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Response Error and the Medicaid Undercount in the Current Population Survey

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Abstract

The Current Population Survey Annual Social and Economic Supplement (CPS ASEC) is an important source for estimates of the uninsured population. Previous research has shown that survey estimates produce an undercount of beneficiaries compared to Medicaid enrollment records. We extend past work by examining the Medicaid undercount in the 2007-2011 CPS ASEC compared to enrollment data from the Medicaid Statistical Information System for calendar years 2006-2010. By linking individuals across datasets, we analyze two types of response error regarding Medicaid enrollment – false negative error and false positive error. We use regression analysis to identify factors associated with these two types of response error in the 2011 CPS ASEC. We find that the Medicaid undercount was between 22 and 31 percent from 2007 to 2011. In 2011, the false negative rate was 40 percent, and 27 percent of Medicaid reports in CPS ASEC were false positives. False negative error is associated with the duration of enrollment in Medicaid, enrollment in Medicare and private insurance, and Medicaid enrollment in the survey year. False positive error is associated with enrollment in Medicare and shared Medicaid coverage in the household. We discuss implications for survey reports of health insurance coverage and for estimating the uninsured population.

Key Words: Medicaid undercount, Response error, Record linkage, Uninsured, Administrative data

Introduction

Medicaid is an important part of our nation's safety net providing health insurance coverage to low-income children and adults, people with disabilities, and the elderly. Touching the lives of many Americans, the program covered an estimated 72.5 million people in 2013 (Burwell 2014).[1] Administrative and survey data provide important information about Medicaid enrollees, however, accurately measuring Medicaid participation in surveys has proven difficult for several decades. Dating back to the 1990s, previous research has shown that estimates of Medicaid coverage based on the Current Population Survey Annual Social and Economic Supplement (CPS ASEC) have consistently produced an undercount of beneficiaries when compared to actual Medicaid enrollment records (Call et al. 2008; Card et al. 2004; Davern et al. 2008; Davern et al. 2009; Klerman et al. 2005;, Klerman et al. 2009; Lewis et al. 1998). For instance, in 2000, the CPS ASEC estimated 32 percent fewer Medicaid participants compared to Medicaid administrative records. This discrepancy between survey data and administrative records has become known as the "Medicaid undercount."

This issue has important policy implications because it affects estimates of the uninsured population. For instance, individuals undercounted in survey data for Medicaid are considered uninsured if they have not reported any other form of insurance coverage. Accurate and reliable estimates of the uninsured population are important as they serve as the basis for both public policy decisions and inform programs focused on expanding insurance coverage (Kincheloe et al. 2006). In particular, as Medicaid enrollment expands with the Patient Protection and Affordable Care Act, understanding the Medicaid undercount in surveys is increasingly important to assess estimates of the uninsured population.

[1] According for Burwell (2014), 72.5 million people were estimated to be covered by Medicaid for at least one month.

We contribute to the Medicaid undercount literature in several ways. First, we extend past work by measuring the Medicaid undercount in the 2007-2011 CPS ASEC using Medicaid Statistical Information System (MSIS) data for calendar years 2006-2010. Second, with substantially more linkages than previous research, we use linked 2011 CPS ASEC and 2010 MSIS enrollment data to evaluate the two components of measurement error that contribute to the undercount: false negative error and false positive error (Figure 1). Some persons have Medicaid coverage but report no coverage in the CPS ASEC (false negative error), lowering survey estimates of Medicaid coverage. Some persons report Medicaid coverage in the CPS ASEC but cannot be linked to Medicaid enrollment records in MSIS data (false positive error), increasing survey estimates of Medicaid coverage.

We examine two hypotheses related to how respondents interpret questions about health insurance on the CPS ASEC: 1) whether they interpret the question as asking about their current coverage status or if they have difficulty remembering past coverage and 2) whether respondents confuse different programs or only report certain forms of insurance. We also look at the effect of others' insurance coverage in the household on response error and describe demographic and socioeconomic characteristics associated with response error. We then provide adjusted rates of Medicaid coverage and the uninsured correcting these survey response errors. We discuss possible reasons for differences in our estimates with respect to previous research, and we discuss the implications of our findings on uninsured population estimates.

Literature Review

Discrepancies between Medicaid enrollment data and the CPS ASEC estimates of Medicaid participants were documented in the 1990s (Card et al. 2004). Klerman et al. (2005)

evaluated matched CPS ASEC and Medi-Cal data and found Medicaid underreporting for about 30 percent of adults and 25 percent of children using the CPS ASEC from 1990 to 2000.

In 2007, multiple institutions partnered on the SNACC Medicaid Undercount Project to better understand the Medicaid undercount at a national level using linked 2000-2005 CPS ASEC data and Medicaid enrollment data.[2] SNACC researchers (2010) determined that the Medicaid undercount in the CPS ASEC ranged between 31 and 38 percent from 2000 to 2005. By linking the Medicaid and CPS ASEC data, they found that reporting error as opposed to editing and imputation procedures was the main cause of the undercount, in particular false negative response error (SNACC Phase V 2010). Evaluating a few variables descriptively, SNACC researchers found that people in poverty were more likely to report a false negative error. They also found that the longer individuals were enrolled in Medicaid the less likely they were to report a false negative error.

Kincheloe et al. (2006) reviewed prior research on the Medicaid undercount and identified several factors associated with the Medicaid undercount and false negative response error. Respondents enrolled in Medicaid may mistakenly report having Medicare or some other form of public coverage. In addition to confusion over the program name, some respondents with dual Medicare and Medicaid coverage may only report having Medicare and fail to report also having Medicaid. Others may report a private health care plan instead of reporting Medicaid. The scope of Medicaid benefits as well as the health status of beneficiaries can also affect the accuracy of survey reports of Medicaid coverage. Persons with only partial benefits may not

[2] Researchers and staff from the University of Minnesota's State Health Access Data Assistance Center, Centers for Medicare and Medicaid Services, Assistant Secretary for Planning and Evaluation, National Center for Health Statistics, Administration for Healthcare Research and Quality, and the U.S. Census Bureau partnered to research the Medicaid undercount issue in the CPS ASEC. The project is known as the SNACC Medicaid Undercount Project to represent the collaborating agencies. All SNACC reports can be retrieved from: https://www.census.gov/did/www/snacc/

report Medicaid coverage. Similarly, persons who are in better health or do not use health services often may fail to report their Medicaid coverage status as compared to persons in poor health who more frequently seek out health care. Automatic enrollment in some states for those below a certain income threshold as well as the stigma associated with Medicaid coverage are additional factors that may influence false negative reports of Medicaid in the CPS ASEC.

Klerman et al. (2009) explored two explanations for understanding the Medicaid undercount in the CPS ASEC, what they described as the point-in-time versus recall conjectures. The point-in-time conjecture posits that respondents either disregard or do not understand instructions for the insurance coverage question that ask the respondent to report on the previous calendar year. Instead, respondents report their insurance coverage at the time of the survey. Cognitive testing of the CPS ASEC health insurance questions suggested that some respondents focused on their current coverage status rather than the previous year reference period (Pascale et al. 2009). SNACC researchers also found that those who are enrolled in Medicaid at the time of the survey are less likely to report false negatives (SNACC Phase V 2010).

The recall conjecture argues that the recall task is too difficult for respondents. Many respondents are unable to remember whether they had Medicaid coverage during the previous year or not, particularly if coverage was early in the prior year. As an explanation for the Medicaid undercount, Klerman et al. (2009) found more support for the recall conjecture than the point-in-time conjecture. Too few people, they argued, have different Medicaid coverage status at the time of the interview than during the prior year for it to explain the Medicaid undercount. Instead, they suggested the undercount is related to how recent the respondent had Medicaid coverage with more recent coverage yielding more accurate reports.

A respondent reporting for other household members may also contribute to reporting error. Cognitive testing revealed that some respondents did not have accurate knowledge of the coverage of other household members, while other respondents failed to include certain household members at all in their reports (Pascale 2007). Based on these findings, Pascale et al. (2009) investigated and found support for a shared coverage hypothesis to explain response error in the CPS ASEC for the calendar year 2000. In their analysis of matched CPS ASEC and MSIS data, respondents were most accurate in reporting Medicaid coverage for other household members when the respondent shared that coverage with the other members of the household.

Most Medicaid undercount research has focused on false negative error rather than false positive error since it is a larger component of the undercount. The research that does exist on false positive error is mainly from the SNACC project. SNACC researchers (2010) determined that false positive reports of Medicaid enrollment result when persons incorrectly report having Medicaid, or when no linked MSIS record can be identified to verify the CPS ASEC report of coverage. The rate of false positive response error in the CPS ASEC for the years 2000-2005 ranged between about 20 and 25 percent of all reports of Medicaid enrollment. Whereas false negative response error resulted mostly from reporting by respondents, a majority of false positive response error resulted predominantly from editing and imputation procedures in the CPS ASEC. However, about 40 percent of the cases of false positive error stemmed from respondent reporting. SNACC researchers found that the rate of false positives was higher among those in poverty compared to those not in poverty.

We expand on this rich literature and contribute to the understanding of the Medicaid undercount by updating Medicaid undercount numbers using 2007 to 2011 CPS ASEC data.[3] We

[3] The Census Bureau recently changed the CPS ASEC question on Medicaid in 2014. We cannot evaluate the Medicaid Undercount for the new question in this paper because Medicaid administrative data for this year are not

are able to link more MSIS cases to the CPS ASEC compared to previous research allowing us to more accurately measure and analyze false negative and false positive errors. Based on prior research we answer three main research questions related to response error. First, how is false negative reporting associated with the point-in-time and recall conjectures explored by Klerman et al. (2009)? Second, to what extent do program name confusion and selective reporting of health insurance affect false negative and false positive response error? And third, how does shared Medicaid coverage in the household affect false negative and false positive error reporting? Fourth, we describe the demographic and socioeconomic characteristics associated with response error. These findings deepen our knowledge of Medicaid coverage as it relates to estimates of the uninsured population based on the CPS ASEC.

Data and Methods

We use Medicaid administrative records for calendar years 2006 through 2010 and CPS ASEC survey data on health insurance coverage from 2007 through 2011 for the analysis conducted in this study. For reference, the tables also show Medicaid data from 2000-2005 and CPS ASEC data from 2001-2006 based on the SNACC Phase V (2010) report on the Medicaid undercount.

The CPS ASEC is a supplement which collects additional data on poverty, migration, and work experience and is administered in February, March, and April, with most of the data collected in March. The CPS ASEC samples 98,000 households. Data on Medicaid enrollment are from the MSIS and are submitted electronically by states on a quarterly basis to the Centers for Medicare and Medicaid, mandated for this period by the Balanced Budget Act of 1997. MSIS

yet available to analyze. We receive Medicaid data at quite a lag. We have Medicaid data for all states up through 2010. We are missing some state data for 2011 and 2012, thus we do not include these data in our analysis.

data contain information for persons enrolled in Medicaid including the number of days enrolled by month and type of Medicaid coverage.

Several differences exist between the MSIS and CPS ASEC universes. States report MSIS data in fiscal quarters and each Medicaid enrollment record is assigned an MSIS case number. Since cases rather than persons are the unit of analysis, multiple records may exist for a person who has different case numbers across different states. By comparison, the CPS ASEC includes survey data reported with persons as the unit of analysis. The MSIS data includes the institutionalized population whereas the CPS ASEC sample does not include persons residing in institutionalized group quarters.[4] MSIS data includes information on both full and restricted benefits, but the CPS ASEC does not collect data on the level of Medicaid benefit eligibility. Finally, MSIS includes point-in-time data on Medicaid enrollment while the CPS ASEC collects retrospective information on health insurance coverage for the previous calendar year.[5]

We calculate raw and adjusted measures for the Medicaid undercount. The raw measures use both the CPS ASEC and MSIS data universes without adjustments. We then make adjustments to both datasets outlined below to make them more comparable. We use raw measures and adjusted measures to evaluate the Medicaid undercount and use only adjusted measures to analyze false negative and false positive reporting.

For the adjusted MSIS measure, we remove persons residing in institutional group quarters from the MSIS data. We aggregate the state MSIS data into one national file and unduplicate by persons. We exclude enrollees reported in MSIS with only partial benefits (e.g., emergency services or family planning) or who are only covered through State Children's Health

[4] The CPS ASEC includes Armed forces personnel who live with their families in civilian housing or on a military base.

[5] The CPS ASEC questionnaire asks respondents about their Medicaid coverage during the past calendar year. For example, the 2011 CPS ASEC asks, “At any time in 2010, (was/were) (you/ anyone in this household) covered by Medicaid?” If “yes,” then the questionnaire asks who in the household was covered.

Insurance Program (SCHIP). SCHIP is administered as a separate program from Medicaid in many states, and it is likely that many participating families are not aware of the difference (SNACC Phase II 2008). For the CPS ASEC adjusted measure, we exclude persons reported as covered only through SCHIP programs.

We evaluate false negative and false positive error by linking individuals in the CPS ASEC to their MSIS record. Individuals in the CPS ASEC and MSIS are assigned an anonymized unique person identifier called a Protected Identification Key (PIK) via probabilistic record linkage techniques (Fellegi and Sunter 1969; Wagner and Layne 2014). Social Security Number (SSN), name, date of birth, gender, and address are used to assign a PIK, when available.

In MSIS, the PIK is assigned based on SSN, date of birth, and gender. In the CPS ASEC, it is assigned based on name, date of birth, gender, and address. Starting with 2006, CPS no longer asked for SSN, and nearly all records were eligible for probabilistic linkage. The result of this change was an increasing proportion of CPS ASEC records that could be assigned a PIK. As seen in Table 1, using unadjusted data, the percent of 2011 CPS ASEC records that received a PIK was 90 percent as opposed to 70 percent in 2005.[6] Compared to the CPS ASEC, a higher proportion of MSIS records received a PIK (e.g., 94 percent for 2010).

Only observations with PIKs are linkable. Therefore, CPS ASEC records with a PIK are re-weighted to compensate for observations that did not receive a PIK. The CPS ASEC weighting adjustment factors are calculated based on the PIK rates by age group, relative poverty ratio, health insurance status, and whether health insurance status was imputed.

We use two logistic regression models to evaluate the characteristics of people who report false negatives and false positives. The dependent variable for the false negative

[6] In 2005 and earlier years, presence of a SSN determined eligibility for linkage.

regression analysis is coded as “1” if a person said they did not have Medicaid coverage in the CPS ASEC but was enrolled according to MSIS data. The dependent variable is coded as “0” if the person reported Medicaid coverage in the CPS ASEC and was enrolled in MSIS data with full benefits. In the regression on false positives responses, the dependent variable is coded as “1” if a person reports Medicaid coverage in the CPS ASEC, but according to MSIS, they are not receiving partial benefits, full benefits, or coverage through the SCHIP expansion program. The dependent variable is coded as “0” if a person reports Medicaid coverage in the CPS ASEC and has full or partial benefits in MSIS data. We remove imputed and edited survey responses from both analyses.

To address the point-in-time versus recall conjecture research question, we include in the model a measure for whether the respondent was enrolled in MSIS data in 2011, the year the CPS ASEC was conducted. If there is support for the point-in-time hypothesis, we would expect to see a higher likelihood of false positive reporting when respondents are newly enrolled in Medicaid at the time of the survey but were not enrolled during the previous calendar year. Consistent with previous SNACC analyses, for false negative reports, we measure whether the respondent was enrolled with full benefits in 2011, and for false positive reports, we measure whether the respondent was enrolled with full or partial benefits in 2011.

We also assess the impact of recall issues on false negative error using a measure of Medicaid coverage duration, measured as the number of days a person is enrolled in Medicaid during the 2010 calendar year. We assess the impact of recall issues on false positive error by observing whether a person had Medicaid coverage in MSIS for calendar year 2009. According to the recall hypothesis, respondents with shorter Medicaid enrollment periods are more likely to provide false negative reports. For false positive error, the hypothesis predicts that people

enrolled in Medicaid two years prior to the survey are more likely to provide a false positive response.

One source of false positive error may be the inability to link persons reporting Medicaid coverage in the CPS ASEC with their MSIS enrollment data. A person may be correct in their survey response, but if the person did not receive a PIK in MSIS data, then they cannot be linked back to the survey data. For calendar years 2000-2005, it was estimated that between 39.4 and 62.1 percent of false positive error in the CPS ASEC were incorrectly identified as a consequence of unlinkable MSIS records (SNACC Phase V 2010). For calendar year 2010, that estimate dropped to about 18 percent as a result of the increased PIK rate in MSIS. This estimate relies on the assumption that unlinkable MSIS records match with CPS ASEC records at the same rate as the linkable records. It also relies on the assumption that both unlinkable and linkable MSIS records have similar patterns of Medicaid reporting accuracy in the CPS ASEC. Regression results will be interpreted in light of this caveat. In particular, respondents coded as false positives but who have coverage in 2009 and 2011 may be more likely to have an unlinkable MSIS record as their source of error.

For our second research question, to take into account possible confusion between Medicaid and Medicare or another type of insurance, both models include whether the person was coded in the CPS ASEC as being enrolled in Medicare and whether the person was coded as being enrolled in any other type of insurance. To address our third research question on shared coverage, we include an independent variable for whether anyone else in the household had Medicaid enrollment data in MSIS.

We also describe demographic and socioeconomic factors associated with false negative and false positive error. We include Hispanic origin, race, sex, age, education level, foreign-born status, and logged household income in both models.

Results

Medicaid Undercount

Figure 2 and Table 2 present results for the measurement of the Medicaid undercount in the CPS ASEC. We include SNACC Medicaid undercount results for 2000 to 2005 for comparison. The raw measures of the undercount ranged from 39 percent to 33 percent from 2006 to 2010, similar to the raw undercount for previous years of analysis. After adjusting MSIS and CPS ASEC universes, the adjusted measure of the Medicaid undercount ranged from 31 percent to 22 percent from 2006 to 2010. The adjusted undercount for 2010 was the lowest for the entire time series from 2000 to 2010.

The percent difference between the raw and adjusted measures of the undercount increased over time reaching a high of 11.5 percent in 2009, and was at 11.2 percent in 2010. The decline in the adjusted measure of the undercount and the corresponding increase in the gap between the raw and adjusted measures are likely due to more duplicate persons being identified in the MSIS data through more complete data and improved PIK assignment. There may also be an increased use of partial benefits relative to full benefits. Since partial benefits are removed from the MSIS adjusted count, this would lower the adjusted undercount and increase the difference with the raw undercount.

Measurement Error Descriptives

Now we will turn to the rates for false negative error in Medicaid reporting in the CPS ASEC and then we will discuss the false positive error rates. Table 3 presents the rates for false

negative survey error, whether survey responses were imputed or reported, and other insurance status for the false negative population. We show SNACC false negative results from 2000 to 2005 for comparison. For the years 2000-2010, there were between 40 percent and 45 percent of false negative reports for Medicaid in the CPS ASEC. This figure declined from 45 percent in calendar year 2006 to a low of 39 percent in 2009 and 40 percent in 2010. This means that only about 60 percent of CPS ASEC respondents linked to Medicaid enrollment data in MSIS correctly classified themselves as being enrolled in Medicaid. The results indicate the persistence of false negative error in the CPS ASEC despite its decline from 2007 to 2010.

The majority of false negative survey error for Medicaid in the CPS ASEC was a consequence of reported insurance status while the remainder resulted from data imputation procedures. Consistent with previous research, between 73 and 79 percent of false negative error for the years 2006-2009 resulted from reporting of insurance status in the CPS ASEC. Among the false negative respondents, about 60 percent reported having some other type of insurance coverage. Conversely, about 40 percent of the false negative population for Medicaid or about 8 million people in 2010 erroneously contributed to estimates of the uninsured.

Table 4 presents results for the CPS ASEC false positive respondents. The false positive error rate for the calendar years 2000-2010 ranged from 2.6 to 4.7 percent. Among all CPS ASEC records with a PIK that did not match to MSIS reported, about 3 to 5 percent reported Medicaid coverage in the survey. The percentage of all Medicaid reports that were identified as false positive errors ranged from 21 percent to 27 percent for calendar years 2000-2010. While the majority of false negative error was attributable to reporting by respondents, the majority of false positive error resulted from edit and imputation procedures. About 60 percent of false

positive error was a consequence of edit and imputation procedures and 40 percent from respondent reporting.

Regression Results

Table 5 shows logistic regression results modeling for the false negative reports of Medicaid coverage in the CPS ASEC. Of the weighted sample used in this regression, about 42 percent are coded as a false negative report, and about 58 percent correctly reported being enrolled in Medicaid.

We find support for both point-in-time and recall conjectures. Enrollment in Medicaid in the CPS ASEC survey year is associated with a lower likelihood of a false negative report. This lends support to the point-in-time conjecture, that some are reporting their Medicaid status at the time of the interview rather than for the previous year. Longer enrollment in Medicaid is associated with lower odds of a false negative report, providing support for the recall conjecture. Compared to those who were enrolled for 60 days or fewer, those enrolled for the entire year were the least likely to provide a false negative response with 80 percent lower odds.

We also find support that people may be confusing Medicaid with Medicare and other insurance programs or their dual-enrollment is leading them not to report Medicaid. The magnitude of the coefficient for other insurance programs is particularly large. Reporting Medicare is associated with about 50 percent higher odds of a false negative response, and reporting some other form of insurance makes a person nearly 6 times as likely to provide a false negative report.

We did not find evidence that shared Medicaid coverage in the household is associated with false negative reporting error. The odds ratio is close to 1 and not significant.

Hispanics have about 34 percent higher odds of a false negative Medicaid report compared to non-Hispanics. For race, persons reported in the CPS ASEC as either Black alone or Asian alone have a greater likelihood of providing a false negative response compared to persons reported as White alone. The odds ratios are not significant for the other races groups.[7]

Fewer women than men report false negatives. Compared to persons ages 18-24, persons ages 45-64 are less likely to have a false negative Medicaid report in the CPS ASEC, and persons ages 65 and over are more likely to report a false negative. There is no statistical difference in reporting a false negative between those ages 25-44 and persons ages 18 to 24. Being foreign born is associated with a greater likelihood of a false negative Medicaid response in the CPS ASEC.

Relative to those with less than a high school diploma, persons with a high school degree, some college, or a bachelor's degree are more likely to give a false negative Medicaid report in the CPS ASEC. However, persons with a graduate degree are not statistically different from those without a high school diploma when reporting false negatives about Medicaid coverage. Persons with a higher family income are less likely to give a false negative report than persons with a lower family income.

Next, we discuss the results for the regression on false positive reporting. Of the weighted sample used in this regression, about 16 percent are coded as a false positive report, and about 84 percent are correctly coded as having Medicaid enrollment coverage in MSIS.

As shown in Table 6, among those who report Medicaid coverage in the CPS ASEC, those who also report Medicare coverage are no more or less likely to give a false positive report. However, those who report other forms of insurance are less likely to give a false positive report

[7] When we ran the regression on another year of data, the results for Asian alone were not significant. This may be a consequence of a small number of observations, so this particular result may not be robust.

compared to those who do not report other forms of insurance. Persons who were enrolled in Medicaid in the previous year, and persons who were enrolled in Medicaid in the survey year were less likely to have false positive reports with over 90 percent lower odds.

When Medicaid coverage is shared in the household, then the respondent is less likely to give a false positive report of Medicaid coverage. When the respondent is the only one reporting Medicaid coverage in the household, then that person is more likely to give a false positive report.

Results for Hispanic origin show that Hispanics are twice as likely than non-Hispanics to have a false positive report. For race, relative to those who report White alone, persons who report their race as Asian alone or Native Hawaiian or Pacific Islander alone have a higher likelihood of providing a false positive report of Medicaid coverage with approximately three and six times greater odds respectively.[8]

Similar to the results on false negatives, among persons who report Medicaid coverage in the CPS ASEC, women are less likely than men to give a false positive response. Women have about 29 percent lower odds of giving a false positive response compared to men. Persons ages 45-64 and persons ages 65 and older are more likely to give a false positive response compared to persons age 18-24.[9] Persons ages 45-64 are about 60 percent more likely to give a false positive report, and persons age 65 and older are about two times as likely to give a false positive report compared to persons age 18-24. In contrast to the false negative results, foreign-born persons are no more or less likely to give a false positive report compared to natives.

Persons with a graduate degree are more likely to provide a false positive response compared to persons with less than a high school degree, though the results are not significant

[8] These results were also different when we ran regressions for different years of data, again suggesting that the results may not be robust as a consequence of a small number of observations.
[9] Persons age 0-17 are left out of the regressions because of the inclusion of education as an independent variable.

for other levels of education. Logged total family income is associated with false positive reporting such that as the family income increases, so does the likelihood of giving a false positive report.

Adjusted Insurance Rates

False negative and false positive response error in the CPS ASEC both affect estimates of Medicaid coverage and the uninsured population. When respondents incorrectly report that they do not have Medicaid coverage, they lower estimates of Medicaid coverage. When they also do not have any other form of government or private insurance, then those persons incorrectly add to the count of the uninsured population. As shown in Table 7, for the 2011 CPS ASEC, this amounted to 8.1 million persons incorrectly classified as lacking health insurance coverage.

Conversely, persons who report having only Medicaid coverage when there is no enrollment data to support that response incorrectly reduce the count of the uninsured. For the 2011 CPS ASEC, this amounted to 5.8 million persons. When we adjust the Medicaid coverage rates to account for false negative and false positive Medicaid reporting, the Medicaid coverage rate increases from 15.9 percent to 18.7 percent. Applying a similar adjustment to the estimate of the uninsured population in the 2011 CPS ASEC, the percent uninsured declines by a full percentage point from 16.3 percent to 15.6 percent. While this difference is nearly one percentage point, this difference could grow as more people become enrolled in Medicaid through the Affordable Care Act.

Conclusion

The Medicaid undercount measured from 2000-2005 persists when analyzing 2006-2010. Based on the regression analysis presented here, false negative and false positive reporting errors are not randomly distributed across persons in the CPS ASEC. We found evidence to support

both the point in time and recall conjectures with both processes affecting false negative reporting. Enrollment in Medicaid in the survey year and the duration of Medicaid enrollment in the previous calendar year both lower the likelihood of a false negative report. We also found effects of enrollment in other insurance programs on response error. We found evidence to support the shared coverage hypothesis as it related to false positive responses but not with regard to false negative response error. We also find evidence of variation in false negative and false positive survey response error according to race and ethnicity, age, sex, education, and foreign-born status. Additional research is needed to examine more closely these relationships.

Future work should investigate the utility of using MSIS administrative records to assist in CPS ASEC editing and imputation procedures. This could facilitate a reduction in response error and increased confidence in survey estimates of Medicaid coverage in the CPS ASEC. However, doing so would require a more timely delivery and processing of state Medicaid enrollment data.

The CPS ASEC is an important survey instrument providing important insights to the U.S. population. Given that the Medicaid undercount in the CPS ASEC has persisted over time, this suggests the importance of considering appropriate steps to align survey estimates of Medicaid coverage more with administrative record totals from Medicaid enrollment data. As shown in the adjusted measures of the Medicaid-covered population and the uninsured population, the observed survey error produces error in the estimates of both of these groups. In order to achieve more accurate estimates of insurance coverage, the Census Bureau has regularly conducted research and testing on question design for health insurance in the CPS ASEC. In the 2014 CPS ASEC asked respondents which months they were uninsured rather than whether they

were uninsured at any point during the prior year (Pascale et al. 2016). This will yield improved estimates of the uninsured population (Brault et al. 2014).

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Figure 1. Linked MSIS and CPS ASEC Medicaid Enrollment Data and Response Error

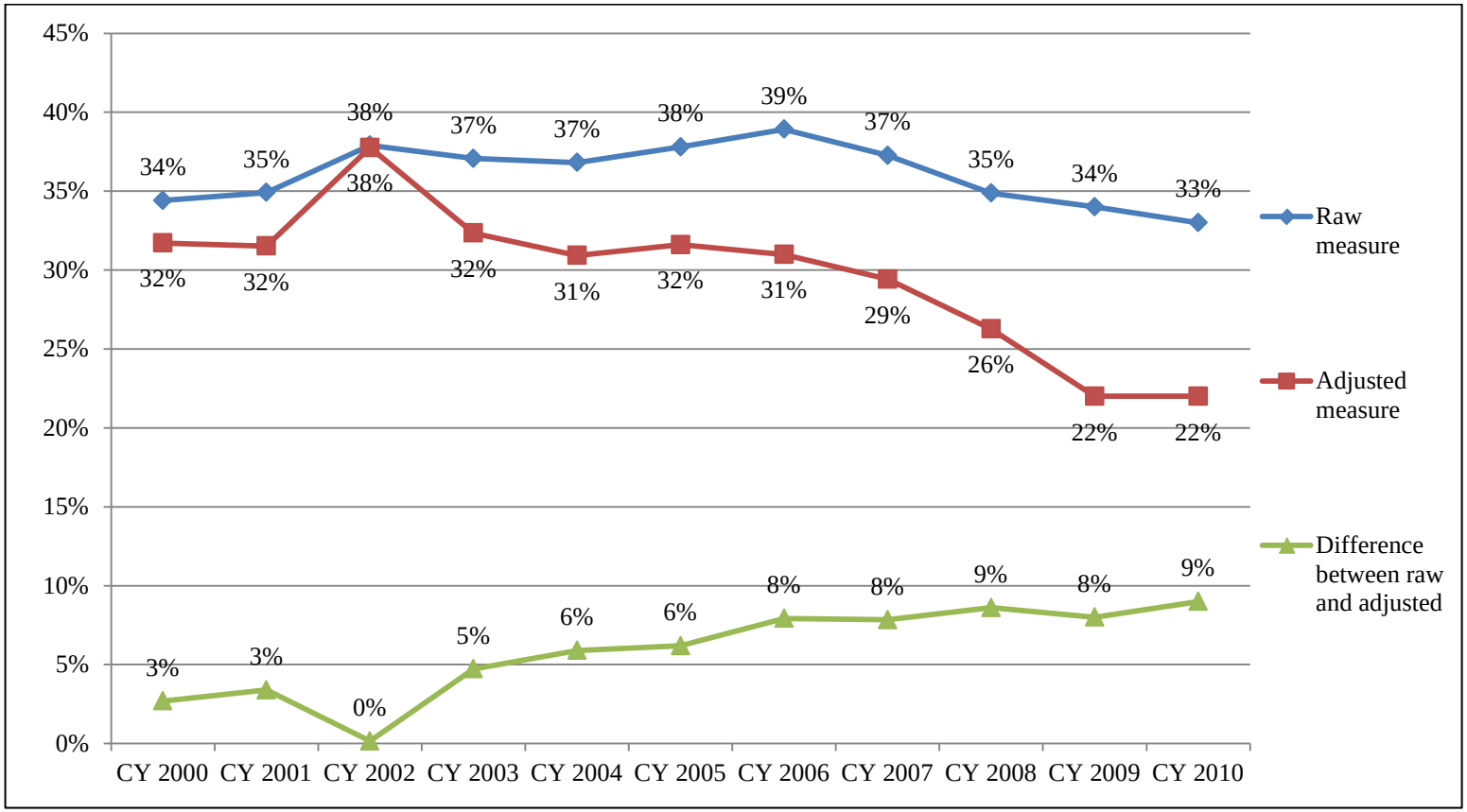
		CPS ASEC Medicaid Enrollment Response	
	Medicaid Coverage	Yes	No
MSIS Medicaid Benefits	Yes	Medicaid Coverage in MSIS and CPS ASEC	False Negative Error
	No	False Positive Error	No Medicaid coverage

Table 1: Linking MSIS and CPS ASEC Records

	CY 2000	CY 2001	CY 2002	CY 2003	CY 2004	CY 2005	CY 2006	CY 2007	CY 2008	CY 2009	CY 2010
CPS (unweighted)											
Not Validated	44,300	44,600	49,200	60,600	63,200	24,050	23,225	25,131	25,347	24,794	20,409
Validated	173,700	173,100	167,000	152,500	147,800	184,400	183,414	181,273	182,574	185,008	184,574
Percent Validated	79.7%	79.5%	77.2%	71.6%	70.0%	88.5%	88.8%	87.8%	87.8%	88.2%	90.0%
MSIS											
Not Validated	4,550,000	5,250,000	5,940,000	7,390,000	7,670,000	7,340,000					
Validated	39,873,700	42,576,100	46,478,000	48,777,500	51,077,800	52,481,400					
Percent Validated	89.8%	89.0%	88.7%	86.8%	86.9%	87.7%	92.8%	92.7%	93.3%	94.0%	94.3%

Note: Data for Calendar Years 2000-2005 from SHADAC (2010). Numbers are rounded for 2000-2005 according to SHADAC report.

Figure 2. Medicaid Undercount in CPS ASEC, 2000-2010



Sources: SNACC Phase V (2010) for years 2000-2005; authors' computations for years 2006-2010; CPS ASEC and MSIS.

Table 2: Measuring the Medicaid Undercount in the CPS ASEC

	CY 2000	CY 2001	CY 2002	CY 2003	CY 2004	CY 2005	CY 2006	CY 2007	CY 2008	CY 2009	CY 2010
Undercount											
Raw measure	34.4%	34.9%	37.9%	37.1%	36.8%	37.8%	38.9%	37.3%	34.9%	33.9%	33.2%
Adjusted measure	31.7%	31.5%	37.8%	32.3%	30.9%	31.6%	31.0%	29.4%	26.3%	22.4%	22.0%
Difference between raw and adjusted	2.7%	3.4%	0.2%	4.7%	5.9%	6.2%	7.9%	7.8%	8.6%	11.5%	11.2%
MSIS Enrollment											
Raw Total	45,050,000	48,550,000	53,550,000	56,650,000	59,350,000	61,250,000	62,814,724	63,251,758	65,763,995	72,377,229	72,740,815
Adjusted Total	38,150,000	40,450,000	45,950,000	45,600,000	47,700,000	49,200,000	48,791,594	48,813,182	50,520,559	53,813,902	55,576,733
CPS Enrollment											
Raw Total	29,550,000	31,600,000	33,250,000	35,650,000	37,500,000	38,100,000	38,369,832	39,684,984	42,830,746	47,847,441	48,580,103
Adjusted Total	26,050,000	27,700,000	28,600,000	30,850,000	32,950,000	33,650,000	33,673,128	34,450,753	37,249,946	41,755,208	43,348,345

Note: Data for Calendar Years 2000-2005 from SHADAC (2010). Numbers are rounded for 2000-2005 according to SHADAC report.

Table 3: False Negative Survey Errors in the CPS ASEC

	CY 2000	CY 2001	CY 2002	CY 2003	CY 2004	CY 2005	CY 2006	CY 2007	CY 2008	CY 2009	CY 2010
Correctly classified as enrolled	19,090,000	20,550,000	21,350,000	23,270,000	24,380,000	24,830,000	23,800,091	24,538,855	26,397,133	29,522,452	29,746,502
Incorrectly classified as not enrolled (false negative errors)	14,360,000	15,450,000	17,250,000	17,680,000	18,870,000	18,670,000	19,271,550	18,942,205	18,616,298	18,699,087	20,135,208
Percent enrolled who reported no enrollment	42.9%	42.9%	44.7%	43.2%	43.6%	42.9%	44.7%	43.6%	41.4%	38.8%	40.4%
Source of enrollment status among false negative errors											
Reported	11,030,000	11,960,000	13,240,000	13,730,000	13,980,000	14,350,000	14,903,989	14,899,526	14,542,359	14,666,776	14,632,048
Imputed	3,340,000	3,500,000	4,000,000	3,900,000	4,880,000	4,320,000	4,367,561	4,042,679	4,073,939	4,032,311	5,503,160
Percent of false negatives that were reported (not imputed)	76.8%	77.4%	76.8%	77.9%	74.1%	76.9%	77.3%	78.7%	78.1%	78.4%	72.7%
"Other Insurance" status of false negative population:											
Insured	8,600,000	9,190,000	10,370,000	10,580,000	11,170,000	10,870,000	11,534,054	11,663,882	11,458,087	11,247,313	12,084,859
Uninsured	5,760,000	6,260,000	6,880,000	7,100,000	7,700,000	7,800,000	7,737,495	7,278,323	7,158,211	7,451,773	8,050,349
Percent false negatives who are uninsured	40.1%	40.5%	39.9%	40.2%	40.8%	41.8%	40.1%	38.4%	38.5%	39.9%	40.0%

Note: Enrollment status is edited only to assign enrollment, not to take it away, so it never causes false negative errors.

Note: Reweighted data for Calendar Years 2000-2005 from SHADAC (2010). Numbers are rounded for 2000-2005 according to SHADAC report.

Table 4: Medicaid False Positive Survey Errors in the CPS ASEC

	CY 2000	CY 2001	CY 2002	CY 2003	CY 2004	CY 2005	CY 2006	CY 2007	CY 2008	CY 2009	CY 2010
Linkable Records not in MSIS	244,050,000	243,600,000	242,900,000	241,750,000	243,650,000	245,250,000	248,313,514	250,089,263	250,486,590	249,528,631	249,691,437
CPS Adjusted Enrollment	26,050,000	27,700,000	28,600,000	30,850,000	32,950,000	33,650,000	33,673,128	34,450,753	37,249,946	41,755,208	43,348,345
Total false positive errors	6,460,000	6,420,000	6,200,000	6,380,000	7,460,000	7,680,000	8,664,802	8,494,168	9,101,359	10,167,982	11,618,694
False positive error rate	2.6%	2.6%	2.6%	2.6%	3.1%	3.1%	3.5%	3.4%	3.6%	4.1%	4.7%
Percent reporting enrolled but do not have MSIS enrollment data	24.8%	23.2%	21.7%	20.7%	22.6%	22.8%	25.7%	24.7%	24.4%	24.4%	26.8%
Source of enrollment status among false positive errors:											
Reported	2,460,000	2,740,000	2,400,000	2,540,000	2,500,000	2,640,000	3,286,602	3,427,260	3,472,635	3,901,083	4,411,684
Imputed	2,560,000	2,520,000	2,480,000	2,520,000	3,140,000	3,060,000	3,231,220	2,873,591	3,155,255	3,715,733	4,475,359
Edited	1,420,000	1,160,000	1,320,000	1,320,000	1,840,000	1,980,000	2,146,980	2,193,317	2,473,469	2,551,166	2,731,651
Reported, %	38.2%	42.7%	38.7%	39.8%	33.4%	34.4%	37.9%	40.3%	38.2%	38.4%	38.0%
Imputed, %	39.8%	39.3%	40.0%	39.5%	42.0%	39.8%	37.3%	33.8%	34.7%	36.5%	38.5%
Edited, %	22.0%	18.1%	21.3%	20.7%	24.6%	25.8%	24.8%	25.8%	27.2%	25.1%	23.5%

Note: Data for Calendar Years 2000-2005 from SHADAC (2010). Numbers are rounded for 2000-2005 according to SHADAC report.

Table 5. Weighted Logistic Regression Results: False Negative Response Error in 2011 CPS ASEC	
Variables	False Negative Response
	Odds Ratios
Demographic and Socioeconomic Characteristics	
Hispanic origin (Not Hispanic omitted)	1.34***
Race (White alone omitted)	
Black alone	1.21**
American Indian or Alaska Native alone	1.34
Asian alone	1.35*
Native Hawaiian or Pacific Islander alone	1.63
Two or More Races	0.84
Sex (Male omitted)	
Female	0.86**
Age (18-24 omitted)	
25-44	0.94
45-64	0.71***
65+	1.30*
Education (Less than High School Omitted)	
High School Degree	1.33***
Some College	1.19*
Bachelor's Degree	1.43**
Graduate Degree	1.33
Nativity (U.S. born omitted)	
Foreign Born	1.27**
Insurance Coverage	
Reported Medicare Coverage	1.50***
Reported Enrolled in another insurance program	5.88***
Number of days enrolled in Medicaid in 2008 (1-60 omitted)	
61-180	0.55***
181-364	0.29***
All year	0.20***
Enrolled in Medicaid in survey year (2009)	0.39***
Household Variables	
Shared coverage	1.01
Logged household income	0.96***
-2 Log Likelihood 24,839,027	
Weighted N 18,202,244	

*p<.05, **p<.01, ***p<.001

Sources: 2011 CPS ASEC, MSIS Administrative Records

Table 6. Weighted Logistic Regression Results: False Positive Response Error in 2011 CPS ASEC	
Variables	False Positive Response
	Odds Ratios
Demographic and Socioeconomic Characteristics	
Hispanic origin (Not Hispanic omitted)	2.30***
Race (White alone omitted)	
Black alone	1.35
American Indian or Alaska Native alone	1.87
Asian alone	2.60**
Native Hawaiian or Pacific Islander alone	6.26**
Two or More Races	0.74
Sex (Male omitted)	
Female	0.71*
Age (18-24 omitted)	
25-44	1.19
45-64	1.60*
65+	2.06*
Education (Less than High School Omitted)	
High School Degree	1.30
Some College	1.21
Bachelor's Degree	1.19
Graduate Degree	2.83*
Nativity (U.S. born omitted)	
Foreign Born	0.80
Insurance Coverage	
Reported Medicare Coverage	0.71
Reported Enrolled in another insurance program	0.63*
Enrolled in Medicaid in previous year (2007)	0.02***
Enrolled in Medicaid in survey year (2009)	0.04***
Household Variables	
Shared coverage	0.38***
Logged household income	1.06*
-2 Log Likelihood 12,883,186	
Weighted N 13,974,634	

*p<.05, **p<.01, ***p<.001

Sources: 2011 CPS ASEC, MSIS Administrative Record

Table 7. Adjusted Insured, Medicaid Coverage, Uninsured Rates, Weighted

	CY 2006		CY 2007		CY 2008		CY 2009		CY 2010	
	Number	**Pct**	**Number**	**Pct**	**Number**	**Pct**	**Number**	**Pct**	**Number**	**Pct**
Total	296,823,990	100.0	299,105,708	100.0	301,482,819	100.0	304,279,918	100.0	306,109,649	100.0
Report Medicaid in CPS	38,369,832	12.9	39,684,984	13.3	42,830,746	14.2	47,847,441	15.7	48,580,103	15.9
Report Insured in CPS	251,609,645	84.8	255,017,524	85.3	256,702,416	85.1	255,295,098	83.9	256,205,568	83.7
Report Uninsured in CPS	45,214,345	15.2	44,088,184	14.7	44,780,403	14.9	48,984,820	16.1	49,904,081	16.3
Total, False Negative with Other Coverage	11,534,054		11,663,882		11,458,087		11,247,313		12,084,859	
Total, False Negative without Other Coverage	7,737,495		7,278,323		7,158,211		7,451,773		8,050,349	
Total, False Positive with Other Coverage	4,839,071		4,336,512		4,720,731		5,038,230		5,806,502	
Total, False Positive without Other Coverage	3,825,731		4,157,655		4,380,628		5,129,752		5,812,192	
Adjusted Medicaid Coverage Rate	48,976,580	16.5	50,133,022	16.8	52,345,685	17.4	56,378,545	18.5	57,096,617	18.7
(Report Medicaid + False Negative with or without Other Coverage - False Positive with or without Other Coverage)										
Adjusted Uninsured in CPS	41,302,581	13.9	40,967,516	13.7	42,002,819	13.9	46,662,799	15.3	47,665,924	15.6
(Report Uninsured - False Negative without Other Coverage + False Positive without Other Coverage)										

Source: Matched CPS ASEC-MSIS