## Economic Policy Institute

# ECONOMIC POLICY INSTITUTE 2013 FAMILY BUDGET CALCULATOR
## Technical Documentation

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T his working paper presents the methodology and data sources used to compute the Economic Policy Institute's 2013 Family Budget Calculator.

## Definition of family

The size of a family dramatically affects the budget needed to maintain a safe and comfortable, but modest, standard of living. We have constructed budgets for six different types of families in each area. These families include single-parent families with one, two, or three children, and two-parent families with one, two, or three children.

Our definition of single-parent families assumes that the head of household is employed, lives with his or her children, and is considered the head of household for federal income tax purposes. Our definition of two-parent families assumes that both partners are employed, live together with their children, and file federal income taxes jointly. An employment assumption needs to be made in order to calculate child-care costs, transportation needs, and tax liabilities.

Families with one child are assumed to have a 4-year-old. Families with two children are assumed to have a 4-year-old and an 8-year-old. Families with three children have a 4-year-old, an 8-year-old, and a 12-year-old.

**Use the EPI Family Budget Calculator**
*http://www.epi.org/resources/budget*

Read the overview
*http://www.epi.org/publication/ ib368-basic-family-budgets*

Download data [Excel]
*http://www.epi.org/files/2013/ 2013-family-budget-calculator.xlsx*

## Definition of areas

There are 615 areas in the 2013 EPI Family Budget Calculator. Forty-seven of these 615 areas are statewide averages of rural areas; Rhode Island, New Jersey, and Massachusetts do not have rural areas. The remaining 568 areas are defined using the following technique:

A Metropolitan Statistical Area (MSA) is defined by the Office of Management and Budget as having at least one urbanized area of 50,000 or more people, plus adjacent territory that has a high degree of social and economic integration with the core as measured by commuting ties (OMB 2009). Some of our data (housing section) require us to use Fair Market Rent areas (FMR areas). FMR areas are published by the U.S. Department of Housing and Urban Development (2013). They are divided into metropolitan FMR areas and nonmetropolitan FMR areas. Several of our components depend on the MSA categorization (child care and out-of-pocket medical costs in the health care section) and on population size of the MSA (transportation).

Since most metropolitan FMR areas match up with an MSA, we replaced all metropolitan FMR areas with the MSA in the list of "Family Budget" areas. The remaining nonmetropolitan FMR areas were labeled as non-MSA. The rural areas were also labeled as non-MSA.

When regional breakdowns were used for budget calculations, they are based on the Census Bureau Regions, per data availability (U.S. Census Bureau 2013).

# Components of the 2013 EPI Family Budget Calculator

The 2013 EPI Family Budget Calculator consists of seven individual components: rent, food, child care, transportation, health care, other items of necessity, and taxes. The following sections will describe the methodology used to construct a monthly cost for each of these seven components across the 615 areas for which data have been made available.

## Rent

Annually, HUD estimates Fair Market Rents (FMRs) in order to establish cost information for the federal government's Section 8 housing assistance programs (HUD 2013). FMRs are used to assess the sufficiency of housing supply in MSAs for housing assistance programs. HUD obtains the data using 5-year data from the American Communities Survey (ACS). All counties that do not fall into a "family budget area" (see documentation on family budget areas) are counted as rural for that state. To establish a "rural" FMR, and thus a family budget cost for housing in a rural area, rental costs for rural counties are averaged into one price to be applied as "rural" for the entire state. Data extracts of these cost estimates are made publicly available, and EPI made use of these data to construct our family budget measure.

HUD FMR estimates are at the 40th percentile of rent cost—the dollar amount below which 40 percent of standard quality rental units are rented. HUD makes rental rates available for studio apartments and one-bedroom through four-bedroom apartments. For the EPI family budget, we assumed that families with one or two children use the two-bedroom rate. Families with three children use the rate for a three-bedroom unit. Rental costs include shelter plus *all tenant-paid utilities,* excluding telephone service, cable or satellite service, and Internet service.

## Food

Data for food costs are taken from the Center for Nutrition Policy and Promotion (CNPP) publication "Official USDA Food Plans: Cost of Food at Home at Four Levels" (USDA 2013). Presented there are the official USDA costs for four types of food plans that serve as national standards for nutritious diets: the "Thrifty Plan," "Low-Cost Plan," "Moderate-Cost Plan," and "Liberal Food Plan." We use the USDA "Low-Cost Plan," which assumes that almost all food is bought at a grocer and then prepared at home. We use June 2012 data that represent the annual average monthly cost (Carlson, Lino, and Fungwe 2007). The data are only available at the national level, and are thus the same for all family budget areas (except Alaska and Hawaii, which are discussed later). Since the costs of raw, unprepared foods vary relatively little over geographic areas and the data present only nationally representative costs of raw, unprepared foods, our calculations for costs of food vary only by the size of the family and not by geographical area.

Families are constructed from data for the following age categories: male 19–50, female 19–50, child 4–5, child 6–8, average of male and female for individual age 12–13.

- All costs in the USDA food plans table are for individuals in four-person families. For individuals in other size families, the following adjustments are suggested to account for differences in returns to scale for different family sizes (USDA 2013):

    - Two-person – add 10 percent

    - Three-person – add 5 percent

    - Five-person – subtract 5 percent

- To calculate overall household food costs, we first adjust food costs for each person in the household and then sum the adjusted food costs.

- Example: For a one-parent, two-child household:

    Food cost = [female(age19–50)*1.05]+[child(age 4–5)*1.05]+[child(age 6–8)*1.05]

Note that for Alaska and Hawaii, separate food cost data are available in half-year increments. We use data for the first half of the year to compute household food costs for the four Alaska areas and the two Hawaii areas because it most closely represents the annual national data used for the other states. (Note that only the "Thrifty Plan" is available for these states; there is no "Low-Cost Plan.")

The USDA food plans represent a nutritious diet at four different cost levels. The nutritional bases of the plans are the 1997–2005 Dietary Reference Intakes, 2005 Dietary Guidelines for Americans, and 2005 MyPyramid food intake recommendations. In addition to cost, differences among plans are in specific foods and quantities of foods. Another basis of the food plans is that all meals and snacks are prepared at home. All four food plans are based on 2001–2002 data and updated to current dollars by using the Consumer Price Index for specific food items.

## Child care

We utilize the Child Care Aware of America (2012) (formerly NACCRRA) publication *Parents and the High Cost of Child Care*, which relies on information provided by the January 2012 State Child Care Resource and Referral Network survey. For the purposes of this study, we use Appendix Table 1, "2011 Average Annual Cost of Full-Time Care by State," and Appendix Table 10a, "2011 Urban-Rural Cost Difference for Center Care, by State." Several states in the survey report data on a delay, including the District of Columbia, Iowa, Louisiana, North Carolina, Oregon, Pennsylvania, South Dakota, and Vermont, which report 2010 data, and California and New Hampshire, which report data for 2009. If an MSA is in multiple states, the child care cost is assigned separately for each state within the MSA. Therefore, for example, child care costs would vary between St. Louis, Mo., and St. Louis, Ill.

From available years, we inflate all data to reflect real 2012 dollars using the Consumer Price Index of "Child care and nursery school" for all urban consumers from the Bureau of Labor Statistics, or BLS (BLS 2013b).

We calculate our child care costs for our family types based on the following assumptions:

- One parent, one child = cost of 4-year-old care

- One parent, two children = cost of 4-year-old care + cost of one school-age child

- One parent, three children = cost of 4-year-old care + cost of two school-age children

- Two parents, one child = cost of 4-year-old care

- Two parents, two children = cost of 4-year-old care + cost of one school-age child

- Two parents, three children = cost of 4-year-old care + cost of two school-age children

## Center care

- We use center care estimates instead of in-home care for our child care costs because the costs of center care do not fluctuate as much as the costs of in-home care. We assume that other family members are not available to provide care.

## Infant care

- The family budget does not include infant care in its child care costs because we do not have an infant as part of any "Family Budget" family. It should be noted, however, that infant center care is significantly more expensive than 4-year-old care, so the child care component for some families may be underestimated.

## Four-year-old care

- Four-year-old care is full-time care. To approximate MSA and non-MSA care, we use urban and rural estimates for all 4-year-old center care costs, taken from Appendix 10a in the Child Care Aware of America (2012) publication. Urban and rural care cost estimates are not available for Alabama, Arizona, Connecticut, Idaho, Mississippi, New Jersey, North Carolina, Rhode Island, Vermont, and West Virginia, so state averages for 4-year-old care are used instead.

## School-age child care

- The survey for school-age care specifically represents the average annual cost of before- and after-school care, and therefore it does not include full-time, weekend, or full-day summer care. Because of the need for 4-year-olds (and some 12-year-olds) to be in care during the summer, the value of school-aged child care is significantly underestimated.

- Urban and rural data do not exist for school-age children, so we use state averages for all the MSAs with the exception of the District of Columbia, Idaho, Minnesota, North Carolina, North Dakota, Texas, and West Virginia, as state-level data are not reported for these states. Regional averages, based on the Census Bureau Regions and Divisions, are taken for these states. The following indicate the regions the states with missing data fall into. We construct regional averages for these states to be used instead:

  - **The District of Columbia** falls into the South Atlantic Division, which is composed of Delaware, Florida, the District of Columbia, Georgia, Maryland, North Carolina, South Carolina, Virginia, and West Virginia.

  - **Minnesota** falls into the West North Central Division, which is composed of Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota.

  - **North Dakota** falls into the West North Central division, which is composed of Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota.

  - **North Carolina** falls into the South Atlantic Division, which is composed of Delaware, Florida, the District of Columbia, Georgia, Maryland, North Carolina, South Carolina, Virginia, and West Virginia.

  - **West Virginia** falls in the South Atlantic Division, which is composed of Delaware, Florida, the District of Columbia, Georgia, Maryland, North Carolina, South Carolina, Virginia, and West Virginia.

  - **Idaho** falls into the Western division, which is composed of Alaska, Arizona, California, Hawaii, Idaho, Nevada, Oregon, and Washington.

- **Texas** falls into the Southwest division, which is composed of Arkansas, Louisiana, New Mexico, Oklahoma, and Texas.

## *Transportation*

Data on costs of transportation are produced by the Federal Highway Administration's 2009 National Household Travel Survey, or NHTS (FHA 2009) and IRS Announcement 2011-116 (IRS 2012). We choose to use annualized vehicle miles traveled (VMT) for calculating both the total annual miles driven and to determine the trip purpose. While it is possible to use other metrics, such as person miles traveled, we judge that in many MSAs the use of a vehicle is necessary to get to and from nearly all major destinations, such as work, medical appointments, a grocery store, etc. In areas in which public transportation is accessible and available for traveling to and from major destinations, this cost may be overstated (though obviously even public transportation carries significant costs if used every day).

Our equations for calculating total transportation costs are as follows:

Single-parent families' transportation costs =

[(% work & non-social trips)/100*(average miles per month by MSA size)*(cost/mile)]

Two-parent families' transportation costs =

[(% work & non-social trips)/100*(average miles per month by MSA size)*(cost/mile)] + [(% work trips)/100*(average miles per month by MSA size)*(cost/mile)]

**Equation components**

- The share of work and non-social trips is calculated using the 2009 National Household Travel Survey (FHA 2009), as 2009 is the most recent year for which data are available. The variable WHYTRP1S, trip purpose summary, is used in conjunction with the variable Travel Day VMT to categorize each vehicle trip into the following purposes: home; work; school, day care, religious activity; medical, dental services; shopping, errands; social, recreational; family, personal business, obligations; transport someone; meals; and other purposes. We chose to make non-social trips the share of trips to home; school, day care, religious activity; medical, dental services; shopping, errands; family, personal business, obligations; and to transport someone.

- We decompose the trip purpose and average vehicle miles traveled by MSA size using the variable MSASIZE, from the National Household Travel Survey. The MSASIZE uses the same definition of a Metropolitan Statistical Area as the Office of Management and Budget. The NHTS reports MSASIZE in six sizes, based on household population within a given area:

  - 0–49,999 inhabitants

  - 50,000–249,999 inhabitants

  - 250,000–499,999 inhabitants

  - 500,000–999,999 inhabitants

  - 1,000,000–2,999,999 inhabitants

- 3,000,000+ inhabitants
- We group our MSAs by these six population categories using population data from the Office of Management and Budget.
- The IRS reports the standard mileage rates used to calculate the costs of operating an automobile for businesses, charitable, medical, or moving purposes. 2012 data are available at the beginning of January and are revised semi-annually for a more accurate estimate. For 2012, the revised and most accurate standard mileage rate for the use of car, van, pick-up, or panel truck is 55.5 cents per mile for business miles driven. The mileage rate includes fixed costs such as depreciation, lease payments, insurance, registration and license fees, and personal property taxes, and variable costs such as gasoline, oil, tires, and routine maintenance and repairs.

*Example*

Single parent in a rural area:

$$= (\text{\% work \& non-social trips})/100*(\text{average annual miles by MSA size})/12*(\text{cost/mile})$$
$$= (84.4\%/100)*\$14{,}607/12*(\$0.555)$$
$$= .844*\$1217.2*\$0.555$$
$$= \$570.18$$

So $570.18 is the monthly transportation cost for a single parent who lives in a rural area.

## Health care

There are two components to the health care data: total insurance premiums and total out-of-pocket costs. Data for premiums are average total premiums (in 2012 dollars) for private-sector establishments for areas within states for 2011. These data are from Table IX.A.2 from the insurance component of the Medical Expenditure Panel Study (MEPS) published by the Agency for Healthcare Research and Quality (AHRQ) at the U.S. Department of Health and Human Services (HHS 2013b). Out-of-pocket costs are from the MEPS Household Component (Full-Year Consolidated File) for 2010 (HHS 2013a). To calculate data for the 40th percentile, we use Table 14 from the BLS Employee Benefits Survey (BLS 2013d).

**Premiums**

*Benchmarking decisions*

- Our benchmark insurance plan cost in the Family Budget Calculator is the cost of an employer-sponsored insurance plan. We use this benchmark for a number of reasons. First, there is wide variation in the cost of individual plans, but a good portion of this variation is due to individual characteristics (i.e., young, healthy people get cheaper insurance on the individual market). To have a benchmark influenced less by individual characteristics, we use the employer-provided plan, which is pooled across many people. Further, the cost of individual plans can vary significantly depending on the actuarial generosity of each particular plan (i.e., what share of expected medical costs will be covered by insurance versus covered out of the patient's pocket). The actuarial generosity of employer-based plans is more tightly distributed, which also makes an employer-based plan a better single benchmark. We obviously recognize that a significant share of families do not receive health care coverage through employer-sponsored plans, but we think this is a decent benchmark and defensible minimum standard for our Family Budget Calculator.

- We use insurance from private-sector employers because data on employer-sponsored insurance from public-sector employers were only available by region and not by state. Additionally, public-sector premiums were only available for state and local government employees (there were no data on federal government employee premiums). To control for this, we would have to weight the regional state and local government premiums by public-sector employment in a state and assume that federal employees get the same premium. This would also only add a level change. Since we were already approximating the 40th percentile premiums from a proxy ratio, we did not want to create any potential inaccuracy. Premiums in the public sector tend to be more expensive, so we are more likely to understate, not overstate, the costs by using only private-sector and not public-sector premiums.

- We use *total* premium costs rather than focusing only on employee contributions. We do this because while we think the cost of an employer-sponsored plan is a good benchmark for what a given standard of health insurance costs, we cannot assume that people have access to any particular level of employer-provided benefit to help pay for it. No other part of the family budget construction requires assuming any particular behavior by employers, so we did not want to introduce one here. In future research we hope to look at the resources side of the equation to see what share of American families can meet the basic family budget thresholds. In constructing these shares, we will take into account the receipt of employer contributions to health insurance premiums (as well as the potential assistance received through public insurance such as Medicare and Medicaid).

### Data source and selection

- We use "employee-plus-one premium" and "family premium" data. "Employee-plus-one premium" data are used for one-parent, one-child families from MEPS Table IX.A.2 (HHS 2013b). Premiums for "employee-plus-one" are generally less expensive than "family" premiums, and we assume that when one-parent, one-child families are faced with two different plans, they will opt for the less expensive alternative when it exists. "Family premium" data are used for all other family sizes.

- Some areas from MEPS Table IX.A.2 (HHS 2013b) do not match the areas chosen for the Family Budget Calculator ("Family Budget" areas). However, there usually was a very close match, so the MEPS areas were matched with the closest Family Budget area. For Family Budget areas that did not have a corresponding MEPS area, the "Remainder of state" value was used. "Remainder of state" was also used for rural Family Budget areas.

### Data compilation

- Since the average total premiums from MEPS Table IX.A.2 (HHS 2013b) are annual figures, we divided by 12 to get the monthly premium.

- To calculate the premium for the 40th percentile, we used data from BLS Employee Benefits Survey Table 14, "Medical care benefits, family coverage: Employer and employee premiums by employee contribution requirement, private industry workers from the National Compensation Survey, March 2011" (BLS 2013d).

- We used a ratio of total premiums for the lowest 25th percentile to the average total premium:

$$\frac{total \ average \ flat \ monthly \ premium \ for \ lowest \ 25th \ percentile}{total \ average \ flat \ monthly \ premium \ for \ all \ workers}$$

where the numerator is a weighted premium from the "All workers" row of data:

[(*percent of participating employees in employee contribution not required*) * (*average flat monthly employer premium if employee contribution not required*)] + [(*percent of participating employees in employee contribution required*) * (*average flat monthly employer + average flat monthly employee contribution in employee contribution required*)]

and the denominator is a weighted premium (using the same formula from above) from the "Lowest 25 percent" row of data under the heading "Average wage within the following categories."

- We use the lowest 25th percentile because the data in this table have an income distribution based only on people with employer-sponsored insurance. The distribution is very tight and skewed upwards. We assumed that an income earner in the 40th percentile on the total income distribution would fall into the lowest 25th percentile of the income distribution of those with insurance.

- The 40th percentile premium is adjusted for inflation to 2012 dollars using the regional breakdowns of the Consumer Price Index-All Urban Consumers for Medical Care (CPI-U-MC) from the Bureau of Labor Statistics (BLS 2013c).

## Out-of-pocket costs

### Benchmarking decisions

- We assume that everyone has the equivalent of an employer-sponsored health insurance plan (defined by the variable PRIEU10).

### Data source and selection

- Out-of-pocket costs are from the MEPS Household Component (Full-Year Consolidated File) for 2010 (HHS 2013a).

- We use the regional breakdown of costs for both the adult and child numbers (we used the variable REGION10, with the regions defined as Northeast, Midwest, South, and West).

- The data are divided into MSA data and non-MSA data (we used the variable MSA10). For out-of-pocket costs, an area only gets MSA data if it is strictly an MSA, and nonmetropolitan Fair Market Rent areas and rural areas get non-MSA data (see "Definition of areas" documentation).

- We classify a child (regardless of family size) as age 17 and under and an adult as age 18–64 (we used the variable AGE10X). We did not break down children into smaller age groups or by gender because the resulting sample sizes were too small.

- For each Family Budget area, adult out-of-pocket costs are the mean costs (variable TOTSLF10) for adults age 18–64 with private employer-sponsored insurance in one of four regions and the metropolitan classification in that region.

- Child out-of-pocket costs are the mean costs for children age 0–17 with private employer-sponsored insurance in one of four regions and the metropolitan classification in that region in 2009.

- We compute total out-of-pocket costs (OOP) in the following way:

$$[(\textit{number of parents}) * (\textit{adult OOP})] + [(\textit{number of children}) * (\textit{child OOP})]$$

- Since out-of-pocket costs are annual numbers, we divided by 12 to get the total monthly out-of-pocket costs.

- The total out-of-pocket costs were adjusted for inflation to 2012 dollars using the regional breakdowns of the Consumer Price Index-All Urban Consumers for Medical Care (CPI-U-MC) from the Bureau of Labor Statistics (BLS 2013c).

- When computing the mean, a population weight needs to be used (variable PERWT10F).

**Other notes**

- The health care costs for the 2013 Family Budget Calculator are significantly higher than the health care costs for the previous edition of the Family Budget Calculator (2007 and 2008 update), and these higher health care costs are the main reason why *overall* 2013 Family Budget Calculator budgets are higher than 2007 and 2008 budgets. A significant portion of the increase in health costs in the 2013 family budgets relative to the 2007 and 2008 budgets is due to a change in methodology.

    - The previous editions did not solely use a benchmark based on employer-sponsored health insurance plans. They also used non-group market premiums as an input. The "sticker prices" of such non-group plans are often *significantly* lower than the post-underwriting premiums—and these post-underwriting premiums are not available from public data sources. We did not want to allow our health costs to become biased down by reporting less-accurate, pre-underwriting costs. The employer-sponsored health insurance premium benchmark we use instead is fully post-underwriting, reflecting the actual price.

    - Additionally, previous editions made strong assumptions about *resources* available to households. These previous editions calculated total cost of health care as a weighted average of employer-provided plans *including* an average employer contribution, as well as the (substantially subsidized) costs of public plans. All of these decisions required making strong assumptions about *resources* available to families rather than simply *costs* of a benchmarked necessity.

## *Other necessities*

Our calculation of "other necessities" is derived from the Bureau of Labor Statistics Consumer Expenditures Survey (BLS 2013a). We consider other items of necessity as items that do not fall into the aforementioned categories but are nevertheless necessary for a reasonably safe and comfortable, but modest, standard of living. These items include apparel, entertainment, personal care products and services, reading, education, and miscellaneous items.

Using 2011 data (the latest available data) on families in the bottom 40 percent of the overall income distribution from the 2011 Consumer Expenditures Survey expenditure table "Quintiles of income before taxes," "other necessities" is the proportion of costs for these items in relation to the costs of food and housing (also from the Consumer Expenditures Survey). In 2011, this was 25.6 percent. We use this figure to calculate "other necessities" in our Family Budget Calculator by taking 25.6 percent of the family budget's food and housing cost for each family budget as the cost for "other necessities."

## *Taxes*

The Family Budget Calculator's components, without taxes, sum to the family's post-tax income. To calculate the family budget tax component, a pre-tax income level had to be estimated using a tax rate and the post-tax income.

We utilized the National Bureau of Economic Research's Internet TAXSIM Version 9.2 with ATRA to calculate these tax rates (NBER 2013; Feenberg, Richard, and Coutts 1993). The TAXSIM model accepts 22 input variables, including state, marital status, dependent exemptions, wage income, other incomes, rent paid, child care expenses, and capital gains and losses. We ran the TAXSIM model for each family type across all 615 areas.

Our input variables were (variables not listed were input as zero):

- State

- Marital status (single for one-parent families, married for two-parent)

- Dependent exemptions (one for each child)

- Wage and salary income of taxpayer (entire post-tax family budget for one-parent families)

- Wage and salary income of spouse (for two-parent families, the post-tax family budget was split evenly between the two parents)

- Rent paid (the annual cost of rent for each family budget, which is used to calculate state property tax rebates in certain states)

- Child care expenses (the annual cost of child care for each family budget)

- Number of dependents under age 17 (one for each child)

The TAXSIM model takes these inputs and calculates three outputs: federal tax liability, state tax liability, and FICA tax liability. All of these liabilities are for year 2011 tax law. Note that in 2011 the 2.0 percent payroll tax holiday was in effect; we eliminate this payroll tax cut to move it to its 2013 level. Additionally, the TAXSIM model calculates FICA liability as the full 15.3 percent tax from both the employer and employee side; we cut this in half to more accurately represent the typical taxpayer. Local taxes, such as county- or city-level income taxes, are not included in this model. Sales taxes are also not included.

We made the conservative assumption that the full cost of health care premiums would be excluded from taxation (as there exist substantial tax advantages to employer-sponsored premiums). As aforementioned, it is not accurate to simply input the post-tax family budgets as the wage incomes and use the TAXSIM output as the tax rates. To correct for this, we input the post-tax family budgets and obtained the tax rates and established these as a lower floor for tax rates (because the pre-tax incomes will almost always be higher than these post-tax incomes, these tax rates must be lower given our assumptions about sources of income and the income ranges we are considering). We then established an upper bound of tax rates by taking the post-tax family budget and multiplying it by 1.25 and inputting these budgets into the TAXSIM model.

Once we had the lower and upper bounds of tax rates, we calculated an accurate average of these tax rates using the following weighting procedure:

1. Multiply the lower- and upper-bound inputs to TAXSIM by (1 – tax rate calculated by TAXSIM).

2. Calculate the difference between the actual post-tax family budget and the lower bound calculated in step one.

3. Calculate the difference between the upper bound and the actual post-tax family budget calculated in step one.

4. Calculate the difference between the upper bound and the lower bound calculated in step one.

5. Calculate the weight for the lower bound, which is equal to the upper post-tax budget difference divided by the upper–lower difference.

6. Calculate the weight for the upper bound, which is equal to (1 – lower-bound weight from step five).

7. Multiply the lower-bound tax rate from TAXSIM by the lower-bound weight from step five.

8. Multiply the upper-bound tax rate from TAXSIM by the upper-bound weight from step six.

9. Add these two weights together to get the final, weighted tax rate.

The final tax rate calculated in step nine is then applied to the post-tax family incomes (multiply that income by 1 + the tax rate) to obtain a pre-tax income. The difference between the pre- and post-tax incomes is the annual tax bill for the family budget unit.

## About the authors

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