Modifications to the Imputation Routine for Health Insurance in the CPS ASEC: Description and Evaluation

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Introduction

The Annual Social and Economic Supplement to the Current Population Survey (CPS ASEC) is an important source of information about health insurance coverage in the U.S. Due to its long time series, its state representative sample and its detailed series on health insurance, the CPS ASEC is a critical data source for federal and state policy making and health policy research (Blewett et al., 2004). It is routinely used in surveillance activities and in policy evaluations; to project the cost of proposed legislation; and was historically used as an input in the federal allocation formula of the State Children's Health Insurance Program (SCHIP).

The U.S. Census Bureau is engaged in an on-going effort to improve the quality of health insurance information in the CPS ASEC (Ziegenfuss and Davern, 2011). The purpose of this paper is to explain the latest development in their quality improvement effort – a change to the imputation routine for health insurance coverage. In an experimental version of the 2009 CPS ASEC, the change to the imputation routine and a simultaneous correction to the coding of directly purchased coverage increased the percent of people with health insurance coverage by about 0.5 percentage points (1.5 million people), primarily through an increase in private coverage. The Census Bureau implemented the new method with the 2011 CPS ASEC and retroactively applied the new routine for the 2000 to 2010 CPS ASECs. In addition to the new allocation procedures, the new data files reflect all data processing adjustments that have occurred since 2000 (see below for details). The data were released as supplementary files available from the Census Bureau's health insurance web page.[1]

The rest of this paper is organized as follows. First, we describe the CPS ASEC, review its imputation procedures and discuss previous work that identified problems with the way health insurance was imputed. Next, we describe the modifications that the Census Bureau made to correct the problem. Finally, we empirically evaluate the new procedure and discuss the implications of our findings.

CPS ASEC Background and Improvements

The CPS is a monthly labor force survey conducted by the Census Bureau on behalf of the Bureau of Labor Statistics. The ASEC supplement is administered in February through April and asks additional questions on work, income, migration, and health insurance coverage. The CPS ASEC is based on a complex area probability sample and is representative of the civilian non-institutionalized population of the 50 states and the District of Columbia. About 100,000 addresses are sampled each year. In 2008, this was about 76,200 households.

Questions on health insurance coverage have been asked in a consistent manner since 1988. The instrument gathers information on the presence, type, and characteristics of coverage held during the previous calendar year. Information is obtained for each member of the household.

[1] Available at http://www.census.gov/hhes/www/hlthins/index.html. These new data will also be available from SHADAC's Data Center, http://www.shadac.org/datacenter, and the Minnesota Population Center's Integrated Public Use Microdata Series (IPUMS), http://cps.ipums.org/cps.

Over time improvements have been made to the instrument and data processing regimen. These improvements were undertaken with the desire to improve the accuracy of the instrument while maintaining, to the extent possible, the consistency of the time series (Davern et al., 2003; SHADAC, 2009; Ziegenfuss and Davern, 2011). In addition to the new allocation routine described in this paper, there have been three data processing changes since 2000 that are included in the new supplementary files. These changes include a 2010 modification to assign Medicaid coverage to uninsured foster children, a 2005-2006 adjustment to the assignment of private coverage, and a 2002 correction to the assignment of SCHIP to a public coverage source. In 2007, a revised time series was released for 1997 to 2004 with an approximation for the 2005-2006 edit change. The series released in 2011 supplants the revised time series for 2000 to 2010. In some instances the latest release does not agree with the approximation of the 2005-2006 edit change due to small errors in approximating the CPS ASEC production level data processing routine.

Missing Data Allocation in the CPS ASEC

Similar to its other data products, the Census Bureau fills in all missing data in the CPS ASEC using allocation methods. This allows data users to use complete case methods without additional processing. Missing health insurance data includes the roughly 10% of the monthly sample that does not fully complete the ASEC and is missing data for all of the health insurance items (called full supplement imputations) and the 2-3% of cases that respond to a large portion of the ASEC, but skip one or more health insurance items.

Missing values for each item in the health insurance series are filled in with hot deck allocation. Hot deck matches cases with missing data ("recipients") to a set of similar cases ("donors") that have a non-missing value on the variable of interest. The cases are organized into matrices and matched on characteristics, such as marital status and age (see Table 1 for complete list), which are known to be predictive of health insurance coverage. Missing values are filled in by randomly selecting a valid value from the donors. Hot deck allocation may produce different means and variances than the complete cases. However, when correctly specified, the imputed data set should have the same correlation structures as the complete data. For more background on hot deck allocation see Davern et al., 2007; Andridge et al., 2010; and David et al., 1986.

Davern et al. (2007) observed that the ASEC instrument itself allowed any member of a household to be reported as a dependent on the policy of another household member. Indeed, interviewers can press a single key to automatically assign everyone in the household to the same plan. However, there was incongruence between the imputation and the instrument—the imputation routine only allowed the nuclear family of a policy holder to be covered as a dependent. The authors hypothesized that this feature led to an underestimate of private coverage and an overestimate of uninsured, relative to expectations from the instrument itself.

To test their hypothesis Davern and colleagues conducted two analyses. First, they used multinomial logistic regression to study the impact of full supplement imputation status on the presence and type of health insurance. They controlled for variables that were included in the hot deck routine and other informative predictors such as race and health status. They argued that after controlling for covariates, full

supplement imputation status would not be a significant predictor of insurance if the hot deck was correctly specified. However, they found that it was a strong and significant variable in their model. They concluded that their finding was due to the incongruence of the allocation routine and the survey instrument. In their second set of analyses they produced two counterfactual estimates of health insurance assuming that the data had no full supplement imputations. The first estimate removed all full supplement imputation cases and re-weighted the data to population controls. The second set of estimates used the coefficients from the multinomial model to predict insurance coverage, assuming no full supplement imputations. Under both methods the counterfactual estimates produced a private coverage rate among the non-elderly that was one percentage point higher, no change to public coverage, and a one percentage point reduction in the uninsured as compared to the CPS ASEC estimate using the fully imputed data.

New Health Insurance Allocation Routine

In response to Davern et al. (2007), the Social, Economic and Housing Statistics Division at the Census Bureau reformulated the health insurance allocation specification. Table 1 describes the variables used in the hot deck and the modifications that were made. The first column lists the variables being imputed, the second column lists the order the variables were imputed in the original routine, the third column lists the construction of the hot deck donor matrices in the original routine and the final column lists modifications that were made. The new routine includes several new features. First, the order of the data processing steps was changed. In the original routine private sources of health insurance were imputed first and public coverage was imputed last. This was changed so that public coverage is allocated first with un-imputed private coverage in the hot deck matrix. Following the imputation of public coverage, the public coverage consistency edit is run. This edit forces public coverage responses to be consistent with other information obtained in the survey.[2] In the new routine, private coverage is imputed last—after public coverage sources have been imputed and edited. The most important change to the specification of the donor matrices is for private sources of dependent coverage (variables DEPHI and DEPRIV). As previously discussed, in the original routine only nuclear family members of a policy holder that were not policy holders themselves, were eligible to be coded as dependents. This was changed so that any non-policy holder in the household can now be coded as a dependent on another household member's plan. This change was meant to resolve the incongruence between the instrument and the imputation routine that Davern (2007) identified.

The nuclear family restriction that was in place in the original imputation specification is conceptually appealing and consistent with health insurance coverage eligibility rules. However, the goal of imputation is not to logically edit the data, but to reproduce the distributions found in the reported data. Further, while improving overall data quality is an important long-term goal, the new routine ensures consistency in measurement across sub-groups. This is essential for reducing bias to measures of contrast that are important to research and policy making.

In the process of implementing these changes the Census Bureau also discovered and corrected a coding error that caused an undercount to imputed values of directly purchased dependent coverage. The

[2] For example, respondents over age 65 that report social security income, but not Medicare, are edited to have Medicare. For more information on the consistency edit see http://www.census.gov/hhes/www/hlthins/publications/coverage_edits_final.pdf.

allocation change and coding correction occurred simultaneously, so all estimates presented in this paper reflect the effect of both.

As discussed above, the 2011 CPS ASEC data release reflects these changes. The Census Bureau retroactively applied the new method and all other data processing adjustments made since 2000 to previous years of data. Data for the 2000-2010 CPS ASECs were re-released and can be obtained from the Census Bureau's health insurance web page.

Evaluation Strategy

We evaluated the new routine using a 2009 CPS ASEC research file that was delivered to the State Health Access Data Assistance Center (SHADAC). The file contained each variable that changed as a result of the new imputation. We merged the research file onto an original 2009 CPS ASEC public use data file and data from the SHADAC-Enhanced CPS (described below) to create an analytic data set. The analytic data, which we call the 2009 CPS ASEC Research File, consists of all 207,921 cases from 2009.

Data from the old routine reflects the production environment in 2009. Data from the new routine, incorporating both the imputation modification and the coding fix, reflects the 2011 production environment. The SHADAC-Enhanced CPS data are created by removing the full supplement imputations and reweighting the remaining cases back to population totals (Ziegenfuss and Davern, 2011). Thus, because it lacks full-supplement imputation cases, the SHADAC-Enhanced CPS contains a far smaller proportion of imputed values than the original CPS. For example, 11.5% of the original 2009 CPS sample has imputed values for Medicaid whereas 3.6% of the SHADAC-Enhanced CPS has imputed Medicaid. The SHADAC-Enhanced CPS series was created to account for historical methodological changes and to correct for the bias in the imputation of health insurance status identified by Davern et al. (2007). The SHADAC-Enhanced CPS for 2007-2008 produced estimates that differ from the original CPS in the range of no change in Idaho to a 2.2 percentage point reduction in uninsured in New Jersey (SHADAC, 2010). While the SHADAC-Enhanced CPS series is not a gold-standard, we feel it provides a close approximation to what we expect from the new routine –an allocation that maintains the correlations between reported variables.

Our evaluation strategy was two-fold. First, we used *t* tests to compare coverage rates from 3 sources: estimates produced by the old routine, the new routine, and estimates from the SHADAC-Enhanced CPS. We compare detailed coverage categories by age, broader measures of coverage among more refined subgroups, and finally, policy-holder and dependent coverage by age. Sub-groups were chosen that we expected to be sensitive to the imputation change (i.e. family relationship) or groups important to health policy research (i.e. race and poverty). We examined a selected number of states. States were chosen so that they varied in size, region of the country and level of coverage.

Our *t* test formula accounts for the fact that both processing routines were run on the same sample. We estimated the covariance for the new and old variables directly. However, because the SHADAC-Enhanced CPS has different weights than the original CPS ASEC we are unable to directly estimate the covariance between the new and SHADAC-Enhanced CPS variables. We use a crude approximation, based on the new-old covariance (described in expression 1) to estimate the covariance for the new and SHADAC-Enhanced CPS variables. Given the high degree of correlation in the data, our tests of

significance have the power to detect very small differences. Therefore, while we report p values, most of our attention is on the magnitude of effects rather than statistical significance per se.

$$(1) \qquad COV_{New,Enhanced} = (Var_{New} + Var_{Enhanced}) * \left(\frac{COV_{New,Old}}{Var_{New} + Var_{old}}\right)$$

The second stage of our analysis was to estimate multinomial logistic models similar to that reported in Davern et al. (2007). We regressed a hierarchical coverage variable with three levels (defined as only private, public coverage alone or in combination, or uninsured) on an indicator of full supplement imputation status and covariates found in the hot deck specification. Because each coverage type has its own set if hot deck cells, but we model each coverage type simultaneously, we could not mimic the hot deck routine exactly. We chose variables that were common across the coverage constructs and/or those that had the largest universes. We ran the model on health insurance variables produced under the old routine and then on insurance variables produced by the new routine. A reduction in the size of the coefficient on full supplement imputation status in the second model provides evidence of improvement. Even though our model is an imperfect representation of the hot deck specification, our goal is to compare coefficients across imputation routines. We believe any bias from the imperfection of the model specification should be washed out in this comparison.

Our model specification differed in important ways from the Davern et al. model. Namely, unlike Davern et al., we estimated the model on all age groups, we did not include other potentially informative predictors not found in the hot deck, and we did not interact any terms.[3] These choices were made to simplify the interpretation of the coefficients.

We coded all variables using standard Census Bureau definitions. Public coverage includes Medicare, Medicaid, the Children's Health Insurance Program (CHIP), other public programs, and military coverage. Private coverage refers to coverage obtained from an employer or union (ESI), coverage purchased directly (we call such coverage direct purchase or individual coverage), and coverage purchased by a person outside of the household. All coverage measures refer to any coverage in the preceding calendar year (2008). Unless otherwise noted (i.e. "private only") people can be classified as having multiple coverage types (i.e. alone or in combination). Model covariates were coded according to the Census Bureau's imputation specification with one exception. We created a variable that counts the number of family members that worked in the previous year. This was to help account for the fact that employment of other household members is implicit in the assignment of dependent coverage. Dependent coverage depends on the presence of a policy holder in the household, which itself is a function of employment.

We estimated standard errors that account for the complex design of the CPS ASEC sample using successive difference replication (SDR) (U.S. Census Bureau, 2010). SDR is the best available approximation of the true variance value. In the SHADAC-Enhanced CPS, which does not have replicate weights, we used Taylor series linearization. We proxy the sampling strata with MSA or the state balance

[3] In a specification test we repeated our models on data from the old routine using Davern's exact specification and achieved nearly identical results as those reported in their 2007 paper. That model included: full supplement imputation status, family size, age, full supplement imputation*family size (1 person), full supplement imputation*age (0-18), gender, health status, race, ratio of family income to the poverty level, marital status, education, veteran status, and employer size.

and we approximate clusters using household ID. In our tables, we report p values that meet the <0.05 p<0.01 and p<0.001 threshold. As noted earlier, we spend most of attention on the magnitude of effects rather than significance due to the high correlation of the sample and the subsequent statistical power of our tests.

Results

The top panel of Table 2 compares coverage rates for all age groups. Compared to the old routine, estimates derived from the new data processing routine reduced the uninsurance rate by 0.5 percentage points or 1.5 million people. The rate of any private coverage increased by 0.5 percentage points or 1.7 million people. A similar pattern was found for only private coverage. A large portion of the gain appeared to be driven by direct purchase coverage – 1.7 million additional people are estimated to have direct purchase coverage. It is likely that the direct purchase coding correction had a large effect. There was no statistically detectable change to Medicare or Military coverage rates and only a small (0.03 percentage point) detectable increase in Medicaid coverage.

As we expected, overall estimates of coverage from the new routine tracked more closely to estimates from the SHADAC-Enhanced CPS. A notable exception to this trend was the estimate of direct purchase coverage which was one percentage point higher in the new data compared to the SHADAC-Enhanced CPS data (almost twice that of the new-old comparison). A potential explanation of this finding is that the SHADAC-Enhanced CPS is based on data generated by the old coding structure which undercounted direct purchase relative to the new coding (note that 4% of direct purchase values are imputed in the SHADAC-Enhanced CPS data and are therefore at-risk for the coding error). Given that the imputation and coding correction changed simultaneously we cannot directly test this hypothesis. However, the much smaller difference in ESI coverage (0.2 percent points) suggests that there was something unique about direct purchase (i.e. the coding correction). To investigate this hypothesis we estimated the level of direct purchase using the new routine variable and the SHADAC-Enhanced CPS weight (data not shown). There was a small gain to a rate of 8.6%, but this estimate was still substantially lower than the estimate from the new-routine and the full sample weight (9.5%).

The remaining panels of Table 2 report coverage rates by age. Non-elderly adults (19 to 64 years of age) were the most sensitive to the change in routine. The new data produced a 0.7 percentage point gain or 1.2 million additional people covered, compared to the old routine. The next largest effect was for children and the smallest effect was for elderly adults. The pattern of effect sizes by age reflects the distribution of private coverage—the main target of the imputation change and coding correction. Non-elderly adults were the most likely to be covered by private insurance, and elderly adults were the least likely. A final observation from Table 2 is that changes to specific coverage types do not have a one to one correspondence with a reduction in the count of the uninsured. This is due to people that are coded as having multiple coverage types.

In Table 3 we examine only private coverage, public coverage alone or in combination, and uninsurance for selected sub-groups. The most notable differences between the new and old routine were by family relationship. For other relatives, the rate of any private coverage was 2.3 percentage points higher in the new routine than the old routine. There was virtually no change for public coverage and a 2.2 percentage

point decline in uninsurance. The effect to private coverage for other relatives was nearly 4 times the size of the effect observed for children. This pattern was expected given the removal of the nuclear family restriction from the private coverage allocation matrix. Under the new routine, imputed values for other relatives are more likely to be coded as dependents under a nuclear family policy holder.

Differences between the new routine and the SHADAC-Enhanced CPS were less consistent than the new – old differences. For example, the difference in any private coverage by race/ethnicity ranged from 1.6 percentage points for Hispanics to -0.7 percentage points for whites. This pattern of uneven differences also appeared across states. For example, the differences in private coverage range from -0.7 percentage points in Massachusetts to a 0.4 percentage point change in California. The state effect is likely explained by the absence of state in the CPS allocation matrix. Due to this absence, state-level estimates are shrunk towards the national average in the new routine, but to a far lesser degree in the SHADAC-Enhanced CPS (Davern et al., 2004). The state pattern could potentially explain the inconsistency of results within the other sub-groups we studied. However, we are unable to separate the effect of state from the effect of other correlated covariates such as race that are also absent from the allocation matrix.

Similar to the differences between the new and old routines by family relationship, the new routine estimates 2.6 percentage points more private coverage, 0.7 percentage points less public coverage, and 1.9 percentage points less uninsured compared to the SHADAC-Enhanced CPS estimates. Our expectation was the SHADAC-Enhanced CPS would track more closely to the new routine than to the old routine. Our result could be because the unweighted imputation rate for only private coverage among other relatives in the SHADAC-Enhanced CPS is 5.7%--higher than any other relationship code (data not shown). Therefore, this group has the most members at risk of and the direct purchase coding changes that are present in the new routine, but not in the SHADAC-Enhanced CPS. We applied the SHADAC-Enhanced CPS weight to the new routine variable and the result was a reduction of the difference in private coverage rates from 2.7% to 0.6%, providing support for this hypothesis (data not shown).

We examined private coverage more closely in Table 4 because the changes to the imputation and the coding correction were focused on private sources of coverage. The top panel considers policy holder and dependent status for all age groups. The difference in rates between the new and old routine were larger for dependents than policy holders. This pattern of results is consistent with the change in the allocation of dependent coverage.

The largest significant difference between the new and old routine was for direct purchase dependents (0.4 percentage point increase). The effect to dependents was 2.5 times the size as the effect to policy holders. As described above, a large portion of the dependent coverage effect may be caused by the coding correction. Across all age groups the gain to ESI dependents was about half the size of the direct purchase effect.

Compared to the SHADAC-Enhanced CPS, the overall private dependent rate from the new routine was 0.7 percentage points higher. The rate of ESI dependents was 0.4 percentage points (or 1.3 million people) higher in the new routine compared to the SHADAC-Enhanced CPS estimates. We found larger rates of direct purchase policy holders and dependents.

The next set of tables describe results from our regression analyses. These regressions examine whether the problems with the full supplement imputation cases identified by Davern et al. (2007) are as strong in

data produced by the new routine. Specifically, we determined if an indicator of full supplement imputation status is as influential a predictor of hierarchical coverage in the new routine as in the old routine, controlling for variables contained in the hot deck.

Table 5 describes the distribution of coverage status and hot deck covariates across full supplement imputation status. Full supplement imputation cases made up 9.1% of the sample (unweighted). In the new routine, full supplement imputation cases were less likely to be privately covered (52.7% vs. 56.5%; $p<0.001$) and more likely to be uninsured (18.3% vs. 14.5%; $p<0.001$) than those that completed the supplement. Consistent with our expectations, the magnitude of the differences in insurance rates was different in the old routine. The difference in the rate of uninsurance across imputation status was 3.8 percentage points in the new routine and 8.0 points in the old routine. This difference-in-difference of -4.2 percentage points was statistically significant. The difference-in-difference for only private coverage was -4.0 percentage points and statistically significant. There was no evidence of a significant difference-in-difference for any public coverage.

Table 5 also shows that full supplement imputation cases were also more likely to be non-elderly adults, more likely to be working, more likely to be on public assistance, less likely to be veterans and less likely to work for small firms. Full supplement imputation cases may have a different coverage profile because of other confounding factors related to full supplement imputation status.

Table 6 presents results from our multinomial logistic regression models. All models use private coverage as the base category. We present exponentiated results and interpret them as relative risk ratios. In both models the Adjusted Wald test for the full supplement imputation coefficients was significant indicating that model results are not sensitive to the choice of the base category. The first set of columns describes results from the old imputation routine (Model 1). Controlling for a subset of variables in the hot deck, full supplement imputation cases were 1.8 times more likely to be uninsured relative to private coverage, compared to those that fully completed the ASEC. The ratio of public to private coverage was 1.3 times higher for full supplement imputations than for others. These are the baseline levels that the change in the imputation routine was intended to correct. Based on Davern et al.'s 2007 study we expected that the exponentiated coefficient on full supplement imputation status would move towards 1.0 in the new imputation. Such a finding would indicate that full supplement imputation status is a weaker independent predictor of health insurance coverage in the new routine.

The second set of columns describes the results from the new imputation routine (Model 2). Under the new routine, full supplement imputation cases were 1.3 times more likely to be uninsured relative to private coverage, compared to cases that fully completed the ASEC. They were 1.2 times more likely to have public coverage relative to private coverage. These results demonstrate that in the new routine, full supplement imputation is a weaker, albeit still significant, predictor of insurance coverage.[4]

[4] To confirm that the difference in coefficients from Model 2 versus Model 1 was statistically significant we ran a separate model in which data from the new routine was stacked on top of data from the old routine. The alternative model included the same covariate set. The independent variable of interest was an interaction of full supplement imputation and an indicator of the data processing version. We found that the marginal effects produced by this model were significant at the $p<0.001$ level. These results are available upon request.

Discussion

In response to previous work that found an inconsistency between the instrument and the imputation routine for health insurance coverage in the CPS ASEC, the Census Bureau improved its imputation procedures. The bulk of the change was removing a restriction that limited dependent coverage to a policy holder's nuclear family. This restriction did not align with the instrument itself which allows dependent coverage to be applied to anyone in the household. In the process of making this adjustment the Census Bureau also found a coding error to direct purchase coverage that was causing an undercount to imputed versions of dependent direct purchase coverage.

Our analysis show that these data processing changes led to a decrease in uninsurance by 1.5 million people. Coverage gains occurred mainly for private coverage. This finding matches our expectations from Davern et al.'s 2007 analysis and estimates produced from the SHADAC-Enhanced CPS.

We observed that data from the new routine often tracked closely with estimates from the SHADAC-Enhanced CPS. There were three interesting exceptions. First, levels of direct purchase coverage were significantly higher in the new routine than they were in the SHADAC-Enhanced CPS data. This finding was robust to using the SHADAC-Enhanced CPS weight on the new routine variable. It is likely that a portion of this change came from the direct purchase coding correction. The second exception was that the new routine produced significantly higher levels of ESI dependent coverage than we found in the SHADAC-Enhanced CPS data. This finding is in need of further investigation. Finally, Table 3 showed that differences across sub-groups were inconsistent in sign and magnitude. One potential explanation is the variation in state rates which is caused by the absence of state in the CPS allocation matrices. The absence of other variables, such as race, could also influence this trend.

Our findings do suggest that the SHADAC-Enhanced CPS will need to be adjusted to account for the new data processing scheme. A small, but non-ignorable portion of the SHADAC-Enhanced CPS is imputed and therefore at risk of being sensitive to the imputation change and coding correction. Updating the SHADAC-Enhanced CPS will be facilitated by the Census Bureau's retroactive release of previous data years produced under the new production environment.[5] Our regression analysis demonstrates that full supplement imputation status is a weaker predictor of coverage status in the new routine than in the old routine. This finding suggests that the new routine improves on the old routine, i.e., it does a better job of reproducing the correlations found in the reported data. However, the coefficient on full supplement imputation status was still positive and significant in the new routine. This could be because sample size limits what the Census Bureau can include in the hot deck routine. For example, variables such as race, poverty, and state of residence are theoretically appropriate, but their inclusion would create matrix cells that are too small to sample (cf. Davern et al., 2004). A potential solution to this problem is to adopt a model based imputation strategy, such as multiple imputation (MI). MI would reduce imputation sampling error by allowing statistical power to be borrowed across strata. Further, the Census Bureau should consider releasing 5 or more versions of each imputed variable. That would allow data users to fully incorporate the additional sampling error created by the hot-deck sampling procedure. Without that

[5] Since the original release of this paper the SHADAC-Enhanced CPS series has been updated with the revised estimates for 2000-2010. The uninsurance rate for the revised SHADAC-Enhanced CPS series is 0.1 to 0.3 percentage points lower than the unrevised SHADAC-Enhanced CPS series.

information standard errors are understated and statistical tests of significance are anti-conservative (Rubin, 1996).

The changes described in this paper improve the quality of the CPS ASEC health insurance data. The Census Bureau's new imputation routine and the correction to the direct purchase coding error were reflected in the 2011 data release. Data for survey years 2000-2010 were retroactively released in supplemental files available through the Census Bureau's health insurance web page. These new data reflect not only changes made in 2011, but all data processing improvement implemented since 2000. The retroactive release ensures a consistent time series in the CPS ASEC health insurance variables from 2000 to the present providing a rich resource for policy analysis. Users that wish to examine earlier trends can turn to the SHADAC-Enhanced CPS which harmonizes previous methodological changes such as the introduction of the health insurance verification question.

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Table 1. Changes to the Health Insurance Coverage Allocation Routine, CPS ASEC

Construct (Variable Name)	Original Order in Imputation Routine	Original Donor Matrix	Modification
Policy Holder of Group Health Insurance (HI)	1	For Workers: Age, Family Relationship, Class of Worker, Earnings Level, Firm Size For Non-workers: Age, Government Health Insurance, Family Relationship	Imputation of all private coverage sources occurs after public imputation and public coverage consistency edit.
Group Health Insurance Type: Single or Family (HITYP)	2	Family Relationship, Presence of Children, Marital Status	Occurs after public imputation and public coverage consistency edit.
Dependent on Group Health Insurance (DEPHI)	3	There is no matrix. Dependent coverage is assigned to records that are not already dependents on a plan, are not policy holders themselves, and live in a nuclear family with a person that holds a family group health insurance plan policy.	Remove nuclear family restriction. Any non-policy holder in the household is eligible for dependent coverage.
Policy holder of Directly Purchased plan (PRIV)	4	Age, Group Health Insurance, Family Relationship, Work Disability, Public Assistance or SSI	Private imputation occurs after public imputation and public coverage consistency edit.
Directly Purchased Plan Type: Single or Family (PRIVTYPE)	5	Age, Government Coverage, Family Relationship	Occurs after public imputation and public coverage consistency edit.
Dependent on Directly Purchased Plan (DEPRIV)	6	There is no matrix. Dependent coverage is assigned to records that are not already dependents on a plan, are not policy holders themselves, and live in a nuclear family with a person that holds a family group health insurance plan policy.	Remove nuclear family restriction. Any non-policy holder in the household is eligible for dependent coverage
Medicare (CARE)	7	Age, Work Disability, Social Security, Public Assistance or SSI, Veteran, Family Relationship	Public coverage occurs before private; un-imputed private coverage in public matrix.
Medicaid (CAID)	8	Age, Work Disability, Social Security, Public Assistance or SSI, Veteran, Family Relationship	Public coverage run before private; Un-imputed private coverage in public matrix.

Source: CPS ASEC Data Processing Specification

Table 2. Coverage Rates by Imputation Routine and Age, 2009 CPS ASEC

	Old			New			SHADAC-Enhanced			Difference					
										New - Old			New - Enhanced		
	Rate	SE	Count	Rate	SE	Count	Rate	SE	Count	Rate		Count	Rate		Count
All Ages															
Hierarchical Coverage															
Only Private	55.64	0.19	167,733	56.11	0.19	169,173	56.26	0.21	169,614	0.47	***	1,440	-0.15	***	-442
Any Public	28.99	0.15	87,411	29.02	0.15	87,478	28.91	0.18	87,168	0.03	*	67	0.11	***	310
Uninsured	15.37	0.13	46,340	14.87	0.13	44,832	14.83	0.14	44,700	0.50	***	-1,507	0.04		132
Alone or in Combination															
Any Coverage	84.63	0.13	255,143	85.13	0.13	256,651	85.17	0.14	256,783	0.50	***	1,507	-0.04		-132
Any Private	66.67	0.21	200,992	67.21	0.21	202,629	66.81	0.20	201,432	0.54	***	1,637	0.40	***	1,197
Any Employment Based	58.49	0.21	176,332	58.89	0.22	177,543	58.67	0.21	176,880	0.40	***	1,212	0.22	***	664
Any Direct Purchase	8.88	0.10	26,777	9.46	0.11	28,514	8.42	0.11	25,394	0.58	***	1,738	1.04	***	3,120
Any Public	28.99	0.15	87,411	29.02	0.15	87,478	28.91	0.18	87,168	0.03	*	67	0.11	***	310
Any Medicare	14.27	0.06	43,029	14.27	0.06	43,031	14.26	0.13	42,998	0.00		2	0.01	***	33
Any Medicaid	14.14	0.13	42,641	14.17	0.13	42,722	14.07	0.15	42,408	0.03	**	81	0.10	***	314
Any Military Health Care	3.83	0.12	11,560	3.84	0.12	11,562	3.76	0.08	11,346	0.01		2	0.08	***	217
Under 19 Years															
Hierarchical Coverage															
Only Private	57.07	0.32	44,908	57.42	0.32	45,177	57.56	0.36	45,247	0.35	***	269	-0.14	*	-70
Any Public	32.66	0.33	25,699	32.64	0.33	25,686	32.91	0.35	25,874	-0.02		-13	-0.27	***	-188
Uninsured	10.26	0.19	8,076	9.94	0.19	7,820	9.53	0.21	7,492	-0.32	***	-256	0.41	***	328
Alone or in Combination															
Any Coverage	89.74	0.19	70,606	90.06	0.19	70,863	90.47	0.21	71,121	0.32	***	256	-0.41	***	-258
Any Private	63.58	0.31	50,029	63.75	0.31	50,158	63.00	0.36	49,525	0.17	*	129	0.75	***	633
Any Employment Based	58.68	0.30	46,173	58.75	0.30	46,227	58.18	0.36	45,738	0.07		54	0.57	***	489
Any Direct Purchase	5.12	0.16	4,025	5.83	0.17	4,588	4.65	0.15	3,658	0.71	***	563	1.18	***	930
Any Public	32.66	0.33	25,699	32.64	0.33	25,686	32.91	0.35	25,874	-0.02		-13	-0.27	***	-188
Any Medicare	0.84	0.07	664	0.84	0.07	664	0.82	0.07	645	0.00		0	0.02	***	19
Any Medicaid	29.70	0.31	23,368	29.69	0.31	23,362	30.01	0.34	23,596	-0.01		-7	-0.32	***	-234
Any Military Health Care	3.00	0.18	2,357	3.00	0.18	2,357	2.91	0.12	2,290	0.00		0	0.09	***	67

See footnotes at end of table

Table 2. Coverage Rates by Imputation Routine and Age, 2009 CPS ASEC - Continued

	Old			New			SHADAC-Enhanced			Difference					
										New - Old			New - Enhanced		
	Rate	SE	Count	Rate	SE	Count	Rate	SE	Count	Rate		Count	Rate		Count
19 to 64 Years															
Hierarchical Coverage															
Only Private	65.46	0.22	121,117	66.09	0.23	122,268	66.29	0.22	122,690	0.63	***	1,151	-0.20	***	-421
Any Public	14.20	0.15	26,278	14.25	0.15	26,359	13.95	0.15	25,821	0.05	**	80	0.30	***	538
Uninsured	20.33	0.17	37,617	19.67	0.17	36,386	19.76	0.18	36,571	-0.66	***	-1,231	-0.09	*	-185
Alone or in Combination															
Any Coverage	79.67	0.17	147,395	80.33	0.17	148,627	80.24	0.18	148,511	0.66	***	1,231	0.09	*	116
Any Private	69.55	0.21	128,676	70.27	0.22	130,001	70.00	0.21	129,553	0.72	***	1,325	0.27	***	449
Any Employment Based	63.21	0.23	116,946	63.81	0.23	118,058	63.70	0.22	117,898	0.60	***	1,112	0.11	*	160
Any Direct Purchase	6.84	0.10	12,648	7.39	0.10	13,677	6.38	0.11	11,807	0.55	***	1,029	1.01	***	1,870
Any Public	14.20	0.15	26,278	14.25	0.15	26,359	13.95	0.15	25,821	0.05	**	80	0.30	***	538
Any Medicare	3.82	0.08	7,061	3.82	0.08	7,063	3.78	0.08	6,994	0.00		2	0.04	***	69
Any Medicaid	8.56	0.12	15,845	8.61	0.12	15,927	8.34	0.12	15,444	0.05	***	83	0.27	***	484
Any Military Health Care	3.45	0.11	6,383	3.45	0.11	6,383	3.41	0.08	6,312	0.00		0	0.04	***	71
65 Years and Older															
Hierarchical Coverage															
Only Private	4.52	0.19	1,708	4.57	0.19	1,728	4.44	0.18	1,678	0.05	*	20	0.13	***	50
Any Public	93.77	0.21	35,434	93.77	0.21	35,434	93.87	0.21	35,473	0.00		0	-0.10	***	-39
Uninsured	1.71	0.10	646	1.66	0.10	627	1.69	0.11	637	-0.05	*	-20	-0.03		-11
Alone or in Combination															
Any Coverage	98.29	0.10	37,142	98.34	0.10	37,161	98.31	0.11	37,151	0.05	*	20	0.03		10
Any Private	58.98	0.54	22,287	59.46	0.53	22,470	59.16	0.48	22,354	0.48	**	182	0.30		116
Any Employment Based	34.96	0.51	13,212	35.09	0.53	13,258	35.05	0.48	13,244	0.13		46	0.04		14
Any Direct Purchase	26.74	0.49	10,103	27.12	0.48	10,249	26.28	0.44	9,929	0.38	***	146	0.84	***	320
Any Public	93.77	0.21	35,434	93.77	0.21	35,434	93.87	0.21	35,473	0.00		0	-0.10	***	-39
Any Medicare	93.43	0.21	35,304	93.43	0.21	35,304	93.57	0.22	35,360	0.00		0	-0.14	***	-56
Any Medicaid	9.07	0.25	3,428	9.07	0.25	3,428	8.92	0.26	3,369	0.00		0	0.15	***	59
Any Military Health Care	7.46	0.27	2,821	7.46	0.27	2,821	7.26	0.27	2,744	0.00		0	0.20	***	76

Source: SHADAC tabulations of the 2009 CPS ASEC Research File and the 2009 SHADAC-Enhanced CPS. Counts are presented in thousands. SE: Standard error, accounting for the complex sample design. Military Health Care includes Tricare and Department of Veterans Affairs (VA) coverage. *p<0.05; **p<0.01; ***p<0.001.

Table 3. Coverage Rates by Imputation Routine and Demographics, 2009 CPS ASEC

	Old			New			SHADAC-Enhanced			Difference					
										New - Old			New - Enhanced		
	Rate	SE	Count	Rate	SE	Count	Rate	SE	Count	Rate		Count	Rate		Count
Only Private															
Age															
0 to 18	57.07	0.32	44,908	57.42	0.32	45,177	57.56	0.36	45,247	0.35	***	269	-0.14	*	-70
19 to 64	65.46	0.22	121,117	66.09	0.23	122,268	66.29	0.22	122,690	0.63	***	1,151	-0.20	***	-422
65 and older	4.52	0.19	1,708	4.57	0.19	1,728	4.44	0.18	1,678	0.05	*	20	0.13	***	50
Family Relationship															
Reference person	57.57	0.24	47,960	57.92	0.24	48,251	58.41	0.25	48,659	0.35	***	291	-0.49	***	-408
Spouse	64.02	0.26	38,965	64.20	0.26	39,073	64.98	0.29	39,545	0.18	***	108	-0.78	***	-472
Child	57.83	0.30	54,053	58.42	0.30	54,609	58.31	0.33	54,513	0.59	***	556	0.11		96
Other relative	26.49	0.77	3,145	28.76	0.78	3,414	26.14	0.72	3,099	2.27	***	269	2.62	***	315
Unrelated	45.42	0.40	23,609	45.84	0.40	23,826	45.78	0.40	23,797	0.42	***	217	0.06		29
Race and Ethnicity															
White NH alone	61.66	0.24	121,566	61.99	0.23	122,214	62.71	0.24	123,677	0.33	***	648	-0.72	***	-1,463
Black NH alone	43.89	0.59	16,069	44.50	0.59	16,219	43.96	0.61	16,073	0.61	***	150	0.54	***	146
Asian/NHOPI NH alone	61.32	0.92	8,427	62.24	0.95	8,554	62.21	0.94	8,549	0.92	***	127	0.03		5
Other NH	49.22	1.22	3,191	49.90	1.25	3,234	49.38	1.13	3,194	0.68	***	43	0.52	**	40
Hispanic	38.92	0.47	18,480	39.75	0.48	18,876	38.16	0.51	18,122	0.83	***	396	1.59	***	754
Work Status															
Working	70.22	0.23	111,424	70.71	0.23	112,205	70.92	0.22	112,645	0.49	***	781	-0.21	***	-440
Not working	39.43	0.22	56,308	39.89	0.22	56,967	39.93	0.27	56,970	0.46	***	659	-0.04		-3
Poverty Status															
0-99%	15.34	0.36	6,109	15.82	0.37	6,300	14.47	0.40	5,762	0.48	***	191	1.35	***	538
100-199%	31.70	0.42	17,814	32.31	0.43	18,160	31.44	0.45	17,779	0.61	***	346	0.87	***	381
200%+	69.99	0.21	143,809	70.43	0.21	144,713	71.22	0.22	146,073	0.44	***	904	-0.79	***	-1,360
Selected States															
California	53.44	0.72	19,609	53.94	0.72	19,792	53.58	0.63	19,703	0.50	***	183	0.36	***	89
Colorado	60.71	1.31	2,985	61.19	1.31	3,008	61.27	1.23	3,006	0.48	*	23	-0.08		2
Massachusetts	63.44	1.47	4,074	63.96	1.50	4,107	64.66	1.46	4,145	0.52	**	33	-0.70	***	-38
Minnesota	64.20	1.90	3,287	64.68	1.90	3,312	64.91	1.27	3,314	0.48	***	25	-0.23	*	-2
Texas	47.57	0.93	11,510	48.26	0.93	11,675	48.45	0.83	11,722	0.69	***	165	-0.19		-47
Wyoming	57.99	2.14	307	58.23	2.14	308	58.96	1.67	311	0.24		1	-0.73	***	-3

See footnotes at end of table

Table 3. Coverage Rates by Imputation Routine and Demographics, 2009 CPS ASEC– Continued

	Old			New			SHADAC-Enhanced			Difference					
										New - Old			New - Enhanced		
	Rate	SE	Count	Rate	SE	Count	Rate	SE	Count	Rate		Count	Rate		Count
Any Public															
Age															
0 to 18	32.66	0.33	25,699	32.64	0.33	25,686	32.91	0.35	25,874	-0.02		-13	-0.27	***	-188
19 to 64	14.20	0.15	26,278	14.25	0.15	26,359	13.95	0.15	25,821	0.05	**	81	0.30	***	538
65 and older	93.77	0.21	35,434	93.77	0.21	35,434	93.87	0.21	35,473	0.00		0	-0.10		-39
Family Relationship															
Reference person	27.93	0.21	23,267	28.02	0.21	23,340	27.76	0.23	23,131	0.09	***	73	0.26	***	209
Spouse	25.24	0.23	15,360	25.31	0.23	15,404	24.96	0.27	15,190	0.07	***	44	0.35	***	214
Child	28.56	0.28	26,699	28.54	0.28	26,673	28.60	0.31	26,732	-0.02	*	-26	-0.06	***	-59
Other relative	37.98	0.84	4,510	37.86	0.84	4,495	38.60	0.79	4,576	-0.12		-15	-0.74	***	-81
Unrelated	33.81	0.34	17,575	33.80	0.34	17,567	33.75	0.37	17,539	-0.01		-8	0.05	***	28
Race and Ethnicity															
White NH alone	27.53	0.18	54,271	27.56	0.18	54,339	27.23	0.21	53,694	0.03	**	68	0.33	***	645
Black NH alone	37.11	0.50	13,588	37.14	0.50	13,597	37.57	0.57	13,379	0.03		9	-0.43	***	218
Asian/NHOPI NH alone	21.18	0.74	2,911	21.18	0.75	2,910	21.13	0.74	2,904	0.00		-1	0.05		6
Other NH	33.83	1.08	2,193	33.80	1.08	2,191	33.97	1.07	2,196	-0.03		-2	-0.17	***	-5
Hispanic	30.43	0.40	14,448	30.41	0.40	14,442	30.82	0.44	14,635	-0.02		-6	-0.41	***	-193
Work Status															
Working	11.99	0.16	19,019	12.04	0.16	19,106	11.74	0.14	18,640	0.05	***	87	0.30	***	466
Not working	47.90	0.22	68,392	47.88	0.22	68,372	48.04	0.27	68,528	-0.02		-20	-0.16	***	-156
Poverty Status															
0-99%	54.23	0.53	21,598	54.23	0.53	21,600	55.54	0.54	22,117	0.00		2	-1.31	***	-517
100-199%	43.99	0.40	24,722	44.01	0.39	24,730	44.47	0.44	25,147	0.02		8	-0.46	***	-417
200%+	20.00	0.17	41,091	20.03	0.17	41,148	19.46	0.18	39,904	0.03	*	57	0.57	***	1,244
Selected States															
California	27.96	0.53	10,259	27.96	0.53	10,257	28.00	0.53	10,299	0.00		-2	-0.04	**	-42
Colorado	23.43	1.16	1,152	23.43	1.16	1,152	23.41	1.01	1,148	0.00		0	0.02		4
Massachusetts	31.07	1.29	1,995	31.07	1.29	1,995	30.80	1.39	1,974	0.00		0	0.27		21
Minnesota	27.12	2.00	1,389	27.09	2.00	1,387	27.15	1.20	1,386	-0.03		-2	-0.06	*	1
Texas	27.28	0.77	6,601	27.26	0.77	6,595	27.12	0.65	6,560	-0.02		-6	0.14	***	35
Wyoming	28.45	1.26	151	28.45	1.26	151	27.18	1.40	143	0.00		0	1.27		8

See footnotes at end of table

Table 3. Coverage Rates by Imputation Routine and Demographics, 2009 CPS ASEC– Continued

	Old			New			SHADAC-Enhanced			Difference					
										New - Old			New - Enhanced		
	Rate	SE	Count	Rate	SE	Count	Rate	SE	Count	Rate		Count	Rate		Count
Uninsured															
Age															
0 to 18	10.26	0.19	8,076	9.94	0.19	7,820	9.53	0.21	7,492	-0.32	***	-256	0.41	***	328
19 to 64	20.33	0.17	37,617	19.67	0.17	36,386	19.76	0.18	36,571	-0.66	***	-1,231	-0.09	*	-185
65 and older	1.71	0.10	646	1.66	0.10	627	1.69	0.11	637	-0.05	*	-19	-0.03		-10
Family Relationship															
Reference person	14.50	0.18	12,076	14.06	0.17	11,712	13.83	0.18	11,523	-0.44	***	-364	0.23	***	189
Spouse	10.74	0.17	6,538	10.49	0.16	6,387	10.06	0.18	6,122	-0.25	***	-151	0.43	***	265
Child	13.61	0.21	12,716	13.04	0.20	12,187	13.09	0.22	12,237	-0.57	***	-529	-0.05		-50
Other relative	35.53	0.86	4,218	33.38	0.84	3,963	35.26	0.81	4,180	-2.15	***	-255	-1.88	***	-217
Unrelated	20.76	0.32	10,791	20.36	0.32	10,583	20.47	0.34	10,638	-0.40	***	-208	-0.11		-55
Race and Ethnicity															
White NH alone	10.81	0.14	21,322	10.45	0.14	20,606	10.07	0.14	19,851	-0.36	***	-716	0.38	***	755
Black NH alone	19.00	0.43	6,957	18.36	0.42	6,722	18.47	0.44	6,755	-0.64	***	-235	-0.11		-33
Asian/NHOPI NH alone	17.50	0.66	2,405	16.58	0.68	2,279	16.66	0.71	2,289	-0.92	***	-126	-0.08		-10
Other NH	16.94	0.77	1,098	16.31	0.77	1,057	16.65	0.77	1,077	-0.63	***	-41	-0.34		-20
Hispanic	30.66	0.46	14,558	29.84	0.46	14,167	31.02	0.47	14,728	-0.82	***	-391	-1.18	***	-561
Work Status															
Working	17.80	0.16	28,245	17.25	0.16	27,377	17.34	0.18	27,539	-0.55	***	-868	-0.09	*	-162
Not working	12.67	0.18	18,094	12.22	0.17	17,455	12.03	0.18	17,161	-0.45	***	-639	0.19	***	294
Poverty Status															
0-99%	30.44	0.48	12,122	29.95	0.48	11,929	29.99	0.49	11,942	-0.49	***	-193	-0.04		-13
100-199%	24.31	0.37	13,660	23.68	0.37	13,306	24.10	0.38	13,627	-0.63	***	-354	-0.42	***	-321
200%+	10.01	0.13	20,557	9.54	0.13	19,597	9.33	0.14	19,132	-0.47	***	-960	0.21	***	465
Selected States															
California	18.59	0.48	6,822	18.10	0.48	6,641	18.41	0.46	6,768	-0.49	***	-181	-0.31	***	-127
Colorado	15.86	0.81	780	15.39	0.80	756	15.32	0.85	752	-0.47	*	-24	0.07		4
Massachusetts	5.49	0.63	352	4.97	0.65	319	4.54	0.63	291	-0.52	**	-33	0.43	*	28
Minnesota	8.68	0.71	444	8.23	0.70	421	7.94	0.65	405	-0.45	***	-23	0.29	*	16
Texas	25.15	0.68	6,084	24.48	0.70	5,924	24.43	0.68	5,911	-0.67	***	-160	0.05		13
Wyoming	13.56	1.32	72	13.32	1.32	71	13.86	1.17	73	-0.24		-1	-0.54	***	-2

Source: SHADAC tabulations of the 2009 CPS ASEC Research File and the 2009 SHADAC-Enhanced CPS. Counts are presented in thousands. SE: Standard error, accounting for the complex sample design. Significant difference between imputation routines is indicated by confidence levels of: *p<0.05; **p<0.01; ***p<0.001.

Table 4. Policy Holder/Dependent Coverage Rates by Imputation Routine and Age, 2009 CPS ASEC

	Old			New			SHADAC-Enhanced			Difference: New - Old			Difference: New - Enhanced		
	Rate	SE	Count	Rate	SE	Count	Rate	SE	Count	Rate		Count	Rate		Count
All Ages															
Policy Holder															
Private	36.31	0.12	109,473	36.36	0.12	109,612	36.26	0.14	109,306	0.05	***	139	0.10	***	306
Employment Based	30.86	0.13	93,052	30.85	0.13	92,994	30.83	0.13	92,959	-0.01	***	-58	0.02	*	35
Direct Purchase	6.55	0.07	19,752	6.71	0.08	20,215	6.28	0.08	18,923	0.16	***	462	0.43	***	1,291
Dependent															
Private	33.98	0.16	102,457	34.23	0.16	103,196	33.55	0.16	101,148	0.25	***	739	0.68	***	2,048
Employment Based	29.66	0.15	89,420	29.88	0.15	90,071	29.45	0.16	88,797	0.22	***	650	0.43	***	1,274
Direct Purchase	2.80	0.07	8,451	3.20	0.07	9,642	2.58	0.06	7,780	0.40	***	1,191	0.62	***	1,863
Under 19 Years															
Policy Holder															
Private	0.93	0.06	733	0.92	0.06	721	0.83	0.06	655	-0.01	*	-11	0.09	***	67
Employment Based	0.61	0.05	484	0.61	0.05	480	0.54	0.05	426	0.00		-3	0.07	***	54
Direct Purchase	0.33	0.03	256	0.32	0.03	248	0.30	0.03	234	-0.01		-8	0.02	***	15
Dependent															
Private	62.86	0.31	49,460	63.06	0.31	49,616	62.34	0.36	49,006	0.20	*	155	0.72	***	610
Employment Based	55.57	0.30	43,727	56.06	0.30	44,107	55.47	0.36	43,609	0.49	***	380	0.59	***	498
Direct Purchase	4.78	0.15	3,763	5.52	0.16	4,340	4.35	0.14	3,421	0.74	***	576	1.17	***	919
19 to 64 Years															
Policy Holder															
Private	48.71	0.17	90,112	48.76	0.17	90,210	48.67	0.18	90,087	0.05	**	98	0.09	***	123
Employment Based	44.62	0.17	82,552	44.59	0.17	82,496	44.63	0.18	82,594	-0.03	***	-56	-0.04	***	-98
Direct Purchase	5.37	0.08	9,941	5.57	0.08	10,306	5.03	0.09	9,309	0.20	***	365	0.54	***	996
Dependent															
Private	25.69	0.16	47,529	26.03	0.17	48,163	25.28	0.15	46,791	0.34	***	634	0.75	***	1,372
Employment Based	22.51	0.16	41,648	22.67	0.16	41,935	22.27	0.15	41,221	0.16	**	287	0.40	***	714
Direct Purchase	1.85	0.05	3,414	2.19	0.06	4,053	1.68	0.05	3,110	0.34	***	638	0.51	***	942

Source: SHADAC tabulations of the 2009 CPS ASEC Research File and the 2009 SHADAC-Enhanced CPS. Counts are presented in thousands. SE: Standard error, accounting for the complex sample design. Significant difference between imputation routines is indicated by confidence levels of: *p<0.05; **p<0.01; ***p<0.001.

Table 5. Demographic Characteristics by Full Supplement Status, 2009 CPS ASEC

	Total		Completed Supplement		Full Supplement Imputations		
Population (Count in Thousands)	301,482		272,865		28,617		
	Percent	**SE**	**Percent**	**SE**	**Percent**	**SE**	
Hierarchical Coverage (New Routine)							
Only Private	56.1	0.19	56.5	0.20	52.7	0.63	***^
Any Public	29.0	0.15	29.0	0.16	29.0	0.54	
Uninsured	14.9	0.13	14.5	0.14	18.3	0.46	***^
Hierarchical Coverage (Old Routine)							
Only Private	55.6	0.19	56.4	0.20	48.6	0.58	***
Any Public	29.0	0.15	29.0	0.16	28.8	0.54	
Uninsured	15.4	0.13	14.6	0.14	22.6	0.49	***
Age							
0 to 14	20.4	0.01	20.8	0.03	16.4	0.31	***
15 to 24	13.9	0.01	13.6	0.03	16.4	0.32	***
25 to 34	13.4	0.01	13.3	0.04	14.5	0.36	**
35 to 44	13.7	0.01	13.6	0.03	14.4	0.29	**
45 to 64	26.1	0.01	26.0	0.04	26.6	0.40	
65 and older	12.5	0.01	12.6	0.03	11.7	0.32	**
Family Relationship							
Reference person/spouse	45.9	0.15	46.1	0.16	44.8	0.40	**
Child/other relative	36.8	0.13	36.9	0.13	36.1	0.47	
Unrelated	17.2	0.15	17.1	0.16	19.1	0.49	***
Marital Status							
Married	41.5	0.16	41.6	0.17	40.8	0.48	
Never Married	44.3	0.11	44.2	0.12	45.0	0.45	
Divorced/Separated	9.5	0.09	9.5	0.09	9.7	0.28	
Widowed	4.7	0.06	4.8	0.06	4.5	0.19	

See footnotes at end of table

Table 5. Demographic Characteristics by Full Supplement Status, 2009 CPS ASEC – Continued

	Total		Completed Supplement		Full Supplement Imputations		
	Percent	SE	Percent	SE	Percent	SE	
Workers in Family (Past Year)							
0	16.0	0.13	16.0	0.14	15.7	0.45	
1	38.4	0.21	38.3	0.23	39.1	0.65	
2+	45.7	0.21	45.7	0.22	45.3	0.69	
Self Employed	3.4	0.05	3.4	0.05	3.6	0.16	
Work Disability							
Working	52.6	0.11	52.4	0.11	54.6	0.45	***
Disabled	4.7	0.07	4.7	0.07	4.7	0.21	
Other	42.7	0.10	42.9	0.10	40.7	0.47	***
Firm Size							
<=24 or not in universe	63.4	0.12	63.6	0.13	62.3	0.44	**
25 to 499	13.3	0.10	13.3	0.10	13.9	0.32	*
500 to 999	2.9	0.05	2.9	0.05	3.1	0.15	
1000+	20.3	0.12	20.3	0.13	20.7	0.34	
Social Security Beneficiary	14.3	0.07	14.3	0.08	13.5	0.35	*
Public Cash Transfer Recipient	2.4	0.05	2.3	0.05	2.7	0.15	*
Veteran (Active Duty not shown)	7.0	0.07	7.1	0.07	6.6	0.22	*
Sample Size	207,921 (100%)		188,965 (90.9%)		18,926 (9.1%)		

Source: SHADAC tabulations of the 2009 CPS ASEC Research File. SE: Standard error, accounting for the complex sample design. Significant difference between full supplement imputations and completed supplements is indicated by confidence levels of: *p<0.05; **p<0.01; ***p<0.001. ^ Indicates that the difference in insurance rates across supplement status is significantly different in the new routine compared to the old routine at p <0.001.

Table 6. Multinomial Logit Regressions of Hierarchical Insurance Coverage on FSI and Covariates, 2009 CPS ASEC

	Model 1 (Old Routine – All Ages)						Model 2 (New Routine – All Ages)					
	Uninsured vs. Private			Public vs. Private			Uninsured vs. Private			Public vs. Private		
	RRR		SE	RRR		SE	RRR		SE	RRR		SE
Full Supplement Imputation	1.77	***	0.062	1.33	***	0.059	1.29	***	0.049	1.23	***	0.055
Age												
0 to 14	1.00		0.000	1.00		0.000	1.00		0.000	1.00		0.000
15 to 24	3.12	***	0.101	0.58	***	0.017	2.97	***	0.099	0.56	***	0.017
25 to 34	5.34	***	0.234	0.33	***	0.016	4.90	***	0.221	0.31	***	0.015
35 to 44	3.81	***	0.191	0.20	***	0.011	3.52	***	0.186	0.19	***	0.010
45 to 64	2.50	***	0.127	0.15	***	0.008	2.33	***	0.123	0.14	***	0.008
65 and older	3.15	***	0.326	3.15	***	0.238	2.90	***	0.301	2.98	***	0.224
Family Relationship												
Reference person/spouse	1.00		0.000	1.00		0.000	1.00		0.000	1.00		0.000
Child/other relative	1.98	***	0.077	1.23	***	0.052	1.89	***	0.071	1.18	***	0.048
Unrelated	0.84	***	0.035	0.38	***	0.016	0.86	***	0.035	0.37	***	0.016
Marital Status												
Married	1.00		0.000	1.00		0.000	1.00		0.000	1.00		0.000
Never Married	1.55	***	0.065	0.90	*	0.043	1.49	***	0.062	0.89	*	0.043
Divorced/Separated	1.78	***	0.062	1.14	**	0.051	1.72	***	0.061	1.12	**	0.050
Widowed	1.97	***	0.134	1.77	***	0.113	1.86	***	0.135	1.73	***	0.112
Workers in Family (Past Year)												
0	1.00		0.000	1.00		0.000	1.00		0.000	1.00		0.000
1	0.27	***	0.012	0.22	***	0.009	0.28	***	0.012	0.22	***	0.010
2+	0.12	***	0.005	0.08	***	0.004	0.12	***	0.005	0.08	***	0.004
Self Employment (Class of Work)												
Not self employed	1.00		0.000	1.00		0.000	1.00		0.000	1.00		0.000
Self employed/unincorporated	1.58	***	0.069	1.49	***	0.086	1.58	***	0.070	1.49	***	0.087

See footnotes at end of table

Table 6. Multinomial Logit Regressions of Hierarchical Insurance Coverage on FSI and Covariates, 2009 CPS ASEC – Continued

	Model 1 (Old Routine – All Ages)						Model 2 (New Routine – All Ages)					
	Uninsured vs. Private			Public vs. Private			Uninsured vs. Private			Public vs. Private		
	RRR		SE	RRR		SE	RRR		SE	RRR		SE
Work Disability												
Working	1.00		0.000	1.00		0.000	1.00		0.000	1.00		0.000
Disabled	1.19	*	0.084	4.52	***	0.301	1.14		0.081	4.35	***	0.288
Other	0.46	***	0.013	0.84	***	0.037	0.46	***	0.013	0.84	***	0.036
Firm Size												
<=24 or not in universe	1.00		0.000	1.00		0.000	1.00		0.000	1.00		0.000
25 to 499	0.43	***	0.013	0.67	***	0.033	0.44	***	0.014	0.68	***	0.033
500 to 999	0.28	***	0.016	0.60	***	0.042	0.28	***	0.016	0.60	***	0.042
1000+	0.27	***	0.008	0.76	***	0.032	0.28	***	0.009	0.77	***	0.032
Social Security Beneficiary												
None	1.00		0.000	1.00		0.000	1.00		0.000	1.00		0.000
Social Security	0.69	***	0.049	10.81	***	0.490	0.70	***	0.049	10.93	***	0.485
Public Cash Transfer Recipient												
None	1.00		0.000	1.00		0.000	1.00		0.000	1.00		0.000
Public Assistance/SSI	1.73	*	0.363	140.32	***	19.979	2.08	***	0.414	153.81	***	22.079
Veteran Status												
Veteran	1.00		0.000	1.00		0.000	1.00		0.000	1.00		0.000
Not a Veteran/Active Duty	1.22	***	0.057	0.35	***	0.016	1.22	***	0.058	0.35	***	0.016
Intercept	0.47	***	0.040	11.93	***	1.044	0.50	***	0.044	12.35	***	1.092
Sample Size	207,921						207,921					
Model Statistics												
Adjusted Wald (FSI)	F = 132.77 (p <0.001)						F = 24.55 (p <0.001)					

Source: SHADAC analysis of the 2009 CPS ASEC Research File. RRR: Relative risk ratio. SE: Standard error, accounting for the complex sample design. Significant difference is indicated by confidence levels of: *p<0.05; **p<0.01; ***p<0.001.