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MEMORANDUM FOR ACS Research and Evaluation Advisory Group

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Subject: Consistency of ACS Data Quality Filtering Over Time

Attached is the final American Community Survey (ACS) Research and Evaluation report for “Consistency of ACS Data Quality Filtering Over Time”.

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Attachment

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# Consistency of ACS Data Quality Filtering Over Time

REPORT

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## EXECUTIVE SUMMARY

One-year ACS data products on American FactFinder, including detailed tables and data profiles, are subject to the data quality filtering applied to prevent the poorest quality estimates from being published. This can be frustrating for users if estimates are published in one year but are filtered out the next, i.e., the filtering results are inconsistent. (We further defined “especially inconsistent” results as occurring when an estimate transitioned from both filtered-to-published and published-to-filtered during the study period.) However, no research had previously been done to look at the frequency and effects of filtering over time. The research discussed in this report attempts to fill that information gap.

Five 1-year sets of detailed tables and data profile estimates from 2009 through 2013 for states, counties, and places were used in this analysis. Key results include:

- More than 10 percent of detailed tables at the county and place summary levels have inconsistent filtering in the study period. Data profile estimates were filtered at a rate of about 6 percent for counties and 7 percent for places.
- Detailed tables, for both counties and places, also had “especially inconsistent” rates of seven percent or higher. Rates for data profiles were less than five percent.
- The inconsistent filtering rates were higher for iterated tables than non-iterated tables.
- In general, aggregate, median, and ratio estimate tables had higher inconsistent and “especially inconsistent” filtering rates than count estimate tables.
- Inconsistent filtering rates for tables and profiles also varied by topic, with grandparent characteristics being the topic with the highest rates for tables, and among the highest rates for data profile estimates.

### I. INTRODUCTION

The ACS uses data quality filtering of 1-year detailed tables and other data products to help meet its goal of publishing useful estimates of high reliability. Not all users have sufficient statistical knowledge to understand the factors that may affect the quality of estimates and to consider margins of error when using estimates. Data quality filtering is a way to keep the public from using data deemed to be of low quality and to prevent misinterpretation when dealing with estimates with relatively high margins of error.

However, a downside for advanced users is the inability to compare estimates across time if the data product is filtered for a geographic area for some years but not others. (The filtering is done on a table basis for a given geographic area, so an entire table is either published or filtered out and not published.) This is why data quality filtering is not applied to 5-year data, as one of its primary purposes is to allow users to create custom tabulations by aggregating across small areas.

Previous research has looked at overall filtering rates for detailed tables and data profiles (Starsinic 2011), but not at filtering of areas across time. This research will quantify how often 1-year data products are intermittently filtered for geographic areas at various summary levels.

## II. RESEARCH QUESTION

Because this aspect of data quality filtering has never been researched before, the research question is quite basic: “What are the rates of year-to-year filtering consistency for 1-year data products?”

## III. BACKGROUND

### A. Basic Data Quality Filtering Rules

Beyond the required ACS 65,000 population threshold for publishing a geographic area’s 1-year estimates, additional steps are taken to preserve the data quality of published estimates. Data quality filtering is applied to detailed tables, and the results of the filtering are carried over to other data products derived from the detailed tables. A filtering flag (1 = filtered out, 0 = published) is assigned for each table and geographic area. For each “detailed” line (any line other than a subtotal or total) in a table, the coefficient of variation (CV) is calculated. The CV is a measure of reliability and is defined as the standard error (SE) of an estimate divided by the estimate itself. The median CV across the detailed lines is determined for the table. If the median CV for a table for a specific geographic area is greater than 0.61, then the filter flag is set to 1 for that table, and that table is not published on American FactFinder for that particular geographic area. This cutoff value is set because when a 90 percent margin of error is equal to its estimate, then the CV is equal to 0.61, rounded to 2 decimal places.<sup>1</sup> There is one caveat to this rule for count estimates of zero, where the CV is undefined; a CV of one is assigned before the median is calculated.

### B. Disclosure Avoidance Filtering

There is some additional filtering caused by tables failing confidentiality rules put in place by the Disclosure Review Board (DRB). The DRB rules affect the filtering of aggregate<sup>2</sup> and ratio tables. If any aggregate estimate in a detailed table for a geographic area is based on one or two unweighted cases, then the entire table for that area is filtered out. Any ratio table using estimates from that table would be filtered out as well. This DRB filtering is not related to quality, but its effect is indistinguishable to the end user, and it was included along with data quality filtering in this research.

### C. Estimate Types and Other Data Products

Data quality filtering rules apply to most types of estimates, including population and housing unit counts, medians, and aggregates. Ratio estimates (such as per capita

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<sup>1</sup> For more information on data quality filtering, see U.S. Census Bureau (2013), Starsinic (2009) and King (2010).

<sup>2</sup> Aggregates are sums of any quantity other than persons, households, families, or housing units, such as dollars, time, or vehicles.

income) and their tables are handled differently. If the table that sources either the numerator or denominator of a ratio is filtered out, then the ratio table is filtered out as well.

Estimates in data profiles and most other data products are filtered based on the filtering of the detailed tables that source the estimates. If the sourced table is filtered out, then the profile estimates based on that table are filtered out as well and appears as “N” in the profile. If a sum, percent or ratio in the data profile is constructed from estimates from several different tables, the profile estimate is filtered out if any one of the source tables is filtered out. An entire data profile can be filtered out if more than half of the estimates in the profile are filtered. However, it is extremely rare for this to occur, and it did not occur in the profiles analyzed for this research.

#### **D. Iterated Tables**

Certain detailed tables are published as “iterated” versions. In addition to the basic version of each of these tables based on the total population, nine additional versions are created with additional race and/or Hispanic origin restrictions on the universe. The nine iterated groups are:

- White Alone
- Black Alone
- American Indian and Alaska Native Alone
- Asian Alone
- Native Hawaiian and other Pacific Islander Alone
- Some Other Race Alone
- Two or More Races
- Hispanic
- White Alone Not Hispanic

For example, a table on educational attainment might have the universe restricted to persons 25 years old and over. Iterated versions of this table would have universes of persons White alone 25 years old and over, Black alone 25 years old and over, and so on.

Data quality filtering rules are applied to each iterated version independently of the initial Total population version. Iterated tables tend to have very high filtering rates because these groups can be quite small in many geographic areas.

#### **E. Collapsed/Uncollapsed Tables**

Some detailed tables also have “collapsed versions”. These are modified from the “uncollapsed” version to reduce the number of lines (estimates) in the table. The purpose of defining collapsed versions was to create tables that may be more likely to pass the data quality filtering methodology should the noncollapsed version fail. The collapsed version may combine individual lines together — by combining separate age groups 15-17 and 18-21 into a single 15-21 group, for example — or may omit a dimension from

the original table, such as age by sex by poverty being collapsed to age by poverty only. The layout of the collapsed table is prespecified and not done on-the-fly through an algorithm. Collapsed tables are also always created, not just if the noncollapsed version fails the data quality filtering, but they are subject to the same filtering criteria as noncollapsed tables.

If a data profile estimate can be sourced from both the noncollapsed and collapsed version of a table, then the profile estimate will be published if either the noncollapsed or collapsed versions are published. The profile estimate would only be filtered if both noncollapsed and collapsed versions are filtered.

## **IV. METHODOLOGY AND LIMITATIONS**

### **A. Methodology**

The research analyzed the filtering rates of 1-year detailed tables and data profiles, specifically looking at data for the five single years 2009 through 2013. The initial focus was the frequency of being filtered out.

In ACS processing, along with the current year detailed tables produced each year, the same tables are also produced using the microdata from the four previous years. These previous-year tables are used to produce the comparison profile (published on AFF) as well as to aid in analysts' review of the current-year data and tables. The previous-year tabulations are based on the current-year's set of tables, and dollar values are inflation-adjusted to current-year values. However, geographic areas are not updated for boundary changes. The 2013 data year set of current-year and previous-year detailed tables was selected as the source of data for this analysis. The benefit of using such a bundle of detailed tables is the consistency between the current year and the previous years' estimates. The 2013 set was selected because it was the most current at the time this research was started.

For both detailed tables and data profiles, the research initially focused on four summary levels: nation, state, county, and place. A county or place was included in the research only if it was published, i.e. met the population size publication threshold of 65,000, for all five 1-year periods. Otherwise, the geographic area was not included. The analysis included 803 counties and 530 places. Counties and places in Puerto Rico were also included in the analysis.

Similarly, detailed tables and profile estimates were included only when they were available for all years or periods. For example, there are 17 detailed tables and three profile estimates associated with the new computer and Internet use questions which were introduced to the ACS data products in 2013. Because detailed tables and profile estimates only exist for that year, those tables and profile estimates are not included in this analysis.



The analysis was broadened to look at not just how many years were filtered, but also at the patterns of which years were filtered. Users generally expect the same published or filtered outcome for a given estimate and area from year-to-year. When the outcome changes from one year to the next, the expectation is still that the new outcome will be the permanent one. Thus, they may be most frustrated with estimates which are “especially inconsistent”, where there are changes from both published-to-filtered and filtered-to-published over the period. For example, a five-year pattern of “No-Yes-No-Yes-No” (Yes = published, No = filtered) could be especially inconsistent, as compared with a pattern of “No-No-Yes-Yes-Yes”. We will also use the term “flip-flop” to describe these estimates which go back and forth between published and filtered.

Filtering results for tables were crossed by area size, collapsed status, iterated status, type of estimate, and topic. Areas with high/low rates, as well as specific tables with high/low rates, are also spotlighted in the following section.

## **B. Limitations**

One limitation arising from choosing to use the 2013 data year set of current-year and previous-year detailed tables is that it doesn’t exactly reflect a user’s experience with ACS data. The previous-year data are published in the most current year’s comparison profiles. However many users may be drawing their data from the original detailed tables on AFF, which may not match what we are using. For tables using dollar-valued data, the filtering for the original table may differ from the filtering for the inflation-adjusted version. If a table was incorrectly filtered when originally published (which has happened occasionally), the previous-year version would use the corrected filtering result.

Another limitation is the use of only five years’ worth of tables. This analysis could have been extended back to 2005, and also included 2014, for a potential total of 10 years’ worth of published data. It is possible that longer-term patterns of filtering exist that this analysis will not capture.

## **V. RESULTS – DETAILED TABLES**

### **A. By Summary Level**

Table 1 shows filtering results for the four summary levels in this analysis, with a breakdown of how many tables were filtered out how many years.

Table 1: Summary Level by Number of Years Filtered

Summary Level	Total Tables	Never Filtered	Filtered All Years	Inconsistent Filtering	Filtered 1 Year	Filtered 2 Years	Filtered 3 Years	Filtered 4 Years
Nation	1,053	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
State	54,175	91.2%	5.2%	3.6%	1.3%	0.8%	0.7%	0.8%
County	826,188	65.5%	23.5%	11.0%	3.6%	2.6%	2.2%	2.6%
Place	545,307	62.9%	24.4%	12.8%	4.2%	2.9%	2.6%	3.1%

Source: ACS 2009 through 2013 1-year data. For more information, see [www.census.gov/acs](http://www.census.gov/acs)

None of the 1,053 tables were filtered at the national level, so that level will be omitted from further tables in this section. At the state level, more than 90 percent of the tables are never filtered over the 5 years examined, another 5.2 percent are filtered for all years, and the remaining 3.6 percent have inconsistent filtering (filtered one year, two years, three years, or four years). The distributions for these large counties and places are generally similar, with more than 60 percent of tables never filtered, and between 10 and 15 percent of tables inconsistently filtered.

Looking at the distribution of the number of years filtered for state, county and place, the percent filtered for one year is higher than the percent filtered for two, three, and four years (which are themselves similar). To take a closer look at the tables filtered one year, Table 2 shows the year for which the table is not published.

Table 2: Filtered 1 Year Only, Summary Level by Year Filtered

Summary Level	Filtered 1 Year	Filtered in 2009	Filtered in 2010	Filtered in 2011	Filtered in 2012	Filtered in 2013
State	698	32.1%	26.4%	15.3%	9.2%	17.0%
County	30,039	25.8%	21.3%	24.8%	11.6%	16.6%
Place	22,829	27.4%	21.1%	27.3%	10.0%	14.1%

Source: ACS 2009 through 2013 1-year data. For more information, see [www.census.gov/acs](http://www.census.gov/acs)

For all three, the highest percentage is in 2009 and the lowest is in 2012, which is the only year with the full effect of the sample expansion. The uptick from 2012 to 2013 is likely due to the effects of the government shutdown that occurred in October 2013.

Table 3 examines the ways in which the inconsistently filtered tables behave from year-to-year. It can be argued that tables which are published irregularly are the most frustrating for a user. The “Filter => Publish” category includes tables which start out being filtered out in 2009, but then are published in 2010, 2011, 2012, or 2013, and remains published each subsequent year. The sample expansion mentioned above may play a role in creating this type of pattern. Using the Y/N shorthand from the previous section, these tables started as N, shifted to Y in some year, and stayed Y (i.e., NYYYY, NNYYYY, NNNYY, or NNNNY).

In the “Publish => Filter” category, tables start out being published but then begin to be filtered out and remain so for subsequent years (i.e. YNNNN, YYNNN, YYYYNN, or

YYYYN). Two events mentioned earlier may play a role in this pattern. These are the sample reallocation started in 2011 and the government shutdown in 2013.

All other inconsistent filtering patterns are included in the “Flip-Flop” category. Each of these patterns contains at least one shift from published to filtered, and at least one from filtered to published. These are, we assume, the most problematic for a user.

Table 3: Summary Level by Type of Inconsistent Filtering

	Total Inconsistent Tables	Percent of All Tables	Filter => Publish	Flip-Flop	Publish => Filter
State	1,959	3.6%	1.0%	2.2%	0.4%
County	90,598	11.0%	2.4%	7.2%	1.3%
Place	69,552	12.8%	3.1%	8.3%	1.3%

Source: ACS 2009 through 2013 1-year data. For more information, see [www.census.gov/acs](http://www.census.gov/acs)

The Flip-Flop category is the largest among the three types of inconsistent filtering. At the state level, 2.2 percent of tables fall in the Flip-Flop category, along with 7.2 percent of county tables and 8.3 percent of place tables. “Filter => Publish” is the second largest, and these may be due to the ACS sample expansion. Users would see these as an improvement in the ACS data products.

## B. By Size

We expect the size of the area to have an effect on filtering results. Table 4 groups the 803 counties into eight categories by the size of their total population. (For this and some subsequent analyses, only county results are shown. Place results can be considered to be similar, and state results would not be as useful.)

Table 4: County Level, Population Range by Number of Years Filtered

Population Size Range	Total Number of Counties	Total Number of Tables	Never Filtered	Filtered All Years	Inconsistent Filtering	Filtered 1 Year	Filtered 2 Years	Filtered 3 Years	Filtered 4 Years
1M+	41	42,189	90.0%	6.3%	3.7%	1.2%	0.9%	0.7%	0.8%
500K-1M	93	95,697	83.0%	10.8%	6.2%	2.3%	1.5%	1.1%	1.3%
250-500K	130	133,761	74.3%	16.5%	9.2%	3.1%	2.1%	1.9%	2.1%
200-250K	57	58,653	67.0%	22.1%	10.9%	3.8%	2.5%	2.1%	2.4%
150-200K	107	110,076	63.3%	24.5%	12.1%	4.1%	2.9%	2.4%	2.7%
125-150K	70	72,021	60.7%	26.8%	12.5%	4.2%	2.9%	2.5%	2.9%
100-125K	97	99,813	57.6%	29.3%	13.1%	4.2%	3.0%	2.6%	3.2%
65-100K	208	213,978	53.4%	33.1%	13.6%	4.3%	3.2%	2.7%	3.4%

Source: ACS 2009 through 2013 1-year data. For more information, see [www.census.gov/acs](http://www.census.gov/acs)

The 41 counties with populations of a million or more have 90 percent of tables that are never filtered for the five years. At the other end, of the 208 counties with populations 65,000 to 100,000, 53 percent of their tables are never filtered, and a third of tables are filtered all five years. The percent with inconsistent filtering changes more slowly, but

still increases 10 percentage points between the largest and smallest population categories.

In Table 5, we revisit the county level results shown in Table 3, broken out by population size.

Table 5: County Level, Population Range by Type of Inconsistent Filtering

Population Size Range	Total Inconsistent Tables	Percent of All Tables	Filter => Publish	Flip-Flop	Publish => Filter
1M+	1,567	3.7%	1.0%	2.3%	0.4%
500K-1M	5,942	6.2%	1.6%	4.0%	0.7%
250-500K	12,296	9.2%	2.1%	6.1%	1.1%
200-250K	6,370	10.9%	2.4%	7.2%	1.2%
150-200K	13,372	12.1%	2.6%	8.1%	1.5%
125-150K	8,996	12.5%	2.7%	8.3%	1.5%
100-125K	13,044	13.1%	2.6%	8.7%	1.8%
65-100K	29,011	13.7%	3.1%	8.8%	1.6%

Source: ACS 2009 through 2013 1-year data. For more information, see [www.census.gov/acs](http://www.census.gov/acs)

The percent of flip-flopping tables rises from 2.3 percent in the largest counties to 8.8 percent in the smallest of the 803.

### C. By Iterated/Not Iterated

Table 6 breaks the tables down into iterated and non-iterated groups, which were described in Section III.C.

Table 6: Summary Level and Iteration by Number of Years Filtered

Summary Level	Iteration Type	Total Tables	Never Filtered	Filtered All Years	Inconsistent Filtering	Filtered 1 Year	Filtered 2 Years	Filtered 3 Years	Filtered 4 Years
State	Not Iterated	32,647	97.6%	1.3%	1.0%	0.4%	0.2%	0.2%	0.2%
	Iterated	21,528	81.4%	11.1%	7.5%	2.7%	1.7%	1.4%	1.7%
County	Not Iterated	493,746	81.2%	10.2%	8.6%	3.0%	2.0%	1.7%	1.8%
	Iterated	332,442	42.2%	43.3%	14.5%	4.5%	3.4%	2.9%	3.7%
Place	Not Iterated	325,887	76.9%	12.4%	10.7%	3.6%	2.5%	2.1%	2.4%
	Iterated	219,420	41.9%	42.2%	15.9%	5.0%	3.7%	3.2%	4.0%

Source: ACS 2009 through 2013 1-year data. For more information, see [www.census.gov/acs](http://www.census.gov/acs)

While the iterated tables have higher inconsistency percentages than the non-iterated tables (five to six percentage points), the larger differences are between tables never filtered and tables filtered all years. Each of these differences is 30 percentage points or more for counties and places.

#### D. By Collapsed/Uncollapsed

Table 7 breaks down the tables by the collapsing status of the tables: the uncollapsed version of a table, the collapsed version of the table, or the table does not have a collapsed version. (Collapsed tables were discussed in Section III.E.)

Table 7: Summary Level and Collapsing Status by Number of Years Filtered

Summary Level	Collapsing Status <sup>3</sup>	Total Tables	Never Filtered	Filtered All Years	Inconsistent Filtering
State	Uncollapsed	12,736	88.5%	8.0%	3.6%
	Collapsed	12,788	94.0%	3.4%	2.7%
	No Collapsed Version	28,651	91.1%	4.8%	4.1%
County	Uncollapsed	194,282	55.9%	34.1%	10.0%
	Collapsed	197,494	70.2%	20.5%	9.3%
	No Collapsed Version	434,412	67.7%	20.2%	12.2%
Place	Uncollapsed	128,232	50.9%	36.9%	12.3%
	Collapsed	130,352	68.5%	20.5%	11.0%
	No Collapsed Version	286,723	65.7%	20.6%	13.8%

Summary Level	Collapsing Status	Filtered 1 Year	Filtered 2 Years	Filtered 3 Years	Filtered 4 Years
State	Uncollapsed	1.1%	0.8%	0.7%	1.0%
	Collapsed	0.9%	0.5%	0.6%	0.6%
	No Collapsed Version	1.5%	1.0%	0.7%	0.8%
County	Uncollapsed	3.1%	2.3%	2.2%	2.5%
	Collapsed	2.8%	2.0%	2.0%	2.6%
	No Collapsed Version	4.3%	3.0%	2.3%	2.6%
Place	Uncollapsed	3.7%	2.7%	2.6%	3.3%
	Collapsed	3.6%	2.4%	2.2%	2.8%
	No Collapsed Version	4.7%	3.3%	2.7%	3.0%

Source: ACS 2009 through 2013 1-year data. For more information, see [www.census.gov/acs](http://www.census.gov/acs)

While the tables without a collapsed version have the highest percentage of inconsistent filtering, the differences between the three categories are not large.

<sup>3</sup> There are three detailed tables where the uncollapsed version is produced at the nation and state, but not county or place, and one additional table where the uncollapsed version is produced only for the nation. The collapsed versions of these tables are produced for nation, state, county, and place. This is why the number of uncollapsed and collapsed tables is not the same at each summary level.

## E. By Estimate Type

Table 8 shows the table filtering breakdown by estimate type. (Recall from Section III.C that each detailed table only includes one type of estimate.) Counts include estimates of persons, housing units, households, and families. “Gini” estimates are from a set of tables relating to the calculation of the Gini coefficient (which rarely fail filtering). Note that detailed tables do not contain any percent estimates, although the data profiles do.

Table 8: County Level, Estimate Type by Number of Years Filtered

Estimate Type	Total Tables	Never Filtered	Filtered All Years	Inconsistent Filtering	Filtered 1 Year	Filtered 2 Years	Filtered 3 Years	Filtered 4 Years
Count	674,421	62.0%	28.0%	9.9%	2.9%	2.2%	2.1%	2.7%
Median	84,315	85.6%	0.1%	14.3%	7.2%	4.4%	2.1%	0.6%
Aggregate	54,604	75.8%	6.9%	17.4%	6.3%	4.4%	3.3%	3.4%
Ratio	9,636	63.4%	16.0%	20.5%	6.6%	4.6%	4.0%	5.3%
Gini	3,212	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Source: ACS 2009 through 2013 1-year data. For more information, see [www.census.gov/acs](http://www.census.gov/acs)

Count tables have the smallest rate of inconsistent filtering (excluding Gini), while ratio tables have the highest.

Again we look at the behavior of the inconsistently filtered tables in Table 9, using Table 8’s breakdown by estimate type.

Table 9: County Level, Estimate Type by Type of Inconsistent Filtering

Estimate Type	Total Inconsistent Tables	Percent of All Tables	Filter => Publish	Flip-Flop	Publish => Filter
Count	67,082	9.9%	2.4%	6.4%	1.1%
Median	12,063	14.3%	2.3%	9.9%	2.1%
Aggregate	9,475	17.4%	3.0%	12.0%	2.4%
Ratio	1,978	20.5%	4.0%	13.6%	2.9%

Source: ACS 2009 through 2013 1-year data. For more information, see [www.census.gov/acs](http://www.census.gov/acs)

Median, aggregate and ratio tables all have higher flip-flopping rates than count tables, with ratio tables being twice as likely to be flip-floppers. Recall that a ratio can be filtered out if either its numerator or denominator is filtered out.

## F. By Topic

Table 10 looks at the 27 major topic categories for ACS detailed tables. The “topic” is derived from the first two digits of the table’s ID code (as displayed on American FactFinder, for example). Tables dealing with common subjects are grouped together by table ID, hence making the “topic” easy to deduce.

Table 10: County Level, Table Topic by Number of Years Filtered

Topic	Total Tables	Never Filtered	Filtered All Years	Inconsistent Filtering	Filtered 1 Year	Filtered 2 Years	Filtered 3 Years	Filtered 4 Years
Age & sex	24,090	62.4%	22.6%	15.0%	6.0%	3.7%	2.5%	2.7%
Race	8,833	57.4%	27.2%	15.4%	5.4%	3.3%	3.0%	3.7%
Hispanic	4,015	53.8%	31.2%	15.0%	4.2%	3.3%	3.2%	4.3%
Ancestry	11,242	46.0%	45.6%	8.4%	2.9%	1.8%	1.8%	1.9%
Nativity & Citizenship	24,057	53.0%	34.6%	12.3%	3.4%	2.7%	2.8%	3.4%
Place of Birth	17,677	77.9%	11.7%	10.4%	2.9%	2.4%	2.2%	3.0%
Migration	23,265	55.3%	30.4%	14.3%	4.5%	2.9%	2.8%	4.1%
Journey to Work	67,452	61.1%	26.8%	12.1%	3.7%	2.7%	2.5%	3.2%
Relationship	8,030	93.5%	0.1%	6.4%	3.8%	1.5%	0.7%	0.4%
Grandparents	19,272	36.6%	36.6%	26.9%	8.7%	6.5%	5.4%	6.2%
Household type	30,514	66.2%	23.9%	9.9%	2.9%	2.2%	2.2%	2.7%
Marital Status	10,439	53.7%	36.8%	9.6%	2.3%	1.9%	2.2%	3.2%
Fertility	15,257	65.1%	23.5%	11.5%	3.7%	2.6%	2.3%	2.9%
School enrollment	22,484	56.9%	30.7%	12.4%	3.3%	2.5%	2.7%	4.0%
Educational attainment	28,908	54.6%	37.7%	7.7%	2.0%	1.6%	1.7%	2.4%
Language	22,484	46.1%	35.4%	18.5%	5.2%	4.0%	4.1%	5.2%
Poverty	74,679	61.6%	29.8%	8.6%	2.7%	2.0%	1.8%	2.1%
Disability	28,105	85.3%	10.3%	4.3%	1.0%	0.9%	1.0%	1.6%
Income	106,799	68.8%	17.9%	13.3%	5.4%	3.6%	2.3%	2.0%
Earnings	19,272	58.4%	27.3%	14.2%	6.2%	4.4%	2.5%	1.1%
Veteran status	22,484	53.4%	38.7%	7.9%	2.1%	1.8%	1.8%	2.2%
Food stamps	12,848	70.1%	16.5%	13.4%	3.8%	2.9%	2.8%	3.9%
Employment	31,317	62.7%	30.6%	6.7%	2.3%	1.5%	1.3%	1.6%
Occupation & Industry	14,454	82.6%	14.7%	2.7%	0.9%	0.4%	0.6%	0.8%
Housing	131,637	74.9%	14.3%	10.8%	3.7%	2.5%	2.1%	2.5%
Group quarters population	803	78.1%	0.4%	21.5%	10.8%	9.6%	0.7%	0.4%
Health insurance	45,771	81.5%	13.7%	4.8%	1.3%	1.0%	1.1%	1.4%

Source: ACS 2009 through 2013 1-year data. For more information, see [www.census.gov/acs](http://www.census.gov/acs)

The Grandparents topic has the highest inconsistent filtering rate of any topic, 26.9 percent, and also the lowest percent of tables never filtered in the five years, 36.6 percent. Disability, Occupation & Industry, and Health Insurance all have inconsistent filtering

rates less than five percent. Ancestry, Grandparents, and Language all have “Never Filtered” rates less than 50 percent, and “Filtered All Years” rates greater than 35 percent.

### G. Areas with Highest and Lowest Rates

Table 11 gives the areas with the three highest and three lowest inconsistent filtering rates for states, counties, and places. After seeing the strong correlation between population size and inconsistency in Table 4, it’s not a surprise that the lowest rates are found in areas with the some of the largest populations. (Some tables are not published below the state level; hence the difference in total tables between states, counties, and places.)

Table 11: Areas with Three Highest and Lowest Inconsistent Filtering Rates

States	Total Tables	Never Filtered	Filtered All Years	Inconsistent Filtering	Filtered 1 Year	Filtered 2 Years	Filtered 3 Years	Filtered 4 Years
Wyoming	1,042	78.5%	12.7%	8.8%	3.6%	1.9%	1.5%	1.7%
Vermont	1,042	77.1%	14.9%	8.1%	3.0%	1.7%	1.5%	1.8%
North Dakota	1,042	80.4%	11.7%	7.9%	2.7%	1.6%	2.0%	1.5%
Texas	1,042	97.9%	0.9%	1.2%	0.6%	0.6%	0.0%	0.1%
Washington	1,042	99.2%	0.4%	0.4%	0.3%	0.1%	0.0%	0.0%
California	1,042	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%

Counties	Total Tables	Never Filtered	Filtered All Years	Inconsistent Filtering	Filtered 1 Year	Filtered 2 Years	Filtered 3 Years	Filtered 4 Years
Forsyth, GA	1,029	51.0%	24.3%	24.7%	12.1%	5.0%	3.9%	3.8%
Flagler, FL	1,029	47.3%	31.2%	21.5%	9.5%	4.8%	3.1%	4.1%
Coryell, TX	1,029	50.9%	29.3%	19.7%	6.3%	5.0%	4.6%	3.9%
Harris, TX	1,029	92.9%	4.7%	2.4%	0.5%	0.7%	0.8%	0.5%
San Diego, CA	1,029	95.8%	2.3%	1.8%	0.9%	0.2%	0.3%	0.5%
Los Angeles, CA	1,029	98.1%	1.2%	0.8%	0.3%	0.2%	0.1%	0.2%

Places	Total Tables	Never Filtered	Filtered All Years	Inconsistent Filtering	Filtered 1 Year	Filtered 2 Years	Filtered 3 Years	Filtered 4 Years
Flower Mound, TX	1,029	31.0%	41.1%	27.9%	10.0%	6.0%	6.6%	5.2%
Avondale, AZ	1,029	46.0%	26.9%	27.1%	9.3%	6.6%	5.5%	5.6%
Fishers, IN	1,029	32.7%	43.5%	23.8%	10.6%	4.4%	4.0%	4.9%
Houston, TX	1,029	90.5%	6.8%	2.7%	1.4%	0.6%	0.4%	0.4%
New York, NY	1,029	93.7%	3.8%	2.5%	1.0%	0.5%	0.5%	0.6%
Los Angeles, CA	1,029	94.8%	3.0%	2.2%	0.8%	0.5%	0.5%	0.5%

Source: ACS 2009 through 2013 1-year data. For more information, see [www.census.gov/acs](http://www.census.gov/acs)



For states, Wyoming had the largest inconsistent filtering rate at 8.8 percent, followed by Vermont and North Dakota. It may bear further investigation to understand why Washington’s rate is so low.

Forsyth County, Flagler County, Flower Mound town, Avondale city, and Fishers town all have “filtered one year” rates much higher than any other “filtered X years” category. Further investigation of these areas may indicate these are concentrated in a specific survey year due to some circumstance perhaps specific to that area that caused elevated sampling error and higher filtering rates.

## H. Tables with Highest Rates

Table 12 looks at the specific detailed tables with the worst county-level filtering inconsistency, specifically those 13 with rates above 60 percent, and for comparison purposes, the five worst-performing count tables. That means that these tables are published for at least one year *and* filtered for at least one year in 60 percent or more of the 803 1-year counties. Titles of the detailed table included in Table 12 can be found in Attachment A.

Table 12: County Level, Detailed Tables with Highest Inconsistent Filtering Rates

Table ID	Estimate Type	Total Tables	Never Filtered	Filtered All Years	Incon-sistent Filtering	Filtered 1 Year	Filtered 2 Years	Filtered 3 Years	Filtered 4 Years
B08136	Aggregate	803	16.1%	9.1%	74.8%	15.8%	23.9%	16.6%	18.6%
B25066	Aggregate	803	23.3%	5.2%	71.5%	25.9%	22.0%	13.9%	9.6%
B25112	Aggregate	803	27.0%	3.4%	69.6%	36.7%	18.6%	9.3%	5.0%
B10010	Median	803	30.1%	0.4%	69.5%	31.0%	24.2%	11.1%	3.2%
B25108	Aggregate	803	33.6%	0.2%	66.1%	44.7%	16.1%	4.6%	0.7%
B19202G	Median	803	34.9%	0.1%	65.0%	31.3%	20.2%	10.7%	2.9%
B19113G	Median	803	36.2%	0.4%	63.4%	27.0%	24.5%	9.3%	2.5%
B20017G	Median	803	35.7%	1.2%	63.0%	21.8%	20.4%	14.7%	6.1%
B25023	Aggregate	803	4.5%	33.5%	62.0%	8.3%	11.3%	16.1%	26.3%
B19013C	Median	803	37.9%	0.4%	61.8%	28.8%	18.9%	10.7%	3.4%
B20017C	Median	803	38.9%	0.1%	61.0%	30.1%	20.2%	8.5%	2.2%
B19216	Aggregate	803	23.9%	15.3%	60.8%	9.6%	12.0%	19.4%	19.8%
B19013G	Median	803	39.6%	0.2%	60.1%	25.9%	20.7%	10.3%	3.2%
B25128	Count	803	43.8%	1.5%	54.7%	36.2%	12.8%	3.6%	2.0%
B11014	Count	803	41.2%	10.2%	48.6%	13.4%	11.6%	12.3%	11.2%
B10050	Count	803	37.5%	16.1%	46.5%	12.3%	10.7%	9.6%	13.8%
B22005G	Count	803	37.1%	17.6%	45.3%	11.3%	8.2%	10.0%	15.8%
B11013	Count	803	42.0%	13.7%	44.3%	9.8%	11.0%	12.1%	11.5%

Source: ACS 2009 through 2013 1-year data. For more information, see [www.census.gov/acs](http://www.census.gov/acs)

Very interestingly, all of the 13 worst tables are either aggregate or median tables. It is easy to speculate that the aggregate tables are being affected by the additional DRB filtering rules that are applied to them.

Six of the tables are iterated (four for Two or More Races and two for American Indian and Alaska Native Alone, ending in “G” and “C”, respectively). Five are from the income topic and four are from the housing topic (the first two digits of “19” and “25”, respectively).

The five count tables come from four different topics, and only one has an inconsistent filtering rate larger than 50 percent.

We now present the results for data profile estimates.

## VI. RESULTS –DATA PROFILES

Data profiles collect some of the most commonly requested ACS estimates into one data product, which gives users an overview across a large number of characteristics collected by the ACS for a given area. The profile is split into four sections (listed separately on AFF) corresponding to social, economic, housing, and demographic characteristics. A separate version of the social profile is produced for Puerto Rico, which includes some differences for place of birth and migration estimates. Each geographic area has 508 profile estimates.

Groups of lines dealing with the same topic are often drawn from the same detailed table, so if the table is filtered, the data for all the corresponding lines in the data profile will be filtered as well. For example, there are 25 lines sourced from detailed table B01001, Sex by Age. If this table were filtered out for a geographic area, the estimates in all 25 lines would be replaced by an “N”. However, many estimates can be sourced from either an uncollapsed or collapsed table. If the uncollapsed version is filtered out, the profile estimate can still be published if the collapsed version is published. Hence, filtering rates for profile estimates are generally lower than those for detailed tables.

### A. By Summary Level

The following tables of profile results generally mirror those in the previous section dealing with detailed tables. Table 13, for example, is similar to Table 1, giving the filtering rates for the profile estimates at nation, state, county, and place. Again, filtering in general increases as we go down to lower summary levels. Interesting, the rates for filtering all years and inconsistent filtering for the profile estimates are similar.

Table 13: Summary Level by Number of Years Filtered – Data Profiles

Summary Level	Total Estimates	Never Filtered	Filtered All Years	Inconsistent Filtering	Filtered 1 Year	Filtered 2 Years	Filtered 3 Years	Filtered 4 Years
Nation	508	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
State	26,416	99.1%	0.4%	0.5%	0.2%	0.1%	0.1%	0.1%
County	407,924	88.9%	5.7%	5.5%	1.9%	1.3%	1.2%	1.1%
Place	269,240	85.8%	6.8%	7.4%	3.0%	1.4%	1.4%	1.6%

Source: ACS 2009 through 2013 1-year data. For more information, see [www.census.gov/acs](http://www.census.gov/acs)

Since all detailed tables at the national level were published, all national profile estimates were published as well. The percent of estimates never filtered in all five years is eight percentage points higher than what we saw for detailed tables at the state level, and more than 20 percentage points higher for counties and places. Inconsistent filtering rates are about 5.5 percentage points lower than what we saw for detailed tables for counties and places. Inconsistent filtering, and filtering in general, is simply less prevalent for profile estimates than for detailed tables.

Table 14 looks at the inconsistently filtered estimates in more detail.

Table 14: Summary Level by Type of Inconsistent Filtering – Data Profiles

Summary Level	Total Inconsistent Estimates	Percent of All Estimates	Filter => Publish	Flip-Flop	Publish => Filter
State	130	0.5%	0.2%	0.3%	0.0%
County	22,277	5.5%	1.2%	3.6%	0.6%
Place	19,897	7.4%	1.9%	4.8%	0.7%

Source: ACS 2009 through 2013 1-year data. For more information, see [www.census.gov/acs](http://www.census.gov/acs)

As with the detailed tables (Table 3), the Flip-Flop category was the largest for each type of area, followed by “Filter => Publish”, and then “Publish => Filter”. The Flip-Flop percentage decreased about 3.5 percentage points for both counties and places.

## B. By Size

Table 15 looks at the filtering of the data profiles by the size of area, for counties only. (Again, the place-level results are very similar to counties, for Tables 15 through 18, and are not shown.)

Table 15: County Level, Population Range by Number of Years Filtered – Data Profiles

Population Size Range	Number of Counties	Total Estimates	Never Filtered	Filtered All Years	Inconsistent Filtering	Filtered 1 Year	Filtered 2 Years	Filtered 3 Years	Filtered 4 Years
1M+	41	20,828	98.8%	0.8%	0.4%	0.1%	0.1%	0.1%	0.1%
500K-1M	93	47,244	97.7%	1.4%	0.8%	0.3%	0.2%	0.1%	0.2%
250-500K	130	66,040	95.0%	2.7%	2.4%	1.0%	0.6%	0.4%	0.4%
200-250K	57	28,956	91.8%	3.9%	4.4%	1.4%	1.2%	0.7%	1.1%
150-200K	107	54,356	89.1%	5.1%	5.7%	1.9%	1.5%	1.2%	1.2%
125-150K	70	35,560	87.3%	6.3%	6.3%	2.1%	1.3%	1.4%	1.5%
100-125K	97	49,276	85.2%	7.6%	7.2%	2.5%	1.7%	1.5%	1.5%
65-100K	208	105,664	80.4%	10.1%	9.5%	3.4%	2.2%	2.1%	1.9%

Source: ACS 2009 through 2013 1-year data. For more information, see [www.census.gov/acs](http://www.census.gov/acs)

For the largest counties, very few profile estimates are affected by filtering – only 1.2 percent for counties above one million people, and 2.5 percent for counties between 500,000 and one million. Again we see filtering all years and the inconsistent filtering rates are similar once you get below 500,000. For the counties with population under 100,000, 80.4 percent of the estimates are never filtered, 27 percentage points higher than

the rate for detailed tables. Most of that reduction came from those filtered all five years (33.1 percent to 10.1 percent), while the inconsistent filtering rate only dropped from 13.6 percent to 9.5 percent.

Table 16 takes a closer look at the inconsistently filtered estimates by county population size.

Table 16: County Level, Population Range by Type of Inconsistent Filtering – Data Profiles

Population Size Range	Total Inconsistent Estimates	Percent of All Estimates	Filter => Publish	Flip-Flop	Publish => Filter
1M+	74	0.4%	0.1%	0.2%	0.0%
500K-1M	399	0.8%	0.3%	0.5%	0.1%
250-500K	1,558	2.4%	0.5%	1.6%	0.2%
200-250K	1,272	4.4%	1.1%	2.8%	0.5%
150-200K	3,110	5.7%	1.2%	3.9%	0.6%
125-150K	2,245	6.3%	1.5%	4.0%	0.8%
100-125K	3,538	7.2%	1.1%	5.1%	0.9%
65-100K	10,081	9.5%	2.2%	6.2%	1.1%

Source: ACS 2009 through 2013 1-year data. For more information, see [www.census.gov/acs](http://www.census.gov/acs)

The percent of flip-flopping estimates rises from 0.2 percent in the largest counties to 6.2 percent as we get closer to the 65,000 threshold.

### C. By Estimate Type

Table 17 shows the profile filtering broken down by estimate type. Note that profiles do include proportions, but do not include aggregate or Gini estimates, as the detailed tables do.

Table 17: County Level, Estimate Type by Number of Years Filtered – Data Profiles

Estimate Type (Number in Profile)	Total Estimates	Never Filtered	Filtered All Years	Inconsistent Filtering	Filtered 1 Year	Filtered 2 Years	Filtered 3 Years	Filtered 4 Years
Count (453)	363,759	87.7%	6.4%	5.9%	2.0%	1.4%	1.3%	1.3%
Median (12)	9,636	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Proportion (29)	23,287	97.2%	0.0%	2.8%	1.9%	0.6%	0.3%	0.0%
Ratio (14)	11,242	98.3%	0.0%	1.7%	1.0%	0.5%	0.1%	0.0%

Source: ACS 2009 through 2013 1-year data. For more information, see [www.census.gov/acs](http://www.census.gov/acs)

Only count estimates were filtered all years, although there are some proportion and ratio estimates that were inconsistently filtered. The number in parentheses next to each estimate type indicates how many of the 508 profile estimates were of each type.

Table 18 again looks at the breakdown of types of inconsistent filtering by estimate type.

Table 18: County Level, Estimate Type by Type of Inconsistent Filtering – Data Profiles

Estimate Type	Total Inconsistent Estimates	Percent of All Estimates	Filter => Publish	Flip-Flop	Publish => Filter
Count	21,441	5.9%	1.3%	3.9%	0.7%
Proportion	647	2.8%	0.3%	1.9%	0.5%
Ratio	189	1.7%	0.4%	1.0%	0.3%

Source: ACS 2009 through 2013 1-year data. For more information, see [www.census.gov/acs](http://www.census.gov/acs)

The percentage of flip-flopping count estimates is 3.9 percent for the profiles, compared with 6.4 percent for detailed tables. Interestingly, the “Publish => Filter” category is higher than “Filter => Publish” for proportions, bucking the trend seen previously for all other breakdowns of this type.

#### D. By Topic

Table 19 looks at which profile topics are subject to the most inconsistent filtering.

Table 19: Profile Topics with the Highest Inconsistent Filtering Rates by Summary Level

Topic - States	Number of Profile Lines	Never Filtered	Filtered All Years	Inconsistent Filtering
Detailed Native Hawaiian and Other Pacific Islander groups	4	40.4%	30.8%	28.8%
Detailed American Indian groups	4	57.7%	15.4%	26.9%
Detailed Asian groups	7	96.2%	0.0%	3.8%

Topic - Counties	Number of Profile Lines	Never Filtered	Filtered All Years	Inconsistent Filtering
Grandparent characteristics	7	37.5%	15.9%	46.6%
Occupants per Room	4	52.4%	7.5%	40.1%
Native Hawaiian and Other Pacific Islander Alone or In Combination	1	14.2%	46.2%	39.6%

Topic - Places	Number of Profile Lines	Never Filtered	Filtered All Years	Inconsistent Filtering
Responsible Grandparents Percent Female	1	36.9%	19.5%	43.6%
Responsible Grandparents Percent Married	1	30.0%	29.1%	40.9%
Native Hawaiian and Other Pacific Islander Alone or In Combination	1	13.8%	41.9%	44.3%

Source: ACS 2009 through 2013 1-year data. For more information, see [www.census.gov/acs](http://www.census.gov/acs)

Only the three topics listed had any inconsistent filtering at all at the state level. Those three topics fail to make either the county or place lists because these estimates are filtered so much at these summary levels; their inconsistent filtering rates are extremely small.

It's not surprising to see grandparent estimates in these lists for counties and places, as the grandparent detailed tables had the highest inconsistent filtering rate among all detailed table topics (see Table 10). While there is only one topic in common between the top three lists for counties and places, the other four topics are all among the seven highest inconsistent filtering rates for both counties and places.

## VII. CONCLUSIONS

- More than 10 percent of detailed tables at the county and place summary levels have inconsistent filtering between 2009 through 2013. Profile rates were about five percentage points lower. Lower profile filtering rates are due to the flexibility of using either the uncollapsed or collapsed tables as sourcing for its estimates.
- Both counties and places also had especially inconsistent, or “flip-flop”, rates of seven percent or higher. Profile rates were more than three percentage points lower.
- State rates (both the inconsistent and the flip-flop) for detailed tables were substantially lower at 3.6 percent and 2.2 percent, respectively. The rates were 0.5 percent or less for profiles.
- Filtering rates were much higher in the counties with population under 100,000 than in counties with over a 1,000,000 population. The larger counties had 6.3 percent filtered all years, 3.7 percent inconsistent, and 2.3 percent flip-flop, while the smaller counties had 33.1 percent filtered all years, 13.6 percent inconsistent, and 8.8 percent flip-flop.
- It was not surprising that the inconsistent filtering rates were higher for iterated tables than non-iterated tables, since the many iterated tables are based on smaller populations.
- Surprisingly, the inconsistent filtering rates were only slightly smaller for collapsed tables compared to the uncollapsed versions, and tables with no collapsed version had similar rates to both. It appears that although collapsed versions are less likely to be filtered every year, they have inconsistent filtering rates comparable to their uncollapsed versions.
- In general, aggregate, median, and ratio estimate tables had higher inconsistent filtering and flip-flop rates than count estimate tables. The tables with inconsistent filtering rates above 60 percent at the county level were all either aggregates or medians. We suspect that aggregate tables may be especially affected by DRB filtering rules.

- Inconsistent filtering rates for tables and profiles also varied by topic, with grandparent characteristics being the topic with the highest rates for tables, and among the highest rates for profile estimates.

## **VIII. REFERENCES**

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## Titles of Detailed Tables Listed in Table 12

<b>Table ID</b>	<b>Table Title</b>
B08136	Aggregate Travel Time To Work (In Minutes) Of Workers By Means Of Transportation To Work
B25066	Aggregate Gross Rent (Dollars) By Units In Structure
B25112	Aggregate Gross Rent (Dollars) By Year Structure Built
B10010	Median Family Income For Families With Grandparent Householders And/Or Spouses Living With Own Grandchildren Under 18 Years By Responsibility For Own Grandchildren And Presence Of Parent Of Grandchildren
B25108	Aggregate Value (Dollars) By Year Structure Built
B19202G	Median Nonfamily Household Income In The Past 12 Months (In 2013 Inflation-Adjusted Dollars) (Two Or More Races Householder)
B19113G	Median Family Income In The Past 12 Months (In 2013 Inflation-Adjusted Dollars) (Two Or More Races)
B20017G	Median Earnings In The Past 12 Months (In 2013 Inflation-Adjusted Dollars) By Sex By Work Experience In The Past 12 Months For The Population 16 Years And Over With Earnings In The Past 12 Months (Two Or More Races)
B25023	Aggregate Number Of Rooms By Vacancy Status
B19013C	Median Household Income In The Past 12 Months (In 2013 Inflation-Adjusted Dollars) (American Indian And Alaska Native Alone Householder)
B20017C	Median Earnings In The Past 12 Months (In 2013 Inflation-Adjusted Dollars) By Sex By Work Experience In The Past 12 Months For The Population 16 Years And Over With Earnings In The Past 12 Months (American Indian And Alaska Native Alone)
B19216	Aggregate Nonfamily Household Income In The Past 12 Months (In 2013 Inflation-Adjusted Dollars) By Sex Of Householder By Living Alone By Age Of Householder
B19013G	Median Household Income In The Past 12 Months (In 2013 Inflation-Adjusted Dollars) (Two Or More Races Householder)
B25128	Tenure By Age Of Householder By Year Householder Moved Into Unit
B11014	Population In Subfamilies By Subfamily Type By Relationship
B10050	Grandparents Living With Own Grandchildren Under 18 Years By Responsibility For Own Grandchildren By Length Of Time Responsible For Own Grandchildren For The Population 30 Years And Over
B22005G	Receipt Of Food Stamps/Snap In The Past 12 Months By Race Of Householder (Two Or More Races)
B11013	Subfamily Type By Presence Of Own Children Under 18 Years