Using the Annual Social and Economic Supplement with Current Population Survey Panels

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Abstract

The Annual Social and Economic Supplement (ASEC) is the most commonly used type of Current Population Survey (CPS) data with its rich information about employment, unions, health insurance and taxes. Researchers typically use these data as repeated cross sections despite the longitudinal component of the CPS, which many researchers are unaware of and very few leverage. The IPUMS-CPS (https://cps.ipums.org) project at the University of Minnesota is undergoing a large-scale effort to unlock the enormous research potential of the CPS by making it easier to access and use monthly CPS data and to link observations over time. This paper details the complexities and unique aspects of the ASEC and the creation of an identifier that makes the linkage between the ASEC and the March basic monthly data simple and drastically simplifies analyzing ASEC data as part of a panel of CPS observations. The paper also presents two substantive examples of how researchers can link CPS basic monthly data to ASEC data: 1) Analyzing the effects of child tax credits on food security and 2) leveraging longitudinal linking to increase the sample size of earner study respondents that link to the ASEC.

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The Annual Social and Economic Supplement (ASEC) is the most commonly used file from the Current Population Survey (CPS) with its rich information about employment, unions, health insurance and taxes. Researchers typically use these data as repeated cross sections despite the longitudinal component of the CPS, which many researchers are unaware of and relatively few leverage. Indeed researchers have documented the difficulties of and strategies for linking CPS data (Madrian & Lefgren 2000; Feng 2001, 2008; Katz, Teuter and Sidel 1984; Pitts 1988; Drew, Flood & Warren 2014) though none discuss linking the ASEC to non-March Basic Monthly CPS data.

The IPUMS-CPS (https://cps.ipums.org) project at the University of Minnesota is undergoing a large-scale effort to unlock the vast research potential of the CPS by making it easier to access and use Basic Monthly CPS data and to link observations over time. The widespread use of the ASEC means that making it available as part of the larger collection of linked CPS panel data is of enormous value. But the unique aspects of the ASEC compared to other Basic Monthly CPS files makes using it as part of a longitudinal CPS panel cumbersome. IPUMS-CPS is eliminating this barrier for users. This effort promises to save the research community countless hours of duplicated effort, eliminates a huge potential source of error, and increases replicability of research results.

IPUMS-CPS staff has elsewhere documented the creation of a unique identifier (CPSID) that researchers can use to link observations across months of participation in the CPS.[1] Unfortunately, due to the unique aspects of the ASEC compared to the other Basic Monthly CPS data, without the additional efforts we document below, the power of CPSID is limited by the exclusion of the ASEC. This paper documents the creation of an identifier that makes the linkage between the ASEC and the March Basic Monthly CPS data straightforward and simplifies analyzing ASEC data as part of a panel of CPS observations.

The sections that follow give an overview of the CPS and a description of the ASEC oversamples. The CPS overview is relevant for understanding how the ASEC is different from other CPS files and how changes in its oversample affect users who want to link CPS observations from the ASEC over time either to other ASEC files or to Basic Monthly CPS files. We then describe in detail the process we followed to create MARBASECID, which allows us to easily link ASEC and March Basic Monthly CPS data, add CPSID to ASEC files, and drastically simplify researcher use of ASEC data along with other Basic Monthly CPS data as a panel. Finally, we also provide examples of ways researchers might want to combine the ASEC with other Basic Monthly CPS data.

Brief Overview of the Current Population Survey

To link respondents from the ASEC to Basic Monthly CPS data, one must understand the purpose and design of the CPS. The primary function of the CPS is to be "the source of the official Government statistics on employment and unemployment"[2]. These data have been collected on a monthly basis since 1940. Record levels of unemployment during the Great Depression heightened the need for reliable

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[1] Drew, J. A. R., Flood, S., & Warren, J. R. 2014. "Making Full Use of the Longitudinal Design of the Current Population Survey: Methods for Linking Records Across 16 Months." Journal of Economic and Social Measurement 39:121-144.

[2] U.S. Census Bureau. (2010, March). March 2010: Annual Social and Economic (ASEC) Supplement. Retrieved from http://www.census.gov/prod/techdoc/cps/cpsmar10.pdf

statistics on unemployment. Up to that point, there had been little effort to count the number of jobless persons in the country, much less to develop precise definitions and concepts of employment. During the late 1930s, these concepts were developed and adopted for a national survey of households implemented by the Works Progress Administration. This effort resulted in the first iteration the Monthly Report of Unemployment, introduced in 1940, which would later become known as the Current Population Survey. In 1942, the Census Bureau took over the survey and changed the name to the Monthly Report on the Labor Force. In 1948, a final name change occurred to the CPS "to reflect the survey's expanding role as a source for data on a wide variety of demographic, social, and economic characteristics of the population".[3] A final significant event in the history of the survey is that, in 1959, the task of analyzing and publishing CPS labor force data was given to the Bureau of Labor Statistics while the Census Bureau maintained the task of data collection. In short, the CPS has historically been and continues to be a monthly labor force survey.[4]

An important aspect of the Basic Monthly CPS design is the rotation pattern (illustrated in Table 1). The Monthly Basic CPS is a sample representative of the civilian, household-based population of the United States. Importantly, the Basic Monthly CPS selects households[5] (physical structures) to be part of the sample. Once a household is selected into the sample, household members are surveyed in four consecutive months, left out of the sample for the following eight months, and then re-interviewed in each of the following four months. CPS refers to each interview month as a Month-in-Sample (MIS) and thus there are at most eight MIS's for a particular household (MIS 1- MIS 8). For example, consider a dwelling that is selected for the survey in January of 2001. This dwelling will be interviewed in January 2001, February 2001, March 2001, and April 2001. For the following eight months (May 2001-December 2001), the dwelling will not be interviewed, but it will then be interviewed four more times, once in January of 2002, and again in February 2002, March 2002, and a final interview in April 2002.

CPSID

Using original linking keys (made available by the Census Bureau) available on all Basic Monthly CPS files, users can link observations over time to create short sixteen-month panels with up to eight observations per person. This work, however, is cumbersome and expensive for each individual researcher to perform independently. The several obstacles researchers face in linking CPS observations are detailed elsewhere[6]. To lower the barrier to using repeated observations of individuals from Basic Monthly CPS files as a panel, IPUMS-CPS staff created a unique identifier. The process to create CPSID

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[3] U.S. Census Bureau. (2006, October). Technical Paper 66, Design and Methodology. Retrieved from http://www.census.gov/prod/2006pubs/tp-66.pdf.
[4]Ibid.

[5] A household consists of all the people who occupy a housing unit. A house, an apartment or other group of rooms, or a single room, is regarded as a housing unit when it is occupied or intended for occupancy as separate living quarters; that is, when the occupants do not live with any other persons in the structure and there is direct access from the outside or through a common hall. A household includes the related family members and all the unrelated people, if any, such as lodgers, foster children, wards, or employees who share the housing unit. A person living alone in a housing unit, or a group of unrelated people sharing a housing unit such as partners or roomers, is also counted as a household. The count of households excludes group quarters. (http://www.census.gov/cps/about/cpsdef.html)

[6] Drew, J. A. R., Flood, S., & Warren, J. R. (2013). Making Full Use of the Longitudinal Design of the Current Population Survey: Methods for Linking Records Across 16 Months.

uses the original linking keys provided by CPS to match records over time, accounts for the complex CPS rotation pattern, and assigns a new unique identifier to each record in the Basic Monthly CPS. The result is one variable that researchers can use to easily link Basic Monthly CPS observations over time. However, CPSID was not initially created for ASEC files because the ASEC lacks all of the linking keys required for matching records to other Basic Monthly CPS files; the information we provide below describes our process for making CPSID available on the ASEC via a variable called MARBASECID, which matches individuals in the ASEC to the March Basic Monthly CPS.

CPS Supplements

In addition to the Basic Monthly CPS, supplements to the CPS are frequently fielded (see Figure 3). CPS supplements vary widely in score and type[7]. With three exceptions[8], all CPS supplement respondents in a given month are also respondents to the Basic Monthly CPS during the same month. For example, the Voting and Registration supplement is given only to respondents from the November Basic Monthly CPS on a biennial basis. However, not all respondents from a Basic Monthly CPS sample will receive the supplemental questionnaire. Supplement eligibility (i.e. universes) varies from month to month; for example, the Displaced Worker supplement is asked of workers 20 years of age and older who were displaced from their jobs and who were interviewed in the January Basic Monthly CPS. In most cases the sample for a CPS supplement is the same individuals in households sampled for specific Basic Monthly CPS or a subset of that Basic Monthly CPS.

One exception is the ASEC, which is arguably the most popular of the CPS data products. This supplement is administered during the March Basic Monthly CPS, but also includes CPS participants from other months who are not scheduled to receive the March Basic Monthly CPS. This unique aspect of the ASEC requires special handling in the process of linking it to other CPS data files, which we detail in the following sections.

"The March Supplement"

The most popular CPS supplement is the "March Supplement". The technical name for this supplement since 2003 is the Annual Social and Economic Supplement (ASEC) or the Annual Demographic File (ADF) between 1947 and 2003. The ASEC contains basic monthly demographic and labor force data as well as supplementary data on work experience, income, noncash benefits, and migration[9]. As described above, the ASEC sample is derived from Basic Monthly CPS files and is currently comprised of households that are part of the March Basic Monthly CPS but also of households from other non-March Basic Monthly CPS samples.

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[7] See Table 11-1 from Technical Paper 66 for a complete list of CPS supplements: U.S. Census Bureau. (2006, October). Technical Paper 66, Design and Methodology. Retrieved from http://www.census.gov/prod/2006pubs/tp-66.pdf.

[8] There are three exceptions to the CPS Basic serving as the sampling scheme for CPS supplements. The Housing Vacancy Supplement (HVS) and the American Time Use Survey (ATUS) are surveys that base their samples from the CPS Basic surveys but do not happen at the time of the basic CPS. The HVS collects information on housing units that were vacant at the time of the basic CPS. The ATUS collects information on how respondents spend their time and is conducted a few months after a respondent's final basic CPS survey. The third is the ASEC described in detail here.

[9] U.S. Census Bureau. (2010, March). March 2010: Annual Social and Economic (ASEC) Supplement. Retrieved from http://www.census.gov/prod/techdoc/cps/cpsmar10.pdf

The ASEC was first introduced in 1947. Between 1947 and 1955, the ASEC was administered in April and included households from the April Basic Monthly CPS (see Table 2). After 1955, the ASEC was implemented in March, and began being commonly referred to as the "March Supplement". Between 1956 and 1975, the ASEC consisted only of respondents from the March Basic Monthly CPS. Over time, the ASEC sample has increased to improve the reliability of information about certain subpopulations. The first expansion in 1976 was an effort to improve the statistics on persons of Spanish (Hispanic) origin. The second expansion, in 2001, was to collect better data on low-income children who do not have health insurance coverage. While the goals of the expansion are straightforward, the implementation is much more complicated, particularly regarding how it affects the longitudinal linking of Basic Monthly CPS files.[10]

The ASEC Oversample

The ASEC oversampling scheme has important ramifications for researchers who want to link CPS respondents across time. Though all of the ASEC respondents participate in the CPS Basic Monthly, only those who were administered the March Basic Monthly CPS are easily matched to the ASEC. The potential number of links between the March Basic Monthly CPS and the ASEC is equal to the number of respondents in the March Basic Monthly CPS, which is always less than the number of ASEC respondents because of the ASEC oversample. Linking ASEC oversample respondents to their Basic Monthly CPS observations is extremely tedious and labor intensive at best, if not impossible in some cases. We therefore focus our efforts on matching March Basic Monthly CPS observations to records in the ASEC (see Table 3). Figure 1 (see Appendix) graphs the size of the ASEC oversample from 1989 to 2013 despite the inclusion of oversamples since 1976 (as seen in Table 1). MARBASECID is currently created for the 1989 to 2013 period, but will be created forward (up to the most current ASEC) and backward (up to ASEC 1976) in time so that CPSID can be made available via IPUMS-CPS.

March 1976 Expansion - "November Hispanic Oversample"

Since its inception, the ASEC has changed several times. From March 1976 through 2000 the Census Bureau increased the reliability of data for people of "Spanish origin" by "reinterviewing all households identified in November of the previous year as having at least one person of Spanish origin."[11] The ASEC oversample of people of "Spanish origin" is commonly referred to as the "November Hispanic Oversample." The Hispanic oversample increased the size of the ASEC by about 2,500 additional households (see the 1976-2000 range in Figure 1). Because of the CPS rotation pattern (4-8-4), all the "Spanish" households identified in November are out of the CPS sample when the March Basic Monthly CPS is conducted. Nonetheless, the Census Bureau conducts additional interviews for oversample households.[12] For example, a household in MIS 1 in November will be MIS 4 in February and thus out of the CPS in March (similarly, MIS 5 will be MIS 8 in February). MIS 2 and 6 will be out of sample in January, MIS 3 and 7 in December and MIS 4 and 8 will be out after the November questionnaire. Because the oversample households would not have otherwise been in the ASEC, we consider these

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[10] U.S. Census Bureau. (2006, October). Technical Paper 66, Design and Methodology. Retrieved from http://www.census.gov/prod/2006pubs/tp-66.pdf

[11] The ASEC oversample of people of "Spanish origin" is commonly referred to as the "November Hispanic Oversample".

[12] U.S. Census Bureau. (1978, March). Technical Documentation: Annual Demographic File (March Supplement of Current Population Survey). Retrieved from https://cps.ipums.org/cps/resources/codebooks/cpsmar77.pdf

extra-visits a month-in-sample 9 and 10 though in the data the Hispanic oversample is assigned a value between one and eight[13]. During these visits, the Hispanic oversample receives both the March Basic Monthly CPS and the ASEC.[14] Thus, the Hispanic oversample adds cases to the ASEC from other months of the CPS that would not have been in the March Basic Monthly CPS were it not for the oversampling.

March 2001 Expansion - "SCHIP Oversample"

Until 2001, the ASEC consisted of March Basic Monthly CPS respondents and the "November Hispanic Oversample" (see Table 2). The second expansion in 2001 was funded by a Congressional allocation of $10 million annually to the Census Bureau with the intent of making "appropriate adjustment to the annual Current Population Survey…in order to produce statistically reliable annual state data on the number of low-income children who do not have health insurance coverage, so that real changes in the uninsured rates of children can be reasonably detected."[15] This Congressional allocation funded a general expansion of the CPS and an additional oversample to the ASEC.

The general expansion of the ASEC resulted in an additional 12,000 units being sampled each month.[16] This increase is seen in the March Basic Persons and March Basic Household lines on Figure 1. The Basic Monthly CPS sample size increases were completed between September 2000 and July 2001. Accordingly the first March Basic Monthly CPS in which this increase was evident was in March of 2002.[17]

The Congressional allocation also funded the SCHIP oversample, which is in addition to the November Hispanic oversample. The State Children's Health Insurance Program (SCHIP) oversample is drawn differently than the November Hispanic oversample. Two strategies – the "split-path" assignment and MIS-9 – are employed in the SCHIP case.

The "split-path" assignment strategy of the SCHIP oversample selects respondents from the February Basic Monthly CPS and April Basic Monthly CPS (adjacent months to the March Basic Monthly CPS). Households in MIS 4 and 8 in February with children (18 or younger) or non-White household members, who would not typically participate in the March Basic because of the rotation pattern, complete the ASEC at the time of the Basic Monthly CPS interview. Similarly, households in MIS 1 and 5 in April that would not have participated in the March Basic Monthly CPS because of the rotation pattern but that included children (18 or younger) or non-White household members receive the ASEC during the April CPS Basic interview. The term "split-path" thus refers to these February and April cases that would normally have received the supplements assigned for February and April (potentially Job Tenure or Child Support) but instead are "split" to the ASEC. Thus, in February and April, some people receive their scheduled monthly supplement while others, if they meet the criteria, receive the ASEC. Theoretically,

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[13] In the ASEC files, all households receive an MIS value of 1-8. In Census documentation, extra interviews are occasionally referred to as MIS 9. For convenience, we refer to the second additional interview for oversample cases as MIS 9.

[14] Ibid.

[15] U.S. Census Bureau. (2000, March). Technical Paper 63, Design and Methodology. Retrieved from http://www.census.gov/prod/2000pubs/tp63.pdf., Page J-1.

[16] Ibid.

[17] Ibid.

one would be able to identify the respondents of the ASEC selected as part of this split-path assignment. IPUMS-CPS is conducting further research on this identification.

The second set of households belonging to the SCHIP oversample – the MIS 9 households – is administered an extra interview. These households are drawn from the November Basic Monthly CPS of the previous year if they are in MIS 6, 7, or 8 in November and they are not part of the November Hispanic oversample. To meet the criteria, households must either have at least one child 18 years or younger or a non-White member and be non-Hispanic. Note that these households will have completed all eight interviews of the CPS rotation pattern by January at the latest (for MIS 6). Effectively, these households are contacted a ninth time and called "Month-in-Sample 9 Assignments".[18] These households complete the Basic Monthly survey in either February or April and complete the ASEC in that month as well.

The "MIS 9" ASEC oversample changed slightly starting in 2004. Rather than identifying the MIS 9 oversample (non-Hispanic households) from November MIS's 6, 7, 8, the MIS 9 oversample was chosen from August (MIS 8), September (MIS 8) and October (MIS 8). These cases are contacted for interview in either February or April.

Creating MARBASECID

We now turn to the technical details of how we created MARBASECID. MARBASECID is the identifier that "links" the March Basic Monthly CPS to the ASEC, a critical step in the process of getting CPSID, a unique IPUMS-created identifier onto the ASEC. CPSID, via MARBASECID, allows researchers to easily and reliably link data across CPS months, now including the ASEC, thus eliminating the need for individuals researchers to perform this tedious and cumbersome process. There are two primary difficulties in linking the March Basic Monthly CPS to the ASEC. First, the Census Bureau does not make all necessary linking keys available for all years on the ASEC. As a result of omitted linking keys and the ASEC oversample, duplicate and false matches are problematic. Second, as the Census Bureau transitioned to a computer-based interview, issues of data quality became more prominent for linking even if they did not compromise the integrity of each individual sample. No technical documentation on how this transition affected data quality is available and thus we can only speculate that the transition resulted in some data coding issues.

The overarching goal of the March Basic Monthly CPS to ASEC matching algorithm is to overcome these difficulties by matching records between the March Basic Monthly CPS and the ASEC files so that CPSID may then be available on the ASEC. With CPSID on the ASEC, opportunities for using the CPS as a panel multiply since the ASEC is the premier CPS supplement. Theoretically, Census-provided household and person identifiers should be sufficient to link the March Basic Monthly CPS and ASEC files. If that were the case, researchers would have many demographic variables with which to check the

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[18] Notice that the November Hispanic oversample respondents are also contacted an extra time outside of their 8 scheduled CPS Basic interviews. In fact, since the November Hispanic oversample includes households from all MIS's, it is possible that a household from the November Hispanic oversample is contacted two extra times. Thus, though the common understanding of the CPS rotation pattern implies that households are interviewed at most 8 times is technically not correct. As part of the ASEC oversampling, it is possible for Hispanic oversample households to be contacted 10 separate times and MIS-9 oversample households to be contacted 9 times. Unfortunately, MIS values do not go higher than 8.

validity of matches. Practically, however, the linking keys that should uniquely identify records do not always.[19] Table 3 details by year (1989-2013) the variables used to link the March Basic Monthly CPS and ASEC, the number of persons in the March Basic Monthly CPS, the number of matches/non-matches to the ASEC, and the number of invalidated matches. From 1994 forward, we validate matches based on AGE, SEX, and RACE[20], and we find high validation rates for links made between the March Basic Monthly CPS and ASEC files.

MARBASECID is a 10-digit variable that links individuals in the March Basic Monthly CPS of year X (1989-2013) to the ASEC in the same year. Each person in both the March Basic Monthly CPS and the ASEC in a given year are assigned a unique ID that consists of two digits (either 00 or 11), a two-digit year, and a six-digit sequence number. For individuals who appear in both the March Basic Monthly CPS and the ASEC, the two-digit number that becomes the first two digits in MARBASECID is 11; the six-digit sequence number begins at 000001 and increments by one for each additional person in the file who also matches. For a matched observation in March Basic Monthly CPS 1989, MARBASECID is 11 + 89 + six-digit sequence number. The two-digit number for unlinked observations in both the March Basic Monthly CPS and the ASEC is 00. For unlinked March Basic Monthly CPS individuals, MARBASECID takes the form: 00 + two-digit year + six-digit sequence number starting at 000001 and incrementing by one for each unlinked March Basic Monthly CPS person. For unlinked ASEC individuals, MARBASECID is a concatenation of 00, two-digit year, and a six-digit number starting at 500,000 and incrementing by one for each unlinked ASEC observations. This method ensures that MARBASECID is unique within and across years.

Our strategy for creating MARBASECID is slightly different depending on the types of problems we encounter linking the March Basic Monthly CPS and ASEC files. From 2005 to 2013, the matching algorithm is very simple. Using the IPUMS variables listed in Table 3, one is able to uniquely identify all March Basic Monthly CPS respondents and ASEC respondents. Using Census-provided linking keys, March Basic Monthly CPS observations are easily located in the ASEC.

From 1996 to 2004, the matching algorithm is more complicated because of duplicate records caused by non-unique linking keys. We describe our strategy for handling addressing these issues and detail specific problems we encounter. Our strategy for handling the duplicate records is as follows. During the first stage, duplicate records based on the first stage linking keys in Table 3 are identified and flagged in both the March Basic Monthly CPS and the ASEC. Then, March Basic Monthly CPS records that are not uniquely identified are dropped from the file. Within a pair of ASEC duplicates, we keep the duplicate with the lowest H_SEQ value since these records are part of the March Basic Monthly CPS rather than an ASEC oversample[21]. We then merge the pruned March Basic Monthly CPS and ASEC files using the first stage linking keys in Table X. The second stage of work uses the observations from the duplicate record file (i.e. the "pruned" observations) and the non-matches from the first round of matching. We link records using the fewest variables possible. Even then, the data sometimes require a close analysis of a few observations in order to find the correct match.

[19] Feng, 2001.

[20] We follow the evaluation of validity using age, sex and race in line with Madrian and Lefgren (2000).

[21] U.S. Census Bureau. (2014, December). American Time Use Survey User's Guide: Understanding ATUS 2003 to 2013. Retrieved from http://www.bls.gov/tus/atususersguide.pdf.

We also employ the two-stage approach to linking the March Basic Monthly CPS to the ASEC from 1996 to 2004 to make as many reasonable linkages as possible using all information available. The period 2001 to 2004 was potentially problematic because of the SCHIP expansion of the ASEC oversample. CPS documentation details the variables researchers should use for linking though these variables do not uniquely identify records, thus complicating the process. The 1996 to 2000 period was also problematic for unknown reasons.

The greatest challenges in creating MARBASECID occur prior to 1996 when data quality problems (i.e. duplicate records based on linking keys , missing observations) are more common. In 1995, we also employ the two-stage matching approach, but we encountered problems with 951 observations from the March Basic Monthly CPS unable to match to the ASEC. It is possible that the observations are missing from the ASEC, though we have yet to find documentation about this specific issue.

To link the 1994 March Basic Monthly CPS and ASEC files, we employ first and second stage matching (Table 3) and also make additional adjustments. The most important adjustment is that the ASEC file must contain a corrected version of HRHHID. The originally released 1994 ASEC file contained an error in HRHHID resulting from the program that created the variable[22]. A corrected file was made available via NBER in 2003 and is available via IPUMS-CPS. Without the corrected version of HRHHID, it is impossible to match the March Basic Monthly CPS and the ASEC in 1994. Several other minor adjustments must be made and are explained in detail in the Appendix (see Appendix Section 2 - Merge Details). These adjustments include harmonizing age for a few observations (i.e. an observation may have age of 81 in the March Basic Monthly CPS but 80+ in the ASEC) and dealing with a couple of duplicated observations.

Prior to 1994, Census released very few variables for linking surveys. Despite trying to avoid merging on AGE, SEX, and RACE, we used these variables to uniquely identify and match all March Basic Monthly CPS observations to the ASEC.

Linking Research Potential

This section describes the nuances of linking from non-March Basic Monthly CPS files to the ASEC and provides two substantive research examples. The previous sections have focused on how the full March Basic Monthly CPS can be linked to a subsample of ASEC respondents. Because of the CPS rotation pattern, in which each household appears in the CPS up to eight times denoted by their month in sample (MIS) value, one can link data from up to 3 months prior (December, January, February) and up to 3 months after (April, May, June) (see Figure 2 in Appendix). In theory 25% of the December/June Basic Monthly CPS will link to March/ASEC (respondents in MIS 1, 5 for December, respondents in MIS 4, 8 for June); 50% of the January/May Basic Monthly CPS will link to March/ASEC (respondents in MIS 1, 2, 5, 6 for January, respondents in MIS 3, 4, 7, 8 for May); 75% of the February/April Basic Monthly CPS will link to March/ASEC (respondents in MIS 1, 2, 3, 5, 6, 7 for February, respondents in MIS 2, 3, 4, 6, 7, 8 for April). In practice, however, mobility, mortality, births, and non-response are major issues for the CPS. Therefore, actual linkage rates are lower than possible linkage rates.

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[22] U.S. Census Bureau. (1996, March). Appendix for March 1994. Retrieved from http://www.nber.org/morg/docs/usernote.asc

Based on our work to create MARBASECID (described above) and previous work to create CPSID (see Drew, Flood, & Warren 2014), researchers can now use CPS Basic Monthly or supplement data in combination with the ASEC. Data from December of year x through June of year x+1 can be linked to ASEC data in year x+1 for respondents who are also in the March Basic Monthly CPS in year x+1. To illustrate this, we used CPSID and linked observations from the ASEC to eligible Basic Monthly Survey data between 1989 and 2013. Table 4 shows the actual number of linkages to each ASEC and indicates that the percent of linkages to the ASEC are consistently high. In line with expected attrition rates[23], we also see that that the months furthest from March (December, June) have the lowest percentage of actual links (around 90% of the potential links) while the months adjacent to March (February, April) have the highest percentages (most commonly around 95%).

Two subtle issues warrant discussion. First, the percentage of links for April, May and June of 2001 are substantially lower than in other years (see the row for 2001 in Table 4 for April, May and June). For example, the MIS 8 links from June are typically around 90 percent but only about 75% in 2001. This relatively low percentage is due to the SCHIP sample expansion explained above. Recall that the size of the Basic Monthly CPS increased through the inclusion of additional households, which increases the denominator in the ratio of the number of linked respondents over the number of respondents in that particular sample.

Second, there are no links for June of 1995. The reason for this is that the Census Bureau specifically scrambled the household identifiers making it impossible to link the months of June, July and August 1995 to surrounding months. In other words, it is not possible to use CPS identifiers to make linkages from June, July, or August 1995 to surrounding months. This results in three different times frames for making individual linkages over time: 1) May 1995 and prior, 2) June, July, and August 1995, 3) September 1995 forward. As a result, June 1995 respondents are not linkable to the March 1995 sample[24].

The ability to easily link CPS observations over time to the ASEC creates opportunities for many lines of research that have previously been limited without deep knowledge of the ASEC and the CPS more generally. The ASEC is especially important for researchers who want to leverage information about taxes, health insurance, public benefit use, among other things because these data are not collected in the CPS outside of the ASEC. Figure 3 shows the supplements that may be linked to the March Basic (and ASEC). By using MARBASECID and CPSID, researchers will now be able to link ASEC observations to other Basic Monthly CPS observations (depending on the rotation pattern). We illustrate two ways CPSID and MARBASECID can be leveraged to link variables across different CPS datasets.

Substantive Example #1: Child Tax Credit Receipt and Food Security

What is the relationship between the receiving the Child Tax Credit and food security? Tax credit questions are only asked in the ASEC and food security is only assessed in December in recent years. Examining this relationship requires linking ASEC and December Food Security files. We illustrate both cross-sectional and longitudinal use cases.

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[23] See Drew, J. A. R., Flood, S., & Warren, J. R. (2013). Making Full Use of the Longitudinal Design of the Current Population Survey: Methods for Linking Records Across 16 Months.

[24] See U.S. Census Bureau. (1996, March). Appendix for March 1994. Retrieved from http://www.nber.org/morg/docs/usernote.asc

For illustration purposes, we link the December 2005 – December 2008 Basic Monthly CPS files to their ASEC observations in the following year (2006-2009) using CPSID and MARBASECID (see Table 5). First, only ¼ of the December Basic Monthly CPS can be linked to the March Basic Monthly CPS (via CPSID) and accordingly the ASEC (via March and MARBASECID) (MIS 1 and MIS 5) given the CPS rotation pattern. Column 3 in Table 5 shows that about 24% of the December Basic Monthly CPS respondents are potentially linkable to March Basic Monthly CPS. Using CPSID, we are able to match nearly 30,000 observations between the December and March Basic Monthly surveys, which is about 22% of the entire December Basic Monthly CPS (Table 5, Column 5) and about 90% of all cases that could have been linked to the March Basic Monthly CPS (Table 5, Column 6). The linkage rates are consistent with other observations four months apart (see Drew, Flood, and Warren 2014); unlinked records are likely due to migration, mortality, non-response and linking errors.

After linking December Basic Monthly CPS respondents linked to their March Basic Monthly CPS observations using CPSID, we use MARBASECID to make the link to the ASEC. All cases are retained since MARBAESCID perfectly links the March Basic Monthly observations to the ASEC in the 2005-2009 period (see Table 3). However, since we are interested in linking the food security supplement from the December CPS to tax information collected in the ASEC, we must keep in mind that not all respondents to the March Basic Monthly CPS respond to the tax questions (only persons 15 and older). Column 7 in Table 5 shows the number of links that have both food security and tax information available, which translates into about 15% of the entire December Basic Monthly CPS (Table 5, Column 8) or about 62% of the total MIS 1, 5 observations from the December Basic Monthly CPS (Table 5, Column 9).

One may also leverage the possibility of including information from the ASEC as part of a panel of CPS data to examine how the child tax credit has affected the food security of a particular individual over time. This requires extending the December (MIS 1) to ASEC linkage (MIS 4) forward in time to include the subsequent December (MIS 5) and ASEC (MIS 8) observations. For example, individuals from MIS 1 in December 2005 are linked first to March 2005 using CPSID (and then to the ASEC using MARBASECID); CPSID is then used again to link to December 2006 (when they are MIS 5) and then to March 2006 (via CPSID and then MARBASECID to link to the ASEC). About 5% of respondents from each of the December Basic Monthly CPS surveys from 2005-2008 may be linked in this way (these links include only individuals with both food security and child tax credit data in both years) (see Table 5, Column 11) . Of those potentially linkable (MIS 1 in December of a given year), about 70% are linked (see Table 5, Column 12). Given universe and attrition, these percentages are actually rather high. Moreover, the resulting samples (about 7,000 observations for each year) are sizeable.

Substantive Example #2: Outgoing Rotation Groups and the ASEC

Another research opportunity made possible using CPSID and MARBASECID is using the Outgoing Rotation Group (ORG) questions with the ASEC (see Figure 4). Since 1979, specific employment questions have been asked only of the outgoing rotation groups (MIS 4, 8) of each Basic Monthly Survey. Information is collected on topics such as usual hours worked, hourly wage rate, usual weekly earnings, union membership, class of worker, and multiple job holdings (hence called the "earner study" questions). Importantly, these data are "a good measure of a 'point-of-time' price of labor" (Dinardo, Fortin, Lemieux, 1995). Similar information is collected in the ASEC, but the reference period is the "past year" and

information is not collected about multiple jobs. Given the difference in the reference period, many researchers prefer to use wage data from the ORGs.

A researcher who wants to combine information from the ORG with the variables available only on the ASEC would need to link the March Basic Monthly CPS to the ASEC. Only potentially 25% of March Basic Monthly CPS respondents would have this weekly wage data available since only the outgoing rotations (MIS 1 and 4) respond to the earner study questions. Table 6 shows that the ORG respondents represent only about 20% of the entire March Basic Monthly CPS, which is slightly lower than the expected 25%. While sample sizes are still reasonable, researchers can leverage the power of the short panel aspect of the CPS to pull in ORG data from individuals in surrounding months. CPSID and MARBASECID simplify the work of linking the ASEC to April to recover the ORG responses for March MIS 3 and 7, May for MIS 2 and 6, and June for MIS 1, 5 (see Figure 4).

Table 6 shows the actual number of linkages between the March Basic Monthly CPS and the ASEC between 2005 and 2009. If a researcher uses ORGs only from the March Basic Monthly CPS, one would have about 20% of the March Basic Monthly CPS with earnings data (see Table 6, Column 5, rows MIS 4, 8). But, using ORG data from April, May, and June in combination with the ASEC, about 90,000 observations that can be linked (Table 6, Column 2, April, May, June) and nearly 75,000 of those observations have earnings data (recall that only civilians age 15 and older who are currently employed as a wage or salaried worker respond to ORG questions). This is a dramatic increase in sample size for a total of about 100,000 individuals, allowing for analysis of subpopulations. After linking April, May, and June observations to March via CPSID, researchers may then use MARBASECID to link to any ASEC data of interest.

Researchers may also make these kinds of linkages across years to get ASEC data combined with earnings data at two points in time. The process generally required is as described above for year x and year x+1 and then linkages from year x to year x+1 are made using CPSID. As Table 6 shows, this is possible for about 30% of the March Basic Monthly CPS, which is substantially higher than if we only linked the MIS 4's from the March Basic Monthly CPS (resulting in about only 7% of the March Basic Monthly CPS that is linked across years with earnings data) (see Table 6, Column 7). Importantly, this increases the total sample size from about just under 10,000 observations to over 35, 000 (see Table 6, Column 6).

In summary, researchers looking to use ORG variables with ASEC data are typically limited to only about 20% of the March Basic Monthly CPS if they only use observations with earnings data collected in March. By linking to subsequent ORG responses from the Basic Monthly CPS in April, May, and June, the number of cases is nearly quadrupled, increasing the power for using earnings data with the ASEC.

Conclusion

The development of MARBASECID helps researchers overcome the tedious task of linking Basic Monthly CPS data to ASEC data. As we have shown, the increasingly complicated oversample of the ASEC presents serious obstacles for linking March Basic Monthly CPS responses (and other months) to the ASEC. MARBASECID in conjunction with CPSID allows researchers to use the ASEC in combination with the Basic Monthly CPS files and their supplements to unlock the potential of these vast data. Both MARBASECID and CPSID (along with the variables used to create these) will be made

available exclusively via the IPUMS-CPS website, updated as new data become available, and fully documented for use by the research community.

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Table 1. CPS Rotation Pattern

	Year X												Year X+1			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
MiS 1	Jan_X	Feb_X	Mar_X	Apr_X	May_X	Jun_X	Jul_X	Aug_X	Sep_X	Oct_X	Nov_X	Dec_X	Jan_{X+1}	Feb_{X+1}	Mar_{X+1}	Apr_{X+1}
MiS 2	Dec_{X-1}	Jan_X	Feb_X	Mar_X	Apr_X	May_X	Jun_X	Jul_X	Aug_X	Sep_X	Oct_X	Nov_X	Dec_X	Jan_{X+1}	Feb_{X+1}	Mar_{X+1}
MiS 3	Nov_{X-1}	Dec_{X-1}	Jan_X	Feb_X	Mar_X	Apr_X	May_X	Jun_X	Jul_X	Aug_X	Sep_X	Oct_X	Nov_X	Dec_X	Jan_{X+1}	Feb_{X+1}
MiS 4	Oct_{X-1}	Nov_{X-1}	Dec_{X-1}	Jan_X	Feb_X	Mar_X	Apr_X	May_X	Jun_X	Jul_X	Aug_X	Sep_X	Oct_X	Nov_X	Dec_X	Jan_{X+1}
MiS 5	Jan_{X-1}	Feb_{X-1}	Mar_{X-1}	Apr_{X-1}	May_{X-1}	Jun_{X-1}	Jul_{X-1}	Aug_{X-1}	Sep_{X-1}	Oct_{X-1}	Nov_{X-1}	Dec_{X-1}	Jan_X	Feb_X	Mar_X	Apr_X
MiS 6	Dec_{X-2}	Jan_{X-1}	Feb_{X-1}	Mar_{X-1}	Apr_{X-1}	May_{X-1}	Jun_{X-1}	Jul_{X-1}	Aug_{X-1}	Sep_{X-1}	Oct_{X-1}	Nov_{X-1}	Dec_{X-1}	Jan_X	Feb_X	Mar_X
MiS 7	Nov_{X-2}	Dec_{X-2}	Jan_{X-1}	Feb_{X-1}	Mar_{X-1}	Apr_{X-1}	May_{X-1}	Jun_{X-1}	Jul_{X-1}	Aug_{X-1}	Sep_{X-1}	Oct_{X-1}	Nov_{X-1}	Dec_{X-1}	Jan_X	Feb_X
MiS 8	Oct_{X-2}	Nov_{X-2}	Dec_{X-2}	Jan_{X-1}	Feb_{X-1}	Mar_{X-1}	Apr_{X-1}	May_{X-1}	Jun_{X-1}	Jul_{X-1}	Aug_{X-1}	Sep_{X-1}	Oct_{X-1}	Nov_{X-1}	Dec_{X-1}	Jan_X

Note: Table reports the month and year in which respondents began the CPS, separately by calendar month and survey month-in-sample. For example, "Oct_{X-2}" in the bottom left cell means that respondents in month-in-sample 8 in January of Year X first entered the CPS in October of Year X-2.

Table 2. Administering the ASEC to Oversamples Over Time.

ASEC Sample Includes:	Month ASEC Administered	1947-1955	1956-1975	1976-2000	2001-2003	2004-present
April Basic	April	x	--	--	--	--
March Basic	March	--	x	x	x	x
"Hispanic Oversample" November						
MIS 1	February[c]	--	--	x	x	x
MIS 2	March[c]	--	--	x	x	x
MIS 3	March[c]	--	--	x	x	x
MIS 4	March[c]	--	--	x	x	x
MIS 5	February[c]	--	--	x	x	x
MIS 6	March[c]	--	--	x	x	x
MIS 7	March[c]	--	--	x	x	x
MIS 8	March[c]	--	--	x	x	x
Non-Hispanic [a]						
November (MIS 6,7,8)	March[d]	--	--	--	x	--
August (MIS 8)	February[d]	--	--	--	--	x
September (MIS 8)	February[d]	--	--	--	--	x
October (MIS 8)	April[d]	--	--	--	--	x
February (MIS 4, 8)[b]	February[e]	--	--	--	x	x
April (MIS 1, 5)	April[e]	--	--	--	x	x

[a]Includes non-Hispanic non-Whites and non-Hispanic Whites with children 18 years or less

[b]These cases are identified in November as MIS 1,5

[c]These dwellings are interviewed a 9th and 10th time which can be considered MIS 9 and MIS 10

[d]These dwellings are interviewed a 9th time which can be considered MIS 9

[e]These dwellings are part of the split-path supplement assignment.

Table 3. ASEC-March Basic Matches & Match Validation by Year, 1989-2013.

Linking Period

1989-1993

First Stage Merge Variables: IPUMS (HRHHID, PERNUM, AGE, SEX, RACE) Census (H-IDNUM, A-LINENO, A-AGE, A-SEX, A-RACE)

Additional Variables for Second Stage Merge: N/A

Year	Persons	1st Stage Matches	2nd Stage Matches	Non-Matches	Match Rate (Matches/Persons)	Unvalidated Matches		
						Sex	Race	Age
1989	137,384	137,384	N/A	0	100.00	0	0	0
1990	148,730	148,730	N/A	0	100.00	0	0	0
1991	148,228	148,228	N/A	0	100.00	0	0	0
1992	145,355	145,355	N/A	0	100.00	0	0	0
1993	144,618	144,618	N/A	0	100.00	0	0	0

1994-1995[a]

First Stage Merge Variables: IPUMS (HRHHID, HUHHNUM, STATECENSUS, PERNUM) Census (H-IDNUM, H-HHNUM, GESTCEN, A-LINENO)

Additional Variables for Second Stage Merge: IPUMS (AGE, SEX, RACE, NUMPREC) Census (PRTAGE, PESEX, PTDTRACE, HRNUMHOU)

Year	Persons	1st Stage Matches	2nd Stage Matches	Non-Matches	Match Rate (Matches/Persons)	Unvalidated Matches		
						Sex	Race	Age
1994	140,625	140,079	546	0	100.00	115	95	212
1995[b]	138,872	137,473	448	951	99.32	0	0	0

1996-2000[a]

First Stage Merge Variables: IPUMS (HRHHID, HUHHNUM, STATECENSUS, PERNUM) Census (H-IDNUM, H-HHNUM, GESTCEN, A-LINENO)

Additional Variables for Second Stage Merge: IPUMS (AGE, SEX, RACE, NUMPREC) Census (PRTAGE, PESEX, PTDTRACE, HRNUMHOU)

Year	Persons	1st Stage Matches	2nd Stage Matches	Non-Matches	Match Rate (Matches/Persons)	Unvalidated Matches		
						Sex	Race	Age
1996[b]	120,186	120,179	4	3	99.9975	3	3	3
1997	120,989	120,981	8	0	100.00	0	0	0
1998	120,507	120,504	3	0	100.00	0	0	0
1999	120,776	120,760	16	0	100.00	0	0	0
2000	121,194	121,149	45	0	100.00	0	0	0

2001-2004[a]

First Stage Merge Variables: IPUMS (HRHHID, HUHHNUM, STATECENSUS, PERNUM) Census (H-IDNUM, H-HHNUM, GESTCEN, A-LINENO)

Additional Variables for Second Stage Merge: IPUMS (AGE, SEX, RACE, NUMPREC, OCC) Census (PRTAGE, PESEX, PTDTRACE, HRNUMHOU, PEIO1OCD)

Year	Persons	1st Stage Matches	2nd Stage Matches	Non-Matches	Match Rate (Matches/Persons)	Unvalidated Matches		
						Sex	Race	Age
2001[b]	116,663	116,585	78	0	100.00	10	213	573
2002[b]	139,660	139,592	68	0	100.00	0	0	128
2003[b]	141,288	141,220	68	0	100.00	0	0	3957
2004[b]	138,350	138,277	73	0	100.00	0	154	1832

2005-2013

First Stage Merge Variables: IPUMS (HRHHID, HRHHID2, PERNUM) Census (H-IDNUM, H-IDNUM2, A-LINENO)

Additional Variables for Second Stage Merge: N/A

Year	Persons	1st Stage Matches	2nd Stage Matches	Non-Matches	Match Rate (Matches/Persons)	Unvalidated Matches		
						Sex	Race	Age
2005	136,315	136,315	N/A	0	100.00	0	0	0
2006	135,028	135,028	N/A	0	100.00	0	0	0
2007	133,817	133,817	N/A	0	100.00	0	0	0
2008	133,155	133,155	N/A	0	100.00	0	0	0
2009[b]	134,650	134,650	N/A	0	100.00	0	0	6
2010	135,478	135,478	N/A	0	100.00	0	0	0
2011	132,275	132,275	N/A	0	100.00	0	0	0
2012	131,372	131,372	N/A	0	100.00	0	0	0
2013	130,534	130,534	N/A	0	100.00	0	0	0

[a]See Appendix for details on second-stage merging.

[b]See Appendix for notes about non-matches.

Table 4. Actual Number of Basic CPS's that Link to March Basics by MIS

	December					
	MIS 1			MIS 5		
March Basic Year	In Basic	Link to March	Percent	In Basic	Link to March	Percent
1989	---[a]	---[a]	---[a]	---[a]	---[a]	---[a]
1990	18,639	16,542	*88.75%*	18,389	16,019	*87.11%*
1991	17,982	15,888	*88.36%*	19,172	16,705	*87.13%*
1992	18,345	16,247	*88.56%*	18,090	15,909	*87.94%*
1993	17,910	16,073	*89.74%*	18,227	16,272	*89.27%*
1994	17,622	15,637	*88.74%*	17,726	15,659	*88.34%*
1995	17,179	15,640	*91.04%*	17,306	15,951	*92.17%*
1996	15,892	13,052	*82.13%*	15,632	12,989	*83.09%*
1997	15,180	13,899	*91.56%*	15,035	13,852	*92.13%*
1998	15,058	13,889	*92.24%*	14,603	13,488	*92.36%*
1999	15,072	13,753	*91.25%*	15,056	13,853	*92.01%*
2000	14,163	12,979	*91.64%*	15,078	13,903	*92.21%*
2001	14,251	12,948	*90.86%*	14,556	13,419	*92.19%*
2002	17,121	15,569	*90.94%*	17,575	16,142	*91.85%*
2003	17,809	16,225	*91.11%*	17,298	15,936	*92.13%*
2004	16,808	15,383	*91.52%*	17,623	16,194	*91.89%*
2005	16,512	14,848	*89.92%*	17,512	16,030	*91.54%*
2006	16,373	14,809	*90.45%*	16,478	14,998	*91.02%*
2007	16,381	14,700	*89.74%*	16,417	14,707	*89.58%*
2008	16,166	14,693	*90.89%*	16,440	15,064	*91.63%*
2009	15,481	14,194	*91.69%*	15,910	14,679	*92.26%*
2010	16,337	14,878	*91.07%*	16,168	14,963	*92.55%*
2011	16,057	14,575	*90.77%*	16,754	15,273	*91.16%*
2012	16,200	14,636	*90.35%*	15,849	14,461	*91.24%*
2013	16,108	14,477	*89.87%*	15,922	14,428	*90.62%*

[a]: **No matches are presented here since the March 1989 sample links to the December 1988, which we do not include here.**

Table 4. Actual Number of Basic CPS's that Link to March Basics by MIS, continued

January

	MIS 1			MIS 2			MIS 5			MIS 6		
March Basic Year	In Basic	Link to March	Percent	In Basic	Link to March	Percent	In Basic	Link to March	Percent	In Basic	Link to March	Percent
1989	17,086	15,543	*90.97%*	17,784	16,182	*90.99%*	16,851	15,013	*89.09%*	17,725	15,901	*89.71%*
1990	18,080	16,439	*90.92%*	19,101	17,411	*91.15%*	18,403	16,521	*89.77%*	18,718	16,717	*89.31%*
1991	18,505	16,743	*90.48%*	18,126	16,479	*90.91%*	18,476	16,423	*88.89%*	19,234	17,221	*89.53%*
1992	17,492	15,953	*91.20%*	18,513	16,965	*91.64%*	18,735	16,751	*89.41%*	18,282	16,479	*90.14%*
1993	18,020	16,546	*91.82%*	18,222	16,735	*91.84%*	17,520	15,877	*90.62%*	18,330	16,722	*91.23%*
1994	16,863	15,652	*92.82%*	18,037	16,714	*92.67%*	17,582	16,378	*93.15%*	17,885	16,775	*93.79%*
1995	17,560	16,278	*92.70%*	17,729	16,487	*92.99%*	17,135	15,846	*92.48%*	17,767	16,703	*94.01%*
1996	14,517	13,445	*92.62%*	15,494	14,292	*92.24%*	14,795	13,806	*93.32%*	14,831	13,970	*94.19%*
1997	14,975	14,067	*93.94%*	15,531	14,552	*93.70%*	14,636	13,731	*93.82%*	15,294	14,445	*94.45%*
1998	14,918	13,920	*93.31%*	15,808	14,794	*93.59%*	14,592	13,734	*94.12%*	15,190	14,252	*93.82%*
1999	14,941	13,905	*93.07%*	15,479	14,443	*93.31%*	14,676	13,737	*93.60%*	15,480	14,553	*94.01%*
2000	14,807	13,824	*93.36%*	14,920	13,960	*93.57%*	15,161	14,086	*92.91%*	15,610	14,631	*93.73%*
2001	13,882	12,792	*92.15%*	14,763	13,705	*92.83%*	14,845	13,716	*92.39%*	14,838	13,972	*94.16%*
2002	17,552	16,368	*93.25%*	17,716	16,476	*93.00%*	16,882	15,758	*93.34%*	17,846	16,792	*94.09%*
2003	17,128	15,950	*93.12%*	18,412	17,200	*93.42%*	17,275	16,250	*94.07%*	17,691	16,693	*94.36%*
2004	16,647	15,497	*93.09%*	17,474	16,331	*93.46%*	16,901	15,785	*93.40%*	18,129	16,963	*93.57%*
2005	16,710	15,437	*92.38%*	16,991	15,644	*92.07%*	17,449	16,120	*92.38%*	17,843	16,721	*93.71%*
2006	16,747	15,448	*92.24%*	16,993	15,704	*92.41%*	16,866	15,469	*91.72%*	16,842	15,747	*93.50%*
2007	16,657	15,323	*91.99%*	16,735	15,490	*92.56%*	16,626	15,307	*92.07%*	16,528	15,287	*92.49%*
2008	16,407	15,177	*92.50%*	16,885	15,677	*92.85%*	16,571	15,506	*93.57%*	16,815	15,753	*93.68%*
2009	16,942	15,799	*93.25%*	16,443	15,396	*93.63%*	16,791	15,702	*93.51%*	16,537	15,553	*94.05%*
2010	16,375	15,331	*93.62%*	16,930	15,795	*93.30%*	17,057	15,975	*93.66%*	16,514	15,584	*94.37%*
2011	16,494	15,248	*92.45%*	16,312	15,179	*93.05%*	16,434	15,258	*92.84%*	16,932	15,827	*93.47%*
2012	16,139	14,970	*92.76%*	16,541	15,353	*92.82%*	16,439	15,121	*91.98%*	16,150	15,083	*93.39%*
2013	16,290	15,007	*92.12%*	16,664	15,234	*91.42%*	16,344	15,117	*92.49%*	16,335	15,105	*92.47%*

Table 4. Actual Number of Basic CPS's that Link to March Basics by MIS, continued

February

March Basic Year	MIS 1			MIS 2			MIS 3			MIS 5			MIS6			MIS 7		
	In Basic	Link to March	Percent	In Basic	Link to March	Percent	In Basic	Link to March	Percent	In Basic	Link to March	Percent	In Basic	Link to March	Percent	In Basic	Link to March	Percent
1989	17,102	15,913	93.05%	17,488	16,287	93.13%	17,712	16,574	93.57%	17,033	15,379	90.29%	16,849	15,542	92.24%	17,758	16,358	92.12%
1990	18,363	17,082	93.02%	18,374	17,156	93.37%	19,021	17,798	93.57%	18,238	16,690	91.51%	18,681	17,200	92.07%	18,730	17,133	91.47%
1991	18,344	17,132	93.39%	18,834	17,532	93.09%	18,157	16,813	92.60%	18,599	17,066	91.76%	18,715	17,125	91.50%	19,177	17,623	91.90%
1992	17,751	16,618	93.62%	17,873	16,761	93.78%	18,590	17,297	93.04%	18,538	17,009	91.75%	18,903	17,310	91.57%	18,258	16,836	92.21%
1993	18,076	17,053	94.34%	18,445	17,419	94.44%	18,326	17,184	93.77%	17,692	16,427	92.85%	17,723	16,506	93.13%	18,492	17,239	93.22%
1994	16,653	15,878	95.35%	17,417	16,617	95.41%	18,013	17,103	94.95%	17,806	16,879	94.79%	17,711	16,882	95.32%	17,907	17,134	95.68%
1995	17,236	16,345	94.83%	17,804	16,988	95.42%	17,682	16,812	95.08%	16,584	15,858	95.62%	17,286	16,421	95.00%	17,704	16,997	96.01%
1996	15,065	14,408	95.64%	14,915	14,168	94.99%	15,559	14,779	94.99%	14,765	14,159	95.90%	14,910	14,320	96.04%	14,871	14,336	96.40%
1997	14,828	14,288	96.36%	15,262	14,596	95.64%	15,483	14,799	95.58%	14,744	14,209	96.37%	14,786	14,181	95.91%	15,342	14,794	96.43%
1998	14,859	14,224	95.73%	15,195	14,475	95.26%	15,717	15,057	95.80%	14,725	14,066	95.52%	14,750	14,194	96.23%	15,175	14,513	95.64%
1999	14,598	13,887	95.13%	15,358	14,598	95.05%	15,497	14,815	95.60%	14,755	14,124	95.72%	14,808	14,127	95.40%	15,410	14,780	95.91%
2000	14,522	13,789	94.95%	15,199	14,482	95.28%	14,946	14,253	95.36%	14,931	14,215	95.20%	15,335	14,591	95.15%	15,724	15,034	95.61%
2001	14,490	13,775	95.07%	14,249	13,494	94.70%	14,829	14,123	95.24%	14,498	13,768	94.96%	15,001	14,269	95.12%	14,893	14,326	96.19%
2002	17,258	16,411	95.09%	17,858	17,071	95.59%	17,635	16,850	95.55%	17,137	16,379	95.58%	17,161	16,437	95.78%	17,892	17,213	96.21%
2003	17,587	16,737	95.17%	17,522	16,695	95.28%	18,467	17,613	95.38%	17,255	16,519	95.73%	17,464	16,798	96.19%	17,627	16,997	96.43%
2004	16,874	16,043	95.08%	17,148	16,345	95.32%	17,497	16,709	95.50%	17,871	16,913	94.64%	17,289	16,485	95.35%	18,282	17,471	95.56%
2005	16,426	15,488	94.29%	17,147	16,174	94.33%	16,914	16,022	94.73%	17,240	16,297	94.53%	17,680	16,751	94.75%	17,803	17,100	96.05%
2006	16,874	16,020	94.94%	17,127	16,276	95.03%	17,149	16,309	95.10%	16,669	15,669	94.00%	17,183	16,224	94.42%	16,880	16,220	96.09%
2007	16,406	15,540	94.72%	17,091	16,110	94.26%	16,711	15,907	95.19%	16,474	15,374	93.32%	16,843	15,954	94.72%	16,657	15,847	95.14%
2008	16,050	15,262	95.09%	16,777	15,898	94.76%	16,923	16,131	95.32%	16,425	15,564	94.76%	16,991	16,244	95.60%	16,923	16,238	95.95%
2009	16,537	15,740	95.18%	17,623	16,755	95.07%	16,612	15,872	95.55%	16,309	15,617	95.76%	16,961	16,245	95.78%	16,671	16,049	96.27%
2010	16,535	15,725	95.10%	16,906	16,128	95.40%	17,251	16,415	95.15%	16,780	15,991	95.30%	17,468	16,658	95.36%	16,689	16,033	96.07%
2011	16,367	15,498	94.69%	16,797	15,890	94.60%	16,436	15,600	94.91%	16,095	15,216	94.54%	16,694	15,917	95.35%	16,922	16,172	95.57%
2012	16,265	15,348	94.36%	16,749	15,866	94.73%	16,696	15,842	94.89%	16,092	15,278	94.94%	16,679	15,773	94.57%	16,233	15,474	95.32%
2013	16,072	15,133	94.16%	16,643	15,729	94.51%	16,493	15,569	94.40%	15,983	15,214	95.19%	16,530	15,693	94.94%	16,217	15,474	95.42%

Table 4. Actual Number of Basic CPS's that Link to March Basics by MIS, continued

April

March Basic Year	MIS 2 In Basic	Link to March	Percent	MIS 3 In Basic	Link to March	Percent	MIS 4 In Basic	Link to March	Percent	MIS 6 In Basic	Link to March	Percent	MIS 7 In Basic	Link to March	Percent	MIS 8 In Basic	Link to March	Percent
1989	17,418	15,915	91.37%	17,248	16,142	93.59%	17,432	16,303	93.52%	17,757	15,886	89.46%	17,226	15,673	90.98%	16,965	15,555	91.69%
1990	19,065	17,517	91.88%	18,847	17,587	93.31%	18,423	17,173	93.22%	18,593	16,755	90.11%	18,574	17,046	91.77%	18,747	17,237	91.95%
1991	18,459	16,880	91.45%	18,481	17,285	93.53%	18,556	17,476	94.18%	19,000	17,172	90.38%	18,768	17,248	91.90%	18,531	17,051	92.01%
1992	18,310	16,808	91.80%	17,852	16,709	93.60%	17,494	16,412	93.82%	18,257	16,397	89.81%	18,577	16,992	91.47%	18,719	17,058	91.13%
1993	18,509	16,880	91.20%	18,321	17,124	93.47%	18,082	17,002	94.03%	18,301	16,617	90.80%	17,786	16,374	92.06%	17,526	16,281	92.90%
1994	17,750	16,557	93.28%	17,146	16,369	95.47%	17,431	16,598	95.22%	18,239	17,239	94.52%	17,927	17,097	95.37%	17,808	17,021	95.58%
1995	17,707	16,551	93.47%	17,441	16,710	95.81%	17,624	16,886	95.81%	17,488	16,432	93.96%	16,904	16,081	95.13%	17,185	16,468	95.83%
1996	15,354	14,371	93.60%	15,525	14,944	96.26%	14,958	14,295	95.57%	15,165	14,269	94.09%	15,194	14,472	95.25%	15,100	14,533	96.25%
1997	15,655	14,739	94.15%	15,337	14,718	95.96%	15,135	14,584	96.36%	15,239	14,413	94.58%	15,161	14,589	96.23%	14,905	14,343	96.23%
1998	15,325	14,271	93.12%	15,316	14,580	95.19%	15,141	14,525	95.93%	15,212	14,288	93.93%	15,102	14,386	95.26%	14,838	14,293	96.33%
1999	15,536	14,444	92.97%	15,038	14,284	94.99%	15,325	14,594	95.23%	14,865	13,901	93.51%	15,156	14,370	94.81%	14,933	14,243	95.38%
2000	15,023	14,006	93.23%	15,043	14,282	94.94%	15,285	14,626	95.69%	15,798	14,905	94.35%	15,356	14,654	95.43%	15,466	14,773	95.52%
2001	17,761	13,735	77.33%	17,390	13,983	80.41%	16,981	13,545	79.77%	17,525	13,827	78.90%	17,517	14,006	79.96%	17,812	14,263	80.08%
2002	17,796	16,365	91.96%	17,878	16,954	94.83%	17,903	17,179	95.96%	17,809	16,646	93.47%	17,502	16,689	95.35%	17,270	16,561	95.89%
2003	18,202	17,063	93.74%	18,187	17,361	95.46%	17,604	16,884	95.91%	17,768	16,861	94.90%	17,615	16,881	95.83%	17,660	16,997	96.25%
2004	17,087	15,799	92.46%	17,276	16,351	94.65%	17,130	16,290	95.10%	18,009	16,789	93.23%	18,082	17,167	94.94%	17,210	16,402	95.31%
2005	17,158	15,795	92.06%	17,005	15,931	93.68%	17,196	16,259	94.55%	17,412	16,057	92.22%	17,518	16,524	94.33%	17,674	16,831	95.23%
2006	17,392	16,200	93.15%	17,228	16,365	94.99%	17,204	16,431	95.51%	16,978	15,808	93.11%	16,777	15,919	94.89%	17,214	16,329	94.86%
2007	17,163	15,979	93.10%	16,979	16,112	94.89%	17,234	16,369	94.98%	17,296	16,116	93.18%	16,823	15,867	94.32%	17,097	16,234	94.95%
2008	16,950	15,783	93.12%	16,515	15,737	95.29%	16,916	16,083	95.08%	17,144	16,181	94.38%	16,684	15,883	95.20%	17,069	16,363	95.86%
2009	17,667	16,466	93.20%	17,048	16,161	94.80%	17,707	16,827	95.03%	17,114	16,053	93.80%	16,572	15,839	95.58%	17,084	16,362	95.77%
2010	17,228	16,022	93.00%	17,000	16,060	94.47%	16,999	16,202	95.31%	17,709	16,493	93.13%	17,059	16,193	94.92%	17,684	16,812	95.07%
2011	17,139	16,014	93.44%	16,790	15,946	94.97%	16,803	15,972	95.05%	16,775	15,740	93.83%	16,382	15,544	94.88%	16,797	15,946	94.93%
2012	16,974	15,909	93.73%	16,362	15,539	94.97%	16,641	15,843	95.20%	16,876	15,850	93.92%	16,320	15,611	95.66%	16,756	15,892	94.84%
2013	16,898	15,584	92.22%	16,525	15,597	94.38%	16,609	15,817	95.23%	16,622	15,425	92.80%	16,413	15,644	95.31%	16,642	15,860	95.30%

Table 4. Actual Number of Basic CPS's that Link to March Basics by MIS, continued

May

March Basic Year	MIS 3			MIS 4			MIS 7			MIS 8		
	In Basic	Link to March	Percent	In Basic	Link to March	Percent	In Basic	Link to March	Percent	In Basic	Link to March	Percent
1989	17,303	15,484	89.49%	17,176	15,592	90.78%	17,745	15,565	87.71%	17,190	15,287	88.93%
1990	19,031	17,150	90.12%	18,787	17,152	91.30%	18,629	16,412	88.10%	18,557	16,566	89.27%
1991	18,342	16,364	89.22%	18,484	16,897	91.41%	18,979	16,707	88.03%	18,608	16,724	89.88%
1992	18,361	16,410	89.37%	17,871	16,286	91.13%	18,416	16,143	87.66%	18,576	16,749	90.16%
1993	18,402	16,404	89.14%	18,241	16,733	91.73%	18,276	16,227	88.79%	17,664	15,920	90.13%
1994	17,790	16,145	90.75%	17,024	15,974	93.83%	18,259	16,877	92.43%	17,797	16,625	93.41%
1995	17,751	16,203	91.28%	17,474	16,399	93.85%	17,425	16,050	92.11%	17,070	15,862	92.92%
1996	15,261	13,875	90.92%	15,288	14,439	94.45%	15,114	13,830	91.50%	15,157	14,101	93.03%
1997	15,658	14,350	91.65%	15,250	14,298	93.76%	15,287	14,042	91.86%	15,295	14,300	93.49%
1998	15,411	13,975	90.68%	15,396	14,305	92.91%	15,382	14,021	91.15%	15,235	14,127	92.73%
1999	15,598	14,171	90.85%	15,080	13,981	92.71%	14,928	13,612	91.18%	15,160	14,060	92.74%
2000	15,076	13,704	90.90%	14,979	13,974	93.29%	15,721	14,519	92.35%	15,410	14,359	93.18%
2001	14,878	13,453	90.42%	14,711	13,747	93.45%	14,778	13,557	91.74%	14,846	13,760	92.68%
2002	17,868	15,920	89.10%	17,850	16,550	92.72%	17,738	16,168	91.15%	17,590	16,363	93.02%
2003	18,339	16,667	90.88%	18,173	16,888	92.93%	17,778	16,417	92.34%	17,688	16,557	93.61%
2004	17,174	15,389	89.61%	17,239	15,947	92.51%	18,070	16,406	90.79%	18,074	16,754	92.70%
2005	17,240	15,382	89.22%	17,142	15,673	91.43%	17,472	15,716	89.95%	17,604	16,218	92.13%
2006	17,350	15,664	90.28%	17,180	15,895	92.52%	16,949	15,347	90.55%	16,809	15,563	92.59%
2007	17,280	15,585	90.19%	17,048	15,778	92.55%	17,422	15,766	90.49%	16,931	15,629	92.31%
2008	17,059	15,413	90.35%	16,440	15,257	92.80%	17,268	15,830	91.67%	16,636	15,475	93.02%
2009	17,821	16,167	90.72%	17,022	15,764	92.61%	17,197	15,708	91.34%	16,733	15,546	92.91%
2010	17,191	15,565	90.54%	16,864	15,611	92.57%	17,595	16,084	91.41%	17,041	15,865	93.10%
2011	17,202	15,711	91.33%	16,826	15,682	93.20%	16,763	15,454	92.19%	16,495	15,343	93.02%
2012	16,904	15,428	91.27%	16,398	15,149	92.38%	16,887	15,480	91.67%	16,428	15,352	93.45%
2013	16,970	15,172	89.40%	16,506	15,214	92.17%	16,648	15,046	90.38%	16,556	15,437	93.24%

Table 4. Actual Number of Basic CPS's that Link to March Basics by MIS, cont'd

June

	MIS 4			MIS 8		
March Basic Year	In Basic	Link to March	Percent	In Basic	Link to March	Percent
1989	17,109	14,949	*87.38%*	17,602	15,127	*85.94%*
1990	18,662	16,314	*87.42%*	18,398	15,775	*85.74%*
1991	18,250	15,879	*87.01%*	18,750	16,140	*86.08%*
1992	18,106	15,899	*87.81%*	18,302	15,565	*85.05%*
1993	18,257	15,904	*87.11%*	18,090	15,860	*87.67%*
1994	17,609	15,637	*88.80%*	18,014	16,343	*90.72%*
1995	17,548	---[b]	---[b]	17,329	---[b]	---[b]
1996	15,160	13,486	*88.96%*	15,158	13,602	*89.73%*
1997	15,616	14,049	*89.97%*	15,335	13,754	*89.69%*
1998	15,309	13,669	*89.29%*	15,355	13,779	*89.74%*
1999	15,551	13,863	*89.15%*	15,026	13,408	*89.23%*
2000	14,933	13,248	*88.72%*	15,780	14,226	*90.15%*
2001	17,653	12,979	*73.52%*	17,464	13,178	*75.46%*
2002	17,859	15,566	*87.16%*	17,758	15,924	*89.67%*
2003	18,209	16,301	*89.52%*	17,684	16,026	*90.62%*
2004	17,084	14,923	*87.35%*	18,087	16,116	*89.10%*
2005	17,271	14,993	*86.81%*	17,573	15,321	*87.18%*
2006	17,303	15,191	*87.79%*	16,982	15,038	*88.55%*
2007	17,241	15,180	*88.05%*	17,352	15,357	*88.50%*
2008	16,998	15,021	*88.37%*	17,250	15,500	*89.86%*
2009	17,745	15,792	*88.99%*	17,271	15,435	*89.37%*
2010	17,049	15,130	*88.74%*	17,579	15,764	*89.68%*
2011	16,974	15,138	*89.18%*	16,689	15,002	*89.89%*
2012	16,933	15,040	*88.82%*	16,941	15,258	*90.07%*
2013	16,762	14,662	*87.47%*	16,548	14,697	*88.81%*

[b]**: Respondents in June, July and August 1995 are only linkable to each other. See User Note 1 (1994) for more information**

Table 5. Linking Food Security Supplement (December) to Child Tax Credit (ASEC)

	Linking Within a Year								
	1	2	3	4	5	6	7	8	9
	Total December Basic Observations	December Basic - MIS 1, 5 Observations	MIS 1,5 / Total December Basic	Dec Basics MIS 1,5 Linked to March Basic MIS 4, 8	MIS 1, 5 Links / Total December Basic	MIS 1, 5 Links / Total MIS 1, 5 observations	Linked Observations with FSS and CTC Data	Linked Obs with Data / Total Dec. Basic	Linked Obs with Data / MIS 1, 5 Obs
December 2005									
Total	138,903	34,024	*24.49%*	29,807	*21.46%*	*87.61%*	21,091	*15.18%*	*61.99%*
December 2006									
Total	136,174	32,851	*24.12%*	29,407	*21.60%*	*89.52%*	20,324	*14.93%*	*61.87%*
December 2007									
Total	135,275	32,798	*24.25%*	29,757	*22.00%*	*90.73%*	20,455	*15.12%*	*62.37%*
December 2008									
Total	133,672	32,606	*24.39%*	28,873	*21.60%*	*88.55%*	19,975	*14.94%*	*61.26%*

	Linking Across Years		
	10	11	12
	Total December Basic Observations	Linked Obs from MIS 1 with Data Linked to Year + 1	Linked Obs / Total Dec Basic	Linked Obs / Dec MIS 1 Obs
December 2005			
Total	138,903	7,213	*5.19%*	*67.07%*
December 2006			
Total	136,174	7,143	*5.25%*	*68.70%*
December 2007			
Total	135,275	7,081	*5.23%*	*68.42%*
December 2008			
Total	133,672	7,068	*5.29%*	*71.05%*

Table 6. Linking ORG observations from April - June to ASEC's 2005 - 2009

MIS in March (Corresponding ORG Month)	Linking Within a Year					Linking Across Years	
	1	2	3	4	5	6	7
	Total Observations in March Basic by MIS	Observations linked from March to MIS 4, 8 responses	MIS Respondents Linked to March / Total in MIS	Observations in MIS 4, 8 with Earnings Data	MIS / Total March Basic	MIS 1-4 linked to MIS 5- 8 with Earnings data	Respondents Linked / Total in March Basic
March 2005							
MIS 4, 8	34,521	34,521	*100.00%*	26,503	*19.44%*	9,548	*7.00%*
MIS 3, 7 (April MIS 4, 8)	34,488	33,090	*95.95%*	25,430	*18.66%*	8,818	*6.47%*
MIS 2, 6 (May MIS 4, 8)	34,018	31,891	*93.75%*	24,640	*18.08%*	8,686	*6.37%*
MIS 1, 5 (June MIS 4, 8)	33,288	30,314	*91.07%*	23,469	*17.22%*	7,978	*5.85%*
Total	136,315	129,816	*95.23%*	100,042	*73.39%*	35,030	*25.70%*
March 2006							
MIS 4, 8	33,875	33,875	*100.00%*	26,116	*19.34%*	9,931	*7.35%*
MIS 3, 7 (April MIS 4, 8)	33,957	32,760	*96.47%*	25,315	*18.75%*	9,546	*7.07%*
MIS 2, 6 (May MIS 4, 8)	33,749	31,458	*93.21%*	24,476	*18.13%*	9,161	*6.78%*
MIS 1, 5 (June MIS 4, 8)	33,447	30,229	*90.38%*	23,431	*17.35%*	8,740	*6.47%*
Total	135,028	128,322	*95.03%*	99,338	*73.57%*	37,378	*27.68%*
March 2007							
MIS 4, 8	33,443	33,443	*100.00%*	25,940	*19.38%*	10,166	*7.60%*
MIS 3, 7 (April MIS 4, 8)	33,737	32,603	*96.64%*	25,214	*18.84%*	9,579	*7.16%*
MIS 2, 6 (May MIS 4, 8)	33,324	31,407	*94.25%*	24,337	*18.19%*	9,352	*6.99%*
MIS 1, 5 (June MIS 4, 8)	33,313	30,537	*91.67%*	23,720	*17.73%*	8,953	*6.69%*
Total	133,817	127,990	*95.65%*	99,211	*74.14%*	38,050	*28.43%*
March 2008							
MIS 4, 8	33,520	33,520	*100.00%*	26,135	*19.63%*	10,299	*7.73%*
MIS 3, 7 (April MIS 4, 8)	33,556	32,446	*96.69%*	25,305	*19.00%*	9,897	*7.43%*
MIS 2, 6 (May MIS 4, 8)	32,806	30,732	*93.68%*	24,086	*18.09%*	9,372	*7.04%*
MIS 1, 5 (June MIS 4, 8)	33,273	30,521	*91.73%*	23,863	*17.92%*	9,207	*6.91%*
Total	133,155	127,219	*95.54%*	99,389	*74.64%*	38,775	*29.12%*
March 2009							
MIS 4, 8	33,250	33,250	*100.00%*	26,049	*19.35%*	10,343	*7.68%*
MIS 3, 7 (April MIS 4, 8)	34,352	33,189	*96.61%*	25,887	*19.23%*	10,020	*7.44%*
MIS 2, 6 (May MIS 4, 8)	33,263	31,310	*94.13%*	24,591	*18.26%*	9,431	*7.00%*
MIS 1, 5 (June MIS 4, 8)	33,785	31,227	*92.43%*	24,384	*18.11%*	9,185	*6.82%*
Total	134,650	128,976	*95.79%*	100,911	*74.94%*	38,979	*28.95%*
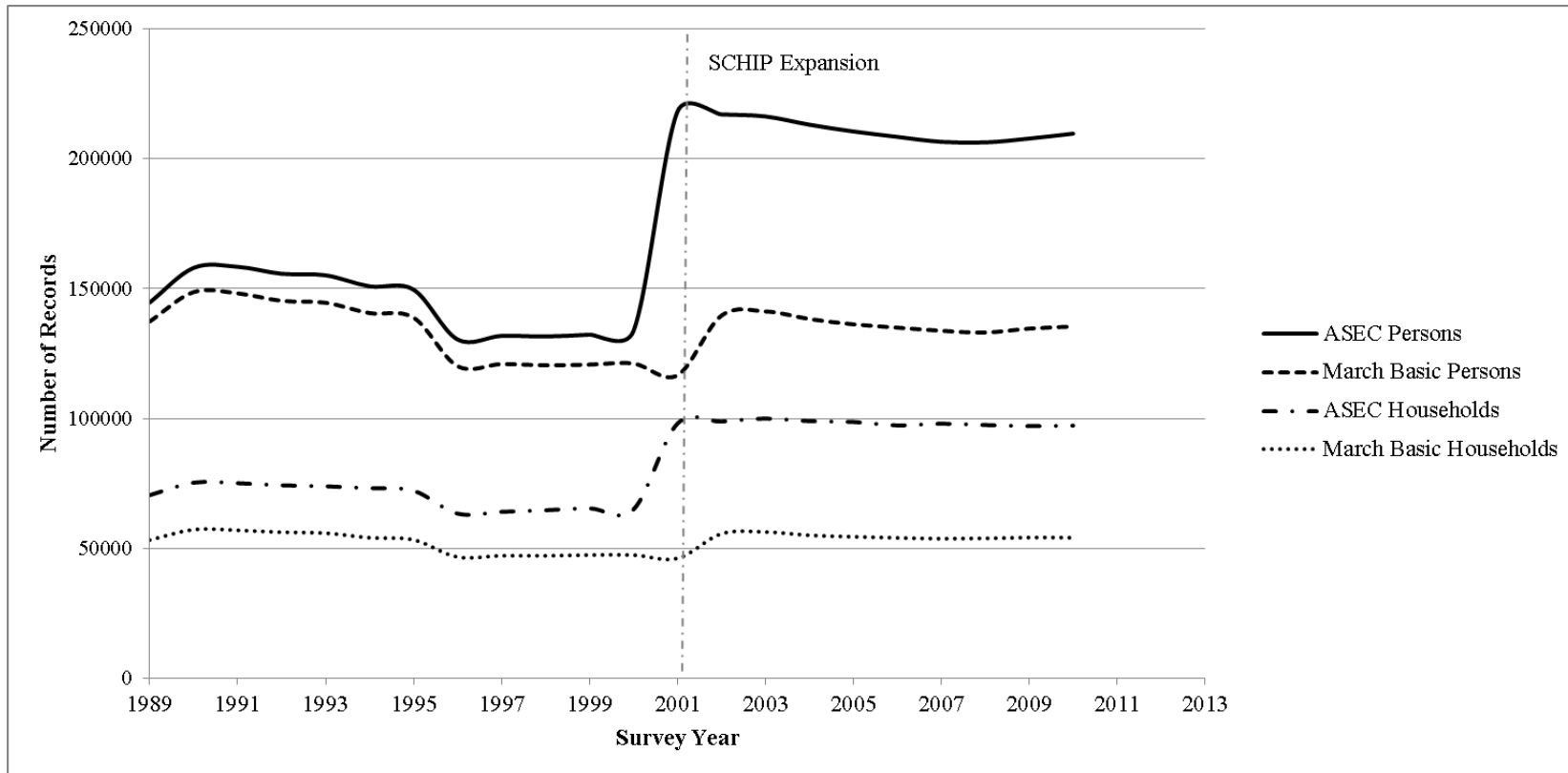
Figure 1 - ASEC Oversample Over Time

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                                    ┌─────────────┐
                                    │             │
                                    │    ASEC     │
                                    │             │
                                    └─────────────┘
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December (MIS 1, 5)	January (MIS 1, 2, 5, 6)	February (MIS 1, 2, 3, 5, 6, 7)	March	April (MIS 2, 3, 4, 5, 6, 7, 8)	May (MIS 3, 4, 7, 8)	June (MIS 4, 8)
25% potential links	50% potential links	75% potential links	100% potential links	75% potential links	50% potential links	25% potential links
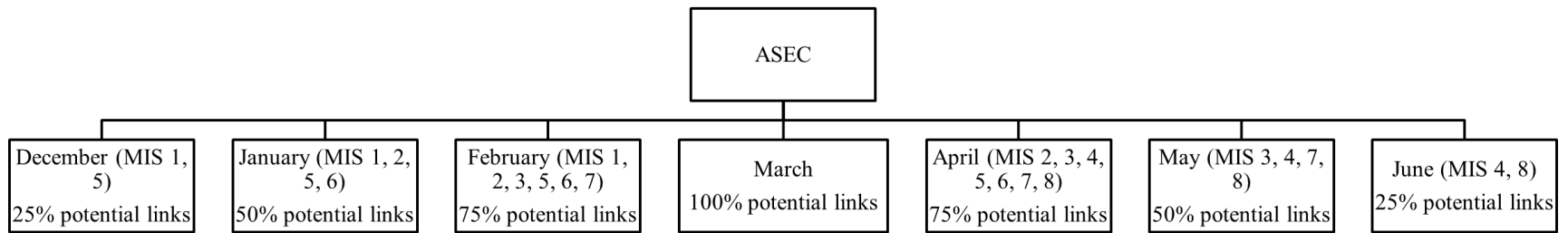
Figure 2 - Linking Basic CPS's to ASEC
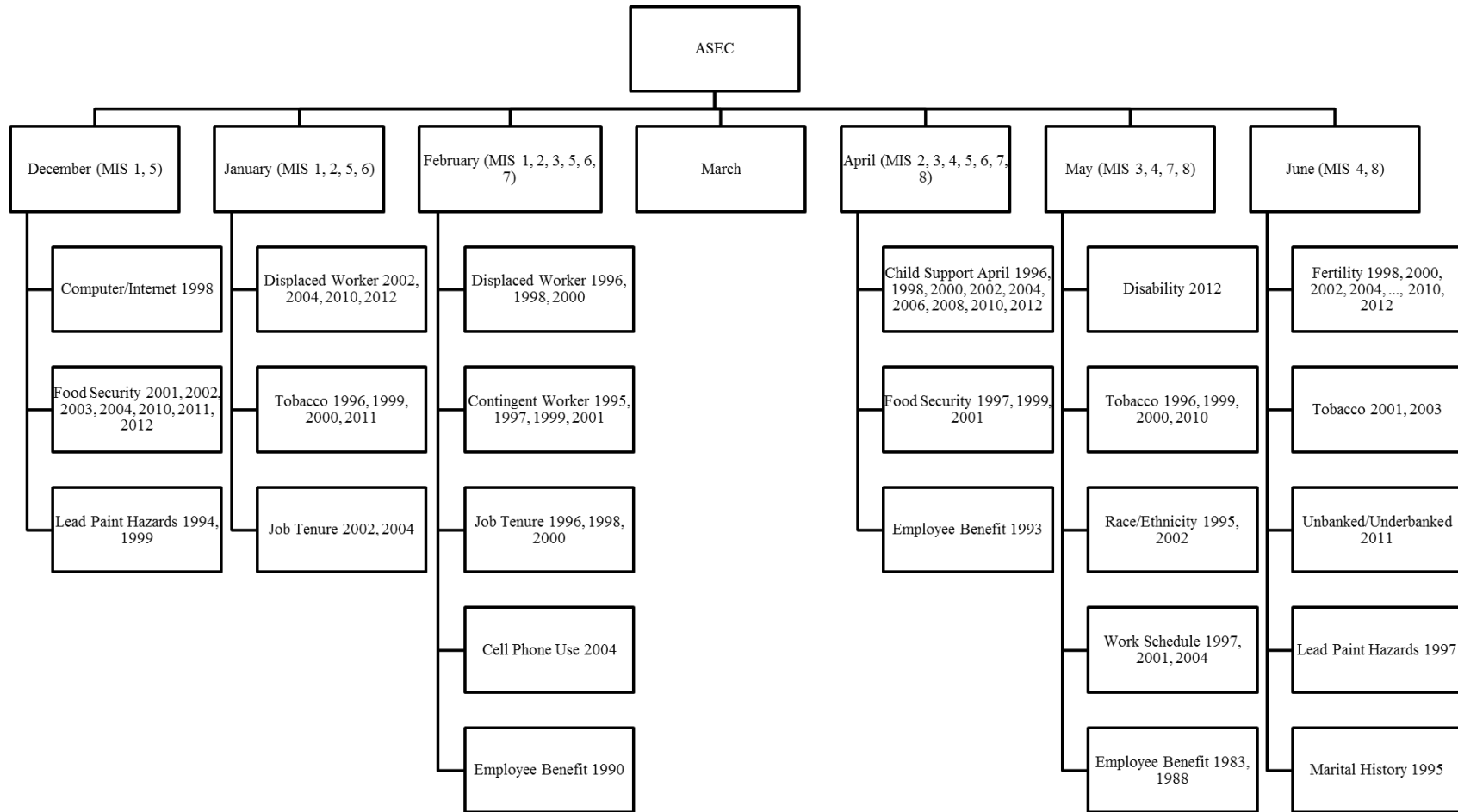
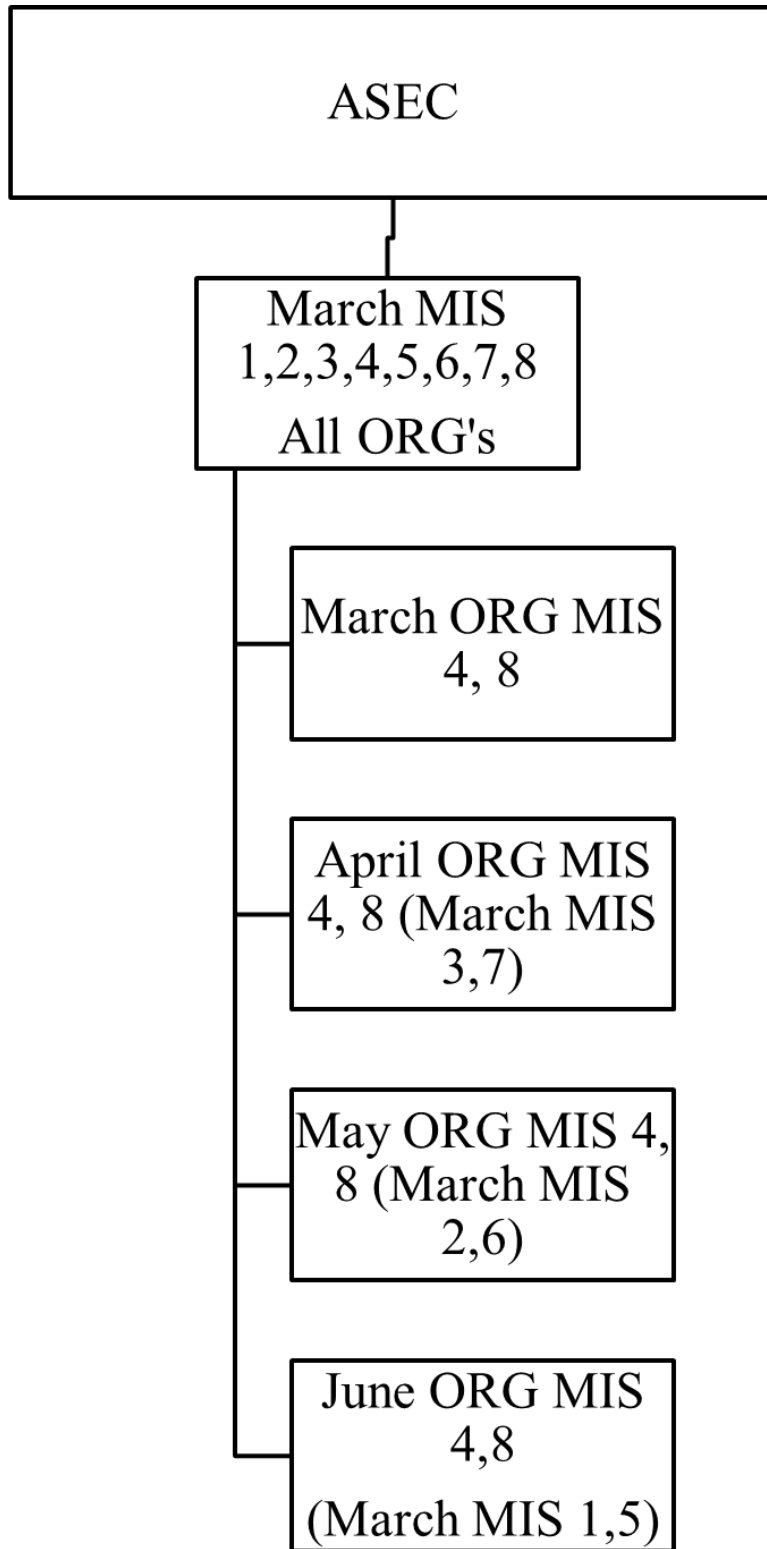**Figure 3 - Linking ASEC to Other CPS Supplements**

Figure 4 - Linking ORGs to ASEC

Appendix

Section 1. Match Validity

Match rates based on the algorithms we use are extremely high except in 1995 and 1996. We validate matches from 1994 forward by comparing AGE, SEX, and RACE in the March Basic Monthly CPS to the ASEC. As is evident in Table 4, nearly all matches are validated. We document the problems we encounter in years where we fail to match or match incorrectly. Due to duplicate IDs in the 1989-1993 period, we are required to use AGE, SEX, and RACE as part of our linking algorithm and thus cannot validate on AGE, Sex, and RACE (but will validate on these variables by construction).

As evident in Table 2, the match rates based on the matching algorithms results in extremely high match rates, with the exception of 1995 and 1996. The validity of these matches is confirmed with a rather higher success rate based on age sex and race. For invalidated matches, we allow each individual research to choose what to do with these observations. This section provides potential explanations for invalid matches.

1994
In 1994, 115 observations fail to match on sex, 95 on race and 212 on age. We found no documentation to explain any of these failures. Our analysis shows that no observations fail to match on all three variables while only 2 observations fail to match on both sex and race.

1995
In 1995, there are 951 records in the March Basic Monthly CPS that cannot be linked to the ASEC. Despite trying to match using various algorithms, IPUMS-CPS was unable to find links for these records. Furthermore, no Census Bureau documentation is available on this issue. It is possible that these non-links are a result of the CPS redesign that occurred in 1994.

1996
In 1996, there are 3 person records that cannot be matched. No explanation has been uncovered.

2001
In 2001, several linked records do not match on age, sex, or race. No Census Bureau documentation on this issue has been located. However, 2001 was a CPS redesign year, which may be an explanation.

2002
The 128 age non-matches are most likely due to age perturbation. In August 2002 "depending on the demographic characteristics of all members of the household, ages of selected household members were adjusted to increase confidentiality protection" (U.S. Census Bureau. (2010, June)). Since the ASEC is typically released in September, it is plausible and likely that these age non-matches are due to this perturbation issue.

2003
The 3,957 cases that do not match on age are a coding issue. That is, the ASEC topcodes at 85 while the Basic topcodes at 80. Thus, in validating the matches, persons ages 81-85 in the ASEC will be assigned the value of their actual age while their age in the Basic will be topcoded.

2004
The 1,832 age non-matches are also top code issues. Similarly, the 154 non-match cases on race are also a coding issue. The Basic Monthly CPS codes "3 or more races" while the ASEC actually lists out the three races.

2009
The 6 observations that do not match on age are most likely an age perturbation issue.

Section 2. Details of Merging

The merging of the 1994 March Basic Monthly CPS to ASEC file requires three manual corrections in order to match correctly. These changes are apparent upon visual inspection. First, a correction is needed for the HUHHNUM of one three households. In 1994, a unique household in the Basic can be identified by the HRHHID and HRHHID2 while in the ASEC it can be identified by its H-seq number. As is apparent in Figure X, there are three distinct households with the same HRHHID. The problem when it comes to linking is that only HUHHNUM is common to both files and all are equal to 1 (resulting in duplicate records based on HRHHID and HUHHNUM). Visual inspection makes it clear that the households from the Basic with HRHHID2 63011 is identical to the ASEC household with HSEQ 12307. Similarly, HRHHID2 63001 is identical to HSEQ 12306. For matching across the Basic Monthly CPS and ASEC, we re-assign the HUHHNUM values for these households (2 and 3, respectively).

	hrhhid	hrhhid2	huhhnum	new huhhnum	year	mis	numper	pernum	age	sex	race
Basic	880669103209	63021	1	1	1994	2	4	1	34	2	2
Basic	880669103209	63021	1	1	1994	2	4	2	15	1	2
Basic	880669103209	63021	1	1	1994	2	4	3	11	1	2
Basic	880669103209	63021	1	1	1994	2	4	4	10	1	2
Basic	880669103209	63011	1	2	1994	2	1	1	72	2	2
Basic	880669103209	63001	1	3	1994	2	2	1	34	2	1
Basic	880669103209	63001	1	3	1994	2	2	2	21	1	2
	hrhhid	hseq	huhhnum	new huhhnum	year	mis	numper	pernum	age	sex	race
ASEC	880669103209	12308	1	1	1994	2	4	1	34	2	2
ASEC	880669103209	12308	1	1	1994	2	4	2	15	1	2
ASEC	880669103209	12308	1	1	1994	2	4	3	11	1	2
ASEC	880669103209	12308	1	1	1994	2	4	4	10	1	2
ASEC	880669103209	12307	1	2	1994	2	1	1	72	2	2
ASEC	880669103209	12306	1	3	1994	2	2	1	33	2	1
ASEC	880669103209	12306	1	3	1994	2	2	2	33	1	2

Another correction that must be made involves the following care. Looking closely at the data, it is evident that the Basic observation with HRHHID2 63001 should be matched to the ASEC observation with HSEQ 258.

	hrhhid	hrhhid2	huhhnum	year	mis	numper	pernum	age	sex	educ	race	occ
Basic	160999430499	63021	1	1994	1	1	1	48	2	40	1	-1
Basic	160999430499	63001	1	1994	1	1	1	48	2	40	1	20
	hrhhid	hseq	huhhnum	year	mis	numper	pernum	age	sex	educ	race	occ
ASEC	160999430499	258	1	1994	1	1	1	48	2	40	1	20
ASEC	160999430499	260	1	1994	1	1	1	48	2	40	1	0

A more complicated duplicate is below in which the records are identical save for HRHHID2. Leveraging the longitudinal component of the survey to figure out the correct match, we locate the observations in 1995 March Basic Monthly CPS and the 1995 ASEC when both should have been in MIS 6 according to the CPS rotation pattern. Only HRHHID2 63001 and HSEQ 13308 is in the 1995 March Basic Monthly CPS and ASEC files, so we match and retain the records which also appear in 1995.

	hrhhid	hrhhid2	huhhnum	year	mis	numper	pernum	age	sex	educ	race	occ	marst
Basic	930479150329	63001	1	1994	2	1	1	71	1	32	1	0	3
Basic	930479150329	63011	1	1994	2	1	1	71	1	32	1	0	3
	hrhhid	h_seq	huhhnum	year	mis	numper	pernum	age	sex	educ	race	occ	marst
ASEC	930479150329	13308	1	1994	2	1	1	71	1	32	1	0	3
ASEC	930479150329	13309	1	1994	2	1	1	71	1	32	1	0	3

In 2003, we identify two problematic cases in the March Basic Monthly CPS. Consider the two 68 year olds of the same sex, race, and education level (below). Using HRHHID2 from the March Basic Monthly CPS, we see that the person who is age 48 is in the same household as the first 68 year old. Thus, we match the first 68 year old in the ASEC (hseq=62477) to the 68 year old in HRHH ID2=76261 in the Basic.

	hrhhid	hrhhid2	huhhnum	year	mis	numper	pernum	age	sex	educ	race
Basic	130962064655659	76261	1	2003	4	2	1	48	1	40	1
Basic	130962064655659	76001	1	2003	4	2	1	78	1	36	1
Basic	130962064655659	76261	1	2003	4	2	2	68	2	39	1
Basic	130962064655659	76001	1	2003	4	2	2	68	2	39	1
	hrhhid	hseq	huhhnum	year	mis	numper	pernum	age	sex	educ	race
ASEC	130962064655659	62476	1	2003	4	2	1	78	1	36	1
ASEC	130962064655659	62477	1	2003	4	2	1	48	1	40	1
ASEC	130962064655659	62476	1	2003	4	2	2	68	2	39	1
ASEC	130962064655659	62477	1	2003	4	2	2	68	2	39	1

The next set of observations that is troublesome contains two people whose age does not match between the Basic Monthly CPS and the ASEC. In order to match, we change the age for one of the observations. Note that original values are maintained in the original files.

	hrhhid	hrhhid2	year	mis	numper	pernum	age	sex	educ	race
Basic	67843683692593	76261	2003	3	2	2	66	2	34	1
	hrhhid	huhhnum	year	mis	numper	pernum	age	sex	educ	race
ASEC	67843683692593	1	2003	3	2	2	67	2	34	1

In 2004, we need only adjust the age of the following observation. Again, the original age values are retained in the original files.

	hrhhid	hrhhid2	year	mis	numper	pernum	age	sex	educ	race
Basic	263943067909060	76261	2004	6	1	1	80	1	34	1
	hrhhid	huhhnum	year	mis	numper	pernum	age	sex	educ	race
ASEC	263943067909060	1	2004	6	1	1	85	1	34	1