13.96]	[8.11]	[3.36]	[1.60]	[0.61]	[0.52]	[58.17]
5	200,230	115	183	803	8,017	38,822	24,776	9,110	3,603	1,306	1,009	112,486
		[0.06]	[0.09]	[0.40]	[4.00]	[19.39]	[12.37]	[4.55]	[1.80]	[0.65]	[0.50]	[56.18]
6	254,659	147	151	711	4,934	28,011	47,404	20,904	8,287	2,692	1,896	139,522
		[0.06]	[0.06]	[0.28]	[1.94]	[11.00]	[18.61]	[8.21]	[3.25]	[1.06]	[0.74]	[54.79]

Table 23: ACS Number of Rooms (2014, Unedited) by Vendor Data; Single-Family, Owner-Occupied Subsample (continued)

ACS Number of Rooms	Linked ACS Count	Vendor Number of Rooms										
		1	2	3	4	5	6	7	8	9	10+	NA
7	209,570	99	105	409	2,587	14,438	27,908	28,186	14,307	4,865	3,307	113,359
		[0.05]	[0.05]	[0.20]	[1.23]	[6.89]	[13.32]	[13.45]	[6.83]	[2.32]	[1.58]	[54.09]
8	160,183	93	81	246	1,359	7,584	15,141	16,911	19,667	7,397	5,207	86,497
		[0.06]	[0.05]	[0.15]	[0.85]	[4.73]	[9.45]	[10.56]	[12.28]	[4.62]	[3.25]	[54.00]
9	95,056	48	42	151	629	3,514	7,327	8,423	10,605	7,465	5,555	51,297
		[0.05]	[0.04]	[0.16]	[0.66]	[3.70]	[7.71]	[8.86]	[11.16]	[7.85]	[5.84]	[53.97]
10+	132,491	82	48	158	655	3,592	7,280	9,423	13,210	10,091	16,633	71,319
		[0.06]	[0.04]	[0.12]	[0.49]	[2.71]	[5.49]	[7.11]	[9.97]	[7.62]	[12.55]	[53.83]
NA	19,622	(D)	(D)	(D)	575	2,030	2,326	1,494	1,030	459	504	11,084
		[(D)]	[(D)]	[(D)]	[2.93]	[10.35]	[11.85]	[7.61]	[5.25]	[2.34]	[2.57]	[56.49]
Column total	1,163,748	684	874	3,940	29,431	110,409	139,705	97,610	72,187	34,808	34,587	639,513

Source: 2014 American Community Survey and administrative property tax data.

Note: Values in brackets are row percentages associated with above cross-tabulation frequency. Results are suppressed (D) where necessary for disclosure avoidance.

11.2.2 Agreement in Number of Rooms across Subpopulation and Housing Characteristics

Table 24: ACS Number of Rooms Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked By MAFID To Vendor Data—Exact Match; Single-Family, Owner-Occupied Subsample

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Sex (of householder)						
Male	601,832	51.71	18.37	12.79	12.88	55.96
Female	561,916	48.29	18.28	14.07	12.26	55.39
Age (of householder)						
15-19	2,181	0.19	16.41	12.10	13.57	57.91
20-24	9,627	0.83	17.13	13.57	14.14	55.17
25-29	34,875	3.00	17.92	13.51	14.25	54.33
30-34	61,650	5.30	18.72	13.47	13.39	54.42
35-39	73,911	6.35	19.06	12.67	13.52	54.75
40-44	92,247	7.93	19.36	12.43	13.30	54.90
45-49	107,952	9.28	19.68	12.38	12.78	55.16
50-54	133,293	11.45	19.39	12.78	12.54	55.29
55-59	143,015	12.29	19.10	13.10	12.08	55.71
60-64	136,180	11.70	18.75	13.27	12.11	55.88
65-69	121,234	10.42	18.12	13.64	11.68	56.56
70 and older	247,418	21.26	16.00	14.90	12.44	56.66
Race (of householder)						
White alone	1,006,378	86.48	18.67	13.30	11.79	56.24
Black or African American alone	78,693	6.76	17.63	14.18	12.09	56.10
American Indian or Alaska Native alone	5,144	0.44	17.53	12.91	12.79	56.77
Asian alone	41,199	3.54	12.39	13.79	28.87	44.95
Native Hawaiian or Pacific Islander alone	686	0.06	17.06	17.35	29.45	36.15
Some Other Race alone	16,529	1.42	15.76	15.54	18.95	49.75
Two or More Races	15,119	1.30	18.46	13.60	15.13	52.81

Table 24: ACS Number of Rooms Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked By MAFID To Vendor Data—Exact Match; Single-Family, Owner-Occupied Subsample (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Ethnicity (of householder)						
Hispanic or Latino (of any race)	83,571	7.18	15.15	13.69	15.71	55.46
Not Hispanic or Latino	1,080,177	92.82	18.57	13.39	12.34	55.70
Place of birth (of householder)						
Native	1,057,774	90.89	18.86	13.44	11.72	55.99
Foreign born	105,974	9.11	13.00	13.15	21.15	52.70
Tenure						
Owned	1,163,748	100.00	18.33	13.41	12.58	55.69
MSA						
Metro	931,414	80.04	19.15	14.43	13.64	52.79
Micro	128,102	11.01	16.54	10.73	8.76	63.97
Other	104,232	8.96	13.18	7.62	7.83	71.37
State						
Alabama	18,381	1.58	28.05	16.14	10.93	44.88
Alaska	2,066	0.18	11.76	9.29	17.96	60.99
Arizona	20,177	1.73	23.36	23.13	27.91	25.61
Arkansas	10,933	0.94	1.00	0.48	0.29	98.23
California	103,615	8.90	19.61	20.28	26.80	33.31
Colorado	20,460	1.76	31.20	14.56	16.74	37.50
Connecticut	13,556	1.16	32.17	41.30	23.58	2.96
Delaware	4,062	0.35	37.72	27.38	22.58	12.33
District of Columbia	1,341	0.12	47.20	24.24	26.70	1.86
Florida	55,550	4.77	5.05	2.06	2.44	90.45
Georgia	28,851	2.48	25.17	14.03	13.16	47.64
Hawaii	2,133	0.18	30.85	27.99	38.12	3.05
Idaho	5,670	0.49	6.31	3.12	7.60	82.96
Illinois	52,025	4.47	6.18	4.82	7.08	81.92
Indiana	29,028	2.49	34.17	22.24	31.00	12.59
Iowa	21,932	1.88	33.81	20.64	20.71	24.84
Kansas	14,743	1.27	51.43	28.65	16.90	3.01
Kentucky	16,919	1.45	6.40	4.37	6.02	83.21
Louisiana	14,908	1.28	1.77	1.30	2.09	94.83
Maine	1,139	0.10	18.96	13.35	9.57	58.12
Maryland	23,666	2.03	0.00	0.00	0.00	100.00

Table 24: ACS Number of Rooms Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked By MAFID To Vendor Data—Exact Match; Single-Family, Owner-Occupied Subsample (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Massachusetts	21,737	1.87	34.85	36.48	20.40	8.28
Michigan	56,802	4.88	9.63	5.68	5.87	78.82
Minnesota	42,758	3.67	15.71	8.41	13.01	62.87
Mississippi	8,513	0.73	29.44	17.90	16.93	35.73
Missouri	25,532	2.19	22.79	15.15	10.98	51.08
Montana	4,030	0.35	51.02	18.78	21.09	9.11
Nebraska	11,981	1.03	23.81	9.36	7.18	59.64
Nevada	8,114	0.70	20.54	23.56	24.57	31.32
New Hampshire	6,093	0.52	24.70	23.45	12.90	38.95
New Jersey	29,824	2.56	0.38	0.17	0.14	99.31
New Mexico	5,706	0.49	0.60	0.23	0.23	98.95
New York	55,844	4.80	12.41	7.91	6.50	73.18
North Carolina	33,986	2.92	17.80	11.78	9.55	60.86
North Dakota	3,493	0.30	3.35	1.29	2.89	92.47
Ohio	50,998	4.38	40.49	30.92	18.54	10.05
Oklahoma	18,399	1.58	25.60	18.72	18.62	37.06
Oregon	12,708	1.09	4.27	1.67	4.31	89.75
Pennsylvania	64,755	5.56	30.70	23.78	13.32	32.21
Rhode Island	3,387	0.29	36.58	40.12	20.84	2.45
South Carolina	15,844	1.36	10.19	6.88	7.66	75.27
South Dakota	3,671	0.32	13.38	4.58	4.85	77.20
Tennessee	24,201	2.08	11.00	9.50	7.50	72.01
Texas	75,645	6.50	9.22	8.00	9.12	73.66
Utah	10,097	0.87	24.09	10.53	43.33	22.06
Vermont	3,471	0.30	0.00	0.00	0.00	100.00
Virginia	31,612	2.72	35.09	24.15	20.28	20.48
Washington	24,810	2.13	13.85	3.44	3.23	79.48
West Virginia	4,980	0.43	28.63	19.88	10.10	41.39
Wisconsin	41,556	3.57	4.82	4.85	2.31	88.02
Wyoming	2,046	0.18	23.17	6.50	5.82	64.52

Source: 2014 American Community Survey and administrative property tax data.

Table 25: ACS Number of Rooms Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—1-Room Difference ; Single -Family, Owner-Occupied Subsample

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Sex (of householder)						
Male	601,832	51.71	10.03	28.33	5.68	55.96
Female	561,916	48.29	9.48	30.20	4.93	55.39
Age (of householder)						
15-19	2,181	0.19	7.24	28.66	6.19	57.91
20-24	9,627	0.83	8.27	30.53	6.04	55.17
25-29	34,875	3.00	9.09	30.52	6.06	54.33
30-34	61,650	5.30	9.99	29.72	5.88	54.42
35-39	73,911	6.35	10.59	28.59	6.07	54.75
40-44	92,247	7.93	11.02	28.11	5.97	54.90
45-49	107,952	9.28	11.24	27.86	5.74	55.16
50-54	133,293	11.45	10.99	28.24	5.48	55.29
55-59	143,015	12.29	10.55	28.65	5.08	55.71
60-64	136,180	11.70	10.06	29.09	4.97	55.88
65-69	121,234	10.42	9.39	29.38	4.67	56.56
70 and older	247,418	21.26	7.44	30.96	4.94	56.66
Race (of householder)						
White alone	1,006,378	86.48	10.04	28.90	4.81	56.24
Black or African American alone	78,693	6.76	8.81	30.27	4.83	56.10
American Indian or Alaska Native alone	5,144	0.44	8.90	28.87	5.46	56.77
Asian alone	41,199	3.54	5.99	32.61	16.44	44.95
Native Hawaiian or Pacific Islander alone	686	0.06	7.87	42.42	13.56	36.15
Some Other Race alone	16,529	1.42	7.33	34.24	8.68	49.75
Two or More Races	15,119	1.30	9.83	30.43	6.93	52.81

Table 25: ACS Number of Rooms Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—1-Room Difference; Single-Family, Owner-Occupied Subsample (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Ethnicity (of householder)						
Hispanic or Latino (of any race)	83,571	7.18	7.30	30.02	7.22	55.46
Not Hispanic or Latino	1,080,177	92.82	9.96	29.17	5.17	55.70
Place of birth (of householder)						
Native	1,057,774	90.89	10.11	29.18	4.72	55.99
Foreign born	105,974	9.11	6.36	29.69	11.25	52.70
Tenure						
Owned	1,163,748	100.00	9.77	29.23	5.32	55.69
MSA						
Metro	931,414	80.04	10.12	31.33	5.77	52.79
Micro	128,102	11.01	8.97	23.50	3.56	63.97
Other	104,232	8.96	7.63	17.55	3.46	71.37
State						
Alabama	18,381	1.58	15.03	36.47	3.62	44.88
Alaska	2,066	0.18	5.52	24.01	9.49	60.99
Arizona	20,177	1.73	11.15	51.95	11.30	25.61
Arkansas	10,933	0.94	(D)	(D)	(D)	98.23
California	103,615	8.90	9.20	45.27	12.21	33.31
Colorado	20,460	1.76	19.95	35.32	7.23	37.50
Connecticut	13,556	1.16	13.03	76.19	7.82	2.96
Delaware	4,062	0.35	19.50	59.48	8.69	12.33
District of Columbia	1,341	0.12	27.89	58.02	12.23	1.86
Florida	55,550	4.77	3.08	5.31	1.16	90.45
Georgia	28,851	2.48	14.64	32.24	5.47	47.64
Hawaii	2,133	0.18	16.50	61.70	18.75	3.05
Idaho	5,670	0.49	3.72	8.77	4.55	82.96
Illinois	52,025	4.47	3.39	11.15	3.54	81.92
Indiana	29,028	2.49	19.13	53.00	15.29	12.59
Iowa	21,932	1.88	19.55	45.97	9.64	24.84
Kansas	14,743	1.27	29.46	61.79	5.74	3.01
Kentucky	16,919	1.45	3.59	10.31	2.88	83.21
Louisiana	14,908	1.28	0.90	3.17	1.10	94.83
Maine	1,139	0.10	10.27	28.36	3.25	58.12
Maryland	23,666	2.03	0.00	0.00	0.00	100.00

Table 25: ACS Number of Rooms Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—1-Room Difference; Single-Family, Owner-Occupied Subsample (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Massachusetts	21,737	1.87	15.91	69.57	6.24	8.28
Michigan	56,802	4.88	5.31	13.08	2.80	78.82
Minnesota	42,758	3.67	9.69	20.65	6.79	62.87
Mississippi	8,513	0.73	15.78	41.82	6.67	35.73
Missouri	25,532	2.19	12.33	33.15	3.45	51.08
Montana	4,030	0.35	33.08	49.11	8.71	9.11
Nebraska	11,981	1.03	15.62	22.18	2.56	59.64
Nevada	8,114	0.70	9.48	49.73	9.48	31.32
New Hampshire	6,093	0.52	12.33	44.77	3.96	38.95
New Jersey	29,824	2.56	0.28	0.36	0.05	99.31
New Mexico	5,706	0.49	(D)	(D)	(D)	98.95
New York	55,844	4.80	6.61	17.68	2.52	73.18
North Carolina	33,986	2.92	9.61	26.03	3.50	60.86
North Dakota	3,493	0.30	2.12	3.61	1.80	92.47
Ohio	50,998	4.38	20.10	64.06	5.79	10.05
Oklahoma	18,399	1.58	12.75	42.62	7.58	37.06
Oregon	12,708	1.09	2.78	4.89	2.57	89.75
Pennsylvania	64,755	5.56	15.43	48.09	4.28	32.21
Rhode Island	3,387	0.29	16.30	75.11	6.14	2.45
South Carolina	15,844	1.36	5.39	15.31	4.03	75.27
South Dakota	3,671	0.32	9.45	11.25	2.10	77.20
Tennessee	24,201	2.08	5.30	20.04	2.65	72.01
Texas	75,645	6.50	4.49	17.90	3.95	73.66
Utah	10,097	0.87	16.16	30.09	31.69	22.06
Vermont	3,471	0.30	0.00	0.00	0.00	100.00
Virginia	31,612	2.72	19.58	52.11	7.82	20.48
Washington	24,810	2.13	9.84	9.27	1.41	79.48
West Virginia	4,980	0.43	15.34	40.16	3.11	41.39
Wisconsin	41,556	3.57	2.18	9.02	0.78	88.02
Wyoming	2,046	0.18	16.96	15.88	2.64	64.52

Source: 2014 American Community Survey and administrative property tax data.
Results are suppressed (D) where necessary for disclosure avoidance.

11.3 Number of Bedrooms

11.3.1 Cross-Tabulation of ACS and Vendor Data Number of Bedrooms Responses

Table 26: ACS Number of Bedrooms (2014, Unedited) by Vendor Data; Single -Family, Owner-Occupied Subsample

ACS Number of Bedrooms	Linked ACS Count	Vendor Number of Bedrooms					
		1	2	3	4	5+	NA
0	2,949	78 [2.64]	302 [10.24]	1,020 [34.59]	343 [11.63]	70 [2.37]	1,136 [38.52]
1	14,354	2,715 [18.91]	2,847 [19.83]	1,892 [13.18]	327 [2.28]	58 [0.40]	6,515 [45.39]
2	170,580	2,296 [1.35]	67,861 [39.78]	27,876 [16.34]	3,387 [1.99]	463 [0.27]	68,697 [40.27]
3	587,998	1,313 [0.22]	29,623 [5.04]	295,132 [50.19]	30,495 [5.19]	3,175 [0.54]	228,260 [38.82]
4	291,129	394 [0.14]	5,848 [2.01]	53,321 [18.32]	118,132 [40.58]	9,290 [3.19]	104,144 [35.77]
5+	78,706	117 [0.15]	1,026 [1.30]	9,252 [11.76]	17,274 [21.95]	23,293 [29.59]	27,744 [35.25]
NA	18,032	128 [0.71]	1,676 [9.29]	5,929 [32.88]	2,478 [13.74]	583 [3.23]	7,238 [40.14]
Column total	1,163,748	7,041	109,183	394,422	172,436	36,932	443,734

Source: 2014 American Community Survey and administrative property taxdata.

Note: Values in brackets are row percentages associated with above cross-tabulation frequency.

11.3.2 Agreement in Number of Bedrooms across Subpopulation and Housing Characteristics

Table 27: ACS Number of Bedrooms Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID To Vendor Data—Exact Match; Single-Family, Owner-Occupied Subsample

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Sex (of householder)						
Male	601,832	51.71	10.39	42.72	7.63	39.26
Female	561,916	48.29	10.74	43.74	6.68	38.84
Age (of householder)						
15-19	2,181	0.19	16.23	40.12	5.82	37.83
20-24	9,627	0.83	12.42	42.71	6.19	38.67
25-29	34,875	3.00	10.50	46.13	6.01	37.36
30-34	61,650	5.30	11.63	46.32	5.55	36.50
35-39	73,911	6.35	12.82	45.09	5.33	36.75
40-44	92,247	7.93	12.98	44.24	5.87	36.91
45-49	107,952	9.28	12.45	43.22	6.37	37.96
50-54	133,293	11.45	11.68	42.96	6.90	38.46
55-59	143,015	12.29	10.54	43.04	7.28	39.14
60-64	136,180	11.70	9.85	42.89	7.70	39.56
65-69	121,234	10.42	9.38	42.35	8.04	40.22
70 and older	247,418	21.26	8.14	41.98	8.53	41.35
Race (of householder)						
White alone	1,006,378	86.48	10.49	42.76	7.15	39.60
Black or African American alone	78,693	6.76	9.90	41.58	6.62	41.90
American Indian or Alaska Native alone	5,144	0.44	11.86	43.25	7.12	37.77
Asian alone	41,199	3.54	11.54	53.33	8.37	26.75
Native Hawaiian or Pacific Islander alone	686	0.06	16.62	57.14	9.62	16.62
Some Other Race alone	16,529	1.42	13.13	49.47	8.07	29.33
Two or More Races	15,119	1.3	12.36	46.99	7.17	33.48

Table 27: ACS Number of Bedrooms Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID To Vendor Data—Exact Match; Single-Family, Owner-Occupied Subsample (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Ethnicity (of householder)						
Hispanic or Latino (of any race)	83,571	7.18	12.76	47.28	7.70	32.26
Not Hispanic or Latino	1,080,177	92.82	10.39	42.90	7.13	39.58
Place of birth (of householder)						
Native	1,057,774	90.89	10.42	42.67	7.07	39.84
Foreign born	105,974	9.11	11.95	48.66	8.13	31.26
Tenure						
Owned	1,163,748	100.00	10.56	43.22	7.17	39.06
MSA						
Metro	931,414	80.04	10.97	46.75	7.40	34.88
Micro	128,102	11.01	9.69	33.47	6.63	50.21
Other	104,232	8.96	7.91	23.60	5.80	62.69
State						
Alabama	18,381	1.58	4.42	19.60	3.98	72.00
Alaska	2,066	0.18	8.33	36.01	10.41	45.26
Arizona	20,177	1.73	0.00	0.00	0.00	100.00
Arkansas	10,933	0.94	0.41	1.72	0.25	97.62
California	103,615	8.90	12.60	70.90	10.77	5.73
Colorado	20,460	1.76	27.05	57.83	10.00	5.12
Connecticut	13,556	1.16	11.60	76.02	9.84	2.54
Delaware	4,062	0.35	16.25	61.87	9.23	12.65
District of Columbia	1,341	0.12	20.58	63.83	14.09	1.49
Florida	55,550	4.77	11.14	54.05	7.94	26.88
Georgia	28,851	2.48	15.52	47.17	8.04	29.26
Hawaii	2,133	0.18	17.35	58.04	21.99	2.63
Idaho	5,670	0.49	13.88	49.19	12.89	24.04
Illinois	52,025	4.47	3.80	16.41	3.06	76.73
Indiana	29,028	2.49	17.40	59.72	11.08	11.81
Iowa	21,932	1.88	14.16	48.63	12.90	24.31
Kansas	14,743	1.27	17.97	69.11	10.38	2.54
Kentucky	16,919	1.45	8.60	30.63	4.73	56.04
Louisiana	14,908	1.28	0.97	4.06	0.78	94.18
Maine	1,139	0.10	9.57	35.12	7.29	48.02
Maryland	23,666	2.03	0.00	0.00	0.00	100.00
Massachusetts	21,737	1.87	15.11	69.35	12.10	3.44

Table 27: ACS Number of Bedrooms Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID To Vendor Data—Exact Match; Single-Family, Owner-Occupied Subsample (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Michigan	56,802	4.88	4.16	18.30	2.61	74.93
Minnesota	42,758	3.67	14.98	44.59	9.76	30.67
Mississippi	8,513	0.73	6.98	23.11	4.35	65.57
Missouri	25,532	2.19	12.06	41.60	5.53	40.81
Montana	4,030	0.35	24.07	56.48	16.53	2.93
Nebraska	11,981	1.03	23.89	50.34	8.30	17.48
Nevada	8,114	0.70	10.49	69.94	12.87	6.70
New Hampshire	6,093	0.52	14.46	71.11	10.98	3.45
New Jersey	29,824	2.56	(D)	(D)	(D)	99.87
New Mexico	5,706	0.49	2.87	12.00	1.81	83.32
New York	55,844	4.80	10.64	44.24	8.12	37.00
North Carolina	33,986	2.92	12.22	54.36	8.69	24.72
North Dakota	3,493	0.30	6.44	10.71	2.29	80.56
Ohio	50,998	4.38	13.71	72.40	8.66	5.23
Oklahoma	18,399	1.58	12.24	52.06	9.21	26.49
Oregon	12,708	1.09	16.80	64.64	11.35	7.21
Pennsylvania	64,755	5.56	11.55	51.08	8.05	29.32
Rhode Island	3,387	0.29	13.05	73.96	10.72	2.27
South Carolina	15,844	1.36	10.77	44.55	6.85	37.83
South Dakota	3,671	0.32	11.63	20.02	4.93	63.42
Tennessee	24,201	2.08	5.26	19.08	3.90	71.76
Texas	75,645	6.50	8.76	39.03	6.62	45.60
Utah	10,097	0.87	25.81	41.69	10.75	21.76
Vermont	3,471	0.30	0.00	0.00	0.00	100.00
Virginia	31,612	2.72	14.77	61.98	8.93	14.32
Washington	24,810	2.13	18.24	62.11	11.63	8.02
West Virginia	4,980	0.43	11.39	40.44	6.93	41.24
Wisconsin	41,556	3.57	1.50	12.51	1.43	84.55
Wyoming	2,046	0.18	15.35	23.02	3.81	57.82

Source: 2014 American Community Survey and administrative property tax data.
Results are suppressed (D) where necessary for disclosure avoidance.

Table 28: ACS Number of Bedrooms Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—1-Room Difference ; Single-Family, Owner-Occupied Subsample

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Sex (of householder)						
Male	601,832	51.71	1.71	57.85	1.18	39.26
Female	561,916	48.29	1.79	58.44	0.93	38.84
Age (of householder)						
15-19	2,181	0.19	3.76	57.59	0.83	37.83
20-24	9,627	0.83	2.27	57.97	1.08	38.67
25-29	34,875	3.00	1.71	60.04	0.88	37.36
30-34	61,650	5.30	1.98	60.70	0.81	36.50
35-39	73,911	6.35	2.39	60.05	0.80	36.75
40-44	92,247	7.93	2.35	59.88	0.87	36.91
45-49	107,952	9.28	2.25	58.82	0.97	37.96
50-54	133,293	11.45	1.94	58.52	1.07	38.46
55-59	143,015	12.29	1.74	58.04	1.07	39.14
60-64	136,180	11.70	1.56	57.73	1.14	39.56
65-69	121,234	10.42	1.39	57.25	1.14	40.22
70 and older	247,418	21.26	1.21	56.20	1.23	41.35
Race (of householder)						
White alone	1,006,378	86.48	1.76	57.62	1.01	39.60
Black or African American alone	78,693	6.76	1.41	55.70	0.99	41.90
American Indian or Alaska Native alone	5,144	0.44	2.18	58.75	1.30	37.77
Asian alone	41,199	3.54	1.74	69.89	1.61	26.75
Native Hawaiian or Pacific Islander alone	686	0.06	4.23	76.97	2.19	16.62
Some Other Race alone	16,529	1.42	2.40	65.82	2.46	29.33
Two or More Races	15,119	1.30	2.25	62.99	1.28	33.48

Table 28: ACS Number of Bedrooms Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—1-Room Difference; Single-Family, Owner-Occupied Subsample (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Ethnicity (of householder)						
Hispanic or Latino (of any race)	83,571	7.18	2.21	63.65	1.88	32.26
Not Hispanic or Latino	1,080,177	92.82	1.72	57.70	1.00	39.58
Place of birth (of householder)						
Native	1,057,774	90.89	1.73	57.45	0.99	39.84
Foreign born	105,974	9.11	1.98	64.98	1.78	31.26
Tenure						
Owned	1,163,748	100.00	1.75	58.13	1.06	39.06
MSA						
Metro	931,414	80.04	1.74	62.31	1.08	34.88
Micro	128,102	11.01	1.85	46.95	0.99	50.21
Other	104,232	8.96	1.74	34.58	1.00	62.69
State						
Alabama	18,381	1.58	0.54	26.96	0.51	72.00
Alaska	2,066	0.18	1.65	50.24	2.86	45.26
Arizona	20,177	1.73	0.00	0.00	0.00	100.00
Arkansas	10,933	0.94	(D)	(D)	(D)	97.62
California	103,615	8.90	1.56	90.91	1.80	5.73
Colorado	20,460	1.76	6.98	86.53	1.37	5.12
Connecticut	13,556	1.16	1.36	94.69	1.40	2.54
Delaware	4,062	0.35	2.29	83.83	1.23	12.65
District of Columbia	1,341	0.12	3.73	91.28	3.50	1.49
Florida	55,550	4.77	1.27	70.91	0.95	26.88
Georgia	28,851	2.48	2.53	67.24	0.97	29.26
Hawaii	2,133	0.18	4.13	86.87	6.38	2.63
Idaho	5,670	0.49	3.26	70.05	2.65	24.04
Illinois	52,025	4.47	0.64	22.18	0.45	76.73
Indiana	29,028	2.49	3.14	83.51	1.54	11.81
Iowa	21,932	1.88	2.86	70.53	2.29	24.31
Kansas	14,743	1.27	4.10	91.56	1.80	2.54
Kentucky	16,919	1.45	1.57	41.86	0.53	56.04
Louisiana	14,908	1.28	0.13	5.58	0.10	94.18
Maine	1,139	0.10	1.67	49.43	0.88	48.02
Maryland	23,666	2.03	0.00	0.00	0.00	100.00

Table 28: ACS Number of Bedrooms Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—1-Room Difference ; Single-Family, Owner-Occupied Subsample (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Massachusetts	21,737	1.87	2.29	92.38	1.90	3.44
Michigan	56,802	4.88	0.66	24.03	0.38	74.93
Minnesota	42,758	3.67	3.21	64.64	1.49	30.67
Mississippi	8,513	0.73	0.93	32.91	0.59	65.57
Missouri	25,532	2.19	2.04	56.38	0.76	40.81
Montana	4,030	0.35	6.65	86.75	3.67	2.93
Nebraska	11,981	1.03	6.42	74.68	1.43	17.48
Nevada	8,114	0.70	1.13	90.44	1.73	6.70
New Hampshire	6,093	0.52	2.17	93.14	1.25	3.45
New Jersey	29,824	2.56	(D)	(D)	(D)	99.87
New Mexico	5,706	0.49	0.37	16.04	0.28	83.32
New York	55,844	4.80	1.64	59.95	1.41	37.00
North Carolina	33,986	2.92	1.48	72.88	0.91	24.72
North Dakota	3,493	0.30	2.23	16.78	0.43	80.56
Ohio	50,998	4.38	1.89	91.66	1.22	5.23
Oklahoma	18,399	1.58	1.43	71.05	1.03	26.49
Oregon	12,708	1.09	3.01	87.92	1.86	7.21
Pennsylvania	64,755	5.56	1.68	67.83	1.17	29.32
Rhode Island	3,387	0.29	1.74	94.51	1.48	2.27
South Carolina	15,844	1.36	1.21	60.23	0.74	37.83
South Dakota	3,671	0.32	3.49	32.14	0.95	63.42
Tennessee	24,201	2.08	0.67	27.12	0.45	71.76
Texas	75,645	6.50	0.87	52.69	0.84	45.60
Utah	10,097	0.87	11.20	64.71	2.33	21.76
Vermont	3,471	0.30	0.00	0.00	0.00	100.00
Virginia	31,612	2.72	1.98	82.62	1.07	14.32
Washington	24,810	2.13	3.28	87.09	1.60	8.02
West Virginia	4,980	0.43	1.67	56.04	1.04	41.24
Wisconsin	41,556	3.57	0.19	14.96	0.29	84.55
Wyoming	2,046	0.18	6.30	35.39	0.49	57.82

Source: 2014 American Community Survey and administrative property tax data.
Results are suppressed (D) where necessary for disclosure avoidance.

11.4 Property Value

11.4.1 Cross-Tabulation of ACS and Vendor Data Property Value Responses

Table 29: ACS Property Value (2014, Unedited) by Vendor Data; Single-Family, Owner-Occupied Subsample

ACS Property Value	Linked ACS Count	Vendor Property Value										
		1	2	3	4	5	6	7	8	9	10	NA
1	90,236	48,570	14,343	6,587	5,276	3,181	3,275	3,502	2,460	1,745	1,048	249
		[53.83]	[15.89]	[7.30]	[5.85]	[3.53]	[3.63]	[3.88]	[2.73]	[1.93]	[1.16]	[0.28]
2	102,325	37,832	50,261	10,908	1,713	466	256	160	104	146	195	284
		[36.97]	[49.12]	[10.66]	[1.67]	[0.46]	[0.25]	[0.16]	[0.10]	[0.14]	[0.19]	[0.28]
3	98,930	19,675	29,194	39,238	7,441	1,434	768	392	196	110	189	293
		[19.89]	[29.51]	[39.66]	[7.52]	[1.45]	[0.78]	[0.40]	[0.20]	[0.11]	[0.19]	[0.30]
4	106,369	13,978	16,643	34,262	33,843	4,953	1,522	524	166	66	94	318
		[13.14]	[15.65]	[32.21]	[31.82]	[4.66]	[1.43]	[0.49]	[0.16]	[0.06]	[0.09]	[0.30]
5	111,815	11,574	12,907	19,191	34,042	23,623	7,540	1,946	360	170	158	304
		[10.35]	[11.54]	[17.16]	[30.44]	[21.13]	[6.74]	[1.74]	[0.32]	[0.15]	[0.14]	[0.27]
6	107,306	8,575	8,535	10,864	18,283	23,256	27,595	8,034	1,316	322	206	320
		[7.99]	[7.95]	[10.12]	[17.04]	[21.67]	[25.72]	[7.49]	[1.23]	[0.30]	[0.19]	[0.30]

Table 29: ACS Property Value (2014, Unedited) by Vendor Data; Single-Family, Owner-Occupied Subsample (continued)

ACS Property Value	Linked ACS Count	Vendor Property Value										
		1	2	3	4	5	6	7	8	9	10	NA
7	110,688	7,310	5,938	6,551	9,980	12,747	27,881	34,288	4,905	614	173	301
		[6.60]	[5.36]	[5.92]	[9.02]	[11.52]	[25.19]	[30.98]	[4.43]	[0.55]	[0.16]	[0.27]
8	121,802	9,148	4,224	5,188	5,718	6,659	14,008	35,939	34,463	5,708	414	333
		[7.51]	[3.47]	[4.26]	[4.69]	[5.47]	[11.50]	[29.51]	[28.29]	[4.69]	[0.34]	[0.27]
9	103,290	8,706	2,903	2,590	2,985	2,533	4,771	12,038	27,370	35,486	3,651	257
		[8.43]	[2.81]	[2.51]	[2.89]	[2.45]	[4.62]	[11.65]	[26.5]	[34.36]	[3.53]	[0.25]
10	101,589	6,539	3,309	2,451	2,006	1,502	2,058	3,784	7,071	21,610	50,989	270
		[6.44]	[3.26]	[2.41]	[1.97]	[1.48]	[2.03]	[3.72]	[6.96]	[21.27]	[50.19]	[0.27]
NA	109,398	26,878	19,194	14,655	11,255	6,787	7,395	7,716	5,846	4,684	4,703	285
		[24.57]	[17.55]	[13.40]	[10.29]	[6.20]	[6.76]	[7.05]	[5.34]	[4.28]	[4.30]	[0.26]
Column total	1,163,748	198,785	167,451	152,485	132,542	87,141	97,069	108,323	84,257	70,661	61,820	3,214

Source: 2014 American Community Survey and administrative property tax data.

Note: Values in brackets are row percentages associated with above cross-tabulation frequency

11.4.2 Agreement in Property Value across Subpopulation and Housing Characteristics

Table 30: ACS Property Value Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—1 Percent Difference; Single-Family, Owner-Occupied Subsample

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Sex (of householder)						
Male	601,832	51.71	70.43	3.41	17.54	8.63
Female	561,916	48.29	67.53	3.53	18.19	10.75
Age (of householder)						
15-19	2,181	0.19	45.71	2.29	14.67	37.32
20-24	9,627	0.83	65.69	3.17	15.77	15.37
25-29	34,875	3.00	75.22	3.75	14.45	6.58
30-34	61,650	5.30	76.71	3.63	13.69	5.97
35-39	73,911	6.35	75.76	3.53	14.47	6.24
40-44	92,247	7.93	73.86	3.55	15.90	6.69
45-49	107,952	9.28	72.17	3.45	17.15	7.23
50-54	133,293	11.45	70.37	3.46	18.02	8.15
55-59	143,015	12.29	69.84	3.29	18.47	8.40
60-64	136,180	11.70	68.94	3.43	18.77	8.86
65-69	121,234	10.42	68.55	3.47	18.25	9.74
70 and older	247,418	21.26	60.49	3.51	20.37	15.63
Race (of householder)						
White alone	1,006,378	86.48	69.54	3.50	17.95	9.02
Black or African American alone	78,693	6.76	62.06	3.35	18.25	16.35
American Indian or Alaska Native alone	5,144	0.44	63.80	2.80	19.21	14.19
Asian alone	41,199	3.54	72.52	3.47	15.20	8.81
Native Hawaiian or Pacific Islander alone	686	0.06	61.95	3.21	21.72	13.12
Some Other Race alone	16,529	1.42	64.36	2.63	16.38	16.63
Two or More Races	15,119	1.30	69.14	3.19	17.52	10.15

Table 30: ACS Property Value Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—1 Percent Difference; Single-Family, Owner-Occupied Subsample (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Ethnicity (of householder)						
Hispanic or Latino (of any race)	83,571	7.18	67.05	2.94	16.63	13.38
Not Hispanic or Latino	1,080,177	92.82	69.18	3.51	17.94	9.36
Place of birth (of householder)						
Native	1,057,774	90.89	68.95	3.51	18.09	9.45
Foreign born	105,974	9.11	69.77	3.09	15.48	11.66
Tenure						
Owned	1,163,748	100.00	69.03	3.47	17.85	9.65
MSA						
Metro	931,414	80.04	70.17	3.52	17.16	9.15
Micro	128,102	11.01	65.34	3.42	20.19	11.04
Other	104,232	8.96	63.34	3.10	21.15	12.42
State						
Alabama	18,381	1.58	59.18	4.14	24.98	11.71
Alaska	2,066	0.18	62.39	7.89	21.59	8.13
Arizona	20,177	1.73	82.63	0.92	7.86	8.59
Arkansas	10,933	0.94	59.83	3.02	23.95	13.20
California	103,615	8.90	75.35	2.09	12.45	10.11
Colorado	20,460	1.76	75.95	3.23	13.99	6.83
Connecticut	13,556	1.16	85.13	0.55	6.05	8.27
Delaware	4,062	0.35	85.65	(D)	(D)	10.32
District of Columbia	1,341	0.12	70.69	2.83	16.11	10.37
Florida	55,550	4.77	77.38	1.35	10.53	10.74
Georgia	28,851	2.48	66.42	3.84	18.55	11.18
Hawaii	2,133	0.18	47.82	4.97	35.63	11.58
Idaho	5,670	0.49	62.20	3.67	24.29	9.84
Illinois	52,025	4.47	86.41	0.21	3.89	9.49
Indiana	29,028	2.49	59.51	4.29	27.45	8.76
Iowa	21,932	1.88	59.38	4.92	27.41	8.28
Kansas	14,743	1.27	58.03	5.83	27.69	8.45
Kentucky	16,919	1.45	62.75	8.00	19.98	9.27
Louisiana	14,908	1.28	78.95	0.92	6.77	13.36
Maine	1,139	0.10	54.70	4.83	32.75	7.73
Maryland	23,666	2.03	68.77	3.85	18.60	8.78

Table 30: ACS Property Value Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—1 Percent Difference; Single-Family, Owner-Occupied Subsample (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Massachusetts	21,737	1.87	63.58	4.33	23.70	8.39
Michigan	56,802	4.88	82.93	0.41	5.82	10.84
Minnesota	42,758	3.67	64.05	5.29	22.82	7.83
Mississippi	8,513	0.73	69.09	1.42	15.71	13.78
Missouri	25,532	2.19	73.97	1.61	13.18	11.24
Montana	4,030	0.35	55.48	3.35	29.90	11.27
Nebraska	11,981	1.03	64.36	5.22	22.17	8.25
Nevada	8,114	0.70	83.61	0.39	5.68	10.32
New Hampshire	6,093	0.52	57.31	7.02	28.66	7.01
New Jersey	29,824	2.56	63.60	4.89	23.50	8.01
New Mexico	5,706	0.49	74.99	1.61	12.83	10.57
New York	55,844	4.80	70.83	3.88	15.79	9.51
North Carolina	33,986	2.92	50.10	7.08	29.49	13.33
North Dakota	3,493	0.30	72.46	2.75	16.23	8.56
Ohio	50,998	4.38	64.32	4.29	22.90	8.48
Oklahoma	18,399	1.58	66.55	3.49	17.33	12.63
Oregon	12,708	1.09	70.12	3.04	19.72	7.12
Pennsylvania	64,755	5.56	76.30	1.85	12.13	9.73
Rhode Island	3,387	0.29	64.63	4.93	22.35	8.09
South Carolina	15,844	1.36	56.99	4.87	27.28	10.86
South Dakota	3,671	0.32	67.23	3.11	21.27	8.39
Tennessee	24,201	2.08	58.46	5.24	25.67	10.63
Texas	75,645	6.50	61.10	5.12	23.33	10.45
Utah	10,097	0.87	67.72	4.68	21.65	5.94
Vermont	3,471	0.30	46.50	8.84	34.34	10.31
Virginia	31,612	2.72	62.95	6.07	23.02	7.96
Washington	24,810	2.13	76.04	3.08	13.69	7.19
West Virginia	4,980	0.43	83.29	0.24	5.16	11.31
Wisconsin	41,556	3.57	54.77	6.10	31.53	7.60
Wyoming	2,046	0.18	65.54	3.27	22.09	9.09

Source: 2014 American Community Survey and administrative property tax data.
Results are suppressed (D) where necessary for disclosure avoidance.

Table 31: ACS Property Value Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—5 Percent Difference; Single-Family, Owner-Occupied Subsample

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Sex (of householder)						
Male	601,832	51.71	64.97	12.53	13.88	8.63
Female	561,916	48.29	62.18	12.49	14.58	10.75
Age (of householder)						
15-19	2,181	0.19	42.09	8.25	12.33	37.32
20-24	9,627	0.83	60.54	11.68	12.41	15.37
25-29	34,875	3.00	68.30	14.61	10.51	6.58
30-34	61,650	5.30	69.88	14.31	9.83	5.97
35-39	73,911	6.35	68.92	14.21	10.63	6.24
40-44	92,247	7.93	67.66	13.61	12.04	6.69
45-49	107,952	9.28	66.35	13.10	13.33	7.23
50-54	133,293	11.45	64.87	12.71	14.27	8.15
55-59	143,015	12.29	64.43	12.38	14.79	8.40
60-64	136,180	11.70	63.85	12.13	15.17	8.86
65-69	121,234	10.42	63.61	11.90	14.75	9.74
70 and older	247,418	21.26	56.19	11.13	17.05	15.63
Race (of householder)						
White alone	1,006,378	86.48	64.05	12.68	14.26	9.02
Black or African American alone	78,693	6.76	57.72	10.71	15.23	16.35
American Indian or Alaska Native alone	5,144	0.44	58.48	11.35	15.98	14.19
Asian alone	41,199	3.54	66.53	13.31	11.35	8.81
Native Hawaiian or Pacific Islander alone	686	0.06	57.14	11.22	18.51	13.12
Some Other Race alone	16,529	1.42	60.19	9.75	13.42	16.63
Two or More Races	15,119	1.30	63.85	11.84	14.16	10.15

Table 31: ACS Property Value Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—5 Percent Difference; Single-Family, Owner-Occupied Subsample (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Ethnicity (of householder)						
Hispanic or Latino (of any race)	83,571	7.18	62.41	10.79	13.41	13.38
Not Hispanic or Latino	1,080,177	92.82	63.72	12.64	14.28	9.36
Place of birth (of householder)						
Native	1,057,774	90.89	63.51	12.61	14.43	9.45
Foreign born	105,974	9.11	64.76	11.49	12.09	11.66
Tenure						
Owned	1,163,748	100.00	63.62	12.51	14.22	9.65
MSA						
Metro	931,414	80.04	64.57	12.79	13.49	9.15
Micro	128,102	11.01	60.33	12.01	16.63	11.04
Other	104,232	8.96	59.19	10.64	17.75	12.42
State						
Alabama	18,381	1.58	52.46	15.60	20.24	11.71
Alaska	2,066	0.18	51.45	25.61	14.81	8.13
Arizona	20,177	1.73	81.13	3.30	6.98	8.59
Arkansas	10,933	0.94	54.05	13.12	19.64	13.20
California	103,615	8.90	71.62	8.31	9.96	10.11
Colorado	20,460	1.76	69.71	12.83	10.63	6.83
Connecticut	13,556	1.16	84.15	2.10	5.49	8.27
Delaware	4,062	0.35	85.65	(D)	(D)	10.32
District of Columbia	1,341	0.12	65.70	11.48	12.45	10.37
Florida	55,550	4.77	75.16	5.03	9.06	10.74
Georgia	28,851	2.48	61.26	12.38	15.18	11.18
Hawaii	2,133	0.18	40.93	18.24	29.25	11.58
Idaho	5,670	0.49	55.78	14.73	19.65	9.84
Illinois	52,025	4.47	86.07	0.81	3.63	9.49
Indiana	29,028	2.49	51.61	17.71	21.93	8.76
Iowa	21,932	1.88	51.01	18.97	21.74	8.28
Kansas	14,743	1.27	48.09	22.46	20.99	8.45
Kentucky	16,919	1.45	54.03	21.29	15.40	9.27
Louisiana	14,908	1.28	77.49	3.37	5.78	13.36
Maine	1,139	0.10	48.38	17.21	26.69	7.73
Maryland	23,666	2.03	62.97	13.43	14.83	8.78
Massachusetts	21,737	1.87	54.82	18.86	17.93	8.39

Table 31: ACS Property Value Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID to Vendor Data—5 Percent Difference; Single-Family, Owner-Occupied Subsample (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Michigan	56,802	4.88	82.40	1.39	5.37	10.84
Minnesota	42,758	3.67	57.08	16.56	18.53	7.83
Mississippi	8,513	0.73	65.75	7.19	13.29	13.78
Missouri	25,532	2.19	70.28	7.62	10.86	11.24
Montana	4,030	0.35	48.73	14.89	25.11	11.27
Nebraska	11,981	1.03	56.38	18.37	16.99	8.25
Nevada	8,114	0.70	82.43	2.07	5.19	10.32
New Hampshire	6,093	0.52	48.61	22.85	21.53	7.01
New Jersey	29,824	2.56	56.98	16.36	18.65	8.01
New Mexico	5,706	0.49	71.36	7.36	10.71	10.57
New York	55,844	4.80	66.11	11.98	12.40	9.51
North Carolina	33,986	2.92	40.82	23.23	22.62	13.33
North Dakota	3,493	0.30	68.71	10.11	12.63	8.56
Ohio	50,998	4.38	57.37	15.94	18.21	8.48
Oklahoma	18,399	1.58	59.69	14.23	13.46	12.63
Oregon	12,708	1.09	63.74	13.45	15.69	7.12
Pennsylvania	64,755	5.56	73.97	6.01	10.29	9.73
Rhode Island	3,387	0.29	55.98	19.13	16.80	8.09
South Carolina	15,844	1.36	49.07	18.47	21.60	10.86
South Dakota	3,671	0.32	61.51	12.61	17.49	8.39
Tennessee	24,201	2.08	50.45	18.53	20.40	10.63
Texas	75,645	6.50	52.83	18.99	17.73	10.45
Utah	10,097	0.87	59.80	17.82	16.44	5.94
Vermont	3,471	0.30	37.57	24.43	27.69	10.31
Virginia	31,612	2.72	53.08	21.44	17.52	7.96
Washington	24,810	2.13	71.11	11.06	10.63	7.19
West Virginia	4,980	0.43	82.95	0.82	4.92	11.31
Wisconsin	41,556	3.57	45.22	22.68	24.50	7.60
Wyoming	2,046	0.18	59.29	14.32	17.30	9.09

Source: 2014 American Community Survey and administrative property taxdata.

Results are suppressed (D) where necessary for disclosure avoidance.

11.5 Real Estate Tax

11.5.1 Cross-Tabulation of ACS and Vendor Data Real Estate Tax Responses

Table 32: ACS Real Estate Tax (2014, Unedited) by Vendor Data; Single-Family, Owner-Occupied Subsample

ACS Real Estate Tax	Linked ACS Count	Vendor Real Estate Tax										
		1	2	3	4	5	6	7	8	9	10+	NA
1	82,921	42,648	12,629	5,276	3,692	2,428	2,227	1,946	1,102	882	508	9,583
		[51.43]	[15.23]	[6.36]	[4.45]	[2.93]	[2.69]	[2.35]	[1.33]	[1.06]	[0.61]	[11.56]
2	99,517	13,808	57,537	12,373	5,441	2,714	1,890	1,447	594	457	138	3,118
		[13.88]	[57.82]	[12.43]	[5.47]	[2.73]	[1.90]	[1.45]	[0.60]	[0.46]	[0.14]	[3.13]
3	115,286	5,091	17,090	51,246	19,763	7,757	5,650	2,901	1,294	741	407	3,346
		[4.42]	[14.82]	[44.45]	[17.14]	[6.73]	[4.90]	[2.52]	[1.12]	[0.64]	[0.35]	[2.90]
4	102,315	2,276	5,813	12,435	47,905	16,253	7,350	4,764	1,596	941	345	2,637
		[2.22]	[5.68]	[12.15]	[46.82]	[15.89]	[7.18]	[4.66]	[1.56]	[0.92]	[0.34]	[2.58]
5	98,668	1,461	3,328	5,594	12,408	42,119	18,971	7,537	2,845	1,419	420	2,566
		[1.48]	[3.37]	[5.67]	[12.58]	[42.69]	[19.23]	[7.64]	[2.88]	[1.44]	[0.43]	[2.60]
6	105,083	968	1,668	2,701	4,751	9,228	55,096	21,458	4,354	2,174	491	2,194
		[0.92]	[1.59]	[2.57]	[4.52]	[8.78]	[52.43]	[20.42]	[4.14]	[2.07]	[0.47]	[2.09]

Table 32: ACS Real Estate Tax (2014, Unedited) by Vendor Data; Single-Family, Owner-Occupied Subsample (continued)

ACS Real Estate Tax	Linked ACS Count	Vendor Real Estate Tax										
		1	2	3	4	5	6	7	8	9	10+	NA
7	121,802	863	1,128	1,850	3,323	4,503	13,769	67,201	20,446	5,555	1,077	2,087
		[0.71]	[0.93]	[1.52]	[2.73]	[3.70]	[11.3]	[55.17]	[16.79]	[4.56]	[0.88]	[1.71]
8	92,142	428	463	685	1,048	1,551	3,600	13,247	50,345	18,129	1,489	1,157
		[0.46]	[0.50]	[0.74]	[1.14]	[1.68]	[3.91]	[14.38]	[54.64]	[19.68]	[1.62]	[1.26]
9	105,376	387	388	421	716	843	1,856	4,250	10,727	74,201	10,605	982
		[0.37]	[0.37]	[0.40]	[0.68]	[0.80]	[1.76]	[4.03]	[10.18]	[70.42]	[10.06]	[0.93]
10+	107,794	575	703	838	1,040	875	1,092	1,779	2,112	10,125	87,959	696
		[0.53]	[0.65]	[0.78]	[0.96]	[0.81]	[1.01]	[1.65]	[1.96]	[9.39]	[81.60]	[0.65]
NA	132,844	13,513	17,427	14,954	14,581	12,009	13,895	14,558	9,724	9,985	7,667	4,531
		[10.17]	[13.12]	[11.26]	[10.98]	[9.04]	[10.46]	[10.96]	[7.32]	[7.52]	[5.77]	[3.41]
Total	1,163,748	82,018	118,174	108,373	114,668	100,280	125,396	141,088	105,139	124,609	111,106	32,897

Source: 2014 American Community Survey and administrative property tax data.

Note: Values in brackets are row percentages associated with above cross-tabulation frequency

11.5.2 Agreement in Real Estate Tax across Subpopulation and Housing Characteristics

Table 33: ACS Real Estate Tax Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID To Vendor Data—1 Percent Difference; Single-Family, Owner-Occupied Subsample

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Sex (of householder)						
Male	601,832	51.71	36.56	11.54	39.75	12.15
Female	561,916	48.29	34.66	11.13	38.53	15.68
Age (of householder)						
15-19	2,181	0.19	17.19	2.80	21.64	58.37
20-24	9,627	0.83	27.94	6.18	32.80	33.07
25-29	34,875	3.00	33.65	8.51	38.88	18.95
30-34	61,650	5.30	35.94	9.05	39.56	15.45
35-39	73,911	6.35	36.40	9.29	40.30	14.01
40-44	92,247	7.93	36.56	9.31	41.24	12.89
45-49	107,952	9.28	36.71	9.67	41.27	12.34
50-54	133,293	11.45	37.11	10.36	40.53	12.01
55-59	143,015	12.29	37.39	11.30	39.70	11.61
60-64	136,180	11.70	36.92	12.51	39.22	11.36
65-69	121,234	10.42	36.33	13.18	38.63	11.86
70 and older	247,418	21.26	32.44	13.71	36.66	17.20
Race (of householder)						
White alone	1,006,378	86.48	35.83	11.63	39.49	13.06
Black or African American alone	78,693	6.76	35.79	7.31	33.44	23.46
American Indian or Alaska Native alone	5,144	0.44	36.41	9.29	33.32	20.98
Asian alone	41,199	3.54	32.68	14.46	42.89	9.97
Native Hawaiian or Pacific Islander alone	686	0.06	28.43	8.60	41.84	21.14
Some Other Race alone	16,529	1.42	30.73	7.37	39.85	22.05
Two or More Races	15,119	1.30	35.91	9.89	38.40	15.80

Table 33: ACS Real Estate Tax Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID To Vendor Data—1 Percent Difference; Single-Family, Owner-Occupied Subsample (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Ethnicity (of householder)						
Hispanic or Latino (of any race)	83,571	7.18	30.91	8.53	42.69	17.88
Not Hispanic or Latino	1,080,177	92.82	36.01	11.56	38.89	13.54
Place of birth (of householder)						
Native	1,057,774	90.89	35.80	11.31	39.00	13.90
Foreign born	105,974	9.11	34.12	11.65	40.82	13.41
Tenure						
Owned	1,163,748	100.00	35.64	11.34	39.16	13.85
MSA						
Metro	931,414	80.04	34.78	11.68	40.82	12.73
Micro	128,102	11.01	37.91	10.67	33.99	17.43
Other	104,232	8.96	40.61	9.16	30.73	19.50
State						
Alabama	18,381	1.58	37.03	12.45	21.43	29.09
Alaska	2,066	0.18	38.58	10.07	28.17	23.18
Arizona	20,177	1.73	34.65	6.83	43.51	15.01
Arkansas	10,933	0.94	41.58	7.12	27.34	23.96
California	103,615	8.90	26.89	16.51	44.27	12.33
Colorado	20,460	1.76	44.38	15.22	28.57	11.84
Connecticut	13,556	1.16	27.63	7.61	56.38	8.37
Delaware	4,062	0.35	34.44	8.47	34.66	22.43
District of Columbia	1,341	0.12	35.12	14.99	33.41	16.48
Florida	55,550	4.77	35.01	8.12	44.34	12.53
Georgia	28,851	2.48	48.62	12.24	23.73	15.42
Hawaii	2,133	0.18	23.86	10.13	47.12	18.89
Idaho	5,670	0.49	38.77	11.01	35.06	15.17
Illinois	52,025	4.47	44.94	16.37	29.28	9.41
Indiana	29,028	2.49	39.69	4.93	40.58	14.80
Iowa	21,932	1.88	35.08	13.54	40.96	10.41
Kansas	14,743	1.27	23.74	8.49	28.52	39.25
Kentucky	16,919	1.45	42.09	4.97	36.50	16.44
Louisiana	14,908	1.28	17.84	5.74	60.52	15.89
Maine	1,139	0.10	23.44	8.34	61.55	6.67
Maryland	23,666	2.03	35.07	13.27	38.51	13.15
Massachusetts	21,737	1.87	24.61	7.35	59.03	9.01

Table 33: ACS Real Estate Tax Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID To Vendor Data—1 Percent Difference; Single-Family, Owner-Occupied Subsample (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Michigan	56,802	4.88	61.62	2.47	8.42	27.49
Minnesota	42,758	3.67	40.83	17.59	32.62	8.96
Mississippi	8,513	0.73	37.70	9.35	23.51	29.45
Missouri	25,532	2.19	41.00	17.72	27.46	13.82
Montana	4,030	0.35	37.62	15.73	32.63	14.02
Nebraska	11,981	1.03	38.03	15.59	30.23	16.15
Nevada	8,114	0.70	41.34	11.44	28.93	18.30
New Hampshire	6,093	0.52	39.90	11.46	43.21	5.43
New Jersey	29,824	2.56	37.33	14.40	42.19	6.08
New Mexico	5,706	0.49	32.19	14.79	37.68	15.33
New York	55,844	4.80	42.02	6.38	40.42	11.18
North Carolina	33,986	2.92	36.82	15.23	35.00	12.96
North Dakota	3,493	0.30	53.97	5.90	28.23	11.91
Ohio	50,998	4.38	37.55	17.50	33.12	11.83
Oklahoma	18,399	1.58	36.95	16.74	27.28	19.02
Oregon	12,708	1.09	25.35	11.32	55.33	8.00
Pennsylvania	64,755	5.56	26.22	3.83	59.50	10.45
Rhode Island	3,387	0.29	29.05	9.65	52.23	9.06
South Carolina	15,844	1.36	45.46	15.20	25.28	14.06
South Dakota	3,671	0.32	26.56	10.35	29.04	34.05
Tennessee	24,201	2.08	40.14	15.71	29.99	14.16
Texas	75,645	6.50	16.24	2.43	68.53	12.80
Utah	10,097	0.87	35.91	15.47	36.67	11.94
Vermont	3,471	0.30	38.58	5.53	14.81	41.08
Virginia	31,612	2.72	32.11	11.81	39.88	16.20
Washington	24,810	2.13	30.43	18.09	39.88	11.60
West Virginia	4,980	0.43	39.10	4.54	38.63	17.73
Wisconsin	41,556	3.57	37.14	20.39	36.46	6.01
Wyoming	2,046	0.18	46.19	7.53	33.24	13.05

Source: 2014 American Community Survey and administrative property taxdata.

Table 34: ACS Real Estate Tax Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID To Vendor Data—5 Percent Difference; Single-Family, Owner-Occupied Subsample

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Sex (of householder)						
Male	601,832	51.71	27.92	30.01	29.92	12.15
Female	561,916	48.29	26.91	27.91	29.50	15.68
Age (of householder)						
15-19	2,181	0.19	14.31	8.67	18.66	58.37
20-24	9,627	0.83	22.99	16.29	27.65	33.07
25-29	34,875	3.00	27.03	23.21	30.82	18.95
30-34	61,650	5.30	28.35	25.03	31.18	15.45
35-39	73,911	6.35	28.44	26.25	31.31	14.01
40-44	92,247	7.93	28.19	27.24	31.69	12.89
45-49	107,952	9.28	28.01	28.07	31.58	12.34
50-54	133,293	11.45	28.36	28.80	30.83	12.01
55-59	143,015	12.29	28.54	30.01	29.84	11.61
60-64	136,180	11.70	27.97	31.59	29.08	11.36
65-69	121,234	10.42	27.76	31.73	28.64	11.86
70 and older	247,418	21.26	25.12	30.12	27.57	17.20
Race (of householder)						
White alone	1,006,378	86.48	27.44	29.69	29.82	13.06
Black or African American alone	78,693	6.76	30.09	19.13	27.33	23.46
American Indian or Alaska Native alone	5,144	0.44	29.61	22.90	26.52	20.98
Asian alone	41,199	3.54	22.69	36.68	30.66	9.97
Native Hawaiian or Pacific Islander alone	686	0.06	23.03	20.55	35.28	21.14
Some Other Race alone	16,529	1.42	24.68	20.36	32.91	22.05
Two or More Races	15,119	1.30	28.73	25.38	30.09	15.80

Table 34: ACS Real Estate Tax Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID To Vendor Data—5 Percent Difference; Single-Family, Owner-Occupied Subsample (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
			vendor < ACS	vendor = ACS	vendor > ACS	vendor is missing
Ethnicity (of householder)						
Hispanic or Latino (of any race)	83,571	7.18	24.38	23.21	34.53	17.88
Not Hispanic or Latino	1,080,177	92.82	27.67	29.44	29.35	13.54
Place of birth (of householder)						
Native	1,057,774	90.89	27.65	28.78	29.68	13.90
Foreign born	105,974	9.11	25.32	31.18	30.08	13.41
Tenure						
Owned	1,163,748	100.00	27.43	29.00	29.72	13.85
MSA						
Metro	931,414	80.04	26.31	30.23	30.73	12.73
Micro	128,102	11.01	30.33	25.52	26.73	17.43
Other	104,232	8.96	33.88	22.26	24.37	19.50
State						
Alabama	18,381	1.58	29.76	24.29	16.85	29.09
Alaska	2,066	0.18	30.30	26.09	20.43	23.18
Arizona	20,177	1.73	28.21	20.30	36.49	15.01
Arkansas	10,933	0.94	38.36	13.19	24.49	23.96
California	103,615	8.90	18.53	36.57	32.57	12.33
Colorado	20,460	1.76	35.26	31.52	21.37	11.84
Connecticut	13,556	1.16	18.26	34.70	38.66	8.37
Delaware	4,062	0.35	29.59	22.28	25.70	22.43
District of Columbia	1,341	0.12	29.08	29.46	24.98	16.48
Florida	55,550	4.77	27.31	34.98	25.17	12.53
Georgia	28,851	2.48	40.43	26.85	17.30	15.42
Hawaii	2,133	0.18	20.86	19.03	41.21	18.89
Idaho	5,670	0.49	31.08	26.40	27.35	15.17
Illinois	52,025	4.47	32.01	40.51	18.07	9.41
Indiana	29,028	2.49	33.55	16.18	35.47	14.80
Iowa	21,932	1.88	24.59	34.85	30.15	10.41
Kansas	14,743	1.27	17.19	21.64	21.92	39.25
Kentucky	16,919	1.45	36.26	22.86	24.44	16.44
Louisiana	14,908	1.28	14.88	11.05	58.18	15.89
Maine	1,139	0.10	17.12	28.71	47.50	6.67
Maryland	23,666	2.03	25.15	34.01	27.69	13.15
Massachusetts	21,737	1.87	15.27	31.79	43.93	9.01

Table 34: ACS Real Estate Tax Coverage and Agreement Rates by Householder and Geography Characteristics (Unedited 2014 ACS) for Data Linked by MAFID To Vendor Data—5 Percent Difference; Single-Family, Owner-Occupied Subsample (continued)

	Linked Count	% of Linked ACS Total	Rate of Agreement			
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Michigan	56,802	4.88	58.79	7.07	6.65	27.49
Minnesota	42,758	3.67	30.92	36.44	23.68	8.96
Mississippi	8,513	0.73	31.53	19.62	19.41	29.45
Missouri	25,532	2.19	30.17	35.88	20.13	13.82
Montana	4,030	0.35	26.67	36.08	23.23	14.02
Nebraska	11,981	1.03	27.53	36.21	20.12	16.15
Nevada	8,114	0.70	30.66	30.82	20.21	18.30
New Hampshire	6,093	0.52	25.77	41.82	26.98	5.43
New Jersey	29,824	2.56	21.21	50.33	22.38	6.08
New Mexico	5,706	0.49	23.40	32.60	28.67	15.33
New York	55,844	4.80	33.60	21.52	33.70	11.18
North Carolina	33,986	2.92	28.06	34.86	24.13	12.96
North Dakota	3,493	0.30	49.27	16.49	22.33	11.91
Ohio	50,998	4.38	28.23	34.88	25.07	11.83
Oklahoma	18,399	1.58	27.89	33.20	19.89	19.02
Oregon	12,708	1.09	16.49	41.27	34.23	8.00
Pennsylvania	64,755	5.56	20.60	18.51	50.44	10.45
Rhode Island	3,387	0.29	20.67	27.84	42.43	9.06
South Carolina	15,844	1.36	36.85	30.48	18.62	14.06
South Dakota	3,671	0.32	18.50	25.85	21.60	34.05
Tennessee	24,201	2.08	32.55	30.11	23.17	14.16
Texas	75,645	6.50	12.92	10.89	63.38	12.80
Utah	10,097	0.87	24.75	37.27	26.04	11.94
Vermont	3,471	0.30	32.84	15.70	10.37	41.08
Virginia	31,612	2.72	24.73	27.51	31.55	16.20
Washington	24,810	2.13	21.45	36.94	30.01	11.60
West Virginia	4,980	0.43	32.57	22.15	27.55	17.73
Wisconsin	41,556	3.57	22.92	48.87	22.20	6.01
Wyoming	2,046	0.18	35.97	25.86	25.12	13.05

Source: 2014 American Community Survey and administrative property tax data.