Methodology Report #28

Construction of Weights for the 2011 Medical Expenditure Panel Survey Insurance Component

ABSTRACT

The Medical Expenditure Panel Survey (MEPS) Insurance Component (IC) is an annual survey of private sector and public sector employers covering the health insurance plans offered to their employees. The survey collects information on the number and types of private insurance plans offered, premiums, contributions by employers and employees, copay and coinsurance payments, benefits associated with these plans, and characteristics of the employers. Estimates from these data are produced at the national and state levels. This document describes the weights used to produce these estimates from the 2011 MEPS-IC data. The variance estimation technique used in the production of the official tables from the data is also described.

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INTRODUCTION

The Medical Expenditure Panel Survey (MEPS) Insurance Component (IC) is an annual survey of private employers as well as state and local governments. The MEPS-IC produces national and state-level estimates of employer-sponsored insurance including offered plans, costs, and number of enrollees. The MEPS-IC is sponsored by the Agency for Healthcare Research and Quality and is fielded by the U.S. Census Bureau.
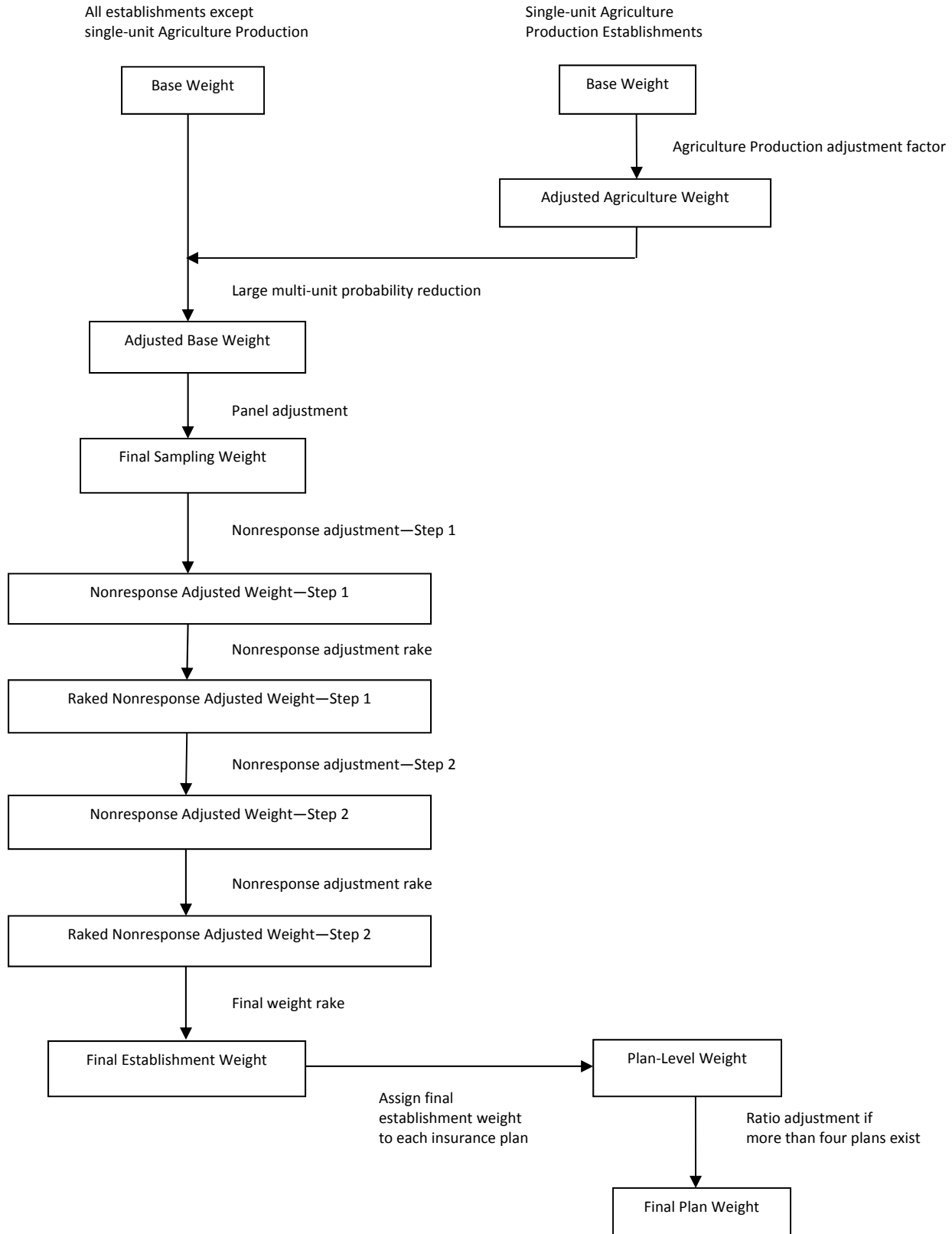
The MEPS-IC comprises two independent samples: the private sector sample and the governments sample. The 2011 MEPS-IC had 39,351 in-scope business establishments selected for the private sector sample. An establishment is a single business entity or location. Firms (also known as companies) can comprise one or more establishments. Those with just one establishment are called single-unit firms and those with more than one establishment are called multi-unit firms. An example of a multi-unit firm is a chain of drug stores, where the establishments of the firm are the sites of each individual drug store. Government agencies in the MEPS-IC include all state governments including the District of Columbia, as well as a sample of local governments. A sampled government includes the parent agency and any dependent agencies that may be associated with that parent agency. The 2011 governments sample had 3,017 in-scope parent and dependent agencies selected for the sample.

This report provides a description of the processes for developing analytic weights for the 2011 MEPS-IC. It serves as an update to the initial MEPS-IC weighting documentation: *Construction of Weights for the 1996 Medical Expenditure Panel Survey Insurance Component List Sample* (Sommers, 1999). Additional information on the sampling process can be found in *Sample Design of the 2011 Medical Expenditure Panel Survey Insurance Component* (Davis, 2013). A chronological listing of the major changes to the survey and the weighting process between the 1996 and the 2011 surveys can be found in Appendix A.

PRIVATE SECTOR

The establishment and plan level weights for the private sector sample are developed through a multi-step procedure outlined in figure 1. In this section, background is provided on relevant data collection processes. The development of the establishment and plan weights are described in the ensuing sections.

Figure 1. MEPS-IC private sector weighting flowchart

All establishments except
single-unit Agriculture Production

Single-unit Agriculture
Production Establishments

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┌─────────────────┐                              ┌─────────────────┐
│   Base Weight   │                              │   Base Weight   │
└─────────────────┘                              └─────────────────┘
         │                                                │
         │                        Agriculture Production adjustment factor
         │                                                ▼
         │                              ┌──────────────────────────────┐
         │                              │  Adjusted Agriculture Weight  │
         │                              └──────────────────────────────┘
         │◄─────────────────────────────────────────────┘
         │
         │  Large multi-unit probability reduction
         ▼
┌──────────────────────┐
│ Adjusted Base Weight │
└──────────────────────┘
         │
         │  Panel adjustment
         ▼
┌──────────────────────┐
│ Final Sampling Weight│
└──────────────────────┘
         │
         │  Nonresponse adjustment—Step 1
         ▼
┌────────────────────────────────────┐
│ Nonresponse Adjusted Weight—Step 1 │
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         │  Nonresponse adjustment rake
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│ Raked Nonresponse Adjusted Weight—Step 1 │
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         │
         │  Nonresponse adjustment—Step 2
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│ Nonresponse Adjusted Weight—Step 2 │
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         │  Nonresponse adjustment rake
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│ Raked Nonresponse Adjusted Weight—Step 2 │
└──────────────────────────────────────────┘
         │
         │  Final weight rake
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┌─────────────────────────────┐              ┌──────────────────┐
│ Final Establishment Weight  │─────────────►│ Plan-Level Weight│
└─────────────────────────────┘              └──────────────────┘
                                                      │
         Assign final                        Ratio adjustment if
         establishment weight                more than four plans exist
         to each insurance plan                      ▼
                                             ┌──────────────────┐
                                             │ Final Plan Weight│
                                             └──────────────────┘
```

Data Collection

Frame

The private sector sample is selected at the establishment level using the Census Bureau's Business Register as the frame. Because selection is at the establishment level, more than one establishment of a multi-unit firm may be selected in any given year. The reference period for the MEPS-IC survey is what the respondent considers to be a typical pay period during the current calendar year.

Telephone prescreener

When selected to participate in the survey, most establishments are contacted by telephone as part of a prescreening operation to determine a point of contact for data collection and to determine whether the employer offered insurance to its employees. During this prescreener, if the employer reports not offering insurance then a short questionnaire is administered and the establishment is classified as a respondent. Employers that report offering insurance are also administered a short questionnaire and then mailed the full survey questionnaire. If no contact is made with the employer during the telephone prescreener, a full survey questionnaire is mailed.

Mailed survey questionnaire

The mailed survey questionnaire collects detailed information about the establishment including the number of employees, the number of employees eligible for insurance, the number of employees enrolled with insurance, and the types of insurance plans offered to the employees. The employers are offered the choice of responding to the questionnaire by either completing the paper form and returning by mail or completing the survey electronically using the Internet. The survey forms can be found at
www.meps.ahrq.gov/survey_comp/survey_ic.jsp.

Telephone follow-up

If the employer does not respond to the mailed questionnaire or fails to provide a Web response an attempt is made to administer an abbreviated version of the survey by telephone.

Survey response status

Table 1 shows the response status and the weighting group classifications for the 2011 private sector sample. The weighting groups are used in the nonresponse adjustment sections of this report to describe the types of respondents and nonrespondents to the survey (summarized in Appendix B). The response rate for the 2011 private sector sample was 81.4 percent. Establishments that are out of scope are those that had either gone out of business; consist of a self-employed person with no other employees; merged, consolidated, or sold establishments with a new business activity; or moved out of the state in which they were sampled. An establishment that moves to a different state is out of scope with the survey because that establishment may no longer be representative of the health care offerings and other characteristics of similar establishments in that state because it now has to comply with the laws and health care systems in place in its new state. In 2011, a negligible percentage of establishments moved out of the state in which they were sampled.

To be classified as a respondent, an employer has to answer a specific subset of key questions or indicate in the telephone prescreener that they did not offer insurance to their employees. Note that employers who did not complete the prescreener may still be considered respondents if they answer the mailed survey questionnaire, provide an adequate Web response, or respond to the telephone follow-up. Nonrespondents are those employers who indicated in the prescreener that they offered insurance but did not complete the survey questionnaire (by mail, Web, or telephone follow-up) as well as those employers whose insurance status was unknown due to an incomplete prescreener.

Table 1. Private sector response in the 2011 Medical Expenditure Panel Survey Insurance Component

Status	Weighting group*	Number
Total sample		42,028
Out of scope	Group 6	2,677
In-scope		39,351
Respondents (81.3 percent of in-scope sample)		31,998
Completed prescreener		29,633
Offered insurance	Group 2	22,312
Did not offer insurance	Group 1	7,321
Did not complete prescreener	Group 4	2,365
Nonrespondents (18.7 percent of in-scope sample)		7,353
Completed prescreener, offered insurance	Group 3	3,369
Incomplete prescreener, unknown insurance status	Group 5	3,984

* Weighting groups for the nonresponse adjustments (Appendix B).

Source: Center for Financing, Access, and Cost Trends, Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey Insurance Component, 2011

Establishment Level Weights

The sample units for the private sector sample are individual establishments within firms (companies). Because these establishments are selected with unequal probabilities, sampling weights are required to produce unbiased estimates from the survey data. Thus, if p_i is the probability of selection of the ith unit in the sample and $wt_i = 1/p_i$ is the initial weight then

$$E\left[\sum_{i \varepsilon S} wt_i x_i\right] = \sum_{i \varepsilon U} p_i wt_i x_i = \sum_{i \varepsilon U} [{p_i}/{p_i}] x_i = \sum_{i \varepsilon U} x_i$$

where S is the set of sampled units and U is the set of units in the universe.

An unbiased estimate of a total from the sample can be found by calculating the weighted sum from the sample. However, because there is survey nonresponse, the sampling weights of the responding units are adjusted by the sampling weights of similar nonresponding units (Kish, 1965). After nonresponse adjustments, the establishment weights are raked. The objective of raking is to have the sum of the new adjusted weights of the respondents within cells based on specified characteristics equal to the totals from the original sample or some other set of known population control totals. The weight adjustment procedures used for the MEPS-IC will be described in detail in the following sections.

Base weight
The initial survey weight for each unit is the inverse of the probability of selection of that unit into the survey sample. As stated earlier, the weight, wt_i is then

$$wt_i = {1}/{p_i}$$

where p_i is the probability of selection for unit i. The development of the probabilities of selection is described in the MEPS Methodology Report: *Sample Design of the 2011 Medical Expenditure Panel Survey Insurance Component*, (Davis, 2013). Because of their significant size, establishments with more than 5,000 employees are selected with certainty. Also, due to their size and complex structure, some railroad establishments are selected as "certainties". These certainty establishments are self-representing and receive a base weight of 1.000.

Single-unit Agriculture Production Establishment weight adjustment
Because the single-unit Agriculture Production Establishments are incomplete on the Business Register when the private sector frame is developed, these establishments are edited and imputed before the private sector sample is drawn. The multi-unit Agriculture Production Establishments do not need any edits and imputation because their data have been processed before being placed on the Business Register. The sample weights of the single-unit Agriculture Production Establishments have an additional step performed to calculate the final sample weights, wt_i (AG), where

$$wt_i(AG) = {wt_i}/{AGfactor}$$

The AG factor is an adjustment for the number of Agricultural Production administrative data records that are not yet available to the Census Bureau when the survey frame is created. Because of these missing records, the weights of the Agricultural Production Establishments are artificially low. The factor is calculated by dividing the current year total number of Agriculture Production records received to date by the prior year total number of Agriculture Production records received as found on the U.S. Census Business Register. For 2011, the AG factor was 0.6460.

Adjusted base weight

To reduce reporting burden for the largest multi-unit firms, a variable cap-limiting target is implemented to reduce the number of establishments sampled from these larger firms. Establishments of the same firm tend to have similar characteristics and have similar health plan offerings. The establishment base weight for all sampled establishments is adjusted based on the expected number of establishments sampled from their firm to obtain the final establishment sampling weight.

The expected number of establishments from any particular firm $E[ESTB_j]$ is calculated by

$$E[ESTB_j] = \sum_{i \in j} p_i$$

where p_i is the initial probability of selection of establishment i in firm j and

$$p_i = {n_s}/{N_s}$$

where n_s is the sample allocation for stratum s and N_s is the total number of establishments in stratum s. The sampling strata are defined by a combination of 14 establishment and firm sizes within each state. The expected number of establishments from a firm is used to calculate an adjustment factor, ME, that is used to develop an adjusted probability of selection for each establishment. In essence, this process will reduce the number of sampled establishments that are part of large multi-unit firms and reallocate the sample to increase the number of establishments from single-unit firms and smaller multi-unit firms. The adjustment factor calculation is

Expected number of establishments in firm $E[ESTB_j]$	Adjustment factor (ME) calculation
0–3	1
4–5	$(3+(2/3)(E[ESTB_j]-3)) / E[ESTB_j]$
6–11	$(5+(1/2)(E[ESTB_j]-6)) / E[ESTB_j]$
12–35	$(8+(1/3)(E[ESTB_j]-12)) / E[ESTB_j]$
36–72	$(16+(1/6)(E[ESTB_j]-36)) / E[ESTB_j]$
73 +	$23 / E[ESTB_j]$

The adjusted probability of selection, p'_i, is then

$$p'_i = ME \times p_i$$

The final selection probability for each establishment, finalp$_i$, is either

If ME = 1 then finalp$_i$ is the lesser of:

$$finalp_i = F_s \times p_i$$

or

$$finalp_i = 1.00$$

If ME < 1 then:

$$finalp_i = p'_i$$

where F$_s$ is a stratum factor based on the difference between the allocated and the expected number of establishments, d$_s$, that will be selected into the sample from the stratum such that

$$F_s = \frac{(SUMPN_s + d_s)}{SUMPN_s}$$

and

$$SUMPN_s = \sum_{ME=1} p'_i$$

and

$$d_s = n_s - SUMNEWP_s$$

SUMNEWP$_S$ is the summation of the adjusted probabilities of selection within strata:

$$SUMNEWP_s = \sum_{i \in s} p'_i$$

Final sampling weight
Just prior to drawing the sample, to further reduce burden on establishments, the frame is divided into four nationally representative panels of which two are utilized each year. The two selected panels include one new panel and one panel that had been utilized the previous survey year. The use of panels makes it less likely that establishments will be selected into multiple consecutive samples.

In the two selected panels, the final sampling weight for each non-certainty establishment is

$$wt_i = {}^{2}/_{finalp_i}$$

For each certainty establishment and each certainty railroad establishment, the final sampling weight is

$$wt_i = 2$$

Nonresponse weight adjustment—Step 1
Appendix B contains a general description of the MEPS-IC two step nonresponse adjustment process. It shows the classification of all sample members into six groups (three types of respondents, two types of nonrespondents and an out-of-scope group). In addition, it provides a high-level view of the redistribution processes of the nonrespondent weights to the appropriate responding groups during the nonresponse weighting adjustment process. A more detailed discussion of the nonresponse adjustments follows in this section. All figures for 2011 provided in this section can be found in table 1.

The initial contact attempt for the survey is by telephone in the prescreening process. One of the primary objectives of the telephone prescreener is to determine if the establishment offers insurance to its employees. For the private sector, 29,633 out of 39,351 establishments (75.3 percent) completed the prescreener. If insurance is not offered, the establishment is considered a respondent and no further contact is made with the establishment after the prescreening process (Group 1, n = 7,321 establishments). If insurance is offered, the establishment is mailed a survey questionnaire. If the establishment responds to the survey questionnaire (initially or on follow-up), the establishment is considered a respondent (Group 2, n = 22,312 establishments). However, if the prescreener indicates an establishment offers insurance but no further survey information is obtained (or not enough partial information is obtained), then the establishment is a nonrespondent to the survey (Group 3, n = 3,369 establishments).

The first step of the nonresponse weight adjustment involves Groups 2 and 3. The weights of the establishments who offered insurance in the prescreener and responded to the survey (Group 2) are adjusted so their total weight equals the weight of all respondents to the prescreener that offered insurance for a specific set of cells, whether they responded to the survey or not. At the conclusion of this process, weights for the 3,369 Group 3 nonresponding establishments are redistributed to the responding 22,312 establishments in Group 2. Thus, those establishments in Group 2 will have their base weights systematically inflated.

The adjustment cells for this nonresponse adjustment procedure are a cross of an eight-level size measure based on firm sizes and establishment sizes (see Appendix C), industry, type of firm (single-unit or multi-unit), and State (including the District of Columbia). However, before

these adjustment cells are utilized some establishments have their size class adjusted in the **Reclassification of Employment Size** process described next.

For a small proportion of cases where the survey reported size differs greatly from the establishment size on the frame, the establishment size class used for raking is adjusted to reflect the survey response. Without reclassification these cases would have a significant net disproportionate effect during the raking process. Thus, to temper their impact, these establishments are reclassified according to their survey reported size rather than their frame size.

In the past, the establishment size class adjustment process was the same for single-unit and multi-unit establishments. However, after the survey data collection was changed from prior year to current year data in 2008, research showed the need to expand the adjustment bounds for multi-unit establishments.

As seen in Appendix C, the establishment size classes are:

Size class	Number of employees
1	1–5 employees
2	6–24 employees
3	25–49 employees
4	50–249 employees
5	250–999 employees
6	1,000 employees or more

The rules for the adjustment of establishment size classes for **single-units** are as follows. If the boundary is exceeded then the frame employment size (F EMP) is replaced by the survey response employment size (S EMP) and the size class of the establishment is adjusted accordingly.

Frame size class	Single-unit boundary
4	F EMP is 5 times greater or less than S EMP
5	F EMP is 4 times greater or less than S EMP
6	F EMP is 2 times greater or less than S EMP

The rules for the adjustment of size classes for establishments that are part of **multi-unit firms** are as follows. If the boundary is exceeded then the frame employment size (F EMP) is replaced by the survey response employment size (S EMP) and the size class of the establishment is adjusted accordingly.

Frame size class	Multi-unit boundary
4	F EMP is 10 times greater or less than S EMP
5	F EMP is 10 times greater or less than S EMP
6	F EMP is 10 times greater or less than S EMP

If the size class was adjusted for an establishment then the firm employment associated with that establishment may need to be adjusted to maintain continuity (i.e., the establishment employment size class should not be larger than the firm employment size class). Thus, for single-units, the firm employment from the frame will be replaced by the establishment employment from the survey response. For multi-units, firm employment sizes are reconciled through a series of edits that compare employment size information from the frame to the establishment, and firm employment sizes reported by the respondents.

After the application of the establishment size class adjustments and the firm size class adjustments, a new value is created for the collapsed firm size and establishment size class variable (Appendix C) if necessary. In the 2011 survey, 0.9 percent of the in-scope establishments changed establishment size classes.

Generally, nonresponse adjustment procedures are based on the adjusted firm and establishment sizes and size classes, with the adjusted weights for respondents defined as follows:

$$adjwt_i = wt_i \sum_{j\varepsilon C} wt_j \bigg/ \sum_{j\varepsilon CR} wt_j$$

where wt_i is the ith unit's initial weight and wt_j is the weight of each unit in response cell C or the weight of each responding unit in response cell C (denoted by CR). The adjusted weights for the nonrespondents are set to zero. This is done for all cells C and CR defined by the cross of all the important variables.

However, because crossing these variables creates a large number of adjustment cells, an iterative technique known as raking (Madow, Olkin, and Rubin, 1983) is used to create an adjustment that retained the sum of the weights for as many cells as possible. In the raking process, the sums of the respondent weights for all cells defined by any one of the raking variables alone were made to sum to the totals for respondents and nonrespondents in the cell.

When describing raking, assume wt_{ijk} is the sampling weight for the ith sample unit in the jkth cell. One would adjust the weights to create a set of weights wt'_{ijk} such that

$$N_{j.} = \sum_{i,k\varepsilon CR} wt'_{ijk} = \sum_{i,k\varepsilon C} wt_{ijk} \quad and \quad N_{.k} = \sum_{ij\varepsilon CR} wt'_{ijk} = \sum_{ij\varepsilon C} wt_{ijk}$$

To do this, one first creates values a_j such that

$$a_j = N_{j.} \bigg/ \sum_{ik\varepsilon CR} wt_{ijk}$$

Then wt$'_{ijk}$ = a_j x wt$_{ijk}$ for all cases where the ijkth case is a respondent. Otherwise, the adjusted weight is 0.

One continues this process through all values of j. This makes the respondents' weights sum to the proper values for the first raking variable, but not the next. One then operates on the values of wt$'_{ijk}$ to adjust them so that the cells defined by the second raking variable are equal. However, this third set of weights may not sum properly for cells defined by the first variable. The cycle is repeated—readjusting each new set of weights while iterating through the process. Usually the weights will converge within several cycles such that for each cell defined by any of the raking variables, the sum of the latest set of weights is a value very close to the required marginal total. This completes the raking process. The process can be applied to make weights sum to marginal cell totals for as many raking variables as one likes. For the MEPS-IC the nonresponse adjustment raking dimensions are: 1) nine industry groups, 2) multi-unit/single unit status, and 3) 51 "States" by eight size classes. The weights are adjusted for seven iterations of these three raking dimensions so the final dimension applied to the data is the State by size dimension.

Nonresponse weight adjustment—Step 2
The process described here is "Step 2" in the outline of the MEPS-IC nonresponse adjustment process located in Appendix B. In this step the weights from the other nonrespondent group (Group 5, n = 3,984 establishments), those with no response via prescreener, mail, Web, or telephone and thus have an unknown insurance status, have their weights redistributed to the responding establishments (those in Groups 1, new Group 2, and 4; n = 7,321 + 22,312 + 2,365 = 31,998 establishments). The total sampling weight of the establishments in Group 5 is redistributed to the responding establishments using the raking methodology described above. The raking dimensions are the same as those used after the first nonresponse adjustment. At the conclusion of this process only responding establishments (Group 1, new Group 2, and Group 4) will have a positive weight.

Final weight
Following the two nonresponse adjustment steps the weights are further adjusted through a final raking process based on characteristics from the subsequent-year's sampling frame. Because the Business Register is the source of official Census Bureau figures on the number and employment sizes of establishments in the United States, it is important that data from the MEPS-IC on employment by selected characteristics match those from the Business Register. Therefore, for the 2011 survey, control totals are obtained from the March 2012 snapshot of the Business Register which provides the first opportunity to obtain comprehensive employment figures for 2011.

Starting in 2008 suspected single-unit deaths are modeled and removed from the frame before the calculation of the control totals. Before 2008, when the retrospective survey design was in place (survey questions asked about prior year information instead of current year information), single-unit deaths were identified and removed from the frame before the sampling procedure. However, due to the switch to the current year design, the single-unit

business death information was no longer available. In addition, an adjustment was necessary to account for the unusually large number of business deaths during the economic downturn that began at the end of 2007. Thus, the "Death Model" was developed, based on data from the prior two years of the survey, to predict the single-unit deaths in the current year. The model is flexible enough to be able to reflect the current economic conditions. These modeled deaths are then removed from the final weight raking process but are not removed from the 2012 frame because they are not actual deaths. This effectively adjusts the control totals used during the final weight raking process for the estimated business deaths.

The final weight raking dimensions are: 1) 51 "States" by eight size classes, 2) multi-unit/single unit status, and 3) nine industry groups. The weights are adjusted for seven and two-thirds iterations of these three raking dimensions so the final dimension applied to the data is the multi-unit/single unit status dimension. The employment size used in this raking process is the frame size, not the reported size, except for those establishments that changed size class in the Reclassification of Employment Size process described earlier. At the conclusion of this process, the sample weights have been corrected such that the weighted sample employment is similar to the Business Register employment minus the projected deaths within each raking cell and the sum of all the weights equals the total number of establishments on the frame minus the projected deaths.
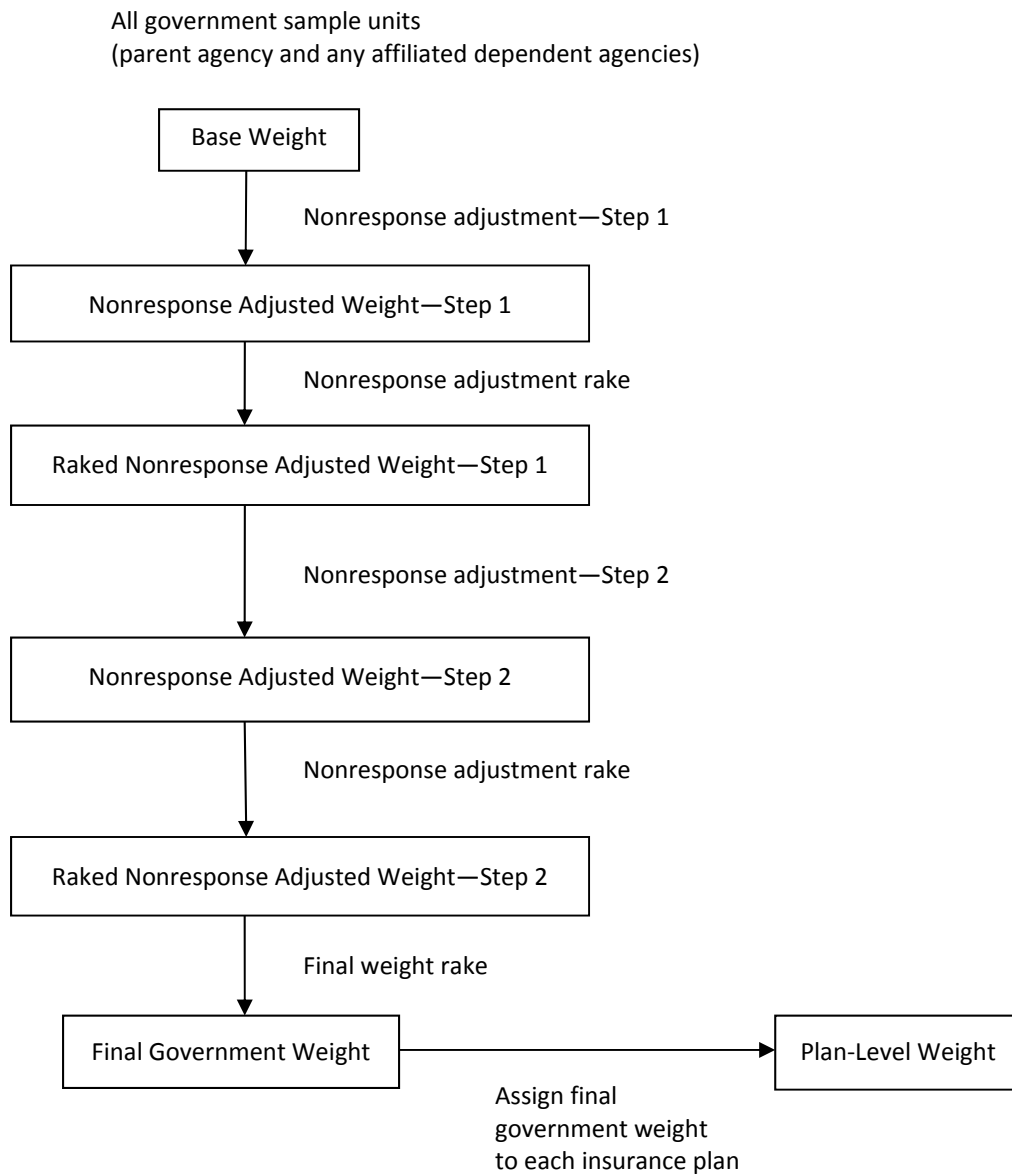
Plan-Level Weights

Establishments are asked to provide names and information on insurance plans they offer to their employees. If the establishment offers four or fewer plans, information is collected on all of the plans and each plan receives the same weight as the final raked weight of the establishment. However, if the establishment offers more than four plans, information is collected on the three plans with the largest enrollment as well as one additional plan. The three plans with the largest enrollment receive the same weight as the final raked weight of the establishment. The fourth plan receives the final raked establishment weight multiplied by a ratio so that it is proportional to the enrollment size of the plans within that establishment that are not one of the three largest plans. Estimates based on data that are collected at the plan level such as premiums, employee contributions, and deductibles are derived from plan weights that are inflated by the number of enrollees in those plans.

U.S. STATE AND LOCAL GOVERNMENTS

The government weights are developed through a process similar to that of the private sector weights. Figure 2 provides an overview of this process and is followed by a more detailed explanation of the steps involved.

Figure 2. MEPS-IC governments weighting flowchart

All government sample units
(parent agency and any affiliated dependent agencies)

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                        ┌─────────────────┐
                        │   Base Weight   │
                        └─────────────────┘
                                 │  Nonresponse adjustment—Step 1
                                 ▼
        ┌──────────────────────────────────────────────┐
        │      Nonresponse Adjusted Weight—Step 1       │
        └──────────────────────────────────────────────┘
                                 │  Nonresponse adjustment rake
                                 ▼
        ┌──────────────────────────────────────────────┐
        │   Raked Nonresponse Adjusted Weight—Step 1    │
        └──────────────────────────────────────────────┘
                                 │  Nonresponse adjustment—Step 2
                                 ▼
        ┌──────────────────────────────────────────────┐
        │      Nonresponse Adjusted Weight—Step 2       │
        └──────────────────────────────────────────────┘
                                 │  Nonresponse adjustment rake
                                 ▼
        ┌──────────────────────────────────────────────┐
        │   Raked Nonresponse Adjusted Weight—Step 2    │
        └──────────────────────────────────────────────┘
                                 │  Final weight rake
                                 ▼
        ┌──────────────────────────┐        ┌────────────────────┐
        │  Final Government Weight  │───────▶│  Plan-Level Weight │
        └──────────────────────────┘        └────────────────────┘
                          Assign final
                          government weight
                          to each insurance plan
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Data Collection

Frame

The governments sample is selected from a frame based on the most recent Census of Governments conducted by the U.S. Census Bureau. The Census of Governments is fielded every five years and is updated annually. Consequently, the 2007 Census of Governments was the source of the frame for 2011 MEPS-IC. A "government" consists of a parent agency and all of the dependent agencies associated with that parent agency. Note that a parent agency may not have any dependent agencies. A hypothetical example of the relationship between a parent agency and its dependent agencies would be a state government that has a headquarters location (parent agency) with a health department (dependent agency) and a commerce department (dependent agency) that report directly to the state government. The Federal Government is not included in the MEPS-IC because all of its relevant information is available from the Office of Personnel Management (OPM). The governments covered by the MEPS-IC are divided into three types (Appendix C): state governments (including the District of Columbia), local certainty governments (5,000 or more employees), and local non-certainty governments (less than 5,000 employees). A small sample of governments with missing frame employment is selected as well.

The sampling unit for governments is at the parent agency-level. However, all dependent agencies of the selected governments are included in the sample. Thus, the size of each government sample unit is determined by the employment in the parent agency in addition to the employment in any dependent agencies of that parent agency. However, data are collected from governments at the field unit-level, where a parent agency and each dependent agency are separate field units. Table 2 shows the breakdown of parent agencies and dependent agencies for the 2011 MEPS-IC government sample. Thus, for 2011, there are 2,160 sample units and 3,128 field units.

Table 2. 2011 MEPS-IC governments sample: type of government by type of field unit

Type of government	Parent agencies	Dependent agencies	Total
Local non-certainty	1,800	553	2,353
Certainty			
State	51	172	223
Local (> 5,000 employees)	269	243	512
Missing employment	40	0	40
Total	2,160	968	3,128

Source: Center for Financing, Access, and Cost Trends, Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey Insurance Component, 2011

Telephone prescreener
When selected to participate in the survey, all non-certainty governments are prescreened. State and very large local governments (those with 5,000 or more employees) are not prescreened because they are selected into the survey every year—therefore a rapport has already been developed and the point of contact has already been established from previous surveys. In addition, it is already known if they offer insurance to their employees based on their earlier responses.

The prescreening process is the same process used for the private sector sample; each non-certainty government is contacted by telephone, if possible, as part of a prescreening operation to determine a point of contact for data collection and to determine whether the government offered insurance to its employees. During the prescreener, if the government did not offer insurance, a short questionnaire was administered and the government was classified as a respondent. Governments that offered insurance were administered a short questionnaire and were then mailed the full survey questionnaire. If no contact was made with the government during the telephone prescreener a survey questionnaire was mailed.

Mailed survey questionnaire
The mailed survey questionnaire collects detailed information about the government including the number of employees, the number of employees eligible for insurance, the number of employees enrolled with insurance, and the types of insurance plans offered to the employees. The governments are offered the choice of responding to the questionnaire by either completing the paper form or completing the survey electronically using the Internet.

Telephone follow-up
If the government does not respond to the mailed questionnaire or fails to provide a Web response an attempt is made to administer an abbreviated version of the survey by telephone.

Survey response status
Table 3 shows the response status and the weighting group classifications for the 2011 government sample. The weighting groups are used to describe types of respondents and nonrespondents in the nonresponse adjustments (Appendix B). The response rate for the 2011 Governments sample was 94.1 percent. Governments that are out of scope are those that have ceased to function or had no employees (e.g. volunteers, appointees with no salary, or board members with salaries paid from other sources). To be a respondent, a government has to answer a specific subset of key questions or indicate in the telephone prescreener that they did not offer insurance to their employees. Note that governments who did not complete the prescreener may still be considered respondents if they answer the mailed survey questionnaire, provide an adequate Web response, or respond to the telephone follow-up. Nonrespondents are those governments who indicated in the prescreener that they offered insurance but did not complete the survey questionnaire (by mail, Web, or telephone follow-up) as well as those governments whose insurance status was unknown due to an incomplete prescreener.

Table 3. Response of fielded units of government agencies in the 2011 Medical Expenditure Panel Survey Insurance Component

Status	Weighting group*	Number
Total sample		3,128
Out of scope	Group 6	111
In-scope		3,017
Respondents (94.1 percent of in-scope sample)		2,828
Completed prescreener		2,049
Offered insurance	Group 2	1,980
Did not offer insurance	Group 1	69
Did not complete prescreener	Group 4	779
Nonrespondents (5.9 percent of in-scope sample)		189
Completed prescreener, offered insurance	Group 3	38
Incomplete prescreener, unknown insurance status	Group 5	151

* Weighting groups for the nonresponse adjustments (Appendix B).

Source: Center for Financing, Access, and Cost Trends, Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey Insurance Component, 2011

Government Agency and Insurance Plan Weights

Methodology

The assignment of weights to the government sample units and their plan records is very similar to the assignment of weights to establishments and their plan records. Once again, the government sample unit is the parent agency along with all of the dependent agencies (if any) associated with that parent agency. Because dependent agencies are not subsampled, they receive the same weight as the corresponding parent agency.

The data for governments are collected using the same methods as for the private sector. A telephone prescreener is followed by a mail or telephone follow-up survey if insurance is offered. The same two nonresponse adjustments are performed (Appendix B) followed by a final weight raking to the frame employment within specified cells. The variables used when performing the final weight raking of the governments sample respondents to employment size control totals during the two nonresponse adjustments are 51 "States" (including the District of Columbia) and five government size groups (Appendix C).

During the final weight raking process, state governments are handled differently than the local governments. The state governments and the District of Columbia (Government Size Group 1, Appendix C) are classified geographically by their state category. The local governments (Government Size Groups 2–5) are classified geographically using the nine Census Divisions. The employment control totals for each cell are produced by the current year (2011) Annual Public Employment Survey that is fielded by the U.S. Census Bureau.

What differs from the private sector weight adjustment is the classification of the sample governments into response and nonresponse groups (Appendix B). While the definitions of the six response/nonresponse groups are the same as for the private sector, classifying the sampled governments into the groups has its own set of rules because the parent agency and the dependent agencies may have different response outcomes. Below are the rules for classifying a government sample unit (the parent agency and all associated dependent agencies).

Responding government classification
1. For each responding government (i.e., any part is in Group 1, 2, or 4), if at least one part of the government is in Group 2, then classify the entire government as Group 2.
2. For responding governments not classified as Group 2 (i.e., any part is in Group 1 or 4) but has at least one part in Group 1, classify the entire government as Group 1.
3. For any remaining responding government not classified as Group 1 or Group 2, classify the entire government as Group 4.

Nonresponding government classification
1. For any nonresponding government (i.e., if each part of the government is in Group 3 or Group 5) and there is at least one part in Group 3, classify the entire government as Group 3.
2. For any remaining nonresponding governments not classified in Group 3, classify the entire government as Group 5.

Once the government sample units (parent agency and all associated dependent agencies) are all classified properly together, the sample weights are then subjected to the two nonresponse adjustment procedures and the final weight raking procedure. Data for nonresponding agencies that are classified as part of a responding government are imputed for estimation purposes.

Insurance plan weight assignment
In the governments survey, information about every insurance plan offered is collected. This differs from the private sector where information from at most four plans, is collected. Information about all plans offered by governments can be obtained because brochures for the plans are readily available and are provided during data collection. The requisite information about the plans is then abstracted from these brochures. Thus, there is not a disparate burden on governments to provide data for all of their offered plans.

Because all insurance plans are collected from every government in the sample, each plan offered by a responding government (Groups 1, 2, or 4) receives a plan weight that is equal to the raked weight of that government sample unit.

Special processing case—missing employment governments
Governments with missing employment are excluded from the sampling frame due to their high prevalence of being out of scope with the survey. However, each year a small sample of 40 missing-employment governments are selected systematically as a separate, independent sample. The weight assigned to each sampled government is equal to the total number of missing-employment governments divided by 40. The weights of these governments are not

adjusted or raked. They are, however, assigned to random groups independently of the other sampled governments, for variance estimation purposes. It is rare that any governments selected in this special sample remain in-scope to the survey. The primary purpose of this sample is to monitor this type of government to insure the coverage of the survey is complete.

VARIANCE ESTIMATION

Tabulated results of national and state-level estimates of employer-sponsored insurance including offered plans, costs, and number of enrollees are available on the MEPS Web site at http://www.meps.ahrq.gov. The variances included in the tables are estimated using the Random Group methodology. For the MEPS-IC, the private sector and the governments cases are processed separately. However, the variance estimation process described in this section applies to both the private sector and the government samples.

Prior to sampling, the cases on the frame are sorted by key characteristic variables. Once sorted, the employment size of the cases is used to draw a probability proportional to size (PPS) sample. As each case is selected into the sample, a number is sequentially assigned such that the final sample can be easily divided into ten "random" groups.

As stated by Wolter (1985), the random group estimator of the variance of the estimate, $\hat{\theta}$, is

$$v(\hat{\theta}) = \frac{1}{k(k-1)} \sum_{\alpha=1}^{k} (\hat{\theta}_\alpha - \hat{\theta})^2$$

where k is the number of random groups (10), $\hat{\theta}$ is the estimate based on the entire sample, and $\hat{\theta}_\alpha$ is the estimate based on the cases in random group α. The relative standard error of the estimate is then

$$RSE = \frac{\sqrt{v(\hat{\theta})}}{\hat{\theta}}$$

The choice of using ten random groups is made because that number of random groups is commonly used for this method. Note that the RSEs are generally quite small for national estimates from the MEPS-IC.

SELECTED RESULTS

Mean and median weights for establishments (private sector) and government agencies in the 2011 MEPS-IC are shown in table 4. Tables 5 and 6 provide selected national estimates and corresponding relative standard errors from the MEPS-IC survey for the private sector and governments, respectively.

Table 4. Mean and median weights for establishments and government agencies, 2011 MEPS-IC

Sample unit	Mean	Median
Establishment	154.9	77.0
Government agency	20.7	7.5

Source: Center for Financing, Access, and Cost Trends, Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey Insurance Component, 2011

Table 5. Selected statistics from the 2011 Medical Expenditure Panel Survey Insurance Component private sector sample

Item description	Estimate	Relative standard error
Total establishments	6,511,525	0.27 %
Total employment	108,244,171	0.77 %
Percentage of establishments offering insurance	51.0 %	0.49 %
Average single premium per enrolled employee	$ 5,222	0.50 %
Average single employee contribution	$ 1,090	0.80 %

Source: Center for Financing, Access, and Cost Trends, Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey Insurance Component, 2011

Table 6. Selected statistics from the 2011 Medical Expenditure Panel Survey Insurance Component government sample

Item description	Estimate	Relative standard error
Total state and local government employment	19,412,939	0.97 %
Percent of governments offering insurance		
State governments	100.0 %	---
Local with less than 250 employees	77.5 %	3.16 %
Local with 250 or more employees	98.6 %	0.34 %
Average single premium per enrolled employee	$ 6,157	0.35 %
Average single employee contribution	$ 631	1.49 %

Source: Center for Financing, Access, and Cost Trends, Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey Insurance Component, 2011

REFERENCES

Bureau of Labor Statistics (US). *Labor Force Statistics from the Current Population Survey*. Washington, D. C. www.bls.gov; 2012.

Davis K. *Sample Design of the 2011 Medical Expenditure Panel Survey Insurance Component*. Methodology Report #27. March 2013. Agency for Healthcare Research and Quality, Rockville, MD. http://www.meps.ahrq.gov/mepsweb/data_files/publications/mr27/mr27.pdf

Kish L. *Survey sampling*. New York: John Wiley and Sons; 1965.

Madow WG, Olkin I, Rubin DR. *Incomplete Data in Sample Surveys, Volume 2: Theory and Bibliographies*. New York: Academic Press; 1983.

Sommers JP. *Construction of Weights for the 1996 Medical Expenditure Panel Survey Insurance Component List Sample*. Rockville (MD): Agency for Health Care Policy and Research; 1999. MEPS Methodology Report No. 8. AHCPR Pub. No. 00-0005.

U.S. Census Bureau. Business Register. Suitland (MD): U.S. Census Bureau. http://www.census.gov/econ/overview/mu0600.html

Wolter, KM. Introduction to Variance Estimation. New York: Springer-Verlag; 1985.

APPENDICES

Appendix A. Major Changes to the MEPS-IC Survey and Weighting Procedure

Year   Change

1996   Initial year of the MEPS-IC survey; State level estimates produced for the 41 largest states

1997   Firm-level forms (15 and 15 S) were added for cases where data collection at the establishment level was not feasible

A rotation schedule to produce estimates for smaller States was introduced

Self-employed with no employees sample discontinued

1998   States allowed to purchase additional sample to produce or enhance state estimates

2000   North American Industry Classification System (NAICS) replaces the Standard Industrial Classification (SIC) industry code

2003   Linked sample to MEPS Household Component discontinued (the linked sample was also skipped in 2000)

2003   Number of State classes expanded from 41 (40 largest States + 1 combined "State" of the 10 smallest States plus the District of Columbia) to 51 (50 States plus the District of Columbia)

2003   First survey year that all MEPS-IC survey samples used the U.S. Census Bureau Business Register instead of the Standard Statistical Establishment List (SSEL) as the frame

2007   No MEPS-IC data available due to the transition from retrospective to current year data collection

2008   Data collection changed from retrospective to current year

Single-unit death model developed for the raking process

2009   Establishment and firm size adjustment rules altered for the raking process; single-unit and multi-unit establishments are handled separately with different bounds

2011   Web survey response introduced

Appendix B. Summary of MEPS-IC Nonresponse Adjustments

Respondent Groups: 1, 2, 4
Nonrespondent Groups: 3, 5
Out of scope Group: 6

Group 1: prescreener information, does not offer insurance

Group 2: offers insurance according to the prescreener; mail, Web, or phone follow-up response

Group 3: offers insurance according to the prescreener; no mail, Web, or phone follow-up response

Group 4: no prescreener information but obtained a mail, Web, or telephone follow-up response

Group 5: no prescreener information; no mail, Web, or phone follow-up response (i.e., all other cases that were not eligible for Groups 1–4 or Group 6)

Group 6: out of scope

Step 1
Groups involved: 2, 3
Group 3 weight is given to Group 2
Rake by industry group, multi-unit/single unit status, and state by size class
Result: new Group 2 has systematically inflated weights; Group 3 weights = 0

Step 2
Groups involved: 1, new 2, 4, 5
Group 5 weights are allocated across other in-scope establishments (Groups 1, new Group 2, and Group 4 combined)
Rake by industry group, multi-unit/single unit status, and state by size class
Result: Groups 1, new 2 and 4 have systematically inflated weights; Group 5 weights = 0

Appendix C. Classifications Used in the MEPS-IC Weighting Process

Firm size
S   Less than 50 employees
M   50–999 employees
L   1,000 employees or more

Establishment size
1   1–5 employees
2   6–24 employees
3   25–49 employees
4   50–249 employees
5   250–999 employees
6   1,000 employees or more

Collapsed firm size x establishment size
1   Firm Size = S, establishment size = 1
2   Firm Size = S, establishment size = 2
3   Firm Size = S, establishment size = 3
4   Firm Size = M, establishment size = 1, 2
5   Firm Size = M, establishment size = 3, 4
6   Firm Size = L, establishment size = 1, 2
7   Firm Size = L, establishment size = 3, 4
8   Firm Size = M, L, establishment size = 5, 6

Industry group	Industries (North American Industry Classification System Codes)
1	Agriculture, Forestry, Fishing, Hunting (11)
2	Mining, Manufacturing (21, 31, 32, 33)
3	Construction (23)
4	Religious, Civic or Other Non-profit Organizations, Professional Services (51, 54, 61, 62, 83)
5	Transportation, Utilities (22, 48, 49)
6	Wholesale Trade (42)
7	Retail Trade (44, 45)
8	Finance, Insurance, Real Estate, Company Management (52, 53, 55)
9	Other Services (56, 71, 72, 81)

Multi-unit/single-unit establishment firm
1   Multi-unit
2   Single-unit

State groupings
All 50 States and Washington, D. C., stand on their own

Type of government

1   State government or the District of Columbia
2   Local certainty governments
3   Local noncertainty governments

Government size groups (parent agency size)

1   State government (including Washington, D. C.)
2   Local certainty government (frame employment greater than or equal to 5,000)
3   Local noncertainty government and $1,000 \leq$ frame employment $< 5,000$
4   Local noncertainty government and $200 \leq$ frame employment $< 1,000$
5   Local noncertainty government and frame employment < 200

Note: State governments were classified separately because there is only one per State making them unique within each state.

Census divisions

1	New England	CT, ME, MA, NH, RI, VT
2	Middle Atlantic	NJ, NY, PA
3	East North Central	IL, IN, MI, OH, WI
4	West North Central	IA, KS, MN, MO, NE, ND, SD
5	South Atlantic	DE, DC, FL, GA, MD, NC, SC, VA, WV
6	East South Central	AL, KY, MS, TN
7	West South Central	AK, LA, OK, TX
8	Mountain	AZ, CO, ID, MT, NV, NM, UT, WY
9	Pacific	AK, CA, HI, OR, WA