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The Analysis of Food Stamp Program Participation with Matched Administrative and Survey Data*

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Abstract

Benefit receipt in major household surveys is often underreported. This mis-reporting has important implications for our understanding of the economic circumstances of disadvantaged populations, program takeup, the distributional effects of government programs, and studies of other program effects. We use administrative data on Food Stamp Program (FSP) participation matched to American Community Survey (ACS) household data. We show that over thirty percent of true recipient households do not report receipt in the ACS. Mis-reporting, both false negatives and false positives, varies with individual characteristics. From these results we infer likely biases in several types of FSP analyses. We then directly examine the determinants of program receipt using our combined administrative and survey data. The combined data allow us to examine accurate participation using individual characteristics missing in administrative data. Our results differ from conventional estimates using only survey data, as such estimates overstate multiple program participation and participation by families with many children and understate participation by older individuals. To evaluate the use of imputed ACS data, we also examine whether our estimates using survey data alone are closer to those using the accurate combined data when imputed survey observations are excluded. Interestingly, excluding the imputed observations leads to worse estimates.

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I. Introduction

Comparisons of rates of program receipt in household surveys to administrative numbers indicate that government and private benefits are substantially underreported. For example, more than forty percent of months of food stamp receipt and Temporary Assistance for Needy Families (TANF) receipt were not reported in the Current Population Survey (CPS) in 2004. This underreporting is evident in most large national surveys, and has typically grown over time. An important consequence of underreporting is that it may lead to significant biases in studies that examine the determinants of program participation, the distributional consequences of programs, and other program effects. This study examines the mis-reporting of Food Stamp Program (FSP) benefits. We examine rates of mis-reporting, how mis-reporting varies with household characteristics, and how it affects estimates of program receipt. We also briefly examine the use of imputed observations.

There is a large literature examining the use of government programs that relies on self-reports of program receipt many of which are inaccurate. For example, a number of studies have examined the likelihood that those eligible for food stamps actually participate in the program (add cites). Blank and Ruggles (1996) examine the takeup of Aid to Families with Dependent Children (AFDC) and food stamps, while McGarry (2002) analyzes the takeup rate for Supplemental Security Income (SSI). A few takeup studies have corrected in some way for under-reporting, such as Bitler, Currie and Scholz (2003) who examine the Women, Infants and Children (WIC) program. Some other studies compare administrative data numerators, that do not suffer from under-reporting, to survey denominators. For excellent reviews of research on program takeup, see Remler and Glied (2003) and Currie (2006).

These takeup studies typically show that participation rates among eligibles are well below one. However, given the extent of underreporting, a major part of what appears to be non-participation may actually be recipients whose receipt is not recorded in the household survey. A better understanding of underreporting and how it may bias takeup estimates has important implications for both policy makers and researchers. Policy makers have long been concerned with low participation rates in some programs, and have recently taken steps to increase participation (see GAO 2004 for efforts to raise

food stamp participation). In addition, a more accurate estimate of program take up should provide better information about who is benefiting from programs, why families choose not to participate in certain programs, or how individual characteristics affect participation. Such information could be used to increase take up and better target programs to the most needy.

Underreporting will also bias studies of the distributional consequences of transfer programs. For example, studies that examine the extent to which food stamps increase the resources of poor families will understate the impact of the FSP due to underreporting of food stamps. In addition, correcting for underreporting bias will yield better measures of the well-being of the worse off, and provide a clearer picture of the distributional consequences of the FSP. For example, Jolliffe et al. (2005) examines the effects of the Food Stamp Program on poverty. Engelhardt and Gruber (2006) analyze the effects of social security on poverty and the income distribution. U.S. Census (2007), Scholz, Moffitt and Cowan (2008), and Meyer (2009) analyze the mechanical effects of a wide variety of programs and taxes on features of the income distribution. The latter two studies correct their estimates for program mis-reporting in some fashion.

Our results also suggest biases in other types of analyses of program effects. Often, receipt of a program will be used as an explanatory variable in a regression. Mismeasurement of receipt will lead to bias in such estimates. In addition, our analyses indicate that the errors of measurement are correlated with a range of explanatory variables. Thus, it is unlikely that common instrumental variables such as a second observation on receipt will satisfy the requirements for a valid instrument, preventing the use of IV methods as a solution to this problem.

Lastly, the results presented in this paper may aid in the improvement of household surveys. There are very few variables in household surveys for which we can obtain independent and accurate measures. The Social Security Numbers on the food stamp and TANF records that we use have been verified (compared to SSA records) as a necessary condition for receipt of benefits, so the accuracy of the match is very high. Thus, these analyses provide an important benchmark for the quality of survey data.

In the following section, we summarize past work on food stamp mis-reporting. In Section III, we describe our data sources and matching. Section IV provides our main

evidence on misreporting while Section V analyzes how misreporting varies with household characteristics. Section VI shows that misreporting affects our understanding of program receipt while Section VII discusses other implications of our misreporting results. In Section VIII we analyze imputation and the use of imputed data, and conclusions are offered in Section IX.

II. Previous Research

A number of studies have documented significant underreporting of food stamps in large national surveys such as the CPS or the Survey of Income and Program Participation (SIPP).[1] Several studies estimate underreporting by using administrative microdata that is directly linked to survey data. In perhaps the most comprehensive of these matching studies, Marquis and Moore (1990) show that 23 percent of survey respondents in four states who were food stamps recipients according to administrative microdata failed to report participation in the 1984 SIPP. Using a subset of these data, Bollinger and David (1997) find a nonreporting rate of 12 percent. Bollinger and David also conclude that female recipients are less likely to fail to report receipt. Taeuber et al. (2004), who examine FSP administrative records in Maryland linked to the national 2001 Supplementary Survey (American Community Survey), find a nonreporting rate of 38 percent (47 percent calculated a second way).

The main limitation to direct matching of survey and administrative microdata at the individual or household level is that such matches are rarely available, and when these matched data are available, it is typically only for a short time period and for a small subset of the survey respondents, such as a single state. An alternative approach is to compare reported receipt in the survey weighted up to the population to administrative reports of the actual number of recipients or actual dollars distributed. Studies that use this approach also find evidence of substantial underreporting. For example, Primus et al. (1999), who compare weighted dollars of reported food stamps for households in the CPS

[1] Underreporting is not unique to food stamps. In fact, there is evidence of significant underreporting in many government transfer programs (Meyer, Mok, and Sullivan 2009). Excellent summaries of data reporting issues in surveys include Moore, Stinson and Welniak (2000), Bound, Brown and Mathiowetz (2001), and Hotz and Scholz (2002).

Annual Demographic File (ADF) to administrative numbers, finds that the underreporting rate increased from 23.8 percent in 1990 to 37.3 percent in 1997. Bitler, Currie, and Scholz (2003) estimate underreporting rates between 1995 and 1999 of about 14 percent in the CPS Food Security Supplement and about 11 percent in the SIPP. Cody and Tuttle (2002) calculate underreporting rates for the CPS ADF that range from about 21 percent in 1991 to 36 percent in 1999.

Meyer, Mok, and Sullivan (2009) document the degree of underreporting of food stamps in several major household surveys and for many years by comparing the weighted total of reported food stamps receipt by households in surveys with totals made available by the US Department of Agriculture, Food and Nutrition Services. Results for the CPS, SIPP, the Panel Study of Income Dynamics (PSID), and the Consumer Expenditure (CE) Survey are reported in Figure 1 (for dollars) and Figure 2 (for months). The dollar and month reporting rates are remarkably similar, suggesting that almost all of the underreporting is due to understating the number of months of receipt. There is other evidence that finds that monthly amounts are actually quite close to the true average for several programs and datasets. Previous research indicates that about two-thirds of the underreporting of food stamps months in surveys results from failure to report receipt at all (Moore, Marquis and Bogen, 1996). The reporting rates in Figures 1 and 2 show that food stamps are significantly under-reported in each of these surveys. Moreover, reporting rates have fallen over time. As shown in Figure 2, between 1973 and 2002, reporting rates for food stamp months fell in the PSID from 0.884 to 0.625. Between 1987 and 2004, reporting rates in the CPS fell from 0.739 to 0.566. The SIPP typically has the highest reporting rate for the FSP program, and these have fluctuated but not steadily declined over time.

III. Data

This project uses two sources of data which are matched at the household level: the 2001 American Community Survey (ACS) and administrative data on food stamp and TANF receipt in Illinois and Maryland. The ACS has replaced the Census of Population long form data and is the largest general purpose survey of U.S. households. The survey

contains basic demographic information on households, characteristics of living units, receipt of government assistance, as well as information on citizenship, immigration status, education, labor force participation, and several categories of income. The ACS is also the best source of socio-economic data such as incomes at a fine geographic detail. Consequently, the ACS is currently being used by several cites and states to determine local poverty rates.[2]

The administrative data record food stamp and TANF receipt for Illinois and Maryland. These data include start dates and ends date of receipt spells, amounts (for some years), as well as Social Security Number (SSN). The source of the Maryland data is the Client Automated Resource and Eligibility System (CARES) provided by the Maryland Department of Human Resources to the Census Bureau Data Integrated Division. The database includes information on recipient characteristics, including income and spell duration. The data provided to the Census Bureau currently cover the period 1998 through September 2003. The source of Illinois data is the Illinois Department of Human Services (DHS) client database, a subsystem of the Client Information System. Each extract contains mainly cross-sectional data, with some limited historical information. From these extracts, Chapin Hall has created the Illinois Longitudinal Public Assistance Research Database (ILPARD), a longitudinal database of public assistance cases (including FSP and AFDC/TANF receipt), currently containing data from February 1989 to the present. The ILPARD is updated monthly with new cases from the IDHS system and records that IDHS has changed in the past month. The Food Stamp Program data of the Illinois DHS Client Database contain information on all members of the household and their monthly utilization of the program. Data from 1998 through 2003 so far have been provided to the Census Bureau.

Matching

Matching the survey and administrative data is accomplished using a variable called the Protected Identification Key or PIK. In order to receive food stamps, an individual must have a validated SSN (their name, gender, and date of birth must match

[2] Levitan et al. (2010), Smeeding et al. (2010), and others.

SSA records). The FSP data are subject to regular audits by the USDA. The validated SSN is converted to a PIK by the Census Bureau. A PIK was obtained for 96.4 percent of the Illinois TANF and food stamp records over the entire period and 97.8 percent of the Maryland records. The Census Bureau uses name, address and date of birth from the ACS records to create a PIK for survey individuals. A PIK is successfully obtained for at least one member of 92.7 percent of ACS households in Illinois and 94.9 percent of ACS households in Maryland. The analyses were done at the Chicago Census Research Data Center by University of Chicago researchers with Special Sworn Status as Census Bureau Employees.

Samples

The main sample for our analyses is households with a head of household at least age 16 and with at least one household member who has been assigned a PIK. We also examine some of our main results with the subsample of households in which all members have a PIK. We also perform some analyses using the subpopulations of households with and without imputed values for the ACS food stamp receipt variable. Finally, in some cases we consider only households with income below 100 percent or below 200 percent of the federal poverty line to identify a population for whom the FSP is especially relevant.[3]

Definitions

Food stamp receipt in the ACS comes from the question "At any time DURING THE PAST 12 MONTHS, did anyone in this household receive Food Stamps?" To match this definition as well as possible we create a binary variable using the administrative data that indicates whether food stamps were received in the survey month or the previous 12 months by anyone in the household.

The food stamp household is notoriously difficult to define, but this complication does not impinge on our analysis. We examine whether a household in the ACS that

[3] Most analyses were done with the household weights.

reports (or does not report) receipt of food stamps, is a recipient in the administrative data. Since we have PIKs for all household members in almost all cases, we can simply examine whether those individuals were in a recipient household in the previous year. We discuss below the biases, which are in a known direction and small, for the few cases where we have a PIK for some household members, but not all. This reliance on the ACS household definition greatly simplifies the analysis.

Missing PIKs and Nonrandom Matching

A very high percentage of the survey households have a PIK which allows them to be matched to the administrative data. Overall the percentage of survey households that have a valid PIK is 92 percent in Illinois and nearly 95 percent in Maryland. However, the rate is lower for those who are likely food stamp recipients. The rates are 89 percent in Illinois and 92 percent in Maryland for households with income below twice the federal poverty line. We examine what household characteristics are associated with it being unable to be linked to a PIK. The results of probit equations for whether a household is PIKed are reported in Appendix Table 1. We find that we can reject that a PIK is missing at random. A number of characteristics are associated with a household being less likely to have a PIK, such as the household being small and the head being nonwhite, Hispanic, or a noncitizen. Because of this nonrandomness, in most of our analyses we weight observations by the inverse of the probability of that household having a PIK.

IV. Agreement between Survey and Administrative Reports

Table 1 reports a cross tabulation of administrative receipt of food stamps and ACS reports of food stamps for households in Illinois in the top panel and Maryland in the bottom panel. Each cell gives the sample count, the corresponding population estimate, the overall percentage, row percentage, and column percentage. Population estimates and all percentages are weighted by household weights adjusted for a missing PIK (multiplied by the inverse of the probability of having a PIK).

Focusing on the row percentages in the fourth row of each cell, we see that the false negative rate is 32 percent in Illinois and 37 percent in Maryland. These are very high rates of failing to report receipt when a household is truly a recipient household. The false positive rate is 0.8 percent in Illinois and 0.5 percent in Maryland. By comparing the column total for reported receipt to the row total for administrative receipt, we see that there is also a net understatement of receipt of 22 percent in Illinois (1 – 257,501/333,695) and 29 percent in Maryland (1 - 83,431/117,350). If we account for the dollar understatement conditional on reporting receipt (which we can only do currently for Maryland) the net dollar understatement is much larger. Conditional on reporting receipt, in Maryland dollars are understated by 18 percent. Combining under-reporting of receipt with under-reporting of conditional dollars leads to a 42 percent understatement of dollars in Maryland.[4] This figure is close to the 44 percent found nationally in the 2005 ACS in Meyer, Mok and Sullivan (2009). Earlier under-reporting rates cannot be calculated for the ACS from public use data since information on food stamp receipt is not released. These are very substantial rates of under-reporting. Approximately one-third of those households that receive are not recorded as receiving in the survey.

Tables 2 and 3 repeat the cross tabulations of Table 1, but separately first for those observations for which food stamp is imputed, and then those observations for which it is not imputed. Several patterns are evident in these tables. First, only a small share of households are imputed, approximately 2.2 percent in Illinois (89,913/4,174,587) and 1.4 percent in Maryland (26,877/1,884,147). However, a large share of true food stamp households are imputed, 14.7 percent in Illinois and 11.3 percent in Maryland, and an even larger share of reported food stamp households are imputed in each state. Second, among those who are imputed (Table 2), a very large share are true food stamp recipients (55 percent in Illinois and 49 percent in Maryland). Third, a substantial share of the false positives are due to imputation. These observations account for 42 percent of false positives in Illinois and 24 percent of false positives in Maryland, despite being no more than 2.2 percent of the total sample. Because of these imputed false positives, the

[4] This figure is from the subsample of recipients with income less than twice the poverty line and will be updated with the full sample figure when available.

overall false positive rate is not a good indicator of households tendency to report receipt when they are not recipients.

Possible Biases in these Probabilities

Our methods will tend to slightly bias false negative and positive reports in the survey data for several reasons. First, we consider a household to be a recipient household if food stamps are received anytime during a 13 month period rather than the 12 month period that is asked about in the ACS. The use of a 13 month period for administrative receipt can lead to either higher or lower false negative and false positive rates.[5] We can easily examine the magnitude of any potential bias by only defining administrative receipt based on the 12 months preceding the current month. When we do this exercise, false negative and false positive report rates are only negligibly different.

Second, a household that moved into the current state over the last year may have received food stamps in their previous state. The administrative data from their current state of residence would not report that receipt. Thus, mobility across state lines will lead to an understatement of false negatives and an overstatement of false positives. Since only about two percent of individuals move across state lines in a year, the likely bias is small. Third, we include households if anyone in the household has a PIK. However, someone in the household may receive food stamps, but since they did not have a PIK we do not treat the household as a recipient household unless someone else in the household who has a PIK is in a recipient household in the administrative data. This issue would tend to understate false negatives and overstate false positives. Since only a few percent of households in Illinois and Maryland in our sample with at least one PIK have household members without a PIK, this bias is likely small.[6]

Finally, a small fraction of the administrative records do not have a PIK. In this case, a true recipient would not appear in the administrative data. If that person does not

[5] While using 13 months of administrative receipt necessarily makes the fraction of sample members who are true recipients rise, since it changes the groups that are true recipients and true nonrecipients it can drive error rates in either direction.

[6] We will report these percentages after they go through Census Bureau disclosure review.

report receipt, then false negatives would be understated. If that person reports receipt, then false positives would be overstated.

Overall, it seems likely that false negatives are understated and false positives are overstated. The first possible bias can be directly examined and is fine to be very small. The remaining three possibilities lead to overstatement of false positives. Two of the these three possibilities lead to understatement of false negatives and in the third case the bias in the opposite direction is found to be bounded by a small number.

V. What Affects the Agreement between the Survey Reports and the Administrative Records?

We next examine how mis-reporting of food stamp receipt differs across households. If mis-reporting does not depend on household characteristics, then it is fairly straightforward to correct estimates of takeup and the distributional effects of programs (examples of such corrections can be found in Meyer, Mok and Sullivan 2009, and Meyer 2009). However, if mis-reporting is correlated with household characteristics, we can use estimates of the relationship to adjust various analyses.

In the first two columns of Table 4 we report probit equations for the determinants of false negative reporting. Here the sample is those who, according to the administrative data, are recipients of food stamps (true recipients). We report derivatives (evaluated at the mean) of the probability of being a false negative reporter rather than coefficients to aid the interpretation of the magnitudes. We examine the effects of family type, number of family members of various ages, age, education, race and employment status of head, income relative to the poverty line for a family of a given composition, English fluency and citizenship, geographic location, reported receipt of other programs, true receipt of TANF, and length of food stamp receipt from the administrative data.

Despite a fairly small sample for this analysis, there are some noticeable differences across households in false negative reporting. Households headed by a person 50 or older are more likely to be false negative reporters (not report) than younger households. This effect is significant in Illinois, but not quite so in Maryland. Recipients with a college education are much more likely to not report in Illinois, but in Maryland

there is no education gradient. Couples without children and those headed by a woman are less likely to fail to report receipt in Illinois, but the Maryland effects are insignificant and of the opposite sign. Black recipients are less like to report in Illinois, but we do not see this pattern in Maryland. [7] Higher income increases the likelihood that a recipient will not report receipt. For example, an increase in income from the poverty line to three times the poverty line increase the likelihood of false negative reporting by over 20 percentage points in each state.

Surprisingly, fluency in English does not have a significant effect on reporting, though those recipients who speak only English at home are much less likely to not report receipt, but the effect is not statistically significant. Non-U.S. citizens are surprisingly less likely to not report in Illinois, and the effect is significant, while in Maryland an insignificant effect of the opposite sign is found with almost the same absolute value. The measures of disability have conflicting effects, but the only significant effect is in Maryland where those with a work limitation are more likely to fail to report receipt.

We also examine the association of not reporting with reported receipt of other transfer programs in the ACS. Quite uniformly, true recipients who report receipt of other programs (public assistance, housing assistance) are more likely to report food stamp receipt. The effect is nearly twenty percentage points for reported public assistance receipt in both states. Reflecting the high imputed receipt rate among those for whom food stamp receipt is imputed, imputed observations are much less likely to be false negatives.[8]

Agreeing with the idea that regularity of receipt is important, those who received food stamps in more months in the previous year, were more likely to report receipt. This effect was very pronounced. An additional month of food stamp receipt is estimated to decrease the non-reporting probability by .03 in Illinois and .05 in Maryland, quite large effects. Finally, there is an insignificant effect of true TANF receipt, once we have accounted for the reporting of program receipt.

[7] In fact, in Maryland the coefficient on nonwhite has the opposite sign and is significant. We are in the process of requesting disclosure for specifications that are the same in the two states, allowing more directly comparisons of the two states' results.

[8] We would like to add the FSP amount received from the administrative data in the future.

We also examine the frequency of reporting receipt by those who are truly nonrecipients in columns 3 and 4 of Table 4. The sample for this false positive analysis, those who are truly nonrecipients, is much larger than that used for the false negative analysis. However, the false positive rate is so low that the number of false positives is much smaller than the number of false negatives. Given this small number of "ones" in this probit analysis, it is not surprising that there are no variables that have coefficients that are significantly different from zero in both states. The coefficient on food stamps imputed is significant in Illinois and nearly so in Maryland. Those whose food stamp receipt is imputed are much more likely to be false positive reporters than those whose receipt is not imputed.

VI. The Effect of Misreporting on Estimates of Program Receipt

Having true food stamp receipt matched to survey data gives us the opportunity to directly examine if the use of administrative data provides a different understanding of the determinants of FSP receipt than we obtain from survey data alone. We first estimate the determinants of receipt using only survey data. We then re-estimate the determinants of receipt, combining the survey data with the administrative data on food stamp receipt, using the administrative measure of receipt as the dependent variable. We then compare the two equations for the use of food stamps.

The determinants of food stamp receipt using only survey data can be seen in Table 5 column 1 for Illinois and column 4 for Maryland. We have restricted our sample to households with income below twice the poverty line to have a sample for which food stamp receipt is a likely possibility. In this low-income sample, 19 percent of households in Illinois report that they receive food stamps, while 17 percent of those in Maryland do. These estimates suggest that, controlling for household income, a household headed by a single parent is 11 percentage points more likely to be a recipient than a married couple household in Illinois and about 8 percentage points more likely in Maryland. Those with more young children are more likely to participate, but the effect is not close to being significant in Maryland. Those 50 or older are much less likely to be participants than those ages 40-49. For those ages 60-69 the rate of participation is at least 6.6 percentage

points lower in both states, while those 70 or older are at least 10 percentage points less likely to participate in both jurisdictions. High school drop headed households are almost 7 percentage points more likely to participate than those with some college. In Illinois, Blacks are much more likely to participate, while there is little difference in Maryland.

Income is a strong predictor of food stamp receipt. In Illinois, a household with income equal to half the poverty line is 9 percentage points more likely to receive food stamps than a household with income 1.5 times the poverty line. In Maryland, the difference is 10 percentage points. The estimates also suggest that a household with a disabled head is about ten percentage points more likely to receive food stamps. The largest effects come from an indicator for reported receipt of public assistance or housing assistance. Those reporting public assistance are more than three times as likely to be recipients, while those receiving housing assistance are about twice as likely to be recipients.

Columns 2 and 5 of Table 5 repeat this analysis substituting an administrative dependent variable for the poorly reported survey measure of receipt. In the administrative data, 24 percent of low-income households in Illinois receive food stamps, while 23 percent of those in Maryland do. There are many notable differences between this specification and the previous one. Households headed by a single individual or parent are much more likely to be recipient households in the combined data. In Illinois the difference is 3-4 percentage points while it is 6-13 in Maryland, but these effects are not statistically significant. The effect of additional children disappears in the combined data and the difference from the survey data alone is statistically significant. In Illinois, the effects of age are quite different in the combined data, and the differences are statistically significant. The combined data indicate a much less pronounced pattern of lower receipt among households headed by an older individual. Black households also have a much higher rate of participation in the combined data, 9 percentage points higher than in the survey data alone, and the difference is statistical significant.

One of the most striking differences between the survey data alone and the combination of survey and administrative data is for reports of public assistance receipt. In Illinois, those who report receipt are 18 percentage points less likely to receive

reported. Overall, one can reject that the combined data give the same estimates as the survey data alone at a level below 0.0001 in Illinois and at 0.05 in Maryland.[9]

The combined administrative and survey data have some important implication that differ from those using the survey data alone. For example, Haider et al. (2003) and Wu (2010) emphasize lower food stamp takeup by older households in survey data. Gunderson and Ziliak (2008) find a more complicated pattern by age. The sharp differences in mis-reporting by age carry over to imply that the combined data show much less of a difference between the aged and non-aged in Illinois. Other examples are that the combined data indicate that multiple program participation (see Keane and Moffitt 1998, for example) is less pronounced than the survey data indicate and the effect of the children on participation is overstated.

VII. The Consequences of Mis-Reporting

The underreporting of food stamps in large surveys discussed above can lead to significant bias in studies of the Food Stamp Program. For example, a number of studies have examined participation rates for the FSP among eligibles or potential eligibles.[10] Underreporting of food stamps will bias such estimates because much of what appears to be non-participation may actually be recipients whose receipt is not recorded in the household survey.[11] To demonstrate the potential importance of underreporting bias we can adjust estimates of participation from the literature for underreporting using the comparison-to-aggregate results in Figure 1. For example, adjusting for underreporting bias in the SIPP would increase take up estimates in Blank and Ruggles (1996) by 15

[9] Tests are based on coefficients even though derivatives are reported. We are in the process of performing the tests on the derivatives.

[10] For example, using data from the SIPP, Blank and Ruggles (1996) estimate take up rates among single mothers that are close to 50 percent in 1986-1987. Zedlewski and Brauner (1999) use data from the National Survey of American Families to show that many welfare leavers do not participate in the FSP despite remaining eligible. Fraker and Moffitt (1988) find that 38 percent of eligibles participate using the 1979 Panel of the Income Survey Development Program (ISDP), the experimental precursor to the SIPP. Using data from the Health and Retirement Survey, Haider, Jacknowitz, and Schoeni (2003) find that only about a third of the elderly who are eligible participate in the FSP. For a survey of the literature on take-up and other transfer programs see Currie (2004).

[11] Survey underreporting of Food Stamps is not an issue in other studies of take up that use administrative microdata on Food Stamps to identify participation (GAO 2004; USDA 2003, 2005).

percent from 0.52 to 0.60.[12] An important limitation with this adjustment is that it assumes that the underreporting rate does not vary across different demographic groups. The estimates of Section V will allow us to relax this assumption.

Other studies of the FSP use survey data to examine the distributional consequences of the program. These studies show that the FSP has very important distributional consequences at the bottom. For example, new, alternative measures of poverty reported by U.S. Census (2006) indicate that Food Stamps and other noncash transfer programs lift a large number of people out of poverty. Several studies show that the FSP increases the resources of those in poverty and plays an important role in filling the poverty gap (Ziliak 2004; Bishop, Formby, and Zeager 1996). Meyer and Sullivan (2006) show that the FSP has an important effect on estimates of changes in family income over time. By not accounting for underreporting of food stamps, these studies understate the distributional effects of the FSP. [13, 14]

To demonstrate the potential underreporting bias in studies of the distributional consequences of the FSP, we use data from the 2002 CPS ADF (for calendar year 2001) to calculate alternative poverty rates that include food stamps following the procedure of several studies of alternative poverty (for example see U.S. Census 2006). We then adjust these alternative poverty estimates for underreporting by scaling up the dollars of food stamps in the CPS sample using the reporting rates for food stamps from Figure 1.[15] As shown in Figure 3, including food stamps in the measure of resources used to determine poverty reduces poverty substantially. The official poverty rate in 2001 was 11.7 percent. Adding reported food stamps reduces the poverty rate to 11.3 percent, which is a decrease in the number of poor individuals of 1.1 million. After adjusting for underreporting of food stamps in the CPS, the poverty rate falls even further, to just

[12] The estimate from Blank and Ruggles is from Table 1, Panel B, which includes left-censored and nonleft-censored spells of eligibility and participation. Our adjustment is based on the reporting rate for months in the SIPP for 1986-1987 (0.87).

[13] Other studies do address underreporting bias in the distributional analyses of the FSP. For example, see Primus et al. (1999) or Jolliffe et al. (2005).

[14] Other studies of the distributional consequences of the FSP that may be affected by underreporting bias include those that look at the consumption-smoothing role of the FSP (Ziliak and Gundersen, 2003; Blundell and Pistaferri, 2003).

[15] We allocate a benefit amount to CPS households that do not report receipt based on the amount each household would be eligible for if they did receive. We allocate these benefits to the nonreceivers with the highest predicted probability of receipt following the procedure in Meyer and Sullivan (2006).

under 11 percent, effectively lifting another 900,000 individuals out of poverty. The differences are particularly large when looking at extreme poverty, such as those below 25 percent of the official poverty line. Including reported food stamps reduces those below 25 percent of the poverty threshold by 14 percent. After adjusting for underreporting, this measure of extreme poverty falls by an additional 14 percent. These results in Figure 3 demonstrate that underreporting bias will lead to a significant understatement of the distributional effects of the FSP. However, these simple adjustments assume that underreporting is random—that the characteristics of FSP households that do not report receipt in surveys are the same as those of FSP households that do report receipt. The estimates of Section V provide the information to allow underreporting to vary with observable characteristics.

VIII. Evaluating Food Stamp Imputation in the ACS

When responses regarding receipt or amounts are missing in surveys, components of income are often predicted using other information. A large share of government payments to individuals are imputed in most household surveys in this way. In 2005, 24 percent of food stamp dollars were imputed in the CPS, and 17 percent were imputed in the ACS (Meyer, Mok and Sullivan 2009). In the most recent year available (2004), 36 percent of dollars were imputed in the SIPP. In our 2001 ACS data, 23 percent of reported recipients were imputed in Illinois and 18 percent in Maryland. We use the unique data we have to evaluate the quality of food stamp imputations in the ACS and to examine the validity of common practice in the use of imputed data.

Food stamp receipt in the ACS is, as in other Census data sets, imputed using hot deck methods. Households (not in group quarters) are classified by state into one of twenty cells, defined by full interactions of family type, presence of children, poverty status, and the race of the reference person. The data go through what is called a "geosort" before the imputation process. The most recent nonmissing response from a given cell at the smallest level of geography available is substituted for a missing response.

It is unclear how to evaluate the accuracy of the ACS imputations. Those who do not answer the food stamp question are very likely to be recipients. Thus, the share of imputed observations for which food stamp receipt is incorrectly imputed will be higher than a sample with a low food stamp rate (such as a random sample) where errors could be kept low by never imputing a positive response to the receipt question. We settled on the idea that an appropriate test of the accuracy of imputations really depends on the use to which one is putting the potentially imputed data. In our case, we are interested in the determinants of program receipt. A natural test of the imputation process is whether or not the survey based estimates of the determinants of program receipt are closer to the combined data estimates when the imputed observations are included.

Comparing the estimates with and without the imputed values also provides an implicit test of the common practice among researchers of dropping imputed observations (we need a list of cites here, but that should be easy to find). To compare the estimates we use the chi-square statistic that measures the distance between the sets of estimates, weighting by the precision of the individual estimates and accounting for the covariances. We find that including the imputed observations leads to estimates that are much closer to those based on the combined data with and administrative dependent variable. The chi-square statistic is about 50 lower including the imputed data in Illinois and 30 in Maryland (with less than 30 degrees of freedom).[16]

This striking result, that we do much better including the imputed observations than excluding them, prompts the question of why the imputed values are so good. This question is especially appropriate since we are including a very large set of controls in the probit equation for receipt of food stamps in the first place. We speculate that the use of fine geographic information in the ACS imputation process leads to the surprisingly accurate imputations. This imputation process can be thought of as a way of bringing sensitive information into the data in a way that does not disclose any sensitive information.[17]

[16] The exact numbers will be substituted once they have gone through Census Bureau disclosure review.
[17] We confirmed that imputed responses do not include people who gave an amount but didn't check the "yes" box on the questionnaire. Such a situation would also make it seem that the imputations were surprisingly accurate. We should confirm that such errors are corrected in an edit phase or are just rare.

IX. Conclusions and Possible Extensions

Benefit receipt in major household surveys is often underreported. This mis-reporting has important implications for our understanding of the economic circumstances of disadvantaged populations, program takeup, the distributional effects of government programs, and studies of other program effects. We use administrative data on Food Stamp Program (FSP) participation matched to American Community Survey (ACS) household data. We show that over thirty percent of true recipient households do not report receipt in the ACS. Mis-reporting, both false negatives and false positives, varies with individual characteristics. From these results we infer likely biases in several types of FSP analyses. We then directly examine the determinants of program receipt using our combined administrative and survey data. The combined data allow us to examine accurate participation using individual characteristics missing in administrative data. Our results differ from conventional estimates using only survey data, as such estimates overstate multiple program participation and participation by families with many children and understate participation by older individuals. To evaluate the use of imputed ACS data, we also examine whether our estimates using survey data alone are closer to those using the accurate combined data when imputed survey observations are excluded. Interestingly, excluding the imputed observations leads to worse estimates.

There are many possible extensions of this work. For example, the ACS is currently being used to calculate poverty rates that incorporate in-kind transfers such as food stamps (Levitan et al. 2010, Smeeding et al. 2010). The data described here along with extensions of these methods can be used to optimally employ the reported information on food stamp receipt combined with additional imputed recipients and dollars to account for under-reporting. Additional work is also needed to incorporate the validation sample information we describe here to other empirical settings.

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Table 1 - Mis-reporting of Food Stamp Receipt, 2001 ACS, Full Sample

	ACS Report		
Administrative Receipt	No Food Stamps	Food Stamps	Total
Illinois			
No Food Stamps	18,618	145	18,763
	3,899,939	29,867	3,929,805
	91.43	0.70	92.13
	99.24	0.76	100.00
	97.31	11.63	92.13
Food Stamps	526	1,108	1,634
	108,060	227,635	335,695
	2.53	5.34	7.87
	32.19	67.81	100.00
	2.69	88.37	7.87
Total	19,144	1,254	20,398[a]
	4,007,999	257,501	4,265,500
	93.96	6.04	100.00
	93.96	6.04	100.00
	100.00	100.00	100.00
Maryland			
No Food Stamps	8,903	46	8,949
	1,784,739	9,149	1,793,888
	93.38	0.48	93.86
	99.49	0.51	100.00
	97.64	10.87	93.86
Food Stamps	215	371	585
	43,067	74,283	117,350
	2.25	3.89	6.14
	36.70	63.30	100.00
	2.36	89.13	6.14
Total	9,118	416	9,534
	1,827,807	83,431	1,911,238
	95.64	4.36	100.00
	95.64	4.36	100.00
	100.00	100.00	100.00

[a]May not equal actual sample size due to rounding error.

Note: Cell entries from top to bottom are sample count, population estimate, overall %, row %, column %.

Table 2 - Mis-reporting of Food Stamp Receipt, 2001 ACS, Imputed Food Stamp Receipt Sample

	ACS Report		
Administrative Receipt	No Food Stamps	Food Stamps	Total
Illinois			
No Food Stamps	108	47	156
	28,353	12,413	40,767
	31.53	13.81	45.34
	69.55	30.45	100.00
	94.59	20.71	45.34
Food Stamps	6	181	187
	1,622	47,525	49,146
	1.80	52.86	54.66
	3.30	96.70	100.00
	5.41	79.29	54.66
Total	114	229	343
	29,975	59,938	89,913
	33.33	66.66	100.00
	33.33	66.66	100.00
	100.00	100.00	100.00
Maryland			
No Food Stamps	54	11	65
	11,462	2,153	13,616
	42.65	8.01	50.66
	82.88	17.12	100.00
	96.49	15.57	51.05
Food Stamps	2	61	63
	416	12,845	13,261
	1.55	47.79	49.34
	3.14	96.86	100.00
	3.51	84.43	48.95
Total	56	72	128
	11,879	14,998	26,877[a]
	44.20	55.80	100.00
	43.85	56.15	100.00
	100.00	100.00	100.00

[a]May not equal actual population estimate due to rounding error.

Note: Cell entries from top to bottom are sample count, population estimate, overall %, row %, column %.

Table 3 - Mis-reporting of Food Stamp Receipt, 2001 ACS, Non-imputed Food Stamp Receipt Sample

	ACS Report		
Administrative Receipt	No Food Stamps	Food Stamps	Total
Illinois			
No Food Stamps	18,937	86	19,023
	3,871,641	17,501	3,889,142
	92.72	0.42	93.14
	99.55	0.45	100.00
	97.33	8.87	93.14
Food Stamps	520	881	1,401
	106,386	180,059	286,445
	2.55	4.31	6.86
	37.14	62.86	100.00
	2.67	91.13	6.86
Total	19,458	966	20,424
	3,978,026	197,561	4,175,587
	95.27	4.73	100.00
	95.27	4.73	100.00
	100.00	100.00	100.00
Maryland			
No Food Stamps	8,852	34	8,886
	1,773,190	6,764	1,779,954
	94.11	0.36	94.47
	99.62	0.38	100.00
	97.65	9.82	94.47
Food Stamps	213	307	520
	42,698	61,495	104,193
	2.27	3.26	5.53
	40.98	59.02	100.00
	2.35	90.18	5.53
Total	9,065	341	9,406
	1,815,888	68,259	1,884,147
	96.38	3.62	100.00
	96.38	3.62	100.00
	100.00	100.00	100.00

Note: Cell entries from top to bottom are sample count, population estimate, overall %, row %, column %.

Table 4 - The Determinants of Mis-reporting, 2001 ACS, Probit Estimates, Households with Income Less Than Twice the Poverty Line

	False Negative Reporting		False Positive Reporting	
	Illinois	Maryland	Illinois	Maryland
	(1)	(2)	(3)	(4)
Single, no children	-0.1179	0.0626	-0.0057	
	(0.0749)	(0.1250)	(0.0048)	
Single, with children	-0.0477	0.1637	0.0016	
	(0.0584)	(0.1160)	(0.0026)	
Married, no children	-0.1116	0.0169	-0.0016	
	(0.0518)	(0.1488)	(0.0011)	
Number of members under 18	-0.0382	-0.0258	0.0002	-0.0014
	(0.0276)	(0.0452)	(0.0006)	(0.0011)
Number of members 18 or older	-0.0107	0.0388	0.0000	0.0011
	(0.0353)	(0.0471)	(0.0005)	(0.0012)
Number of members with PIK	0.0209	0.0516	-0.0014	0.0021
	(0.0283)	(0.0458)	(0.0009)	(0.0014)
Age >= 50	0.1865	0.1728	-0.0017	-0.0028
	(0.0696)	(0.1060)	(0.0015)	(0.0025)
Male	0.1013	-0.0700	-0.0005	0.0002
	(0.0473)	(0.0535)	(0.0007)	(0.0019)
Less than high school education	0.0660	0.0729	0.0042	0.0023
	(0.0502)	(0.0801)	(0.0024)	(0.0031)
High school graduate	0.0172	0.1292	-0.0004	0.0043
	(0.0472)	(0.0867)	(0.0011)	(0.0044)
College graduate and beyond	0.3416	-0.0680		
	(0.1300)	(0.1093)		
Hispanic	0.1154			
	(0.1032)			
Black	0.1114			
	(0.0461)			
Other race	0.0136			
	(0.1134)			
Nonwhite		-0.1170	-0.0062	-0.0031
		(0.0478)	(0.0030)	(0.0026)
Employed				-0.0083
				(0.0055)
Unemployed	-0.0170	-0.1905	0.0056	
	(0.0563)	(0.0393)	(0.0062)	
Not in labor force	-0.0098	-0.0646	0.0004	
	(0.0448)	(0.0673)	(0.0010)	
Income/poverty line	0.1105	0.1246	-0.0011	-0.0007
	(0.0393)	(0.0609)	(0.0007)	(0.0016)
Disabled	-0.0661	-0.0440	0.0021	-0.0021
	(0.0397)	(0.0777)	(0.0023)	(0.0015)
Disabled, not working	-0.0417	0.1947	0.0058	0.0131
	(0.0452)	(0.0857)	(0.0040)	(0.0087)
Speaks English well	-0.0592		-0.0011	
	(0.0665)		(0.0008)	
Speaks English poorly	0.0192		-0.0017	
	(0.0894)		(0.0011)	

(continued)

Table 4 continued - The Determinants of Mis-reporting, 2001 ACS, Probit Estimates, Households with Income Less Than Twice the Poverty Line

	False Negative Reporting		False Positive Reporting	
	Illinois	Maryland	Illinois	Maryland
	(1)	(2)	(3)	(4)
Speaks English only		-0.2215		
		(0.1618)		
Non-U.S. citizen	-0.1294	0.1217	0.0012	
	(0.0415)	(0.1794)	(0.0034)	
MSA central city				-0.0032
				(0.0021)
Rural	-0.0803	-0.1124	-0.0009	
	(0.0417)	(0.0430)	(0.0009)	
Public assistance receipt	-0.1932	-0.1930	0.0565	0.1181
	(0.0245)	(0.0441)	(0.0335)	(0.0995)
Housing assistance receipt	-0.0563	-0.0430	0.0014	0.0038
	(0.0411)	(0.0597)	(0.0021)	(0.0048)
Food stamp receipt imputed	-0.2036	-0.2267	0.2396	0.1312
	(0.0219)	(0.0347)	(0.0761)	(0.0842)
Months of FS in year	-0.0281	-0.0505		
	(0.0044)	(0.0070)		
Administrative TANF receipt	0.0721	0.0133		
	(0.0564)	(0.0721)		
Sample size	797	342	3,416	1,496
Dependent variable mean	0.2585	0.2971	0.0266	0.0151

Note: Reported results are derivatives at average. Heteroskedasticity-robust standard errors

Table 5 - Food Stamp Receipt in Survey Data and Combined Data, Probit Estimates, Households with Income Less Than Twice the Poverty Line

	Illinois			Maryland		
	Survey Data	Combined Data	Equality Test P-value	Survey Data	Combined Data	Equality Test P-value
	(1)	(2)	(3)	(4)	(5)	(6)
Single, no children	0.0630	0.0991	0.5715	0.0419	0.1090	0.3937
	(0.0360)	(0.0419)		(0.0512)	(0.0658)	
Single, with children	0.1085	0.1475	0.6495	0.0755	0.2058	0.1284
	(0.0372)	(0.0402)		(0.0488)	(0.0678)	
Married, no children	0.0772	0.0996	0.8595	0.0281	0.0901	0.5089
	(0.0497)	(0.0550)		(0.0644)	(0.0904)	
Number of members under 18	0.0215	-0.0098	0.0142	0.0133	-0.0232	0.0461
	(0.0109)	(0.0170)		(0.0169)	(0.0266)	
Number of members 18 or older	-0.0031	-0.0296	0.0804	-0.0191	-0.0270	0.9797
	(0.0114)	(0.0162)		(0.0186)	(0.0258)	
Number of members with PIK	0.0171	0.0815	0.0000	0.0231	0.0937	0.0055
	(0.0087)	(0.0161)		(0.0130)	(0.0235)	
Age 16-29	-0.0311	-0.0167	0.3840[a]	0.0421	0.0169	0.6298[a]
	(0.0235)	(0.0297)	0.2315[a]	(0.0388)	(0.0438)	0.3486[a]
Age 30-39	-0.0046	-0.0031	0.8773	-0.0516	-0.0740	0.9783
	(0.0237)	(0.0303)		(0.0246)	(0.0335)	
Age 50-59	-0.0689	-0.0181	0.0057	-0.0112	-0.0197	0.9381
	(0.0192)	(0.0318)		(0.0371)	(0.0432)	
Age 60-69	-0.0824	-0.0548	0.0365	-0.0661	-0.0735	0.5154
	(0.0193)	(0.0311)		(0.0254)	(0.0377)	
Age >= 70	-0.1318	-0.1415	0.1408	-0.1022	-0.1327	0.6017
	(0.0187)	(0.0257)		0.0241	0.0322	
Less than high school education	0.0664	0.0733	0.6479	0.0665	0.1315	0.2268
	(0.0232)	(0.0283)		0.0305	0.0414	
High school graduate	0.0248	0.0368	0.8234	0.0193	0.0744	0.1765
	(0.0213)	(0.0255)		0.0266	0.0357	
College graduate and beyond	-0.0652	-0.0642	0.5587	-0.0027	-0.0359	0.4773
	(0.0228)	(0.0296)		(0.0403)	(0.0438)	
Hispanic	-0.0290	-0.0003	0.2347			
	(0.0315)	(0.0425)				
Black	0.0776	0.1650	0.0074			
	(0.0246)	(0.0288)				
Other race	0.0619	0.0339	0.3624			
	(0.0492)	(0.0562)				
Nonwhite				-0.0117	-0.0745	0.0240
				(0.0205)	(0.0271)	
Employed				-0.0439	-0.0032	0.0787
				(0.0248)	(0.0311)	
Unemployed	0.0508	0.0157	0.2560			
	(0.0321)	(0.0377)				
Not in labor force	0.0205	-0.0020	0.1752			
	(0.0203)	(0.0236)				

(continued)

Table 5 continued - Food Stamp Receipt in Survey Data and Combined Data, Probit Estimates, Households with Income

	Illinois			Maryland		
	Survey Data (1)	Combined Data (2)	Equality Test P-value (3)	Survey Data (4)	Combined Data (5)	Equality Test P-value (6)
Income/poverty line	-0.0876	-0.0845	0.0848	-0.1023	-0.1443	0.9647
	(0.0131)	(0.0157)		(0.0166)	(0.0226)	
Disabled	0.1188	0.0956	0.0332	0.0980	0.1312	0.9731
	(0.0237)	(0.0271)		(0.0314)	(0.0362)	
Disabled, not working	0.0359	0.0119	0.1719	0.0048	0.0478	0.2375
	(0.0226)	(0.0265)		(0.0267)	(0.0375)	
Speaks English only				0.0493	0.0504	0.5578
				(0.0225)	(0.0398)	
Speaks English well	-0.0004	-0.0378	0.1977			
	(0.0331)	(0.0364)				
Speaks English poorly	0.0124	-0.0156	0.4426			
	(0.0363)	(0.0410)				
MSA outside central city	-0.0013	-0.0156	0.7106			
	(0.0373)	(0.0456)				
Rural	0.0572	0.0847	0.4788	0.0728	0.0757	0.4400
	(0.0237)	(0.0253)		(0.0270)	(0.0332)	
Public assistance receipt	0.4985	0.3176	0.0003	0.4999	0.5275	0.6821
	(0.0540)	(0.0574)		(0.0826)	(0.0865)	
Housing assistance receipt	0.1995	0.2356	0.9672	0.1659	0.2240	0.8124
	(0.0305)	(0.0349)		(0.0362)	(0.0448)	
Food stamp receipt imputed	0.5591	0.3472	0.0000	0.5540	0.4483	0.0112
	(0.0474)	(0.0593)		(0.0714)	(0.0781)	
Sample size	4,656	4,213		1,985	1,838	
Dependent variable mean	0.1944	0.2403		0.1699	0.2301	
Test of equality of all coefficients			0.0000			0.0359

Note: Reported results are derivatives at average. Heteroskedasticity-robust standard errors in parentheses. All specifications also include controls for mode of interview (mail-back, CATI, CAPI). All analyses conducted using household weights. The unreported omitted family type is married with children, the age group is 40-49, the education category is some college, the race group is white, and the geographic area is MSA central city.

[a]P-values for separate tests for ages 16-19 and 20-29 are reported.

Appendix Table 1 Determinants of Presence of PIK, Probit Estimates, Households with Income Less Than Twice the Poverty Line

	Illinois	Maryland
Number of members under 18	0.0329	0.0136
	(0.0111)	(0.0109)
Number of members 18 or older	0.0375	0.0408
	(0.0094)	(0.0114)
Less than high school	0.0015	0.0132
	(0.0151)	(0.0167)
High school graduate	0.0074	0.0060
	(0.0142)	(0.0164)
College graduate and beyond	0.0114	-0.0477
	(0.0172)	(0.0323)
Hispanic	-0.0309	-0.1777
	(0.0277)	(0.0868)
Black	-0.0413	-0.0054
	(0.0187)	(0.0147)
Other race	-0.1536	-0.0618
	(0.0518)	(0.0422)
Income/poverty line	0.0002	0.0002
	(0.0001)	(0.0001)
Disabled	-0.0278	0.0309
	(0.0120)	(0.0141)
Disabled, not working	-0.0089	-0.0063
	(0.0153)	(0.0165)
Speaks English only		-0.0448
		(0.0130)
Speaks English well	-0.0032	
	(0.0231)	
Speaks English poorly	0.0010	
	(0.0244)	
Noncitizen	-0.0538	-0.0536
	(0.0299)	(0.0368)
Sample size	4,656	1,985
Dependent variable mean	0.8867	0.9268

Note: Reported results are derivatives at average. Heteroskedasticity-robust standard errors in parentheses. All specifications also include controls for mode of interview (mail-back, CATI, CAPI). All analyses conducted using household weights. The unreported omitted education category is some college and the race group is white.