

**Using Linked Survey and Administrative Data to Better Measure Income:
Implications for Poverty, Program Effectiveness and Holes in the Safety Net**

(VERY PRELIMINARY)

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Abstract

We examine the consequences of underreporting of transfer programs in household survey data for several prototypical analyses of low-income populations. We focus on the Current Population Survey (CPS), the source of official poverty and inequality statistics, but provide evidence that our results are likely to apply to other surveys. We link administrative data for food stamps, TANF, General Assistance, and subsidized housing from New York State to the CPS at the individual level. Program receipt in the CPS is missed for over one-third of housing assistance recipients, 40 percent of food stamp recipients and 60 percent of TANF and General Assistance recipients. Benefits are also undercounted on the intensive margin, particularly for TANF, General Assistance and housing assistance. We find that the survey data sharply understate the income of poor households, as suggested in past work by one of the authors. Underreporting in the survey data also severely understates the effects of anti-poverty programs and changes our understanding of program targeting. Using the administrative data rather than survey data alone, the poverty reducing effect of all programs combined is nearly doubled while the effect of housing assistance is tripled. We also re-examine the coverage of the safety net, specifically the share of people without work or program receipt. Using the administrative measures of program receipt rather than the survey ones often reduces the share of single mothers falling through the safety net by one-half or more.

Key words: Poverty, Measurement Error, Administrative Data, Survey Misreporting, Linked Data

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Introduction

Household survey data are used for many purposes. The Current Population Survey (CPS) on which we focus here is the source of official income, poverty, health insurance, and unemployment statistics. There has been a decline in the quality of most survey datasets as unit and item nonresponse rates have risen. While the rise in nonresponse has been noted by many authors, less documented is the rise in under-reporting of many government transfers. Despite this problem, a large literature examines the income distribution using the CPS. Other literatures examine the targeting of government programs to needy groups, or study the effects of programs on poverty rates. A final literature looks at who is missed by transfer programs. In each case, the under-reporting of program receipt greatly distorts the situation of those at the bottom and the effects of transfer programs. Besides the substantive contributions of this paper, we demonstrate the value of linking administrative data to an important and widely used survey dataset. This type of linkage is likely to be increasingly used to augment and remedy weaknesses of survey data.

Data and Methods

We begin with household survey data from the New York State sample of the 2008-2013 Current Population Survey Annual Social and Economic Supplement (CPS-ASEC). The CPS-ASEC is the source of the official poverty, income and inequality data in the U.S. as well as the unemployment rate and other statistics. Early in the current year (the survey year), usually March, the CPS asks about income in the previous year (the reference year). Income is collected on many sources including earnings and a large set of government transfer programs. Imputed values for many in-kind benefits are also available in the survey files.

We link administrative records from two sources to the CPS. The first set of administrative records is from the New York State Office of Temporary and Disability Assistance (OTDA). The records are monthly payments from SNAP (food stamps), TANF and General Assistance for all individual recipients in New York State from 2007 through 2012. Besides payment amounts and dates, the files include addresses and payment types. The records are from actual payments, and appear to be very accurate. For SNAP, for example, the overall total from our administrative records differs from official aggregate outlays by less than a percent in all years. Many of the fields have been previously checked by NY OTDA against social security records.

The second source of administrative data is records on housing assistance from the Department of Housing and Urban Development (HUD). These data are from the 2009-2012 PIC and TRACS data files and include the programs under HUD jurisdiction. The data contain information on all recipients of these programs including addresses, number and ages of family members, and rent paid by the tenant from April 2008 to March 2012. While the data include the market rent for most units since they are part of voucher programs, the data do not include rent amounts for HUD owned housing units. We impute market rent for these units using conditional mean imputation within cells formed by five-digit ZIP code and household size.

The safety net in New York is more extensive than in other states, with receipt rates and amounts received above the national average, particularly for housing assistance. Consequently, we report several results without housing assistance to focus on the more nationally comparable parts of the safety net.

We match the administrative data to the CPS survey data at the individual level using individual identifiers created by the Person Identification Validation System (PVS) of the U.S. Census Bureau.¹ In short, the PVS uses the person data (such as address, name, gender, and date of birth) from the

¹ NORC (2011) and Wagner and Layne (2012) discuss the PVS in detail.

administrative records and survey data to search for a matching record in a reference file derived from the Social Security Administration Numerical Identification file. The reference file contains all transactions recorded against a social security number. If a matching record is found, the social security number of the record from the reference file is transformed into a protected identification key (PIK)² and attached to the corresponding records in our data. A PIK is obtained for over 99 percent of the administrative records from each source and just under 90 percent of the individuals in the CPS. Our unit of analysis is a household, so we aggregate the data to the household level. We consider a household to have a PIK if a PIK was obtained for anyone in the household, which is the case for well over 90 percent of the households in the CPS. In order to take the imperfect match rate into account, we multiply the household weights by the inverse of the predicted probability of any household member having a PIK (see e.g. Wooldridge 2007). The coefficients of the Probit model we use to predict these probabilities will be reported in the Appendix. As the high PIK rate suggests, our results do not change much when using the adjusted household weights.

Our main approach is to consider two measures of income or program receipt: first a measure that relies only on survey data and second a measure that substitutes some or all of our administrative data for the survey data on transfer program receipt. We use the household as the unit of analysis which is logical given the sharing of resources among members, but also insures a high rate of data linkage. Since the administrative data have records for each recipient person, we are able to link the information from a program case to the household if anyone in the household who is recorded as receiving the benefits of the program has a PIK. The CPS questions regarding SNAP, TANF and General Assistance refer to receipt at any point in the previous calendar year and we define the administrative variables accordingly. In our analyses below, we aggregate TANF and General Assistance to public assistance (PA). The housing data do not include state- and city-level programs, so they do not cover all

² There is a one-to-one correspondence between PIKs and social security numbers; PIKs are used to protect the anonymity of individuals in the data.

types of public housing the CPS questions refer to. Thus, individuals who report housing assistance in the survey data, but cannot be found in the HUD data may receive other programs. Therefore, we cannot be certain that they overreport and consider a household to be a recipient of housing assistance if they are recipients according to either the survey or the administrative data. In contrast to the other transfer programs, the CPS questions on housing assistance refer to the current month rather than any time over the previous year. Thus, we define receipt of housing assistance in the linked data based on the current month as well. The validation information for housing is only available for 2008 to 2011. Consequently, we limit most analyses to this time period, but are able to include 2007 and 2012 when analyzing SNAP and Public Assistance. We define the amount a household receives from SNAP and Public Assistance to be the sum of all payments from the respective program(s) to any household member over the course of the last 12 months. For housing assistance, we use the imputed CPS market values for those who report receipt in the survey, but do not receive assistance from any of the programs in the administrative data and the administrative amount for households that are recipients according to the administrative data or both data sources. In both cases, we calculate annual amounts by multiplying the amount for the current month by 12.³

Due to the high match rates and the quality of the administrative data, we believe that the administrative information on program receipt is highly accurate. We do not mean to claim that linked administrative data are free of errors or contain fewer errors than survey data in general. Both administrative data and data linkage vary substantially in quality. Our records are based on actual payments, which are monitored well and consequently line up very closely with administrative

³ This overstates the amount for households that only received assistance for part of the previous year. For households in the administrative data, we could obtain the exact amount from the administrative data, but this is not possible for recipients of state-level programs. However, we are mainly interested in aggregate amounts and doing so would understate them because we would not include housing assistance received by households that received assistance, but did not do so in the interview month. As long as there are no seasonal trends in housing assistance, multiplying the monthly amount by 12 assigns some of the benefits to the wrong households, but yields correct aggregate amounts.

aggregates, so we believe that they are very accurate. The records also unambiguously represent true transfer receipt as long as the payment was actually received by the household on record. Other linked records, such as tax data where the administrative records are based on reports as well, may contain errors in both measures. In such cases, it may be better to combine both measures as in Abowd and Stinson (2013) or Kapteyn and Ypma (2007). While our administrative variables may not be perfect due to rare errors of omission in the administrative data or false matches, such errors should be infrequent enough to be negligible compared to the extent of misreporting. Therefore, we argue that the results based on the linked administrative data are sufficiently close to “truth” that we consider substituting the administrative variables to correct for misreporting.

The analyses below mainly concern questions on the relation of government programs with income and poverty. We use reported pre-tax money income adjusted for inflation to 2012 dollars as our main measure of income, since it is the most common measure of household resources in the CPS. However, we repeat all analyses using a supplemental poverty measure (SPM) type income definition, which includes in-kind transfers (reported food stamps and imputed market values of housing assistance, school lunch, Medicaid, Medicare and employer health insurance contribution) and subtracts taxes (state and federal taxes after credits) and payroll deductions. Our measures of poverty are based on the official federal poverty thresholds, which we do not adjust for the SPM measure. We also use the poverty thresholds as an equivalence scale to adjust for household size and composition by reporting results in terms of income relative to the poverty line. The federal poverty thresholds arguably have several shortcomings and are often considered arbitrary, but in lieu of a universally preferred measure, they provide a well-known and easily interpretable metric to analyze economic hardship. Contrary to unlinked administrative records, our linked data provides us with the demographic detail necessary to analyze demographic groups that are known to be particularly affected by poverty. So besides analyzing the overall population, we zoom in on three disadvantaged groups: Individuals in single mother headed

households (unmarried females with at least one child under 18 present in the household), in households with an elderly member (age 65 or older), and individuals in households with a disabled member. The survey questions we use to identify disabled individuals were added to the CPS in survey year 2009, so our analyses of the last subpopulation are restricted to 2008 to 2012.

Program Under-reporting and the Income Distribution

We use the linked administrative data to analyze how misreporting alters what we learn about government transfers from survey data. Misreporting of government transfers is known to lead to non-classical measurement error, so there are no results on its consequences for empirical analyses in general. In order to show that underreporting matters substantively and examine the likely direction of biases in other studies, we conduct several prototypical analyses of government transfers. We examine income from transfer programs at different levels of reported income to show program effects on the income distribution, the poverty reducing effect of government programs as well as participation in the safety net and in how far it leaves people behind. We perform each analysis twice, once using the survey answers and once using the administrative measures of program receipt and amounts received. The administrative variables enable us to provide a more accurate description of government programs and their effects and comparing them to the results based on survey data only shows how far underreporting affects what we know about the safety net. Overall, correcting for misreporting sharply changes key results from survey data. Using the administrative variables, poverty and inequality appear better, program effects are larger and fewer individuals have fallen through safety net.

Program Effects Across the Income Distribution

This part shows how misreporting affects our perception of the economic well-being of households throughout the income distribution, particularly low income households. We find that underreporting of government transfers severely understates income of those in deep poverty. While the effect on income fades out quickly as income rises, reporting rates decline with income. Therefore, dollars missing in the survey remain sizeable higher up in the income distribution.

Table 1 compares dollars received and reported from SNAP, PA and Housing Assistance as well as all programs combined in New York State in 2008-2011. We are interested in how these measures compare throughout the income distribution, so we form bins of reported pre-tax money income relative to the poverty line. The definition of the income bins uses survey data only, since we are primarily interested in how accounting for misreporting changes our views of the economic conditions of individuals at different points in the income distribution according to official numbers from the CPS. The first row for each program contains estimates from the CPS survey data, the second row replaces the survey reports of program receipt and amounts received by the numbers recorded in the administrative data. Throughout the income distribution, dollars reported are much lower than the administrative numbers. This pattern shows that there is net underreporting in the CPS and that the differences are large enough to severely skew analyses of the safety net and the well-being of program recipients. The next three rows for each program in the table report three measures of the difference between survey and administrative amounts: The third row contains the difference in dollars. The fourth row divides the difference by average reported cash income in the respective income category. Note that the denominator of this ratio includes reported Public Assistance, but neither Food Stamps nor Housing Assistance. We use this denominator for consistency as the numerator changes, but additionally reported cash income is the most commonly used measure of resources in the CPS and is used to compute the official poverty rate. It therefore provides a good illustration of the magnitude of survey errors relative to the resources we believe an individual or household to have. The last row for

each program contains the dollar reporting rates, i.e. the percentage of dollars truly received that are reported in the survey.

Table 1: Reporting of Receipt and Amounts Received from FS, PA and Housing Combined by Categories of Pre-Tax Money Income divided by the poverty line, NY CPS, 2008-2011 pooled

	Categories of Income relative to Poverty Line								
	< 50%	50-100%	100-150%	150-200%	200-250%	250-300%	300-350%	350-400%	>400%
All Programs Combined									
Dollars Received per Person Survey	\$1,553	\$1,302	\$612	\$369	\$194	\$80	\$58	\$41	\$14
Dollars Received per Person Admin	\$2,991	\$2,850	\$1,630	\$970	\$632	\$429	\$299	\$189	\$98
Dollars Missing per Person in Survey	\$1,438	\$1,548	\$1,018	\$600	\$439	\$348	\$241	\$148	\$84
... as Share of Cash Income	110.2%	28.3%	11.6%	4.9%	2.8%	1.9%	1.1%	0.6%	0.2%
Net Dollar Reporting Rate	52%	46%	38%	38%	31%	19%	19%	22%	14%
Food Stamps									
Dollars Received per Person Survey	\$780	\$669	\$337	\$174	\$92	\$30	\$28	\$16	\$6
Dollars Received per Person Admin	\$914	\$884	\$464	\$306	\$209	\$101	\$100	\$63	\$31
Dollars Missing per Person in Survey	\$135	\$214	\$127	\$131	\$117	\$71	\$72	\$47	\$25
... as Share of Cash Income	10.3%	3.9%	1.4%	1.1%	0.8%	0.4%	0.3%	0.2%	0.0%
Net Dollar Reporting Rate	85%	76%	73%	57%	44%	30%	28%	25%	18%
Public Assistance									
Dollars Received per Person Survey	\$193	\$119	\$48	\$78	\$13	\$8	\$3	\$7	\$2
Dollars Received per Person Admin	\$567	\$306	\$91	\$90	\$30	\$33	\$21	\$17	\$11
Dollars Missing per Person in Survey	\$373	\$187	\$43	\$12	\$16	\$25	\$18	\$10	\$9
... as Share of Cash Income	28.6%	3.4%	0.5%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%
Net Dollar Reporting Rate	34%	39%	53%	87%	45%	24%	16%	42%	19%
Housing Assistance									
Dollars Received per Person Survey	\$578	\$510	\$218	\$117	\$88	\$39	\$27	\$18	\$6
Dollars Received per Person Admin	\$1,509	\$1,660	\$1,076	\$574	\$394	\$294	\$179	\$109	\$57
Dollars Missing per Person in Survey	\$932	\$1,150	\$858	\$457	\$306	\$255	\$152	\$91	\$50
... as Share of Cash Income	71.4%	21.0%	9.8%	3.7%	2.0%	1.4%	0.7%	0.3%	0.1%
Net Dollar Reporting Rate	38%	31%	20%	20%	22%	13%	15%	16%	11%
Share of Individuals	5.5%	7.9%	8.7%	8.0%	8.4%	8.2%	7.3%	6.2%	39.8%
Income per Individual	1305	5474	8782	12240	15505	18661	21959	25964	55973
# of Observations (Households)	689	1045	1143	1000	1001	972	864	750	4682
Estimation uses HHs with at least one PIKed member only, weights are adjusted for PIK rates. Income categories are defined based on pre-tax money income, poverty thresholds are the official poverty thresholds. Dollars received are 2012 dollars, but not adjusted for family size.									

Focusing on column 1 first, the table shows that how we measure government transfers substantially affects our perception of the economic circumstances of individuals in deep poverty. More than \$1400 in transfer payments are missing in the survey data per person. This makes an important difference for a poor family as it adds up to 110 percent of their reported cash income. In other words, the amount of dollars from the three programs we examine that is not reported in the survey exceeds the amount of cash income that is reported by this group. Consequently, accounting for misreporting would

substantially improve measures of the well-being of individuals in deep poverty. Correcting for misreporting also alters analyses of how important the safety net is for people in deep poverty, because only 52 percent of dollars truly received are reported in the survey. Relying on survey data only therefore substantially understates the amount of support families in deep poverty receive from the government. Almost two-thirds of this effect is due to missing housing assistance and about a quarter is caused by underreporting of Public Assistance. The difference between the programs is not due to differences in reporting, since the two programs have similar and low reporting rates in this income category. Only 38 percent of dollars from housing assistance and 34 percent of dollars from Public Assistance are reported. Rather, housing assistance makes up a larger share of missing dollars since individuals in deep poverty receive almost three times as much in housing subsidies (\$1509) as Public Assistance (\$567). With annual transfers of \$914 per individual, food stamps are a more important resource than Public Assistance as well. However, 85 percent of food stamp dollars received by individuals in deep poverty are reported in the CPS. So more accurate reporting makes the Food Stamp Program play a minor role in the analysis of missing dollars, as they only account for 9 percent of missing dollars. On the other hand, the high reporting rates overstate the importance of food stamps compared to other programs for individuals in deep poverty. The Food Stamp Program appears to be the most important transfer program for those in deep poverty. In the survey data it accounts for 50 percent of transfers received from any of the programs we analyze. However, the administrative data reveal that they make up less than a third of total dollars received. This is less than housing assistance and much closer to the share of Public Assistance. On the flipside, the survey data understate the relative importance of housing subsidies (37 instead of 50 percent of total dollars received), and Public Assistance (12 instead of 19 percent of total dollars received).

Repeating the analyses for the three deep poor subpopulations shows a mainly similar picture. Missing dollars per person in deep poverty are higher by about 30% or \$500 for households with a

disabled member and single mother headed households and \$100 lower for households with an elderly member. Consequently, according to both missing dollars and missing dollars as a share of income, the survey data look more accurate for households with an elderly member and worse for single mothers and households with a disabled member. However, this difference is largely due to differences in program participation and dollars received, which are higher for the latter two groups. Dollar reporting rates for all three programs combined are similar to the overall reporting rate for all three groups. Disaggregating the effects by program reveals some differences in reporting. Most notably, dollar reporting rates of households with a disabled member are lower for food stamps, but higher for housing assistance. This makes the survey data suggest that housing assistance is relatively more important and food stamps are less important for households with a disabled member than for the overall population. In contrast, the administrative data show that the composition of transfer receipt is the same for households with a disabled member as for the overall population.

Missing dollars as a share of income fall quickly as income rises. For those between half the poverty line and the poverty line, the unreported dollars add up to 28 percent of reported income, three quarters (21 percentage points) of which are missing dollars of housing assistance. The rapid decline continues above the poverty line as reported cash income is almost 10 times higher than missing transfers for those in near poverty (100-150 percent of the poverty line) and more than 20 times higher for individuals between 150 and 200 percent of the poverty line. As a share of income, missing dollars become almost negligible after that. The speed of the decline differs by program, which makes the composition of missing dollars change with income. Missing dollars from Public Assistance decline rapidly, so the share of missing dollars that is due to underreporting of Public Assistance drops from 26 percent of missing dollars (28 percent of cash income) in deep poverty to 4 percent (0.5 percent of cash income) in near poverty. The share of missing food stamp dollars slowly rises to account for almost 1/3 of total missing dollars, while missing housing subsidies initially rise to make up 84 percent of total

missing dollars for individuals in near poverty and then slowly decline back to their original level of accounting for about two thirds of missing dollars.

This fade out is mainly driven by the rapid increase in income and reinforced by declining total amounts received from government programs. The differences in the composition of missing dollars are partly due to the fact that public assistance spending is more concentrated below the poverty line than food stamps and housing assistance. Another important factor is that both the reporting rates and the way they change with income differ by program. Dollar reporting rates of public assistance decrease with income, which dampens the decline in relative importance. On the contrary, as income rises, a declining share of dollars received from the Food Stamp Program and housing assistance is reported in the survey. This decline is more rapid for food stamps. Combining all three programs, reporting rates decline in income. While slightly more than half of transfer dollars received in deep poverty and almost half (46 percent) of dollars received between 50 and 100 percent of the poverty line are reported, the reporting rate deteriorates quickly above the poverty line. 38% of dollars received between 100 and 200 percent of the poverty line are reported in the CPS, and only roughly every fifth dollar spent higher up is captured by the survey.

These changes in reporting rates have three important effects on how surveys measure transfer income along the income distribution: First, they cause the survey data to conceal that dollars received from transfer programs are still sizeable in higher parts of the income distribution. While they make up only a small share of total income, dollars per person are still substantial in absolute terms. For example, an individual in the income category that includes the median household (300 to 350 percent of the poverty line) receives \$299 in transfer payments per year, only \$58 of which are reported in the CPS. This is mainly due to the fact that dollars received from food stamps (\$100) and housing assistance (\$179) remain high and are poorly reported. As indicated above, the contribution of public assistance to both receipt (\$21) and missing dollars (\$18) is small.

The second effect of declining reporting rates is that the importance of transfer payments becomes less and less visible in the survey data. Missing dollars per person (as well as total missing dollars) peak between 50 and 100 percent of the poverty line and from there on decline at a slower rate than dollars actually received per person. Consequently, even though effect sizes are larger in the left tail of the income distribution because government programs make up a larger share of income there, survey data are particularly problematic when analyzing the role of transfer programs higher up in the income distribution. Becoming less and less visible in the survey data also implies that the rate at which benefits decline with income are overstated in the survey. Even though the level of benefit receipt becomes small, getting the rate at which they decline right is important to analyze the effects of government transfers on important outcomes such as labor supply.

Third, the fact that reporting rates decline with income make the survey data suggest that government income transfers are more concentrated below or slightly above the poverty line. The linked data reveal that a much larger share of recipients and spending are in higher income bins than the survey data suggest. For example, the survey data suggest that about 60 percent of dollars spent overall are received by households with income below the poverty line, while the true share is 50 percent. Similarly, the share of recipients of any of the four programs below the poverty line is overstated by about 10 percentage points in the survey data (50 instead of 39 percent). As reporting rates and how they change with income also differ by program, the survey data also misrepresents the extent to which the transfer programs differ in their target population. For food stamps and housing assistance, the CPS suggests that the majority of recipients are in poverty, even though more than half of actual recipients have incomes above the poverty line. On the other hand, the CPS understates the share of Public Assistance dollars spent below the poverty line (60 instead of 67 percent). Thus, Public Assistance appears to be targeted at less poor households in the survey data, while food stamps and housing assistance appear more focused on them.

The decline of missing transfer dollars is slower for the three subpopulations we examine, particularly for single mothers where missing dollars still add up to 10 percent of reported cash income between 150 and 200 percent of the poverty line. For all subgroups, this is driven by differences in amounts received rather than differences in reporting. While differences in the levels of reporting rates by income remain, the changes in the dollar reporting rates of all subgroups over the income distribution are comparable to the overall population. The most notable difference is that food stamp dollar reporting rates remain high for the disabled and elderly, which is surprising in light of the previous evidence on misreporting of food stamp receipt by the elderly (see e.g. Haider, Jackowitz and Schoeni 2003). Rather, the slower decline is caused by the fact that up to 150 percent of the poverty line all subgroups receive higher amounts of transfers than the general population. This implies another surprise when looking at benefit receipt of households with elderly members: Contrary to those in deep poverty, elderly households between 50 and 150 percent of the poverty line receive more benefits per individual than the population average. Paradoxically for anti-poverty programs, individuals in elderly households between 50 and 100 percent of the poverty line actually receive more than \$1000 more in transfer payment than those in deep poverty. While an increase in dollars received is reflected in the survey data, it is reduced to about \$250 due to the falling reporting rates.

The higher amounts received combined with comparable reporting rates imply substantial absolute dollar amounts missing in the survey for the subpopulations. For example, more than \$2000 per person are missing between 50 and 100 percent of the poverty line for the disabled and elderly. There are still more than \$1600 missing between 100 and 150 percent. Above 150 percent of the poverty line, households with elderly or disabled members are similar to the overall population according to the administrative data. The survey data suggest that both groups receive more benefits than the general population. However, this is only due to their slightly more accurate survey answers.

According to the administrative measures, only households with a disabled member receive more benefits than the overall population and the difference is marginal.

For single mother headed households below 150 percent of the poverty line both dollars received and missing dollars are slightly lower than for the elderly and disabled, but still substantially higher than in the overall population. However, benefit receipt by single mother headed households remains sizeable throughout the income distribution. On top of this, reporting rates tend to be worse than the overall population, so the dollar value of missing benefits remains high. Even for individuals who live in single mother headed households that belong to the upper half of the income distribution because their income exceeds four times the poverty rate, the survey numbers fall short of true benefit receipt by \$414 per person.

Poverty Reduction

Transfer misreporting not only skews our perception of the economic conditions of low income households, but also affects measures of poverty and the poverty reducing effect of government transfer programs. The poverty reduction due to government transfers is one of the most important indicators used to evaluate the effectiveness of individual transfer programs as well as the overall effort to reduce economic deprivation through government policies. In this section, we examine how inaccurate survey responses affect estimates of changes in the rate of poverty, deep poverty and near poverty when including payments from government transfer programs in the income definition. We find that the survey data sharply understate the poverty reducing effect of transfer programs. We consider anyone to be moved out of poverty by a program whose base income is below the poverty threshold, but exceeds it when adding benefits received from the program. Consequently, these analyses have two well-known caveats: First, they abstract from behavioral responses. Second, more than one program may receive credit for moving a given household out of poverty if they individually raise the household

past the poverty threshold, though when we look at combinations of programs that double counting is removed.

We focus on 2008 to 2011, because we have administrative data on all programs for these four years, but are able to analyze 2007 to 2012 when we exclude housing benefits. Average poverty rates according to our base measure of income (reported cash income without Public Assistance) were similar for the two time periods, 13.7 percent for 2008 to 2011 and 13.8 percent for 2007 to 2012. Misreporting severely understates the fraction of people moved out of poverty by the three programs. Including reported benefits from the four programs in the income definition reduces the average poverty rate between 2008 and 2011 by 2.8 percentage points, while including benefits according to the administrative data reduces it by 5.3 percentage points. Thus, when taking underreporting into account all programs combined moved another 2.5 percent of the population out of poverty. Consequently, the overall poverty reducing effect of the four government transfer programs was almost twice as large as the CPS indicates. About two thirds of this difference is due to missing Housing Assistance, which moves 2.5 percent of individuals out of poverty and thereby has the largest poverty reducing effect of the programs. However, this reduction is severely understated in the survey data, where it is only half as large. Excluding Housing Assistance, the poverty reduction of Food Stamps and Public Assistance combined was 1.8 percentage points in the CPS and almost 50 percent higher in the linked data (2.6 percentage points). Most of the reduction is due to Food Stamps (2.1 percentage points), only 0.5 percentage points are due to Public Assistance. The survey data assigns an even larger relative importance to Food Stamps, since the poverty reducing effect of Public Assistance is poorly reported: the CPS only captures a bit more than a third of the poverty reduction due to Public Assistance, but 75 percent of the reduction from food stamps. Consequently, the survey falsely indicates that the poverty reduction from Food Stamps is almost 8 times as high as Public Assistance, while the linked data clarify that it is just 3.5 times as high.

Another key statistic to evaluate poverty and anti-poverty policies is the poverty gap and the share of it that is filled by government transfers. The two statistics measure different aspects of poverty (see e.g. Deaton 2013, Ravallion 1996), but the effects of misreporting on them are similar. Correcting the survey data for underreporting increases the share of the poverty gap filled by the four programs by 44 percent; they now fill about half of the poverty gap rather than one-third of the gap. As with the poverty rate, housing assistance is the most important program as it fills more than a quarter of the poverty gap. Food stamps are almost as important, filling 23 percent of the poverty gap and Public Assistance accounts for an 11 percentage point reduction.⁴ Both housing and public assistance are poorly reported with about half of their effect missing in the survey data. Food stamps are reported much more accurately, so less than a quarter of their effect is missing. Thus, survey data understate the effect of food stamps, but they overstate the relative importance of food stamps. According to the survey, they appear to fill 50 percent more of the poverty gap than housing assistance and almost four times as much as public assistance. Yet after correcting for misreporting they fill a smaller share than housing assistance and only twice as much as public assistance. Thus, as with poverty rates, survey misreporting sharply understates the effects of government transfers and differential reporting rates skew the relative importance of the programs.

The overall pattern is similar for the three subpopulations, but the consequences of misreporting are amplified for single mother headed households and those with a disabled member due to their higher poverty rates. While average poverty rates according to the base income measure between 2008 and 2011 are lower for households with elderly members (10 percent), they are higher for those with a disabled member (19.8 percent) and those headed by single mothers (37.5 percent). The poverty gap per person in poverty relying on income without transfers is also lower among the elderly, but only marginally higher for disabled and single mother headed households. So while a larger

⁴ Note that the contributions of the individual programs add up to more than their joint contribution, since pooling them leads to a larger amount being spent above the poverty line.

share of these two groups is in poverty, those in poverty are not significantly worse off than the overall poor population.

As the poverty rate and gap are lower for the elderly, the effect of our four government programs is lower for them in absolute terms. Yet, they still reduce poverty by 38 percent and the poverty gap by 44 percent. The survey data only suggest a reduction of poverty by 24 percent and the gap by 28 percent. So while the levels of the measures differ, the understatement in survey data for elderly households is similar to the overall population. For households with disabled members and those headed by single mothers, both the poverty reducing effects and the differences between the administrative and the survey measures are striking. All programs combined account for a 10 percentage point reduction in the poverty rate for disabled households and 18 percentage points for single mother headed households. For the latter, the survey only captures a reduction of 7 percentage points (6 for elderly households). Consequently, a reduction in the poverty rate by 11 percentage points is missed when only using the survey data. The difference for single mother headed households is primarily due to the large impact of housing, which is poorly reported. The poverty reduction due to housing assistance in the CPS is only 0.7 percent, while the administrative numbers show that the decrease exceeds 7 percentage points, i.e. it is more than 10 times higher. The CPS also severely underestimates the effect of Public Assistance on the poverty rate for all three subgroups: It is 5 times as large for households with a disabled member and 6.5 times as large for those headed by single mothers in the administrative data. While the effect of public assistance on poverty rates for households with an elderly member is small (0.2 percentage points), it is entirely absent from the survey data.

The survey data also miss a large share of the poverty gap that is filled for these subgroups. Even though the poverty gap is of similar magnitude for the subgroups, government programs fill a larger share of it for households with disabled members and single mother headed households. Thus, the

differences between survey and administrative data are striking. For example, the survey misses a 10 percentage point reduction in the gap due to public assistance and a 22 percentage point reduction due to housing assistance for single mother headed households.

Misreporting changes over time, so the survey data not only misrepresent the level of poverty and program effects, but also how they change over time. It is of particular interest in how accurately the CPS reflects the effect of the government program expansion during the great recession. According to our base income measure, the poverty rate grew steadily between 2008 and 2011, from 12.67% to 14.42%, i.e. a 1.74 percentage point (13.8 percent) increase. With 1.76 percentage points or 13.3%, the increase is similar for 2007 to 2012. However, when including transfers, the poverty rate only grew by 0.76 percentage points (7%) according to survey reports and 0.32 percentage points (4%) according to the administrative measures from 2008 to 2011. Neither measure suggests an economically large increase in poverty over the recessionary period.⁵ These differences have important implications both for the role of government policy during the great recession and for our ability to use survey data to analyze such policies.

Substantively, the results in Table X show that the expansion of government benefits successfully dampened the increase of the poverty rate. While the poverty rate in terms of base income increased, the poverty reducing effect of the programs kept up with this growth: according to the administrative data, the reduction due to all programs combined increased from 4.5 to 5.9 percentage points between 2008 and 2011. This change was mainly due to the expansion of Food Stamps, as their poverty reducing effect steadily grew from 0.9 percentage points in 2007 to 2.9 percentage points in 2011 and then slightly decreased to 2.6 percentage points in 2012. Public Assistance is more volatile, but overall its poverty reducing effect slightly increased, while the poverty reduction of housing assistance slightly declined during the great recession.

⁵ Relying on simple imputation of missing program benefits, Sherman (2011) finds that programs fill in nearly the entire drop in income in the recession.

With regards to survey quality, these results show that while the survey severely underestimates the poverty reducing effect of programs, it fares much better at capturing the effect of their expansion on poverty rates. From 2008 to 2011 the poverty reducing effect of all programs combined grew by 1 percentage point from 2.1 to 3.1 percent in the survey data. This expansion is reasonably close to the 1.4 percentage point increase we see in the linked data. Changes in Housing and Public Assistance are captured well by the survey. Only for Food Stamps is there some evidence that the poverty reducing effect of the program grows faster according to administrative measures than according to survey responses. However, this accuracy in absolute changes comes at the expense of overstating the relative increase of the effects of the programs. For example, the poverty reducing effect of Public Assistance and Food Stamps combined doubled between 2007 and 2012, but the CPS suggests that it increased 3.5 fold. So by this measure, the survey data substantially overstate the expansion of government programs during the great recession.

The subpopulations results in Table Y underline that trends in reporting translate into spurious trends in poverty and the poverty reducing effect of programs in the survey data. This result is most cleanly visible for households with disabled members. Poverty rates are relatively stable between 2008 and 2011 according to both the base income measure and survey reports. Yet the combined survey and administrative data reveal an increase of about a percentage point for the disabled. This increase is due to a declining effect of housing assistance on poverty for households with a disabled member. However, because reporting of housing assistance and (to a lesser extent) Public Assistance improved at the same time, the trend in the survey data is flat. The other two subgroups reveal similar problems, but the numbers are noisier. For both groups, the survey data indicate some volatility, but no clear trend in poverty rates, while the administrative variables show a steady but small decline for the elderly and an increase by almost 3.5 percentage points for single mothers.

The comparisons above focus on the number of people moved across the federal poverty threshold, which may be regarded as an arbitrary cutoff. However, the problems are similar when considering other income thresholds and are likely to affect analyses of movements in the income distribution due to government transfers regardless of the choice of cutoff. The previous section shows that overall reporting rates decline with income, so the understatement is likely to be larger relative to benefits paid for higher cutoffs and smaller for lower cutoffs. For example, accounting for misreporting has similar, but slightly smaller effects on analyses of deep poverty. On average between 2008 and 2012, 6 percent of individuals lived in households with base income below 50 percent of the poverty line, i.e. in deep poverty. According to administrative measures of transfer receipt, government transfers account for a smaller reduction of the rate of deep poverty than the poverty rate, as they reduced it by 3.3 percentage points. In the survey data, the reductions are similar at about 2.5 percentage points. On one hand, it is encouraging that survey reports more accurately reflect the reduction in deep poverty. Yet on the other hand, the differences in reporting along the income distribution can be misleading for analyses of the safety net. While the survey data suggest that our four government transfers move about the same number of people out of deep poverty and poverty, they actually only move half as many people across the deep poverty threshold.

By and large the differences between survey and administrative data are similar when measuring poverty and deep poverty: Housing assistance is the most important program and about half of its effect is missing in the survey. This result causes Food Stamps, which is substantially better reported, to appear as the most important program in fighting deep poverty in the survey while its real effect is much smaller than housing assistance. The effect of misreporting on deep poverty for the subpopulations is similar to the overall population on most accounts. The elderly report better and have lower rates of deep poverty. For households headed by a single mother or with disabled members, misreporting is similar to the general population: the survey data misses about 1/3 of the individuals

moved out of deep poverty. However, the consequences of misreporting are amplified, because the programs move more individuals from these groups across the deep poverty threshold.

As was pointed out above, underreporting is correlated with income, so while government programs become less important at higher income thresholds, the fraction of it that is reflected in the CPS also becomes smaller. For example, 22.3 percent of individuals live in near poverty, i.e. in households with base income below 150% of the federal poverty line. Including the accurate administrative measures of four government transfers reduces this rate by 4.3 percentage points. So their effect is indeed smaller in absolute numbers than for poverty, but only a 1.2 percent decrease is captured by the survey reports. The reporting rate declines faster than the receipt rate, so a larger and larger share of benefits (and hence their effects) is missing from the survey when moving up in the income distribution. For instance, the CPS indicates that government transfers only move 0.6 percent of the population across twice the poverty line, while the linked data reveal that they still move 2.8 percent across this threshold. Aside from the difference in scale, the pattern of the differences is similar. For the subpopulations, the differences at both thresholds are similar and most notable for single mother headed households. For example, of the 11 point reduction in near poverty, only 2 percentage points can be found in the CPS.

Holes in the Safety Net

Another important criterion to evaluate government transfers and the overall safety net is in how far it reaches people in need and how many people are left behind. In this section, we show that both individual programs and the safety net overall reach far more people in need than the survey data suggest. Overall, 8 percent of individuals with income below the poverty line receive one or more government programs, but report no program receipt at all in the survey. This means that 69 percent

rather than 61 percent of individuals below the poverty line receive any of the four programs we examine or that they reach 840 thousand people more than the survey data suggest in New York State alone. The differences are even larger when looking at the programs individually, since many people receive multiple programs, but report only one or two. The differences in receipt rates are as large as 15 percentage points or a 75 percent increase for public assistance among individuals in deep poverty. Consequently, correcting for misreporting is important to provide policy makers with accurate numbers on the performance of the safety net and individual programs.

Since reporting rates differ by demographic group (Meyer, George, Mittag 2014), using survey data to analyze which demographic groups the safety net fails to reach are particularly problematic. Receipt rate for subpopulations estimates are the average product of the probability of receiving the program and the probability of reporting receipt, which is unknown and varies between subpopulations. A group that has received particular attention in the literature is so called disconnected single mothers, i.e. single mothers who have no (or very little) income from both work and welfare programs (Blank and Kovak 2007, 2009, Bitler and Hoynes 2010, Loprest 2011, Loprest and Nichols, 2011). For example, Blank and Kovak (2007, 2009) find high and rising rates of single mothers who neither work nor participate in transfer programs. Misreporting looms particularly large in such studies because the measures of interest are very sensitive to the common failure to report program receipt in the survey. Correcting these errors for subpopulations in the survey is difficult due to differences in the reporting rates and unlinked administrative data usually do not contain the covariates required to isolate particularly poor populations.

Table 2: Gaps in the Safety Net for Single Mother Headed Households According to Survey and Administrative Data, NY CPS, 2008-2011 pooled

Included Programs	No earnings and program receipt			Low earnings and program receipt		
	Survey	Admin	% Over-statement	Survey	Admin	% Over-statement
PA only	17.1%	12.8%	34%	22.8%	17.1%	33%
PA and SNAP	5.3%	3.2%	68%	7.4%	5.1%	46%
PA, SNAP and Housing	3.6%	1.7%	113%	5.1%	3.0%	71%
All Cash Programs	5.4%	3.6%	50%	9.8%	7.0%	40%
All Cash Programs and SNAP	not disclosed			3.5%	1.9%	82%

Notes: All definitions restrict the sample to households headed by an unmarried female with at least one own, grand, related or foster child present in the HH. In column 2-4, we consider households that have no earnings and receive none of the programs in the first 3 columns as left behind, columns 5-7 also include those with yearly earnings less than \$2000 and combined program receipt of less than \$1000 (2005 dollars). Estimation uses individuals in HH with at least one PIKed member only, weights are adjusted for PIK rates.

Linking survey data to administrative records at the individual level can overcome these problems and sharply reduces estimates of how many people the safety net fails to reach. Table 2 reports the percentage of individuals in single mother headed households who are missed by the safety net according to survey reports and administrative program receipt for the years in which administrative data are available on all programs (2008-2011). We consider several definitions, varying what programs we include. Following Blank and Kovak (2009), for each definition we initially require no earnings and no benefits, but then allow up to \$2000 in annual earnings and \$1000 in benefits from all programs combined.⁶ The third and sixth column of the table show that underreporting severely overstates how many individuals the safety net fails to reach for all definitions. Even for the first definition, which is only affected by underreporting of Public Assistance, the survey data overestimate the number of individuals in single mother headed households without earnings and access to the safety net by 33 percent. While allowing for some earnings and program receipt increases the numbers of individuals, it does not decrease the severity of underestimation in the survey. According to the CPS, slightly more than 5 percent of the individuals in single mother headed households seem to fall through the cracks of the

⁶ For comparability with their definition, all dollars are in 2005 dollars.

safety net even though they are in fact program recipients. While the table shows large differences in the levels, on the positive sides the CPS correctly reflects the pattern of the time trend. The administrative and the survey data agree on the fact that both the number and the share of individuals the safety net fails to reach increased initially and declined as the economy improved.

Taking more programs into account in evaluating the failure of the safety net to reach people in need reduces the problem in absolute terms, since the safety net fails to reach fewer and fewer people. Blank and Kovak (2009) consider anyone disconnected who does not work and does not receive TANF (and SSI in other definitions). Comparing the rows of table 2 shows that a large share of those who neither work nor receive public assistance did not fall through the cracks of the safety net, because they receive other cash or non-cash benefits. Including non-cash benefits particularly affects the number of individuals the safety net fails to reach: Adding food stamp receipt reduces the fraction by 75 percent (70 percent for the low income and benefits definition). This reduction is larger than the effect of including reported receipt of all other cash programs combined. Additionally accounting for housing assistance reduces the number by another 40 percent. Both reductions are understated in the survey. When including all cash and non-cash programs, the share of individuals missed by programs among single mother headed households drops to 0.2 percent for 2007-2012⁷ even for the low earnings and receipt definition. It would likely be even lower if we corrected for underreporting of employment, receipt of other programs and housing assistance for 2007 and 2012. While the number also becomes small in the survey data (0.8 percent), it is still overstated by a factor of more than 4.

However, regardless of which programs are included in the definition, table 2 shows that the extent to which the safety net fails to reach individuals substantively depends on how we measure program receipt. Including further program only aggravates the problem of underreporting: Depending on which programs are included, the fraction of individuals in single mother headed households that

⁷ Numbers for 2008-2011 could not be disclosed due to the small number of individuals missed by programs.

neither work nor receive assistance from the government are overstated by 33 to 113 percent in the survey data. The range of overstatement is slightly lower (33 to 82 percent) when including households with low earnings and low benefit receipt, but the survey data still substantively overstate the number of individuals who appear not to have access to the safety net.

In summary, the safety net leaves far fewer people without work and government assistance when we take non-cash benefits into account and correct for under-reporting. Our definition of being severely disadvantaged, but not reached by the safety net leans on a particular definition that is commonly used to analyze single mother headed households, but regardless of how we define who is left behind, underreporting in survey data substantially overstates the number of people who fall through the cracks of the safety net. The differences are likely to be similar for other studies of particularly disadvantaged populations such as those with income below \$2 per day (see e.g. Shaefer and Edin 2012). There are two reasons for this. First, it is likely that there is substantial overlap in the households that these definitions deem in dire need. Second, any way of classifying households as having extremely low resources is very sensitive to misreporting. In most cases, receipt of a single government program is sufficient to move a household out of this category. Thus, the pervasive failure to report program receipt at all makes any measure of extreme deprivation falsely include many households who are below the threshold according to reported benefits, but above the threshold according to truly received benefits. While this shows that the safety net is better at reaching low income populations than the CPS suggests, it should be noted that it says more about access to the safety net than about the economic well-being of recipients.

Discussion and Conclusions

The administrative data sharply alter our view of well-being at the bottom and the effect of transfer programs. New York is similar demographically and in terms of its poverty rate, but has a more robust safety net than other the nation as a whole. However, misreporting seems to be less of a problem in New York than in other states, and we miss other programs with substantial under-reporting such as unemployment insurance and SSI. Even, OASDI, that has little under-reporting is so big that a small degree of misreporting can have a substantial impact. Future work should incorporate more programs and states.

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Data Appendix

The SPM-type measure adds in-kind transfers (food stamps and imputed market values of housing assistance, school lunch, Medicaid, Medicare and employer health insurance contribution and subtracts FICA, the federal retirement payroll deduction and federal and state taxes (including all credits). We use market values and not fungible values of non-cash transfers and do not subtract SECA taxes (unless they are included in the FICA variable).

For each definition, we use two types of income measures: raw dollar amounts (referred to as dollar income) and dollar amounts divided by the poverty line (referred to as poverty index income).

We use the federal poverty threshold. We define them based on the total number of adults and children in the household and the age of the householder.

When we restrict the analysis to single mothers, we use households headed by an unmarried female (divorced, widowed, never married) with at least one child under 18 in the household (including foster, grand and step children). This is the same definition as for left out households, but we do not restrict the age and income range and include full-time students. Households with an elderly member are households in which anyone is 65 or older. A household is included in the analysis for the disabled if anyone in the household gave a positive answer to any of the 6 disability questions. Since these questions are first included in the 2009 CPS, this analysis starts in reference year 2008.