Considerations for Householder-Based Estimation Processes using the American Community Survey: **A Case Study of the Nielsen TV Ratings**

Jonathan D. Stringfield; Research Demographer
Christine G. Pierce; Director, Demographic Research

The Nielsen Company
Media Group, U.S.A.
Measurement Science

I. Abstract

This study is an evaluation of differentiations in householder identification between the Current Population Survey (CPS) and American Community Survey (ACS) with emphasis on impacts this has on householder-based estimation processes using the Nielsen television market section system as a case study. The objectives of this paper are threefold: first, to provide background and a brief overview of standard demographic estimation processes in the Nielsen Media group and how substitution of sources from CPS to ACS produced unexpected results. The second objective is to explore differentiations of the sex distribution between the CPS and ACS; determine the source of this differentiation, and analyze how it relates to collection differences between the two surveys. Finally, we validate findings via comparisons to the Nielsen panel, provide conclusions on how this difference can have an impact on householder-based information extracted from the ACS, and provide suggestions to ameliorate these differences.

II. Introduction

The American Community Survey (ACS) is quickly becoming a mainstay in research communities, demographic or otherwise, which rely heavily upon federal data products for timely and accurate information. The considerable sample provided, timeliness of data releases, and breadth of topics addressed has allowed the ACS to become among the foremost sources of data provided by the U.S. Census Bureau despite the current geographic coverage limitations. However, the advantages of utilizing ACS data must be weighed against the technical and logistical implications of incorporating the data. Specifically, the introduction of ACS data into existing estimation processes inevitably creates impact which requires thorough and careful analysis.

This study is an evaluation of differentiations in householder identification between the Current Population Survey (CPS) and ACS with emphasis on impacts this has on householder-based estimation processes using the demographic market section system of The Nielsen Company Media group as a case study. Comparisons of the two nationally-representative survey products find sharp differences in estimation of householders by sex at a national level. The magnitude and significance of these differences exceeds sampling error and reveals differences in householder identification which are rooted in the differences in survey implementation and mode of data collection. Ultimately, the magnitude of this differentiation has the potential to impact estimates based on householder[1] characteristics.

The objectives of this paper are threefold: first, provide background and a brief overview of standard Nielsen media group demographic estimation processes and how the substitution of ACS data fro CPS produced unexpected results. Second, explore differentiations of the sex distribution between

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[1] The terms householder and reference person are synonymous within the sampling definitions of the ACS and CPS, and are treated as such herein.

the CPS and ACS; determine the source of this differentiation, and how it relates to collection differences between the two nationally-representative surveys. Finally, validate said findings via comparisons to the Nielsen TV ratings survey panels. Conclusions follow on how this difference can have an impact on householder-based information extracted from the ACS, words of caution relating thereto, and provide suggestions to ameliorate these differences.

III. Case Study: Universe Estimates and the Nielsen Demographic Market Section System

The Media group of The Nielsen Company produces the most widely utilized national and local television ratings. In the U.S. alone, television ratings direct upwards of $70 billion in advertising revenue, annually. A crucial technical component of television ratings calculations and reporting are Universe Estimates (UEs), a series of national and local demographic estimates for television households and persons therein.

Broadly, UEs serve two primary purposes: First, UEs serve as controls for Nielsen samples during sample selection, recruitment, maintenance, evaluation, and weighting. TV ratings measurement is facilitated locally by the selected household sample wherein viewing diaries (for less populous television markets) or electronic measurement devices installed on working televisions (for larger markets) are used to measure viewing activity. At a national level, the National People Meter (NPM) sample consists of an average of 15,000 households with electronic measurement devices installed on working televisions to measure viewing.

The second major purpose of UEs is to serve as the denominator in ratings calculations. For example, at a very basic level a household rating is calculated as:

$$HH\ Rating_{xyz} = (\ (Viewing\ Audience_{xyz})\ /\ (Household\ UE_z)\ )* 100$$

For measured TV station viewing audience x during time slot y in geographic area z. Due to the extensive range of uses for UEs, the estimates are calculated at several different geographic levels (both proprietary and governmental) for a variety of demographic segments (referred to as "market sections" or "market breaks"). To minimize the potentiality of compounding error[2] from small-area estimates, UEs are calculated via a "top-down" approach, in which national estimates are utilized as controls for local

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[2] E.g. sampling error from estimates based upon a diminished sample size, measurement or rounding error from mathematical adjustments or otherwise, etc.

estimates (in addition to serving the aforementioned UE functions for national television services). As such, national-level UEs are of critical importance as any errors, abnormalities, or irregularities will affect all subsequently created estimates.

The largest component of national estimation processes is the TV market section system. At the national level, the market section system creates a series of national TV households and persons therein estimates by pertinent demographic, socioeconomic, and/or consumer categories (i.e. "market breaks"). Examples of market breaks include household income, education of householder, sex of householder, age of householder, household size, Spanish language usage etc. National UEs such as those output from the market section system typically incorporate U.S. Census Bureau estimates controlled to estimates created by Nielsen Claritas[3]. UEs relating to standard demographic characteristics are updated annually[4] prior to the start of the TV season (typically in late September) and are projected to the following year (i.e. estimates created for the TV season starting September 2008 are as of January 1st 2009). Because federal products tend to lag upwards of 22-24 months behind the desired estimate date, the federal seed estimates are controlled to Nielsen Claritas estimates projected to the target date.

At a high level, the market section system consists of five fairly simple parts:

1. An initial array of households and persons by age and sex is created based upon results from the latest CPS ASEC file (or from the Nielsen panel for estimation universes not captured in the ASEC).

2. Persons per household (PPH) ratios are derived by dividing the individual persons estimates by the CPS household estimate.

3. Updated TV Household estimates are created from projected data provided by Nielsen Claritas via a ratio adjustment. For market section household types that are not provided directly by Nielsen Claritas, the projected households are shared out using CPS ASEC data or Nielsen panel data for household types not captured in federal products.

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[3] Nielsen Claritas is a Nielsen business unit which provides marketing information resources. Services include demographic data, market research, marketing software, and market segmentation.
[4] Estimates relating to media consumption, including households subscribing to cable or those which own a DVD player, are updated on a quarterly basis to reflect the quickly changing media environment.

4. The PPH ratios are applied to the projected TV household estimates to project the persons estimates to the desired estimate date.

5. The PPH-derived persons estimates are controlled to pre-established national estimates for persons by age and sex via iterative proportional fitting (Deming and Stephan 1940). These pre-established persons by age and sex estimates are also based on Nielsen Claritas data.

By definition, Nielsen's market breaks are defined at the household or householder level, and many household characteristics are based solely upon the demographic characteristics of the respective householder. Correspondingly, large changes in householder characteristics within the seed estimates for the market section system will have a dramatic effect upon the resultant UEs and all subsequently created estimates which are controlled to those output from the market section system.

As part of ongoing methodological refinements to existing estimation processes, for the 2008-2009 television season Nielsen began incorporating results from the ACS into the computations for television universe estimates. In many cases, estimates from the ACS were evaluated as replacements for the CPS ASEC as a basic input for the majority of market breaks created via the market section system. The incorporation of the ACS estimates was determined to be a methodological improvement due to the numerous aforementioned advantages the ACS yields for estimation processes (particularly at a national level, where geography limitations are mostly irrelevant). Though some differences were expected, most were proportionately small with the exception of two basic market section types which exhibited unusually large differentiations from the previous TV season estimates. Specifically, estimates of the sex and age of householder varied by an unexpected degree.

To isolate potential sources of differentiation, the market section system was run using both the ACS and ASEC estimates as seed values to isolate differences between Universe Estimates based on the two different sources. For these calculations, the most recent Public Use Microdata Sample files available at the time were used. Thus, the ASEC-based estimates were based on the March 2007 ASEC file and the ACS-based estimates were based on the 2006 one-year ACS file.

Table 1: Estimates of TV Households and Persons Therein by Sex of Householder

As of January 1st, 2009, Rounded and truncated to the thousands (000)

| | ASEC-Based Estimates | | ACS-Based Estimates | | ACS vs. ASEC Rel. Difference | |
	Male HHlder	Female HHlder	Male HHlder	Female HHlder	Male HHlder	Female HHlder
TV Households	57,620	56,880	63,120	51,380	9.55%	-9.67%
Male 0-1	2,046	2,124	2,240	1,930	9.48%	-9.13%
Male 2-5	3,955	4,395	4,479	3,871	13.25%	-11.92%
Male 6-8	2,872	3,248	3,276	2,844	14.07%	-12.44%
Male 9-11	2,951	3,419	3,421	2,949	15.93%	-13.75%
Male 12-14	2,905	3,205	3,281	2,829	12.94%	-11.73%
Male 15-17	3,097	3,403	3,577	2,923	15.50%	-14.11%
Male 18-20	3,512	2,868	3,829	2,551	9.03%	-11.05%
Male 21-24	5,380	2,790	5,457	2,713	1.43%	-2.76%
Male 25-29	6,609	3,331	6,661	3,279	0.79%	-1.56%
Male 30-34	6,186	3,594	6,592	3,188	6.56%	-11.30%
Male 35-39	6,361	3,619	6,853	3,127	7.73%	-13.59%
Male 40-44	6,829	3,701	7,404	3,126	8.42%	-15.54%
Male 45-49	7,285	3,615	7,895	3,005	8.37%	-16.87%
Male 50-54	6,848	3,452	7,602	2,698	11.01%	-21.84%
Male 55-64	11,602	4,778	12,473	3,907	7.51%	-18.23%
Male 65+	11,635	4,395	12,863	3,167	10.55%	-27.94%
Female 0-1	1,959	2,031	2,128	1,862	8.63%	-8.32%
Female 2-5	3,777	4,203	4,280	3,700	13.32%	-11.97%
Female 6-8	2,746	3,104	3,114	2,736	13.40%	-11.86%
Female 9-11	2,822	3,268	3,252	2,838	15.24%	-13.16%
Female 12-14	2,776	3,064	3,101	2,739	11.71%	-10.61%
Female 15-17	2,983	3,277	3,336	2,924	11.83%	-10.77%
Female 18-20	2,771	3,489	3,019	3,241	8.95%	-7.11%
Female 21-24	3,254	4,726	3,533	4,447	8.57%	-5.90%
Female 25-29	4,176	5,684	4,529	5,331	8.45%	-6.21%
Female 30-34	4,366	5,434	4,809	4,991	10.15%	-8.15%
Female 35-39	4,701	5,469	5,080	5,090	8.06%	-6.93%
Female 40-44	4,910	5,960	5,497	5,373	11.96%	-9.85%
Female 45-49	4,968	6,382	5,776	5,574	16.26%	-12.66%
Female 50-54	4,961	5,899	5,509	5,351	11.05%	-9.29%
Female 55-64	7,909	9,821	9,058	8,672	14.53%	-11.70%
Female 65+	6,975	14,235	8,331	12,879	19.44%	-9.53%

In the case of TV households and persons therein by the sex of the householder, the amount of persons estimated in male-headed households by the ACS was upwards of 19% greater than estimates provided by the ASEC. Given that these estimates represent a fundamental or basic demographic item, the magnitude of these differentiations was unexpected. Further, TV household estimates shared out via the ACS indicated that 55% of householders were male (compared to 50% according to shares derived from the ASEC).

Similarly, a comparative analysis of TV households and persons therein by age of the householder demonstrated larger, patterned disparities (see appendix for estimate tables). Unique to this estimate set is the fact that projected household estimates for age of head are provided by Nielsen Claritas, isolating differences to derived PPH ratios from the ACS and ASEC (differences greater than +/- 10% are bolded, greater than +/-20% are bolded and italicized).

Table 2: Estimates of TV Households and Persons Therein by Age of Householder
Relative Difference of ACS vs. ASEC Derived Estimates
As of January 1st, 2009

	<25	25-34	35-39	40-44	45-49	50-54	55-64	65+
TV Households	0	0	0	0	0	0	0	0
Male 0-1	1.8%	-5.2%	3.7%	6.5%	6.0%	-4.5%	*39.6%*	0.0%
Male 2-5	**12.2%**	-1.9%	0.1%	-4.4%	-5.1%	**11.6%**	8.3%	**11.3%**
Male 6-8	*36.2%*	-0.6%	-2.0%	-3.7%	-1.5%	**11.8%**	9.7%	**12.5%**
Male 9-11	*-64.8%*	8.1%	-6.1%	-3.1%	4.1%	1.5%	**19.9%**	5.6%
Male 12-14	*-60.8%*	1.2%	-3.9%	1.7%	0.2%	4.4%	5.6%	7.0%
Male 15-17	*-64.6%*	-6.6%	-0.7%	0.4%	5.1%	1.8%	**11.6%**	8.0%
Male 18-20	-0.7%	1.3%	**12.7%**	2.9%	-3.6%	-7.3%	6.4%	9.0%
Male 21-24	-4.9%	-4.3%	0.6%	4.2%	**13.7%**	0.4%	2.9%	8.2%
Male 25-29	8.7%	**-10.2%**	6.7%	*32.6%*	*56.3%*	*27.0%*	*22.5%*	*43.8%*
Male 30-34	-4.8%	-4.0%	-9.9%	**17.9%**	*22.3%*	*31.3%*	*41.4%*	*23.5%*
Male 35-39	**-19.8%**	-7.0%	-3.0%	-0.5%	-4.6%	*21.1%*	*44.7%*	*54.0%*
Male 40-44	*-48.4%*	-8.3%	**-18.7%**	0.7%	-7.1%	7.5%	*35.4%*	*38.5%*
Male 45-49	*-56.8%*	**-13.7%**	-9.3%	**-15.3%**	1.0%	-3.2%	3.4%	*44.6%*
Male 50-54	*-58.3%*	*-24.2%*	**19.3%**	**-15.5%**	*-21.9%*	3.3%	**-11.2%**	*45.0%*
Male 55-64	*-53.3%*	4.4%	*28.4%*	-6.1%	**-18.8%**	**-19.9%**	1.7%	*21.6%*
Male 65+	*-36.8%*	0.0%	1.8%	**14.9%**	**11.0%**	**14.0%**	**-16.5%**	0.8%
Female 0-1	1.8%	-4.4%	1.9%	3.7%	**12.6%**	-3.1%	*25.8%*	**11.5%**
Female 2-5	**11.8%**	-2.2%	-0.6%	-2.3%	-3.9%	3.7%	9.4%	*26.0%*
Female 6-8	*39.6%*	-1.8%	-1.2%	-5.9%	3.3%	9.7%	**16.6%**	**13.0%**
Female 9-11	*-66.3%*	7.4%	-4.6%	-3.1%	2.8%	2.4%	**17.3%**	**10.0%**
Female 12-14	*-56.5%*	-0.6%	-1.1%	-0.6%	1.2%	0.7%	**11.5%**	7.3%
Female 15-17	*-58.1%*	-9.1%	-4.9%	1.0%	6.6%	1.6%	**11.4%**	**10.2%**
Female 18-20	**10.4%**	9.1%	5.9%	-5.8%	-6.0%	-6.2%	1.3%	**13.0%**
Female 21-24	4.4%	**-12.1%**	0.6%	-6.9%	8.9%	-1.1%	-3.0%	0.0%
Female 25-29	-0.4%	-0.1%	-4.1%	-0.5%	6.1%	-5.9%	3.1%	**12.3%**
Female 30-34	**-25.0%**	0.3%	1.5%	1.4%	**-11.1%**	**-15.4%**	0.5%	**15.9%**
Female 35-39	*-59.0%*	*27.1%*	-2.4%	3.8%	-1.8%	-0.5%	*26.5%*	4.0%
Female 40-44	*-50.0%*	9.4%	-4.0%	-2.6%	8.8%	8.2%	5.3%	*27.2%*
Female 45-49	*-61.3%*	7.6%	**12.6%**	*22.3%*	-4.4%	**15.3%**	**11.4%**	**17.4%**
Female 50-54	*-55.0%*	*-24.2%*	*25.0%*	**10.1%**	*34.8%*	-4.0%	9.1%	**17.6%**
Female 55-64	*-34.5%*	**-18.8%**	**11.5%**	3.3%	*35.0%*	2.2%	-1.8%	**10.4%**
Female 65+	*-53.5%*	**-10.2%**	**-14.0%**	9.6%	3.1%	5.4%	**12.6%**	-0.4%

Aside from the comparatively minor potpourri of differences exhibited between the two estimate sets (particularly in older age cohorts), two highly disparate groupings are notable. First, an almost universal decline in individuals over the age of 30 in households with a householder under the age of 25 is evident; with relative differences in excess of -60% comparing ACS to ASEC based estimates (note that many of these values were quite small and as such even small differences can result in large relative differences). Within these same household types, younger children (aged 2-8) were much more prevalent, while older children (age 9-17) were much less prevalent with relative differences in excess of -66% between the estimates. Second, as the age of the householder increases the likelihood of older men being present is increasingly likely, with relative differences between the ACS to ASEC based estimates in excess of 56%. To summarize:

- ACS based estimates for persons in male-headed households are almost universally higher than ASEC based estimates.
- Household estimates shared-out via the ACS demonstrated a 55% male householder percentage, roughly 5% higher than household estimates shared-out via the ASEC.
- Households with householders under the age of 25 contain:
  - Fewer persons over the age of 35 as represented by the ACS.
  - More children age 2-8 as represented by the ACS.
  - Fewer children age 9-17 as represented by the ACS.
- Households with older householders contain increasingly larger proportions of older men, as represented by the ACS.

The culmination of these factors indicates a poignant if not seemingly irreconcilable difference in the national distribution of sex of the householder in the respective surveys (accounting for margins of error). Specifically, the ACS was found to estimate a comparatively large preponderance of Male householders. Household and person estimate disparities in the sex of householder tabulations appear to be quite clearly implicated by this hypothesis.

Trends regarding households with a householder under the age of 25 require some speculation at this stage of analysis. It can be tentatively hypothesized that the preponderance of younger children within these households as represented by the ACS implies younger parents responding to the ACS. Given that the crux of this particular issue is an apparent predominance of Male householders within the ACS, and male spouses tend to be older than female spouses, this implicates a larger amount of females acting as the primary respondent to the CPS (and treated as the head of the household). These female householders responding in greater proportion to the CPS are likely to have older male partners and

overall family structures (i.e. children) belied by their "under 25" headship status than males under 25 responding in greater proportion to the ACS (who likely have younger partners and children by merit of having a younger spouse). Correspondingly, examining children estimates across the age of householder categories (mostly) indicates increases in older children as the age of head increases. This same line of logic can be loosely applied to the decreased presence of older persons in households with a householder under the age of 25, as younger overall household structures will contain younger persons. Similarly, trends in the age of householder tabulations indicate an increased preponderance of older men represented in the ACS as the age of householder increases.

In other words, the differences demonstrated here imply that there are not fundamental differences in the population or sampling universe (though they do exist, and will be discussed later herein), but rather the individual who is responding to data collection. Hence, householder distributions are skewed in terms of the sex and age of the householder at a national level between the two nationally representative surveys. Admittedly, these initial hypothesis are tenuous as best, spurious at worst. However, item and collection differentiations between the ACS and ASEC and analyses to a comparative sample seem to support these hypotheses.

While much literature and technical analyses has been devoted to differentiations between results of the ACS and ASEC, we are unaware of any which specifically address representations of the householder. Though such differentiations would seem to be relatively minor to other item differences (i.e. poverty, labor force participation, etc.), the market section system case study demonstrates that this difference can have a profound affect upon householder-based estimation processes.

IV. Methodological Differences between the ACS and CPS ASEC

The Current Population Survey is a household-frame, nationally-representative survey conducted monthly for the Bureau of Labor Statistics by the Bureau of the Census. For the past 50 years the CPS has been the primary measure of economic and labor-force activity in the United States. The CPS sample represents the non-institutionalized population of the United States age 15 and over (though published data is for those ages 16 and over) including members of the Armed Forces within on or off base housing.

The CPS incorporates a 4-8-4 rotational sampling panel in which the housing unit is in the sample for an entire year. A housing unit or group quarters is interviewed 4 consecutive months, removed from the sample for 8 months, interviewed once more within the sample for 4 consecutive months, and then summarily retired from the sample (U.S. Census Bureau 2006a). This rotation panel is a compromise between a permanent panel and a completely new sample each given month, in which the rotation minimizes variance in month-to-month change (three-fourths of the sample is the same in consecutive months), year-to-year change (one-half of the sample is the same in the same month of consecutive years), other sources of variance (outgoing sample is replaced with new sample of similar characteristics), and the overall burden on respondents (eight interviews are conducted across 16 months to create the final data tabulation for the household).

In addition to "basic" monthly release, The Annual Social and Economic (ASEC) Supplement of the CPS is released annually in March. The file release contains the same content within the basic monthly CPS file with additional questions concerning work experience, detailed income, and migration among other topics. In addition to the usual sampling frame for the monthly file, the ASEC contains significant supplemental sample. First, the ASEC is supplemented with a sample of Hispanic households identified the previous November; second, the ASEC incorporates the CHIP sample which includes households from previous months and over-sample in states with high sampling error for uninsured children. The ASEC typically contains interviews from approximately 80,000 households.

The American Community Survey is an annually released, nationally-representative survey conducted by the United States Census Bureau. Part of the decennial census program, the ACS is designed to eliminate the need for the long form for the 2010 and all subsequent decennial censuses. The ACS collects economic, social, and housing characteristics from approximately 1% of the U.S. population via monthly surveys. ACS releases supply period estimates which reflect data collected over 12, 36, or 60 months. Single-year estimates are available for geographic areas with populations of 65,000 or more. Starting in 2008, 3-year estimates (2005-2007) are available for areas of 20,000 or more. In 2010, 5-year estimates (2005-2009) will be available for the smallest geographic areas (including tract and block level to coincide with short-form results).

According to standard methodology, the ACS selects a random sample from the Census Bureau's Master Address File (MAF) – any given address has about a 1 in 480 chance of being select for participation in the ACS for any given month and no address is selected more than once every five years (U.S. Census Bureau 2006b). Each month the ACS collects an independent sample, for a total of 12 independent samples every year. Data collection for each sample lasts for three months and uses three modes of data collection: a mail phase, a computer assisted telephone interview (CATI) phase, and (if both above methods failing to collect data for a household) a computer assisted personal interviewing (CAPI) phase. The ACS typically contains over 1 million responding households per year.

Naturally, the two surveys have a great deal in common which is often the basis of comparison. The ACS and CPS typically have response rates greater than 90%, and have permanent interviewers for CAPI and CATI data collection. However, a number of studies have been conducted analyzing item differences between the two survey products; including differentiations by poverty (Bishaw & Stern 2006, Nelson 2006), educational attainment (Scanniello), geographic mobility (Koerber), school enrollment (Shin), citizenship (Mendez), and Hispanic origin (Ramirez) among others. These studies indicate that item differentiations are primarily attributable to differences in sample size, question wording, residency rules[5], reference period and weighting[6], item nonresponse, and allocation (though both utilize hot deck allocation). The degree to which the differences affect resultant estimates varies by item; for our purposes we will be concentrating upon age and sex (Humes et. al. 2007) along with households and families (O'Connell and Gooding) as it pertains to the householder.

Estimates of age and sex tend to be basic demographic items unlikely to confuse respondents. As such, in analyzing sex and age differences between the ASEC and ACS Humes et. al. (2007) note that the ACS and ASEC have similar age and sex distributions; level differences are likely attributable to differences in weighting. As previously mentioned, the ACS and ASEC are subjected to different controls

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[5] The ACS utilizes "current residence" rules, while the CPS ASEC utilizes a version of "usual residence" to align with the longitudinal panel design.
[6] The ACS and CPS ASEC are both controlled to Population Division intercensal estimates as of July 1 for the ACS (household population), and as of March 1st for the ASEC (civilian non-institutional population). ACS data is collected as an average throughout the year, while ASEC data is primarily representative of the February through April period.

and weighting procedures[7] which alter level differences, though other quality measures may have more of an impact upon the distribution (which, in terms of the market section system which uses PPH ratios rather than "raw" estimates, is more important than level differentiations).

Wording differences are minimal, and item nonresponse is expectedly low. Sex has uniformly low allocation rates between the two surveys (often less than 0.2 percent). Allocation rates for age tend to be somewhat higher, particularly for the ASEC which is between 2-3 percent in comparison to the ACS rate of around 0.5 percent.

Table 3: Age and Sex Allocation Rates for ACS and ASEC PUMS Files: 2007 & 2007

	Total			Males			Females		
	Total	HHlder	Spouse	Total	HHlder	Spouse	Total	Ref. Person	Spouse
Age Allocation Rates									
2007 ACS PUMS	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.5%	0.4%
2007 ASEC PUMS	2.7%	2.8%	2.6%	2.7%	2.8%	2.5%	2.8%	2.8%	2.6%
2006 ACS PUMS	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.5%	0.4%
2006 ASEC PUMS	2.8%	2.9%	2.7%	2.7%	2.7%	2.8%	2.9%	3.1%	2.6%
Sex Allocation Rates									
2007 ACS PUMS	0.2%	0.1%	0.3%	0.1%	0.1%	0.3%	0.2%	0.1%	0.4%
2007 ASEC PUMS	<0.1%	<0.1%	0.1%	0.1%	<0.1%	0.2%	<0.1%	<0.1%	0.1%
2006 ACS PUMS	0.1%	0.1%	0.2%	0.1%	0.1%	0.2%	0.1%	0.0%	0.2%
2006 ASEC PUMS	<0.1%	<0.1%	0.1%	<0.1%	<0.1%	0.1%	<0.1%	<0.1%	0.1%

*Calculated as final persons-weighted number of allocated responses over all final persons-weighted number of responses
Retrieved via DataFerrett

The cause of this discrepancy in age allocation rates is "unknown", though likely partially attributable to specific follow-up criteria in the "ACS Failed Edit Follow-up operation" as opposed to the ASEC which makes no similar effort, though age is typically allocated longitudinally from previous responses (Humes et. al. 2007). Likewise, the ACS incorporates a comparatively elaborate and multi-state relational imputation procedure which is not shared in the ASEC. Relational or longitudinal imputation failing, both products use a form of hot deck imputation wherein the ACS uses multiple hot decks stratified by key personal and household similarities whereas the ASEC allocates age values on a rotation basis (i.e.

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[7] In addition to differences in controls (see note 5), the ACS includes independent weights for households and persons due to controls to both the total household population and total number of housing units (Humes et. al. 2007). In the CPS, the persons weight of the householder represents the household weight. Both the CPS and ACS are weighted to account for the probability of selection and nonresponse.

single year of age increments are assigned from a group of individuals who provided the "last resort" age range in interviews).

Within the ACS, a missing value for sex is assigned by a respondent's first name, in addition to potential responses for fertility items. As with Age, within the ASEC missing values are first evaluated against longitudinal responses and edited accordingly (military status is also used, in which military personnel are assumed to be male). Both surveys will utilize information for the spouse (if sex of the spouse is reported, and only opposite-sex couples are recognized in the ACS and ASEC), or utilize hot deck imputation similar to age (i.e. multiple decks within the ACS, a rotational deck within the ASEC).

Analysis of items relating to household relationships similarly attributes level differences to the aforementioned control and weighting differentiations between the survey products (O'Connell and Gooding). However, aside from previously mentioned differentiations between the surveys the ASEC data employs an additional control not present in the ACS: the ASEC data is raked to insure that the number of husbands and wives, the number of married householders, and the number of married couple households all align. Comparatively, the ASEC represents a greater amount of married households partially attributable to question wording[8] (in which the ACS has five categories instead of six in the ASEC which differentiated between "present" and "absent" spouses) and the aid of a trained interviewer for status verification (e.g. concepts such as "never married" vs. "single" can be accurately determined).

Likewise, O'Connell and Gooding found similar trends in householder status to those hypothesized during the market section case study: Higher proportions of married male family householders are present in the ACS than the ASEC, and lower proportions of female headed family households. Regardless of inherent differences present within these items, the mode of collection between the two surveys is highly implicated in differences between male and female family householders (and the affiliated age/sex structure of the householder).

Specifically, The ACS is largely collected via mailing of the survey (U.S. Census Bureau 2006a), with telephone and in-person collection primarily reserved for non-response follow up. The CPS tends to be collected via telephone or in-person visits to the residence (U.S. Census Bureau 2006b) as

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[8] Question wording for household relationship also varies between the ACS and CPS. However, this is mostly resigned to designating "in laws" and sub-families/children within the household rather than householder identification.

respondents to the CPS are kept in sample for several months, necessitating "personal" contact in lieu of a series of mailing. While several studies have addressed rotation group bias in panel surveys such as the CPS (Irvine 1984, Bailar 1975, among others) in addition to nonresponse bias in householder surveys (Groves 2006) the market section system case study concerns sex-specific response bias between mailed and panel surveys[9]. It has been inferred that collection differences specific to the householder tend to be contingent upon sex by merit of typical household structures and associated response patterns (O'Connell and Gooding); this inference is particularly salient given relatively subjective householder definitions in family households.

A householder is typically defined as "the person, or one of the people, in whose name the home is owned, being bought, or rented and who is listed as 'Person 1' on the survey questionnaire. If there is no such person in the household, any adult household member 15 and older can be designated as the householder" (U.S. Census Bureau 2006b). For non-family households this tends to be fairly straightforward; not withstanding a presumably small amount of "abnormal" household structures. Householder identification becomes more complicated and subjective in family or married-couple households that are jointly owned or rented which, as previously hypothesized, is the primary cause of differences within the market section case study.

In the event of a jointly owned or family household, either the male or female is qualified to act as the householder. In this case, the individual who responds to the survey will be treated as the householder. Specifically, because wives are less likely to participate in the labor force, they are more likely to be home to answer either telephone or personal interviews for the CPS[10] and as such are treated as "Person 1" (i.e. the householder) by CATI or CAPI interviews. As a predominately mailed survey, the ACS has equal opportunity to be answered by either the male or female householder. Given that we are assuming males are more likely to answer important mail correspondence (i.e. bills, or in this specific

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[9] Note that participation in the ACS is required by law (whereas the CPS and CPS ASEC are not) which could additionally be a source of differentiation insofar that that mandatory authority increases response rates and reduce bias (Worden and Hamilton 1985). However, no studies definitively measure the impact of mandatory response on specific demographic groups.

[10] This phenomenon can be further compounded by residency rule differentiations. In the event of a male householder who is frequently away for business or otherwise, the CPS rule of "usual residence" may occlude him from estimation (and hence, potential to act as householder). Given individual interpretations to a mailed questionnaire in the case of the ACS, a similar case may be included within ACS results. However, the decennial census also uses a "usual residence" concept and males are much more likely to householders in the decennial.

case a federally mandated survey) due in part to self-designation as the householder by merit of probable superior earning power; inversely the ACS reports a surplus of male householders than the ASEC. Further, regardless of the individual filling out the ACS form, a degree of subjectivity is introduced via reliance upon respondents to accurately interpret directions. In such instances, even a female householder filling out the ACS form may designate the male as the householder given a relative predisposition for males being designated as "responsible" for the household.

V. Methodology

To analyze this postulation and the proposed hypothesis, we compare a number of tablatures from the ACS and CPS ASEC. The specific case study is primarily contingent upon distributions of populations rather than levels. As such, our analyses are primarily restricted to simple percentage comparisons with an emphasis not only on statistically significant differences but practical differences as well.

Tabulations of ACS and CPS ASEC data were produced using the Public Use Microdata Sample (PUMS) files. Tabulations for Householders were derived using the Persons Weights for the household member identified as the Householder/Reference Person. Comparisons between the ACS (single year) and ASEC were restrained to the 2007 release of each file to minimize temporal differences in the direct survey comparisons.

Standard errors used for conducting the tests of significance are generalized standard errors, computed using the formulas for standard errors of percentages provided in the technical documentation for the respective surveys. Generalized standard error calculations for the ACS data require the use of design factors which are provided in the ACS technical documentation and reflect the sample design and estimation procedures used in ACS. Standard errors calculations for the ASEC estimates required generalized variance parameters as provided by the ASEC technical documentation.

Most estimates in this paper reflect a combination of several characteristics. As recommended by Census Bureau staff, when the estimates reflect a combination of characteristics, the design factors or parameters used for estimating the standard errors were those that resulted in the largest standard errors. ASEC generalized variance parameters are not provided in the technical documentation for all

characteristics estimated in this paper. In these cases, as recommended by the Census Bureau Staff, a parameter provided for "Marital Status, Household, and Family" was used.

In addition, we compare population distributions from the surveys above to the Nielsen household panel which shares similarities to the ASEC. Specifically, the household panel design used for the Nielsen NPM sample can aid in differentiating discrepancies in sex of householder between the ACS to ASEC based upon collection differences. It is assumed that householder sex within the NPM sample will closely mimic that of the ASEC, isolating sample design and collection mode differences as the primary (though not only) causes of discrepancy. Tablatures of householders by specific individual and household characteristics from the ACS and ASEC will illustrate where differentiations are most prominent, and why collection differences might be problematic in terms of empirical representations of householders exhibiting these characteristics and household types.

VI. Analysis & Discussion

As expected, the percent of male householders were significantly higher as represented by the ACS compared to the ASEC. Differentiations by family type illustrate that this difference seems to be driven by married family households wherein the male householder percentage is almost double that of all households (approaching 7%) which coincides with hypothesis based upon results from the market section system that differences in the resultant estimates were largely a result of older or younger household structures by merit of age discrepancies between potential male or female spouse.

Table 4: Estimates and Percents of Households with a Male Householder by Household Type
2007 ACS and 2007 CPS ASEC

	2007 ACS Estimates				2007 ASEC Estimates			Diff. in Pct. Male (ACS-ASEC)
	Total HHlders	Male HHlders	Percent Male		Total HHlders	Male HHlders	Percent Male	
Total	116,011,435	59,209,411	54.5		112,385,566	61,243,102	51.0	3.5***
Family, Husband-Wife	58,945,006	36,808,073	69.3		55,883,847	38,741,376	62.4	6.9***
Family, Not Husband-Wife	19,479,682	5,063,339	27.0		19,235,266	5,195,003	26.0	1.0
NonFamily, Householder Lives Alone	31,132,040	13,527,575	44.0		30,623,472	13,484,758	43.5	0.5
NonFamily, Householder Lives with Nonrelative	6,454,707	3,810,425	57.5		6,642,981	3,821,965	59.0	-1.5

***Statistically Significant Difference, 99% Confidence
Tabulations based on Public Use Microdata files from both surveys, persons weights

Further, within the ACS Male-Female unmarried partner households report 51.9% male headships, considerably lower than the percentage of male householders in Husband-Wife households. This percentage is remarkably similar to male householders in unmarried Male-Female partner reported in the ASEC (51.7%). These results clearly indicate that marriage has a strong affect upon the representation of male headship in Male-Female couples in the ACS. Specifically, it can be safely assumed that differentiations in male headship between the ACS and ASEC are broadly rooted in Married Husband-Wife households. Expanding these household type differences by age coincides with this broader trend and similarly demonstrates patterns found within the market section results.

Table 5: Percent of Households by Age, Sex, and Household Type (Family vs. NonFamily) 2007 ACS and 2007 CPS ASEC

	2007 ACS Estimates				2007 ASEC Estimates			
	Total	Under 35	35-54	55+	Total	Under 35	35-54	55+
Total	100.0	20.6	42.0	37.3	100.0	22.5	40.4	37.1
Family, Husband-Wife	49.7	8.3	23.3	18.2	50.8	9.3	23.4	18.1
Family, Not Husband-Wife	17.1	4.8	8.4	3.9	16.8	5.6	7.5	3.7
NonFamily, Householder Lives Alone	27.2	4.6	8.5	14.1	26.8	4.8	7.9	14.2
NonFamily, Householder Lives with Nonrelative	5.9	2.9	1.9	1.1	5.6	2.9	1.7	1.0
Male	100.0	19.2	43.7	37.1	100.0	21.8	41.9	36.3
Family, Husband-Wife	63.3	8.7	28.6	26.0	62.2	9.6	27.8	24.8
Family, Not Husband-Wife	8.5	2.6	4.1	1.8	8.6	3.4	3.5	1.6
NonFamily, Householder Lives Alone	22.0	4.8	8.9	8.3	22.8	5.3	8.6	8.9
NonFamily, Householder Lives with Nonrelative	6.2	3.1	2.1	1.1	6.4	3.5	1.9	1.0
Female	100.0	22.3	40.0	37.7	100.0	23.2	38.9	37.8
Family, Husband-Wife	33.5	7.7	16.9	8.9	39.0	8.9	18.9	11.1
Family, Not Husband-Wife	27.5	7.6	13.4	6.5	25.4	7.9	11.6	5.9
NonFamily, Householder Lives Alone	33.5	4.3	8.1	21.1	31.0	4.2	7.1	19.8
NonFamily, Householder Lives with Nonrelative	5.5	2.7	1.6	1.1	4.7	2.3	1.4	1.0
	Difference ACS vs. ASEC				P-Values for Differences			
Total	-	-1.9	1.6	0.2	-	<0.0001***	<0.0001***	0.4522
Family, Husband-Wife	-1.1	-1.0	-0.1	0.1	<0.0001***	<0.0001***	0.6679	0.6372
Family, Not Husband-Wife	0.3	-0.8	0.9	0.2	0.1453	<0.0001***	<0.0001***	0.0548
NonFamily, Householder Lives Alone	0.4	-0.2	0.6	-0.1	0.1011	0.0888	0.0001	0.6028
NonFamily, Householder Lives with Nonrelative	0.3	0.0	0.2	0.1	0.0180**	1.0000	0.0053***	0.0793
Male	-	-2.6	1.8	0.8	-	<0.0001***	<0.0001***	<0.0001***
Family, Husband-Wife	1.1	-0.9	0.8	1.2	<0.0001***	<0.0001***	<0.0001***	<0.0001***
Family, Not Husband-Wife	-0.1	-0.8	0.6	0.2	0.0972	<0.0001***	<0.0001***	<0.0001***
NonFamily, Householder Lives Alone	-0.8	-0.5	0.3	-0.6	<0.0001***	<0.0001***	<0.0001***	<0.0001***
NonFamily, Householder Lives with Nonrelative	-0.2	-0.4	0.2	0.1	0.0001***	<0.0001***	<0.0001***	<0.0001***
Female	-	-0.9	1.1	-0.1	-	<0.0001***	<0.0001***	0.3830
Family, Husband-Wife	-5.5	-1.2	-2.0	-2.2	<0.0001***	<0.0001***	<0.0001***	<0.0001***
Family, Not Husband-Wife	2.1	-0.3	1.8	0.6	<0.0001***	<0.0001***	<0.0001***	<0.0001***
NonFamily, Householder Lives Alone	2.5	0.1	1.0	1.3	<0.0001***	0.0371**	<0.0001***	<0.0001***
NonFamily, Householder Lives with Nonrelative	0.8	0.4	0.2	0.1	<0.0001***	<0.0001***	<0.0001***	0.0025***

**Statistically Significant Difference, 95% Confidence

***Statistically Significant Difference, 99% Confidence

Tabulations based on Public Use Microdata files from both surveys, persons weights

While many significant differences were found, a few trends stand out as particularly notable.

The ACS reports significantly fewer households with a head under the age of 35 which helps explain why

the ACS-based market section estimates reflected fewer persons per household for homes with a

householder under age 35. Likewise, as the age of the householder increases female headship in Male-Female married couples drops when comparing the ASEC to ACS. This trend is only significant when the estimates are broken out by the sex of householder; otherwise the trend is offset in aggregate by an increased prevalence of male householders. These findings broadly substantiate initial hypothesis of the age of head distribution in the market section system, wherein ACS results tended to reflect more mature household structures based upon, presumably, the typical age gap between male and female spouses. Considering that husbands are on average 2.4 years older than their wife within the ACS, this assumption seems pertinent to the phenomenon.

While our hypothesis strongly hinges upon such family relationships, literature related to household and age comparisons between the ACS and ASEC indicate that a number of differences could be implicated. Of these potential causes, the most probable is collection difference.   This assumption certainly appears to be true - overall, households responding to the ACS by mail reported proportionately higher instances of male householders (57.5%) as opposed to CATI/CAPI follow-up collection (50.9%). However, this observation can be made more precise by taking family arrangements into account. The male headship rate jumps to 74% in mail collection for married Husband-Wife households.

Table 6: Estimates Households with a Male Householder by Response Mode
2007 American Community Survey

	Total HHlders	Male HHlders	% Male
Total	112,385,566	61,243,102	54.5
Family, Husband-Wife	55,883,847	38,741,376	69.3
Family, Not Husband-Wife	19,235,266	5,195,003	27.0
NonFamily, Householder Lives Alone	30,623,472	13,484,758	44.0
NonFamily, Householder Lives with Nonrelative	6,642,981	3,821,965	57.5
MAIL	61,496,357	35,355,059	57.5
Family, Husband-Wife	34,065,414	25,203,499	74.0
Family, Not Husband-Wife	7,526,061	1,946,085	25.9
NonFamily, Householder Lives Alone	16,897,711	6,669,155	39.5
NonFamily, Householder Lives with Nonrelative	3,007,171	1,536,320	51.1
CATI + CAPI	50,889,209	25,888,043	50.9
Family, Husband-Wife	21,818,433	13,537,877	62.0
Family, Not Husband-Wife	11,709,205	3,248,918	27.7
NonFamily, Householder Lives Alone	13,725,761	6,815,603	49.7
NonFamily, Householder Lives with Nonrelative	3,635,810	2,285,645	62.9

Tabulations based on Public Use Microdata files, persons weights

In all other household types analyzed here, the male headship rate is lower for mail collection outside of the considerably higher percentage represented in married Husband-Wife households. While the male headship percentage also rises considerably in CATI/CAPI collection (62%), the difference is not quite as dramatic. While certainly telling, we must be cautions drawing conclusions from collection differentiations in the ACS given that CATI/CAPI collection is reserved for individuals who did not initially respond to the mailed survey. Individuals responding to CATI/CAPI collection in the ACS are more likely to be Hispanic, African American, and/or lower income. Regardless, across all race, ethnicity, and income groups mail collection reflects a demonstrably higher male headship in Male-Female married households.

Table 7: Percent of Husband-Wife Households with a Male Householder by Response Mode
Households by Race, Hispanic, and Household Income
2007 American Community Survey

	Total	Mail	CATI+CAPI	Diff (Mail - CATI+CAPI)
Total Husband-Wife	69.3	74.0	62.0	11.9
Mutually Exclusive Non-Hispanic Race Groups				
White	69.3	73.7	60.2	13.5
Black/African American	64.4	72.2	59.5	12.7
American Indian or Alaska Native	62.2	69.2	57.2	12.1
Asian	76.1	79.9	70.6	9.4
Native Hawaiian or Other Pacific Islander	61.5	69.9	56.7	13.2
Some Other Race	65.9	69.3	64.2	5.1
Two or More Races	62.4	67.5	56.5	11.0
Hispanic	70.4	76.4	67.7	8.7
Household Income				
Less Than $20,000	66.4	74.0	62.0	11.9
$20,000-$39,999	69.0	72.3	61.4	10.8
$40,000-$74,999	69.2	74.6	62.6	12.0
$75,000 or More	69.9	74.2	62.0	12.2

Tabulations based on Public Use Microdata files, persons weights

To further isolate the potentiality of collection differences impacting male headship, we draw upon the Nielsen People Meter (NPM) sample. As previously stated, the NPM sample is used by Nielsen to measure nationally-televised broadcasts and contains approximately 15-20,000 households recruited and maintained via in-persons interviews. Like the ASEC, the NPM sample is of a panel design though with

considerably differences in the amount of time in the sample: A household is asked to remain in the NPM sample for 2 years, and sample revision is conducted twice per year for larger areas to account for new construction and demolition of housing units.

Table 8: Comparison of Male Householder Distributions
Nielsen People Meter Television Households* (NPM): February 2009
Compared to 2007 ACS and 2007 ASEC

Household Type	Total HHlders	Male HHlders	NPM Percent Male	2007 ACS Percent Male	Difference (NPM - ACS)	2007 ASEC Percent Male	Difference (NPM - ASEC)
Total	114,497,000	56,831,000	49.6	54.5	-4.9	51.0	-1.4
Family, Husband-Wife	60,692,000	36,572,000	60.3	69.3	-9.0	62.4	-2.1
Other Households	53,805,000	20,259,000	37.7	39.3	-1.6	39.8	-2.1

*Total number of households installed in Nielsen's National People Meter Sample = 18,459
Households are weighted to account for over-sampling of certain local areas (Local People Meter Markets)
Non-Television Households are not included in the Nielsen Television Universe, and thus are not installed in the NPM sample.

As expected, Male headship in the NPM is much closer in distribution to the ASEC than the ACS, where the greatest differentiation lies with Male-Female married households (note that other family types outlined above are not available from NPM data files). While all differences between the federal surveys and NPM sample were found to be statistically significant, the significance for the ACS differences (p-values well under 0.01) were larger than that for the ASEC differences (p-values just under 0.01). Further, the practical significance in terms of the magnitude of percent differences is quite evident even with minor universe differentiations between the NPM sample and the ASEC/ACS (the NPM sample includes only households with an operable television set, which includes roughly 98.9% of all households at a national level[11]).

Summarily, these results indicate that differences in male headship between the ACS and ASEC are largely a result of collection differences; specifically, collection differences for Male-Female married couple households. What remains unclear at this juncture is why these differences are so pronounced in these particular households. By definition the householder represents the individual who is regarded as the household owner or principal renter. As such, it can be assumed that the individual who is the primary financial provider for a married couple is likely to be selected as the head of household.

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[11] National television percentage is determined via evaluations of the NPM sample, Residential Energy Consumption Survey (RECS) results, and Survey of Income and Program Participation (SIPP) results.

However, in many married couple households even an individual who does not work may be listed as an owner or renter of the household; in this instance either the male or female may be likely to be selected regardless of fiscal responsibility. Thus, the CAPI/CATI collection prevalent in the ASEC would indicate that a joint homeowner/renter who is not at work will be more likely to be selected given the likelihood of reaching said individual at home for a greater share of hours during the day. This assumption appears to be at least partially validated in analysis of male headship by collection differences in the ACS and compared to the NPM panel.

Based upon the aforementioned trends in Male-Female married households and the technical definition of householder, the likelihood of householder identification hinges upon two non-exclusive sources of variability: fiscal control of the household, and opportunity for survey interview/participation. Naturally, these categories do not address every possible contingency which might affect householder identification. However, these situations constitute probable (and more importantly, measurable) married couple household dynamics.

The work status of the spouses broadly demonstrates both sources of variability. Male headship is greater in the ACS in all possible arrangements with the notable exception of when the female spouse works full time and the male spouse only works part time (-10.0% difference) or the male spouse does not work while the female works full time (-2.5% difference). Conversely, the greatest male headship rate differences are evident when the female spouse does not work and the male spouse works full time (13%) or part time (10.8%).

Table 9: Estimates of Male Householders in Husband-Wife Households by Work Status of Male and Female Spouses 2007 American Community Survey

	2007 ACS Estimates				2007 ASEC Estimates				
	Total HHlds	Percent of HHlds by Work Status	Male	Percent with Male HHlder	Total HHlds	Percent of HHlds by Work Status	Male	Percent with Male HHlder	Diff. in Pct. Male (ACS-ASEC)
Total Husband-Wife	55,883,847	100.0	38,741,376	69.3	58,945,005	100.0	36,808,072	62.4	6.9***
Both Male and Female Work Full Time	22,104,595	39.6	14,461,129	65.4	24,092,251	40.9	14,728,552	61.1	4.3***
Both Male and Female Work Part-Time	948,092	1.7	668,804	70.5	786,421	1.3	518,753	66.0	4.5
Both Male and Female Do Not Work	7,954,108	14.2	6,064,688	76.2	8,815,017	15.0	5,933,784	67.3	8.9***
Male Works Full-Time, Female Works Part-Time	8,151,242	14.6	5,596,163	68.7	7,904,094	13.4	4,723,521	59.8	8.9***
Male Works Full-Time, Female Does Not Work	10,216,203	18.3	7,556,153	74.0	11,270,596	19.1	6,877,110	61.0	13.0***
Male Works Part-Time, Female Works Full-Time	1,517,653	2.7	951,906	62.7	1,126,130	1.9	818,707	72.7	-10.0***
Male Works Part-Time, Female Does Not Work	1,411,673	2.5	1,108,519	78.5	1,073,622	1.8	728,981	67.9	10.6***
Male Does Not Work, Female Works Full-Time	2,478,344	4.4	1,575,478	63.6	2,864,954	4.9	1,893,748	66.1	-2.5
Male Does Not Work, Female Works Part-Time	1,101,937	2.0	758,536	68.8	1,011,920	1.7	584,916	57.8	11.0***

**Statistically Significant Difference, 95% Confidence
***Statistically Significant Difference, 99% Confidence

Tabulations based on Public Use Microdata files from both surveys, persons weights

In almost all work status arrangements male headship is significantly higher within the ACS; however, the trend tends to be exacerbated in situations where the greatest disparity in income earning potential are evident by merit of work status (i.e. the instances noted above). It cannot be definitively determined whether this is a result of earning power or opportunity for CATI/CAPI interview, though the latter certainly seems probable given that the only situations where male headship is greater in the ASEC over the ACS is in situations where the male spouse either does not work or works part time while the female spouse has a full time job. However, in most situations where opportunity for interview is theoretically equivalent (i.e. both spouses work full time) male headship tends to still be predominant in the ACS. As such, it is reasonable to assume that in such instances earning power is a probable

determinant (given that males tend to earn more than females). Instances where the male does not work and the female works part time is the notable exception to these trends, though this work status arrangement is the proportionately second least likely work status arrangement in married couple households (this arrangement potentially accounts for male retirees who maintain fiscal control due to tradition, habit, or retirement savings).

As such, because comparisons of personal income would be problematic between the two surveys, we rely upon educational attainment to serve as a rough proxy for potential earning power and by extension probable fiscal responsibility in the household. We restrict comparison to condensed categories for higher education as individual sub-baccalaureate educational levels were largely found to not have statistically significant differences. Differences that were statistically significant were distributed between "some college" and "HS". These differences were presumed to be attributable to wording and collection differences for the "some college" categories between the ACS and ASEC in addition to individuals reporting "some college" erroneously in the largely self-reported ACS (e.g. counting vocational school as some college).

Table 10: Estimates of Householders by Educational Attainment and Household Type
2007 ACS and 2007 CPS ASEC

		ACS 2007 Estimates			ASEC 2007 Estimates			
Husband	**Wife**	**Total**	**Male**	**Male %**	**Total**	**Male**	**Male %**	**Diff. in Pct. Male (ACS-ASEC)**
		55,883,847	38,741,376	69.3	58,945,010	36,808,072	62.4	6.9***
Less Than BA/BS	Less Than BA/BS	32,124,411	22,032,837	68.6	33,660,382	20,811,356	61.8	6.8***
BA/BS	BA/BS	4,466,938	3,154,714	70.6	5,250,030	3,350,514	63.8	6.8***
Master's or Higher	Master's or Higher	2,743,975	1,902,535	69.3	2,724,888	1,695,982	62.2	7.1***
Less Than BA/BS	BA/BS	3,928,159	2,393,753	60.9	4,215,159	2,430,624	57.7	3.2**
Less Than BA/BS	Master's or Higher	1,548,311	902,638	58.3	1,476,574	830,334	56.2	2.1
BA/BS	Less Than BA/BS	4,611,171	3,559,851	77.2	4,877,538	3,313,879	67.9	9.3***
BA/BS	Master's or Higher	1,782,569	1,167,723	65.5	1,756,779	1,100,029	62.6	2.9
Master's or Higher	Less Than BA/BS	2,072,435	1,673,466	80.7	1,939,103	1,312,240	67.7	13.0***
Master's or Higher	BA/BS	2,605,878	1,953,859	75.0	3,044,557	1,963,114	64.5	10.5***

**Statistically Significant Difference, 95% Confidence
***Statistically Significant Difference, 99% Confidence
Tabulations based on Public Use Microdata files from both surveys, persons weights

Similar to trends in work status, greater disparity in education attainment between the male and female corresponds to the greatest disparities in male headship. Male headship is greatest in the ACS

over the ASEC in situations where the male has higher educational attainment, particularly at the Master's or higher level where the female either has a bachelor's (10.5% difference) or no college degree (13.0% difference). Though in all instances male headship in the ACS is higher than the ASEC, the differentiation is greatly diminished in married couple household where the female is of higher educational attainment (3.2% – 2.1% difference); particularly when the female has a Master's or higher and the male has a baccalaureate degree or less. These specific differences were close enough between the between the ACS and ASEC that they are not statistically significant. In the examples above, fiscal control of the household is highly implicated as a determinant of headship given that higher educational status is highly correlated with earning potential. Instances of equal educational attainment where male headship is greater can be attributed either to possible disparities in work status arrangements, or the "grey" areas of variability not explicitly addressed by either fiscal control or interview opportunity.

If these results indicate that the largest source of male headship disparities in married couples is based in presumed financial discrepancies, is it still appropriate to consider collection the primary cause of differentiation in householder identification between the ACS and ASEC? In almost all instances, the answer would appear to be yes – though the assumptions as to why collection differences cause discrepancies seem to be different than those suggested by relevant literature. O'Connell and Gooding suggest that in instances of jointly owned households, there tend to be more female family householders due to the wife being proportionately more likely to be present for ASEC interview. While this assumption appears to be true in many cases, these results suggest that it is not so much a matter of who is available for CAPI/CATI interview as who is filling out the paper ACS form based upon household status. Specifically, given that the largest proportion of male headship is evident in married family contingencies where the male is likely the primary provider, and married families are driving the male/female headship discrepancy between the surveys, a greater proportion of married males responding to the paper ACS form are the principal cause of this discrepancy. The implicated cause of male/female headship discrepancies ostensibly remains related to collection, though we suggest the intent and focus can be refined.

As stated, this contingency is suggested only as a probable cause of discrepancy, not the only cause of discrepancy. Beyond fiscal responsibility which seems to drive male headship in married

Husband-Wife couples responding to the ACS, and interview opportunity which appears to drive female headship in ASEC, innumerable possible causes of headship designation remain. As such, we close our analysis by considering one such probable candidate to the analytic "grey" area not fully addressed in this paper.   Specifically, we analyze cultural or social views of household headship or responsibility, in which race and ethnicity serve as convenient proxies for these often complex relationships. Male headship in married couple households is greater within the ACS in the three largest race groups: White, Black/African American, and Asian. Likewise, householders reporting Hispanic ethnicity had the proportionately highest percentage of male headship within the ACS.

Table 11: Estimates of Husband-Wife Households with a Male Householder by Race of Householder 2007 ACS and 2007 CPS ASEC

	2007 ACS Estimates				2007 ASEC Estimates			Diff. in Pct. Male (ACS-ASEC)
	Total HHlder	Male HHlder	Percent Male		Total HHlder	Male HHlder	Percent Male	
Total Husband-Wife	55,883,847	38,741,376	69.3		58,945,006	36,808,073	62.4	6.9***
Mutually Exclusive NonHispanic Race Groups								
White	42,556,103	29,509,380	69.3		44,327,278	27,803,433	62.7	6.6***
Black/African American	3,728,743	2,399,917	64.4		4,217,306	2,480,926	58.8	5.6***
American Indian or Alaska Native	269,319	167,616	62.2		271,725	155,778	57.3	4.9
Asian	2,515,826	1,913,509	76.1		2,721,624	1,844,370	67.8	8.3***
Native Hawaiian or Other Pacific Islander	60,786	37,364	61.5		100,169	63,861	63.8	-2.3
Some Other Race	84,552	55,736	65.9		n/a	n/a	n/a	
Two or More Races	484,520	302,134	62.4		544,547	346,330	63.6	-1.2
Hispanic	6,183,998	4,355,720	70.4		6,762,357	4,113,375	60.8	9.6***

***Statistically Significant Difference, 99% Confidence
Tabulations based on Public Use Microdata files from both surveys, persons weights

Once more, comparison between the surveys must be done with caution as race is not fully comparable. The ACS includes "Some Other Race", wherein over 95% of "Some Other Race" is Hispanic. The "Some Other Race" estimate here is restrained to Non-Hispanic due to this possible source of confusion. Any number of explanations could be posed as to why married Husband-Wife male headship is greater in these particular groups, particularly when considering individuals who are Black/African American or Hispanic tend to respond in greater proportion to the CATI/CAPI follow-up

within the ACS (which tends to indicate female headship). As stated, cultural value differentiations regarding the status and responsibilities of males and females in marriage can be implicated (particularly for Hispanic households). Similarly, socioeconomic status differentiations between the three largest race groups could be driving the differences. Ultimately, the complexity and interrelationship between race and other variable analyzed herein lies beyond the scope of this particular paper given that the objectives herein have largely been met; though this stands as a interesting direction for future research.

VII. Conclusions & Recommendations

The market section case study presented a unique problem for universe estimate creation. While the ACS was assumed to be a superior alternative to the ASEC for national estimation, the disparities evident in two "core" market section types such as householder sex and age were largely unexpected; particularly as these market sections are essentially constructs of basic demographic items (i.e. age, sex, and to a less basic extent marriage or relationships status). The magnitude of these differentiations would almost certainly be noticeable for clients and stakeholders of the UEs, as the proportion of these estimates tended to be fairly static across estimate releases even as levels differed. In this case study, the introduction of ACS data to replace ASEC results for a national householder-based estimation process resulted in differentiations which necessitated further exploration to determine what the cause of these differences was and how they could be ameliorated.

While modern literature indicates that collection differences are likely causes for disparities in householder representation between the ASEC and ACS, this analysis implicates married couple households as the primary driver of this difference. Therein we find that while male headship is almost universally higher in the ACS, the amplitude of difference between work status and educational attainment levels for the spouses greatly exacerbates the proportion of male headship reported in the ACS. In terms of work status, households with full time male workers married to a female who either didn't work or worked part had proportionately higher male headship in the ACS. Correspondingly, households with full time female workers married to males who either did not work or worked part time had the smallest proportion of male headship. Trends in educational attainment were similar insofar that higher educational attainment for the male spouse indicated a greater proportion of male headship when the female spouse was of lower education (and the opposite resulting in lower levels of male headship).

Summarily, we suggest that collection differences are the primary cause of headship differentiation – however, we refine this broad statement to be primarily attributable to Husband-Wife households where the spouse with probable greater fiscal control responds in greater proportion to the paper ACS. We do not infer that this occludes differentiations based upon expanded opportunity for CAPI/CATI interview for females within the ASEC or larger cultural and social frameworks (loosely addressed via an analysis of race and ethnicity); rather we suggest that a more refined understanding of householder differentiation between the ACS and ASEC can isolate particular family and household types which are likely to be patently different between the surveys.

Despite the extent of this analysis, whatever the probable causes of variability are we cannot presume to determine which source is a better or more accurate representation of headship in the U.S. Realistically, it is essentially impossible to determine whether more males are identifying as household heads than females (whether they be married or not) given that defining a householder is largely subjective. Why then, if such definitions are subjective, does this difference matter or have practical significance for users of the ACS or ASEC?

As demonstrated by the market section case study, any estimation method which relies upon householder characteristics will inevitably be affected by who is acting as the householder. Theoretically, any number of households can have dramatically different representations depending upon who is acting as the householder and what particular circumstances (or series of circumstances) contributed to this individual acting as the householder. To wit, the same hypothetical household can be completely different as represented by the ACS or ASEC based upon different potential householders responding to the survey. By extension, the resultant estimates which utilize either ACS or ASEC data will likely be notably different despite the fact that both are addressing the same hypothetical household.

Given that the principal purpose of this paper is to facilitate discussion for individuals who use ACS or ASEC results in householder-based estimation processes, any recommendations made herein are provided hesitantly due to the number of considerations which must be analyzed when choosing between the ACS and ASEC as input to an analysis or estimation process. As previously mentioned, it is not possible (or useful) to credit one source or the other as the "best" representation of headship. For most estimation processes it may simply be enough to know they are different, and specifically, how they

are different. Knowing the extent and probable causes of these differentiations within the ACS and ASEC allows users to essentially use "the best tool for the job". As such, we do not recommend that either source should be used exclusively for householder or PPH based estimation processes; rather, source selection should largely be dictated by the research question, estimation objective, or sampling variables of the population under study.

For the purpose of Nielsen television UE computations, the decision to use either ACS or ASEC estimates became contingent upon the sample type and collection the UEs are designed to guide. Specifically, since Nielsen's NPM sample utilizes in person data collection in a panel design, the initial plan to completely replace ASEC inputs to the ACS was revamped to account for the misalignment of householder sex and age in the ACS when compared against the NPM panel. Based upon this research and comparisons to the NPM sample, the ASEC was retained as the basic input for the market section system for items most contingent upon householder sex (i.e. age and sex of the householder). Given that the ACS still provides considerable benefits for other demographic items (regardless of collection), ACS data is now utilized for several other market sections. Ultimately, allowing for the market section system to accept either data file provides greater flexibility going forward as new market sections are requested which may be better suited in one survey product over the other.

The ACS provides a wealth of timely knowledge, but when using ACS results as replacement for the CPS or other federal surveys, it is important to consider differences in the survey design and collection mode. Summarily, utilization of the ACS may not always be the best option for the estimation process despite the strengths of the product; a thorough evaluation of the resultant estimates is not only wise but warranted. Knowing how representations of differing demographic items may vary between the products is generally prudent for any evaluation, particularly if the ultimate objective is to produce comparable estimates. While some items are generally regarded to be better covered in one survey over the other, the issue of householder remains largely contingent upon the broader goal of the research objective and source selection should be dictated as such.

References

Bailar, Barbara A. 1975. "The Effects of Rotation Group Bias on Estimates from Panel Surveys." *Journal of the American Statistical Association.* Vol. 70, No. 349. pp. 23-30

Bishaw, Alemayehu and Sharon Stern. 2006. "Evaluation of Poverty Estimates: A Comparison Of the American Community Survey and the Current Population Survey." U.S. Census Bureau, Poverty and Health Statistics Branch, Housing and Household Economic Statistics Division background paper. Retrieved January 2009.

Deming, Edward W. and Frederick F. Stephan. 1940. "On a Least Squares Adjustment of a Sampled Frequency Table when the Expected Marginal Totals are Known." *The Annals of Mathematical Statistics.* Vol. 11, No. 4. pp 427-444

Groves, Robert M. 2006. "Nonresponse Rates and nonresponse Bias in Household Surveys." *Public Opinion Quarterly.* Vol. 7, No. 5. pp 646-675

Humes, Karen, Julie Meyer and Denise Smith. 2007. "Comparison of ACS and ASEC Data on Age and Sex." U.S. Census Bureau, Population Division report. Retrieved January 2009.

Irvine, John M. 1984 "Rotation Group Bias and the Methods Test Panel." American Statistical Association, 1984 Meeting Proceedings. Retrieved January 2009.

Koerber, Kin. "Comparison of ACS and ASEC Data on Geographic Mobility: 2004." U.S. Census Bureau, Housing and Household Economic Statistics Division report. Retrieved January 2009.

Mather, Mark, Kerri L. Rivers and Linda A. Jacobsen. 2005. "The American Community Survey." Population Reference Bureau, *Population Bulletin.* Vol. 60, No. 3.

Menendez, Janin. "Comparison of ACS and ASEC Data on Citizenship, Year of Entry, and Region of Birth: 2004." U.S. Census Bureau, Population Division report. Retrieved January 2009.

Nelson, Charles. 2006. "What Do We Know About Differences Between CPS and ACS Income And Poverty Estimates?" U.S. Census Bureau, Housing and Household Economic Statistics Division background paper. Retrieved January 2009.

O'Connell, Martin and Gretchen Gooding. "Comparison of ACS and ASEC Data on Households And Families: 2004." U.S. Census Bureau, Population Division report. Retrieved January 2009.

Ramirez, Roberto and Sharon Ennis. "Comparison of ACS and ASEC Data on Hispanic Origin: 2004." U.S. Census Bureau, Population Division report. Retrieved January 2009.

Scanniello, Nicole. "Comparison of ACS and ASEC Data on Educational Attainment: 2004." U.S. Census Bureau, Population Division report. Retrieved January 2009.

Shin, Hyon B. "Comparison of Estimates on School Enrollment from the ACS and the CPS." U.S. Census Bureau, Populations Division report. Retrieved January 2009.

Siegel, Jacob S. and David Swanson, ed. 2004. "The Methods and Materials of Demography." Second Edition. London: Elsevier Academic Press.

Turek, Joan, Gabrielle Denmead and Brian Sinclair-James. "Poverty Estimates in the ACS and

Other Income Surveys: What is the Impact of Methdology?" Department of Health and Human Services report. Retrieved January 2009.

Vroman, Wayne. 2003. "Comparing Labor Market Indicators from the CPS and ACS." Urban Institute draft report. Retrieved January 2009.

Worden, G. and Hamilton, H. H. 1989. "The Use of Mandatory Reporting Authority to Improve the Quality of Statistics." Working Paper. Retrieved January 2009.

U.S. Census Bureau. 2006. *Design and Methodology: American Community Survey, Technical Paper 67.* Retrieved September 2008 (http://www.census.gov/acs/www/Downloads/tp67.pdf)

U.S. Census Bureau. 2006. *Design and Methodology: Current Population Survey, Technical Paper 66.* Retrieved September 2008 (http://www.census.gov/prod/2006pubs/tp-66.pdf)

Appendix: Market Section System Age of Head Tables

Table A1: Estimates of TV Households and Persons Therein by Age of Householder
  CPS ASEC Derived Estimates

As of January 1st, 2009, Rounded and truncated to the thousands (000)

	<25	25-34	35-39	40-44	45-49	50-54	55-64	65+
TV Households	5,810	18,180	10,690	11,730	12,730	11,680	19,330	24,350
Male 0-1	625	2,011	724	338	184	134	*101*	53
Male 2-5	**647**	3,570	1,884	1,098	533	**258**	254	**106**
Male 6-8	*105*	2,113	1,534	1,232	606	**238**	196	**96**
Male 9-11	*108*	1,413	1,565	1,583	949	391	**236**	125
Male 12-14	*74*	810	1,288	1,575	1,286	597	337	143
Male 15-17	*226*	363	1,069	1,582	1,632	954	**500**	174
Male 18-20	1,080	240	**424**	1,080	1,538	1,158	661	199
Male 21-24	3,669	611	164	522	**972**	1,096	903	233
Male 25-29	727	**7,015**	180	*138*	*316*	575	788	*201*
Male 30-34	229	7,850	503	**145**	121	*211*	*478*	243
Male 35-39	**101**	1,215	7,317	431	174	*95*	*356*	*291*
Male 40-44	*124*	398	**1,019**	7,695	468	160	*206*	*460*
Male 45-49	*155*	**175**	290	**911**	8,345	379	206	*439*
Male 50-54	*132*	165	*83*	316	980	7,843	**430**	*351*
Male 55-64	*120*	183	**88**	165	**448**	1,068	13,835	**473**
Male 65+	*38*	96	109	**141**	163	178	1,035	14,270
Female 0-1	599	1,924	691	323	**175**	129	**97**	**52**
Female 2-5	**620**	3,411	1,801	1,049	509	246	244	**100**
Female 6-8	*101*	2,019	1,467	1,178	579	227	**187**	**92**
Female 9-11	*104*	1,350	1,496	1,514	907	374	**225**	120
Female 12-14	*69*	777	1,232	1,506	1,228	570	**321**	137
Female 15-17	*215*	351	1,030	1,525	1,572	918	**482**	**167**
Female 18-20	**1,292**	243	408	1,024	1,441	1,045	630	**177**
Female 21-24	3,477	**1,333**	165	435	768	882	737	183
Female 25-29	257	7,409	462	214	293	476	587	**162**
Female 30-34	**68**	6,647	1,522	503	**252**	**227**	411	**170**
Female 35-39	*105*	**391**	6,929	1,473	567	195	**260**	250
Female 40-44	*140*	127	495	7,485	1,549	474	321	**279**
Female 45-49	*191*	105	**111**	**470**	8,113	**1,366**	**615**	379
Female 50-54	*140*	**236**	**52**	**148**	462	7,531	1,860	**431**
Female 55-64	*87*	308	182	153	**157**	540	13,944	**2,359**
Female 65+	*43*	**128**	**186**	261	357	349	**724**	19,162

Table A2: Estimates of TV Households and Persons Therein by Age of Householder
 ACS Derived Estimates

As of January 1st, 2009, Rounded and truncated to the thousands (000)

	<25	25-34	35-39	40-44	45-49	50-54	55-64	65+
TV Households	5,810	18,180	10,690	11,730	12,730	11,680	19,330	24,350
Male 0-1	636	1,906	751	360	195	128	*141*	53
Male 2-5	**726**	3,502	1,885	1,050	506	**288**	275	**118**
Male 6-8	*143*	2,100	1,504	1,187	597	**266**	215	**108**
Male 9-11	*38*	1,528	1,470	1,534	988	397	**283**	132
Male 12-14	*29*	820	1,238	1,602	1,289	623	356	153
Male 15-17	*80*	339	1,061	1,588	1,715	971	**558**	188
Male 18-20	1,072	243	**478**	1,111	1,482	1,074	703	217
Male 21-24	3,490	585	165	544	**1,105**	1,100	929	252
Male 25-29	790	**6,297**	192	*183*	*494*	730	965	*289*
Male 30-34	218	7,537	453	*171*	148	*277*	676	300
Male 35-39	*81*	1,130	7,096	429	166	*115*	*515*	*448*
Male 40-44	*64*	365	**828**	7,750	435	172	*279*	*637*
Male 45-49	*67*	**151**	263	**772**	8,432	367	213	*635*
Male 50-54	*55*	**125**	**99**	267	765	8,098	382	*509*
Male 55-64	*56*	191	**113**	155	364	855	14,071	575
Male 65+	*24*	96	111	**162**	181	203	864	14,389
Female 0-1	610	1,839	704	335	**197**	125	**122**	**58**
Female 2-5	**693**	3,335	1,790	1,025	489	255	267	**126**
Female 6-8	*141*	1,983	1,449	1,108	598	249	**218**	104
Female 9-11	*35*	1,450	1,427	1,467	932	383	**264**	132
Female 12-14	*30*	772	1,219	1,497	1,243	574	**358**	147
Female 15-17	*90*	319	980	1,541	1,676	933	**537**	**184**
Female 18-20	**1,426**	265	432	965	1,354	980	638	**200**
Female 21-24	3,631	**1,172**	166	405	836	872	715	183
Female 25-29	256	7,402	443	213	311	448	605	**182**
Female 30-34	*51*	6,668	1,545	510	**224**	**192**	413	**197**
Female 35-39	*43*	**497**	6,761	1,529	557	194	**329**	260
Female 40-44	*70*	139	475	7,294	1,686	513	338	**355**
Female 45-49	*74*	113	**125**	575	7,758	**1,575**	685	445
Female 50-54	*63*	**179**	**65**	163	623	7,231	2,029	**507**
Female 55-64	*57*	**250**	**203**	158	**212**	552	13,693	**2,605**
Female 65+	*20*	**115**	**160**	286	368	368	**815**	19,078