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CBO's New Framework for Analyzing the Effects of Means-Tested Transfers and Federal Taxes on the Distribution of Household Income

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Abstract

Government transfers and federal taxes significantly affect the distribution of economic resources available to U.S. households. Conclusions about the redistributive characteristics of the transfer and tax systems, however, depend on the framework used to analyze their effects. In particular, the measure of income used as the basis for ranking households and as the denominator in calculations of average transfer and tax rates significantly affects the conclusions one may draw from a distributional analysis.

This paper presents a new framework CBO will use in its analysis of the distributional effects of government transfers and federal taxes. This framework will rely on a new measure of income: *income before transfers and taxes*, or market income plus social insurance benefits. In that income measure, transfers are limited to means-tested transfers and taxes are limited to federal taxes. The new income measure will be used as the basis for ranking households and as the denominator in the calculation of average federal tax rates and average mean-tested transfer rates—a new metric in CBO's distributional analyses.

This working paper defines CBO's new income measure and distributional framework and analyzes how several common metrics used in CBO's distributional analyses compare between the new framework and the previous framework. By removing means-tested transfers from the base income measure, the new framework allows means-tested transfer rates and federal tax rates to be analyzed on a similar basis—that is, relative to income before transfers and taxes. This paper examines those metrics using data from 1979 through 2013.

Keywords: income distribution, federal taxes, means-tested transfers

JEL Classification: C81, D31, H20, H50, I38

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Introduction

The Congressional Budget Office is improving its distributional framework to better analyze how both means-tested transfers and federal taxes affect the distribution of income. The new distributional framework will rely on a slightly narrower definition of income than CBO has historically used in its analyses of the distribution of household income and federal taxes.[1] This framework will rank households by *income before transfers and taxes*, which is equal to market income plus social insurance benefits. The new income measure will also be used as the denominator in the calculation of average means-tested transfer rates and average federal tax rates.[2]

CBO's previous framework was primarily designed to analyze the distributional effects of the federal tax system. That framework used a measure of *before-tax income*, which was defined as market income plus government transfers, as the basis for ranking households and calculating average federal tax rates. In that framework, all cash payments and in-kind benefits from federal, state, and local governments were called "government transfers." [3] In the new framework, those governmental payments and benefits are differentiated into two distinct categories: social insurance benefits, which remain in the base income measure, and means-tested transfers, which are removed from the base income measure. The distributional impacts of means-tested transfers and of federal taxes can therefore be analyzed on a similar basis—that is, relative to CBO's new income measure: income before transfers and taxes.

Although CBO's previous framework was appropriate for analyzing the distributional effects of federal taxes, the transfer and tax systems have become increasingly intertwined. In many areas—including health, income support, childcare, and higher education—both transfers and taxes are used to achieve policy goals. Therefore, a more complete analysis of the distributional effects of federal policies would evaluate the combined effects of transfers and taxes. CBO's new methodology facilitates such an analysis by excluding means-tested transfers and federal taxes from the base income measure used to evaluate their effects.

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[1] The methodology used in CBO's distributional analyses has undergone several revisions over the years. Beyond the measure of income, most of the dimensions of CBO's distributional framework will remain unchanged. See Appendix A for a description of other key features and assumptions of CBO's distributional framework and a short chronology of changes in CBO's analytic framework over time.

[2] Appendix A provides full definitions of all the components in CBO's measure of income.

[3] CBO relies on the Annual Social and Economic Supplement of the U.S. Census Bureau's Current Population Survey for information on households' receipt of income from many government transfer programs. Some programs, such as Medicaid and Temporary Assistance for Needy Families, are jointly administered by the federal government and state governments; both the federal and state portions are included in CBO's analyses. One program included in CBO's measure of government transfers, the General Assistance program, is solely administered by states.

Most distributional analyses have focused primarily on the effects of tax policies.[4] There are a few reasons for this relatively narrow focus:

- Every U.S. household pays federal taxes, either directly or indirectly,
- Major components of the tax system, such as the progressive structure of the individual income tax, are specifically intended to have distributional effects, and
- The Internal Revenue Service collects high-quality income and tax data.

Taxation, however, is not the only mechanism through which the federal government affects the distribution of resources among U.S. households: Social insurance benefits and means-tested transfers also directly affect that distribution. Social insurance benefits are provided through broadly available government programs (such as Social Security, Medicare, and unemployment insurance) into which individuals explicitly pay certain taxes over the course of their lives to cover specific risks. Means-tested transfers comprise both cash and in-kind benefits (that is, benefits in the form of products or services) and are provided to a relatively narrow segment of households, families, or individuals according to their need. Means-tested cash transfer programs include Temporary Assistance for Needy Families; its predecessor, Aid to Families with Dependent Children; and Supplemental Security Income. Means-tested programs providing in-kind benefits include Medicaid, the Supplemental Nutrition Assistance Program, and housing assistance programs.

When analyzing the effect taxes have on the distribution of income, tax policy analysts strive to use as broad a definition of income as is practical. The consensus among tax analysts is that a theoretically optimal measure of annual income for such analyses is Haig-Simons income, which is equal to consumption in a given year plus change in net worth.[5] That measure represents the total amount of economic resources a household (or any other unit of analysis) is able to harness in a given time period and serves as a proxy for economic welfare. It is also considered a reasonable proxy for one's ability to pay tax liabilities and is therefore deemed an appropriate denominator for the calculation of tax rates.

Although a broad Haig-Simons income concept may be the most appropriate income measure for analyzing tax policies, it has limitations when used to analyze the distributional effects of means-tested transfers. Means-tested transfers received from the government, whether cash or in-kind, increase potential consumption. Consequently, under a Haig-Simons definition of income, such payments are considered part of a person's ability to pay taxes. Although the transfers are generally not taxable, they are often included in the income base in the calculation of average federal tax rates.

[4] The distributional frameworks discussed in this report are limited to those based on cross-sectional measures of annual income. Other researchers have conducted distributional analyses using alternative measures of economic well-being (wealth, annual consumption, and average lifetime earnings, to name a few). Despite several theoretical and empirical shortcomings, however, distributional analyses based on cross-sectional measures of annual income remain the dominant type of framework in use today. See Appendix B for an overview of the range of distributional frameworks used by other researchers and statistical agencies.

[5] See Robert M. Haig, "The Concept of Income—Economic and Legal Aspects," in Haig, ed., *The Federal Income Tax* (Columbia University Press, 1921), pp.1–28; and Henry Simons, *Personal Income Taxation: The Definition of Income as a Problem of Fiscal Policy* (University of Chicago Press, 1938).

By removing means-tested transfers from its base income measure, CBO's new distributional framework deviates slightly from the agency's historically tax-centric framework so that it can be used to jointly analyze the distributional impacts of means-tested transfers and federal taxes. This working paper describes the two distributional frameworks and compares the distribution of income and average federal tax rates in 2013 and over the 1979–2013 period using each one.

CBO's New Distributional Framework

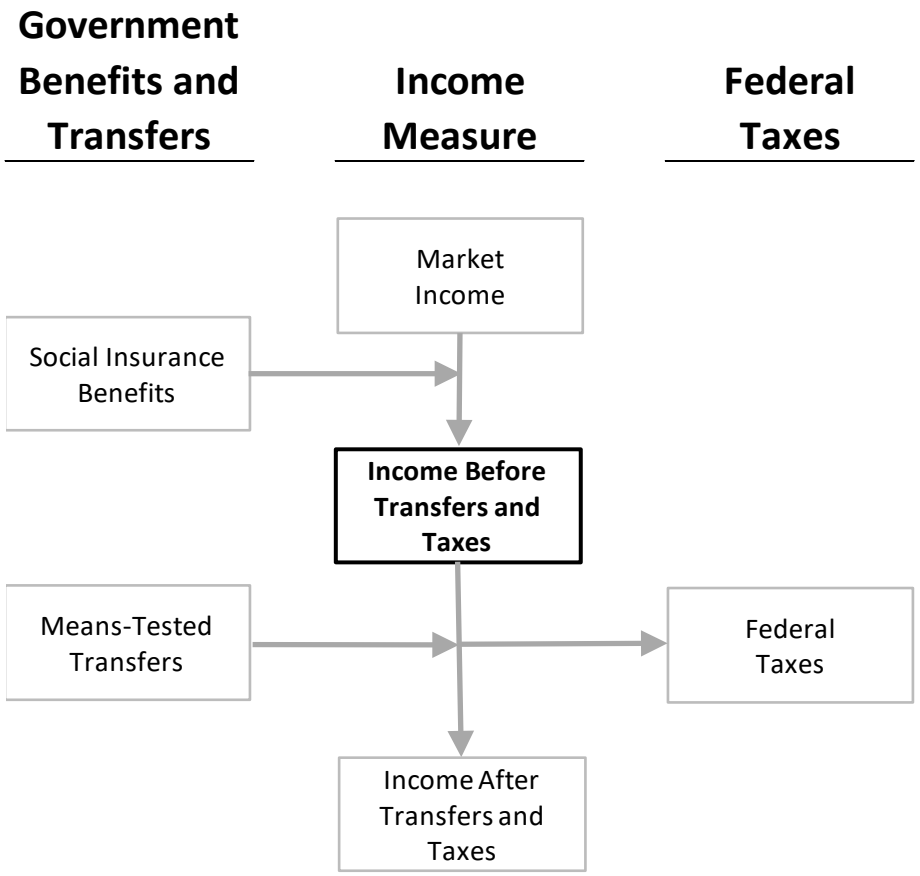
CBO's new distributional framework uses *income before transfers and taxes* as the basis for ranking households and calculating average means-tested transfer rates and average federal tax rates. Income before transfers and taxes equals market income plus social insurance benefits (see Figure 1). Market income comprises labor income, business income, capital income (including capital gains), and income from other nongovernmental sources.[6] Social insurance benefits consist of Social Security Old Age, Survivors, and Disability Insurance benefits, Medicare benefits (measured by the average cost to the government for providing those benefits), and unemployment insurance benefits.

Social insurance benefits are delivered through government programs into which individuals explicitly pay over the course of their lives to cover specific risks. The Social Security system, for example, provides insurance for three specific types of risks: the risk of poverty in retirement, the risk of poverty resulting from a work-limiting disability, and the risk of inadequate support for spouses and dependent children in the event of a worker's death. Similarly, Medicare provides insurance for health-related expenses in retirement, and unemployment insurance partially replaces wages lost through unemployment. Because the risks those programs insure against are relatively evenly distributed across households, the benefits received from the programs also tend to be relatively evenly spread across households.

[6] CBO strives to measure market income as broadly as possible. Its measure of market income therefore includes some items that people may not usually consider part of income. For example, because taxes paid by businesses are ultimately borne by households in the form of reduced income, CBO adds those taxes to household market income as a measure of what a household's economic resources would have been in their absence. See Appendix A for a more detailed list of the components of market income.

Figure 1.

CBO's New Framework for Analyzing the Effects of Means-Tested Transfers and Federal Taxes on the Distribution of Household Income



Source: Congressional Budget Office.

Note: Market income consists of labor income, business income, capital gains (profits realized from the sale of assets), capital income excluding capital gains, income received in retirement for past services, and other nongovernmental sources of income.

Social insurance benefits consist of Social Security Old Age, Survivors, and Disability Insurance benefits; Medicare benefits (measured by the average cost to the government for providing those benefits); and unemployment insurance benefits.

Income before transfers and taxes is market income plus social insurance benefits.

Means-tested transfers consist of various cash and in-kind transfers from federal, state, and local government programs; the two largest means-tested transfers are Medicaid benefits (measured by the average cost to the government for providing those benefits) and Supplemental Nutritional Assistance Program benefits (formerly known as Food Stamps).

Federal taxes consist of individual income taxes, payroll taxes, corporate income taxes, and excise taxes.

Income after transfers and taxes is income before transfers and taxes plus means-tested transfers minus federal taxes.

CBO's previous distributional framework and its new distributional framework differ only in their base measure of income: Whereas the previous income measure included means-tested transfers, the new one does not. In order to receive means-tested transfers, households, families, or individuals generally must be below certain income thresholds, and benefits often phase out as income increases.[7] Because of the targeted nature of means-tested transfers, the benefits are generally progressive, such that they make up a larger share of resources for low-income households than they do for high-income households.[8] The base income measure used in the new framework is therefore slightly less evenly distributed than the base income measure used in the previous framework.

Under the new framework, average income before transfers and taxes in 2013 ranged from $18,700 in the lowest income quintile (the lowest fifth of the distribution of households ranked by their household-size-adjusted income before transfers and taxes) to $262,700 in the highest income quintile (see Table 1). On average, households in the lowest quintile received $9,500 in means-tested transfers and paid $400 in federal taxes. By contrast, households in the highest income quintile received $900 in means-tested transfers and paid over $69,000 in federal taxes, on average.[9] Both means tested-transfers and federal taxes compressed the range of income: On average, households in the lowest income quintile had almost $28,000 in income after accounting for means-tested transfers and federal taxes, compared with almost $195,000 in the highest income quintile.

[7] As defined here, means-tested programs do not include policies with similar properties administered through the tax system, such as the earned income tax credit.

[8] The data used in this analysis extend through 2013. As part of the passage of the 2010 Patient Protection and Affordable Care Act (ACA), two new taxes went into effect in 2013—the net investment income tax and the additional Medicare tax. Both of the new taxes increased average federal tax rates for high-income households in 2013. Other major components of the ACA—expansion of Medicaid eligibility in select states and cost-sharing reductions and premium tax credits for the purchase of private, nongroup health insurance, for example—did not take effect until 2014 and are not included in this analysis.

[9] Although means-tested transfer programs are designed to provide assistance to low-income people, the data indicate that some high-income households receive benefits from those programs. That may occur for a variety of reasons. For instance, some people have income that varies during the year, and they may therefore qualify for benefits on the basis of low monthly income even though their annual income is high. In addition, some people who qualify for benefits because their own income is low live in high-income households. However, a portion of the benefits going to higher-income households probably reflects some misreporting of income, program participation, and benefit amounts in the survey data.

Table 1.

Distribution of Household Income, Government Transfers, and Federal Taxes Using CBO's New Distributional Framework, 2013

	Quintiles					
Dollars	Lowest	Second	Middle	Fourth	Highest	All Households
Income Before Transfers and Taxes	18,700	41,500	66,400	101,600	262,700	96,600
+ Means-Tested Transfers	9,500	4,000	2,200	1,200	900	3,600
- Federal Taxes	400	3,800	9,100	17,800	69,100	20,100
= Income After Transfers and Taxes	27,900	41,700	59,500	85,100	194,500	80,100
Memo:						
Income Before Transfers and Taxes	18,700	41,500	66,400	101,600	262,700	96,600
Market Income	14,200	30,200	53,600	89,500	252,200	86,300
Social Insurance Benefits	4,500	11,400	12,800	12,200	10,500	10,300

Source: Congressional Budget Office.

Note: Income before transfers and taxes is market income plus social insurance benefits. Market income consists of labor income, business income, capital gains (profits realized from the sale of assets), capital income excluding capital gains, income received in retirement for past services, and other nongovernmental sources of income. Social insurance benefits consist of Social Security Old Age, Survivors, and Disability Insurance benefits; Medicare benefits (measured by the average cost to the government for providing those benefits); and unemployment insurance benefits.

Means-tested transfers consist of cash payments and in-kind transfers from federal, state, and local governments; the two largest means-tested transfers are Medicaid benefits and Supplemental Nutritional Assistance Program benefits (formerly known as Food Stamps).

Federal taxes consist of individual income taxes, payroll taxes, corporate income taxes, and excise taxes.

Income after transfers and taxes is income before transfers and taxes plus means-tested transfers minus federal taxes.

Income groups are created by ranking households by income before transfers and taxes, adjusted for household size. Quintiles (fifths) contain equal numbers of people.

CBO's Previous Distributional Framework

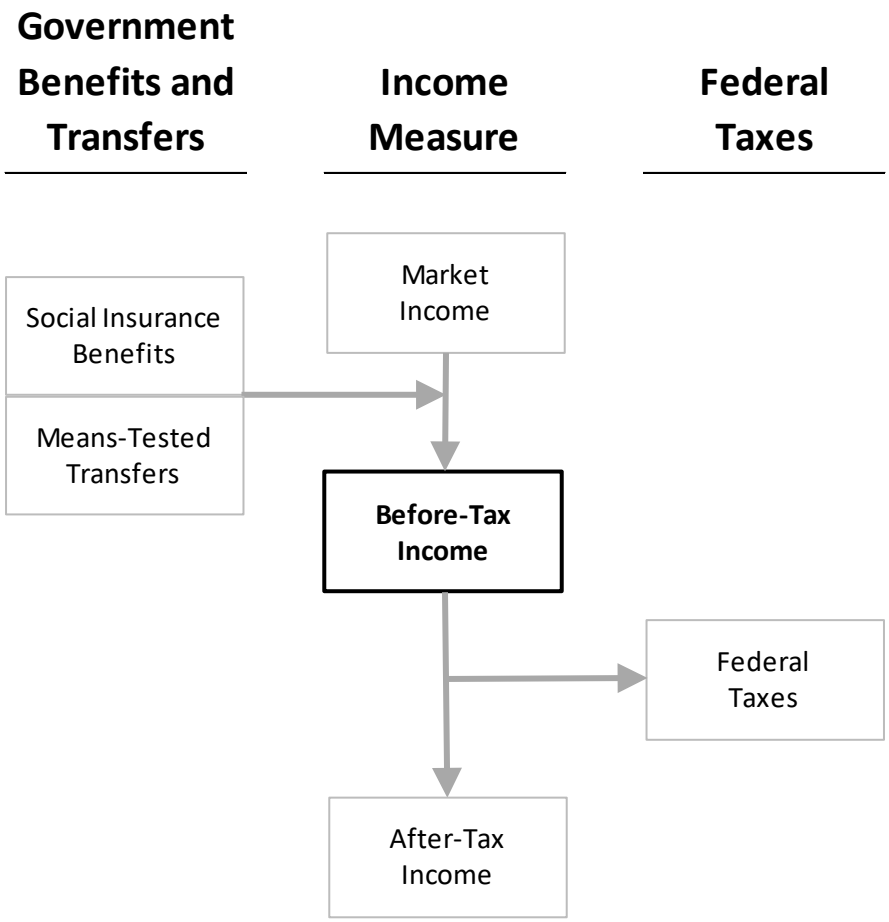
The distributional framework CBO has used for the past decade has been based on a broad measure of *before-tax income*. In that framework, before-tax income was equal to market income plus social insurance benefits plus means-tested transfers (see Figure 2). (The latter two components were jointly referred to as "government transfers.") Federal taxes consist of individual income taxes, payroll taxes, corporate income taxes, and excise taxes.[10]

With households ranked by before-tax income, the average before-tax income in 2013 ranged from $25,400 in the lowest quintile to $265,000 in the highest quintile (see Table 2). Because means-tested transfers are included in the measure of before-tax income and those transfers go predominantly to households in the lowest income quintile, the average before-tax income in the lowest before-tax income quintile is significantly higher than the average income before transfers and taxes ($18,700) in that quintile. The difference in average income measures between the two frameworks is much less significant at the top of the respective distributions ($265,000 for before-tax income versus $262,700 for income before transfers and taxes).

[10] The four sources of taxes included in CBO's analyses account for more than 90 percent of all federal taxes collected in a given year. Other revenue sources not included in CBO's distributional analyses include the estate and gift taxes, the state portion of unemployment insurance collections, net investment earnings from the Federal Reserve remitted to the Treasury, and miscellaneous fees and fines. It is important to note that the CBO framework does not account for the distributional effects of state and local taxes to arrive at a true measure of final income available for households to divide between savings or consumption.

Figure 2.

CBO's Previous Framework for Analyzing the Effect of Federal Taxes on Household Income



Source: Congressional Budget Office.

Note: Market income consists of labor income, business income, capital gains (profits realized from the sale of assets), capital income excluding capital gains, income received in retirement for past services, and other nongovernmental sources of income.

Government transfers comprise social insurance benefits and means-tested transfers from federal, state, and local governments. Social insurance benefits consist of Social Security Old Age, Survivors, and Disability Insurance benefits; Medicare benefits (measured by the average cost to the government for providing those benefits); and unemployment insurance benefits. Means-tested transfers consist of various cash and in-kind transfers from federal, state, and local government programs; the two largest are Medicaid benefits (measured by the average cost to the government for providing those benefits) and Supplemental Nutritional Assistance Program benefits (formerly known as Food Stamps).

Before-tax income is market income plus government transfers.

Federal taxes comprise individual income taxes, payroll taxes, corporate income taxes, and excise taxes.

After-tax income is before-tax income minus federal taxes.

Table 2.

Distribution of Household Income, Government Transfers, and Federal Taxes Under CBO's Previous Distributional Framework, 2013

Dollars	Quintiles					
	Lowest	Second	Middle	Fourth	Highest	All Households
Before-Tax Income	25,300	47,400	69,800	103,700	264,200	100,200
- Federal Taxes	800	4,000	9,000	17,700	69,100	20,100
= After-Tax Income	24,500	43,400	60,800	86,000	195,100	80,100
Memo:						
Before-Tax Income	25,300	47,400	69,800	103,700	264,200	100,200
Market Income	15,800	31,300	53,100	88,800	252,200	86,300
Social Insurance Benefits	5,200	10,500	12,600	12,600	10,700	10,300
Means-Tested Transfers	4,300	5,600	4,100	2,300	1,400	3,600

Source: Congressional Budget Office.

Note: Before-tax income is market income plus social insurance benefits and means-tested transfers (previously referred to jointly as "government transfers.")

Market income consists of labor income, business income, capital gains (profits realized from the sale of assets), capital income excluding capital gains, income received in retirement for past services, and other nongovernmental sources of income.

Social insurance benefits consist of Social Security Old Age, Survivors, and Disability Insurance benefits; Medicare benefits (measured by the average cost to the government for providing those benefits); and unemployment insurance benefits. Means-tested transfers consist of various cash and in-kind transfers; the two largest types of transfers are Medicaid benefits (measured by the average cost to the government for providing those benefits) and Supplemental Nutritional Assistance Program benefits (formerly known as Food Stamps).

Federal taxes consist of individual income taxes, payroll taxes, corporate income taxes, and excise taxes.

After-tax income is before tax income minus federal taxes.

Income groups are created by ranking households by before-tax income, adjusted for household size. Quintiles contain equal numbers of people.

Strengths and Limitations of CBO's New Framework

There are many questions one can ask about how federal tax and transfer policies affect the distribution of household income. Unfortunately, no single framework can be used to answer all of them; choosing to analyze the distribution of household income under any one framework comes with inherent trade-offs.

CBO's previous framework used *before-tax income*—market income plus social insurance benefits and means-tested transfers (referred to jointly as "government transfers")—as the basis for ranking households and calculating average federal tax rates. Before-tax income is a broad income measure that is as close as is practical to the ideal Haig-Simons concept of income and provides a useful proxy for a household's command of economic resources and ability to pay federal tax liabilities. Therefore, for an analysis focused on how tax policies affect the distribution of household income, before-tax income is a reasonable measure to use as the basis for ranking households and an intuitive measure to use as the denominator for calculating federal tax rates.

CBO's new framework excludes mean-tested transfers from the income measure used to rank households and calculate average federal tax rates. This framework allows for a clearer analysis of means-tested transfers than the previous framework, which included those transfers in the base income measure. Changes in means-tested transfer policies will not affect the level or distribution of base income under the new framework. Those policy changes can therefore be analyzed in isolation—that is, without having to consider the effects of household reranking caused by any change in means-tested transfer policy.

As an example, the Affordable Care Act (ACA) introduced both cost-sharing reductions (subsidies that reduce out-of-pocket costs for deductibles, copayments, and coinsurance) and premium tax credits.[11] Although both provide benefits to households, the cost-sharing reductions are means-tested transfers, whereas the premium tax credits are part of the tax system. Under CBO's previous framework, the cost-sharing reductions (because they would be included in the base income measure) could shift some households from one income quintile to another, thereby muddling the effects of the cost-sharing reductions. Moreover, because the premium tax credits would not be included in the base income measure, the measurement of their distributional effects would be different, even though they provide similar benefits to households.

By contrast, analyzing the distributional effects of such a policy using CBO's new income framework would be more straightforward. Cost-sharing reductions would not change households' income because, as means-tested transfers, they would be excluded from the income measure, and therefore the composition of the income quintiles would remain unchanged after the policy was implemented. Transfers would rise by the amount of the new cost-sharing reductions, tax rates would fall by the amount of the new premium tax credits, and the combined effect of the policy on each income quintile would be easy to interpret.

[11] Both of those components of the ACA went into effect in 2014. The data analyzed here, however, extend only through 2013.

The framework based on income before transfers and taxes thus allows for a distributional analysis of means-tested transfers. However, it is limited in its ability to analyze the distributional effects of social insurance benefits because it includes those benefits in its base measure of income. In CBO's judgment, that limitation—which was present in the previous framework as well—is acceptable because of the difficulty in analyzing the distributional impact of social insurance policies with an annual framework. The two largest governmental programs—Social Security and Medicare—have significant life-cycle patterns, such that most individuals who pay into the system receive benefits only after they retire. The distributional effects of those policies are better analyzed within a lifetime income framework than within an annual income framework.

Two additional limitations related to social insurance benefits that were present in CBO's previous distributional framework remain in the new framework. First, even in a cross-sectional context, the new framework does not capture the explicit redistributive properties of some social insurance programs—for example, the fact that Social Security retirement benefits replace a larger share of lifetime income for low-income workers than for high-income workers. Second, because social insurance benefits are not based on measures of annual (or shorter-term) income, the new framework does not treat those benefits and the taxes that finance them (which are based on annual income) symmetrically.

Because social insurance benefits are included in income before transfers and taxes, the direct distributional impact of those benefits falls outside the scope of CBO's distributional analyses. Therefore, the combined distribution of market income and social insurance benefits is taken as the starting point in CBO's cross-sectional, annual distributional analyses.

Analyses of the Distribution of Household Income in 2013 Using CBO's New Framework

The choice of income measure used as the basis for a distributional analysis can substantially affect perspectives on income inequality and the degree to which means-tested transfers and federal taxes reduce it. Those different interpretations derive from differences in the components included in each income measure as well as the differences in household ranking using the different income measures.

Average Federal Tax Rates

The observed progressivity of a tax system depends on the framework used to measure that progressivity. Under CBO's new framework, as under its previous framework, federal taxes are progressive: Households pay a larger share of their income in taxes as that income increases.

Under the previous framework based on *before-tax income*, average federal tax rates ranged from 3.2 percent in the lowest before-tax income quintile to 26.2 percent in the highest quintile (see Table 3). The progressivity of federal tax rates derives primarily from the progressivity of the individual income tax, which ranged from −7.2 percent in the lowest quintile to 15.5 percent in the highest quintile.

Because it uses a slightly narrower measure of income as the denominator for calculating average federal tax rates, the new framework based on *income before transfers and taxes*

produces slightly higher federal tax rates for all income groups. However, because the framework uses the same measure as the basis for ranking households, it causes households to rerank and produces a slightly different pattern in the federal tax rates across income groups—especially toward the bottom of the income distribution.

For example, the average federal tax rate for the lowest income quintile rises from 3.2 percent to 3.9 percent when households are ranked by before-tax income and income before transfers and taxes is used as the denominator in average federal tax rate calculations. But when households are then ranked on the basis of income before transfers and taxes, the rate is significantly lower (2.1 percent).

Removing means-tested transfers from the income measure used to rank households reduces the income of households in the lowest income quintile. As revealed by the second and third banks of federal tax rates in Table 3, most of the reranking of households occurs between the lowest and second income quintiles.

Average federal tax rates are higher under the new framework than under the previous framework for all but the lowest income quintile, largely because the average individual income tax is significantly lower in the lowest quintile of income before transfers and taxes (−11.1 percent) than in the lowest before-tax income quintile. (That pattern reflects the high correlation between receipt of means-tested transfers and eligibility for refundable tax credits.)

Overall, though, average federal tax rates for all households are slightly higher in the new framework based on income before transfers and taxes than in the previous before-tax income framework (20.8 percent versus 20.0 percent). Despite the slight changes in tax rates and the reranking of households between the lowest and second quintiles, the federal tax system is still highly progressive in the new framework.

Means-Tested Transfer Rates

Because CBO's previous distributional frameworks have included means-tested transfers in the household ranking measure, CBO has not calculated average means-tested transfer rates in its reports on the distribution of household income and federal taxes.[12] Means-tested transfer programs, however, are economically equivalent to many targeted credits and subsidies administered through the tax system. That similarity is particularly true for refundable tax credits.[13] Using a distributional framework based on *income before transfers and taxes* permits means-tested transfer rates and federal tax rates to be calculated in similar ways: Households are ranked by the same income measure, the same income measure serves as the denominator in the calculation of both rates, and neither means-tested transfer policies nor federal tax policies alter the household ranking.

[12] Previous reports have shown the share of before-tax income attributable to various government transfers. For example, see Congressional Budget Office, *Distribution of Household Income and Federal Taxes, 2013* (June 2016), Table 3, www.cbo.gov/publications/51361.

[13] Refundable tax credits are a type of tax credit that may exceed a tax unit's tax liability and result in a payment to that tax unit from the federal government.

Table 3.

Average Federal Tax Rates, Crosswalk from Before-Tax Income Framework to Income Before Transfers and Taxes Framework, 2013

Percents	Quintiles: Lowest	Second	Middle	Fourth	Highest	All Households
	CBO's Previous Framework: Rank and Divide by Before-Tax Income					
Federal Tax Rate	3.2	8.5	12.8	17.1	26.2	20.0
Individual Income Tax	-7.2	-1.2	2.6	6.1	15.5	9.3
Payroll Tax	8.0	7.8	8.3	9.0	6.7	7.6
Corporate Tax	0.8	0.8	1.0	1.2	3.6	2.4
Excise Tax	1.7	1.1	0.9	0.7	0.4	0.7
	Rank by Before-Tax Income, Divide by Income Before Transfers and Taxes					
Federal Tax Rate	3.9	9.6	13.6	17.4	26.3	20.8
Individual Income Tax	-8.7	-1.4	2.7	6.2	15.6	9.6
Payroll Tax	9.6	8.8	8.8	9.2	6.7	7.9
Corporate Tax	0.9	0.9	1.1	1.3	3.6	2.5
Excise Tax	2.1	1.2	1.0	0.7	0.4	0.7
	CBO's New Framework: Rank and Divide by Income Before Tranfers and Taxes					
Federal Tax Rate	2.1	9.2	13.7	17.5	26.3	20.8
Individual Income Tax	-11.1	-1.5	2.8	6.3	15.6	9.6
Payroll Tax	9.8	8.6	8.8	9.2	6.7	7.9
Corporate Tax	0.9	0.9	1.1	1.3	3.6	2.5
Excise Tax	2.4	1.2	1.0	0.7	0.4	0.7

Source: Congressional Budget Office.

Note: Before-tax income is market income plus social insurance benefits and means-tested transfers (previously referred to jointly as “government transfers”).

Market income consists of labor income, business income, capital gains (profits realized from the sale of assets), capital income excluding capital gains, income received in retirement for past services, and other nongovernmental sources of income.

Social insurance benefits consist of Social Security Old Age, Survivors, and Disability Insurance benefits; Medicare benefits (measured by the average cost to the government for providing those benefits); and unemployment insurance benefits. Means-tested transfers from federal, state, and local governments consist of various cash and in-kind transfers; the two largest types of transfers are Medicaid benefits (measured by the average cost to the government for providing those benefits) and Supplemental Nutritional Assistance Program benefits (formerly known as Food Stamps).

Income before transfers and taxes is before-tax income plus means-tested transfers.

Income groups are created based on income measures adjusted for household size. Quintiles contain equal numbers of people.

Means-tested transfers are highly progressive: As income increases, average means-tested transfer rates fall precipitously (see Table 4). Among households in the lowest quintile of income before transfers and taxes in 2013, the average means-tested transfer rate was a little over 50 percent. The largest share of means-tested transfers in that quintile—accounting for about 30 percent of the total rate—came from Medicaid. The total means-tested transfer rate among households in the second quintile was substantially lower: less than 10 percent, on average.

Every household—even households that do not file individual income tax returns or receive refundable tax credits through the individual income tax—has at least some federal tax liability from individual income taxes, payroll taxes, corporate income taxes, or excise taxes. By contrast, not all households receive means-tested transfers. (Among all households, the average means-tested transfer rate was less than 4 percent). That fact should be taken into consideration when interpreting the means-tested transfer rates. For example, about two-thirds of households in the lowest quintile of income before transfers and taxes received some form of means-tested transfer; the remaining households in that quintile received none, resulting in a transfer rate of zero. Furthermore, households with little to no income before transfers and taxes (which are likely to be in the lowest income quintile) but some amount of income from means-tested transfers would have a means-tested transfer rate that is extraordinarily high.

Given those extremes in means-tested transfer rates at the household level, average means-tested transfer rates for each income group are calculated as the sum of all means-tested transfers received by households in that income group divided by the sum of all income before transfers and taxes in that income group.[14]

To date, the data on means-tested transfers used in CBO's analyses of household income have come from the U.S. Census Bureau's Current Population Survey. Several researchers have found, however, that those data underrepresent both the receipt and the dollar value of means-tested transfers among U.S. households.[15] Furthermore, the valuation of benefits from Medicaid—the largest means-tested transfer program—also came from Census Bureau imputations. Therefore, actual average means-tested transfer rates are likely to be higher than the rates presented in Table 4. CBO is currently working on improving household imputations for the receipt and dollar value of means-tested transfers.

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[14] Average federal tax rates are calculated in a similar manner. The average federal tax rate for a given income group is equal to the sum of all federal taxes in that income group divided by the sum of all the income in that income group.

[15] See Laura Wheaton, *Underreporting of Means-Tested Transfer Programs in the CPS and SIPP* (Urban Institute, 2008), www.urban.org/research/publication/underreporting-means-tested-transfer-programs-cps-and-sipp; Bruce D. Meyer, Wallace K. C. Mok, and James X. Sullivan, *The Under-Reporting of Transfers in Household Surveys: Its Nature and Consequences*, Working Paper No. 15181 (National Bureau of Economic Research, July 2009), www.nber.org/papers/w15181; and State Health Access Data Assistance Center, *Phase V Research Results: Extending the Phase II Analysis of Discrepancies Between the National Medicaid Statistical Information System (MSIS) and the Current Population Survey (CPS) Annual Social and Economic Supplement (ASEC) from Calendar Years 2000–2001 to Calendar Years 2002–2005* (January 4, 2010), www.shadac.org/publications/snacc-phase-v-report.

Table 4.

Average Means-Tested Transfer Rates Under CBO's New Distributional Framework, 2013

Percents	Quintiles					All
	Lowest	**Second**	**Middle**	**Fourth**	**Highest**	**Households**
Means-Tested Transfer Rate	50.9	9.6	3.2	1.2	0.3	3.7
Medicaid	30.2	5.8	1.8	0.6	0.2	2.1
SNAP	6.0	0.7	0.1	0.0	0.0	0.3
Other	14.7	3.0	1.3	0.6	0.2	1.2

Source: Congressional Budget Office.

Note: Means-tested transfers consist of various cash and in-kind transfers; the two largest are Medicaid benefits (measured by the average cost to the government for providing those benefits) and Supplemental Nutritional Assistance Program benefits (formerly known as Food Stamps).

Means-tested transfer rates are calculated as total means-tested transfers received by an income group divided by total income before transfers and taxes earned or received by that income group.

Income before transfers and taxes is market income plus social insurance benefits. Market income consists of labor income, business income, capital gains (profits realized from the sale of assets), capital income excluding capital gains, income received in retirement for past services, and other nongovernmental sources of income. Social insurance benefits consist of Social Security Old Age, Survivors, and Disability Insurance benefits, Medicare benefits (measured by the average cost to the government for providing those benefits), and unemployment insurance benefits.

Income groups are created by ranking households by income before transfers and taxes, adjusted for household size. Quintiles contain equal numbers of people.

Income Inequality

The most commonly used measure of income inequality is the Gini coefficient. The Gini coefficient is a single number—ranging from zero to one—that represents how equal or unequal the distribution of income distribution is for a given population. At the extremes of that scale, a Gini coefficient of zero indicates that income is distributed equally among all households, whereas a Gini coefficient of one indicates that a single household has all the income.[16] The Gini coefficient is derived from the Lorenz curve, which plots cumulative income percentiles by cumulative population percentiles (with population ranked from lowest to highest incomes). (See Figure 3.) The Gini coefficient represents the ratio of area A (representing the gap between perfectly equal income distribution and the actual distribution of income) over the sum of area A and area B (representing the actual distribution). The closer the Lorenz curve gets to the *line of equality*—a 45-degree line representing equal shares of total income among all households—the more evenly income is distributed and closer the Gini coefficient gets to 0.

In general, a Gini coefficient based on the distribution of *income before transfers and taxes* will be higher than a Gini coefficient based on the distribution of *before-tax income*. That is because means-tested transfers—which represent the only point of difference between the two income measures—go predominately to lower-income households. In 2013, the Gini coefficient was 0.514 based on income before transfers and taxes and 0.484 based on before-tax income.

A statistic used to measure the distributional effect of a given policy (or set of policies) is the Reynolds-Smolensky index. That statistic is calculated as the difference between a pre-policy Gini coefficient and a post-policy Gini coefficient. The Reynolds-Smolensky index can theoretically range from −1 to 1, reflecting extreme cases in which the Gini coefficient changes from 0 to 1 or from 1 to 0, respectively, after the implementation of a given policy. A positive Reynolds-Smolensky index indicates that the policy decreases income inequality, whereas a negative Reynolds-Smolensky index indicates that the policy increases it.

The Reynolds-Smolensky index for means-tested transfers in 2013 is 0.03 (0.514 – 0.484). To compare the distributional effects of transfers and taxes, one can directly compare that value with the Reynolds-Smolensky index for federal taxes. The Gini coefficient for the distribution of after-tax income in 2013 is 0.442, which translates to a Reynolds-Smolensky index for federal taxes of 0.042. That indicates that—on the basis of the given data—the federal tax system has a larger impact on reducing income inequality than means-tested transfers alone do.[17]

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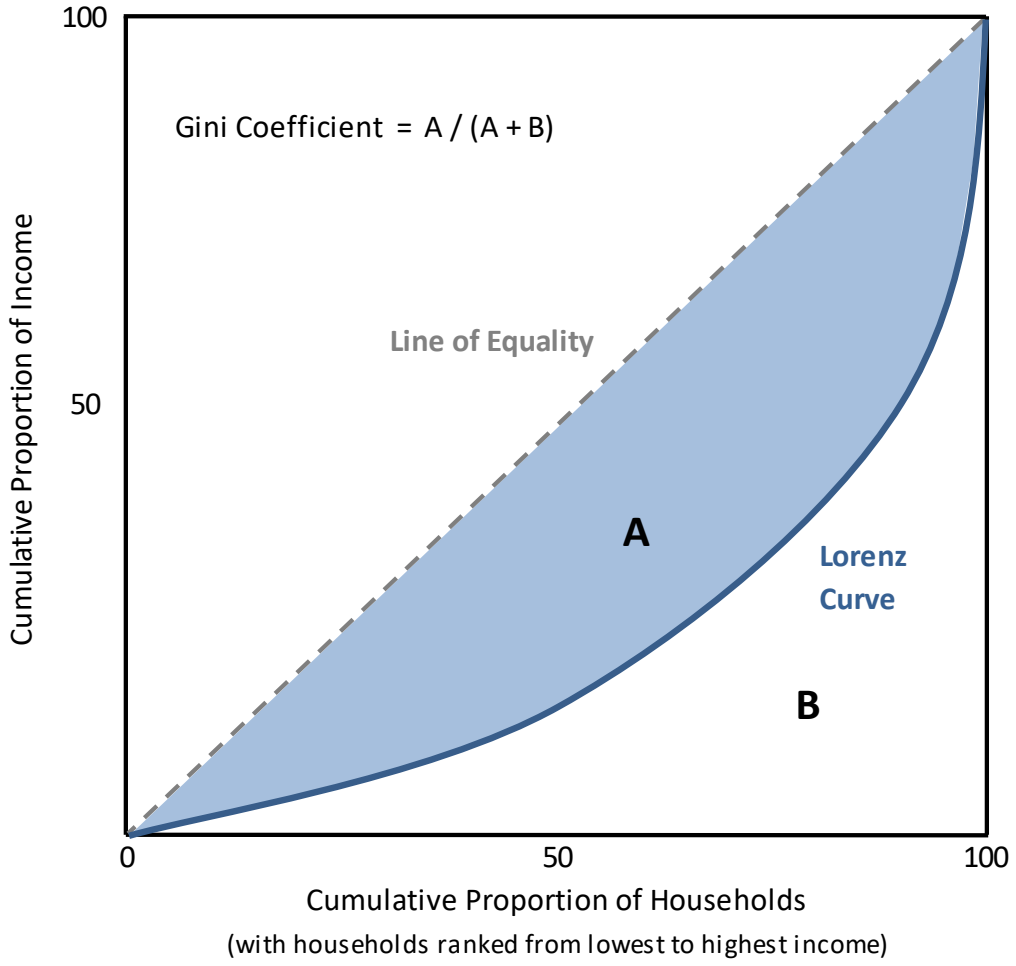
[16] For more details, see Stephen P. Jenkins, "The Measurement of Economic Inequality," in Weimer Salverda, Brian Nolan, and Timothy M. Smeeding, eds., *The Oxford Handbook of Economic Inequality* (Oxford University Press, 2009), pp. 40–46, http://dx.doi.org/10.1093/oxfordhb/9780199606061.013.0003.

[17] In its analyses of the distribution of household income, CBO has been using means-tested income reported in the U.S. Census Bureau's Current Population Survey, which includes Census Bureau imputations of the market value of Medicaid benefits. Those data, however, are problematic. It has been well documented that means-tested transfer income is underreported in the Current Population Survey and that the underreporting has increased over time. Furthermore, the Census Bureau's imputation of the market value of Medicaid benefits was often based on incomplete reporting from states. As of March 2015, the Census Bureau is no longer producing imputations for the market value of Medicaid benefits.

Figure 3.

Lorenz Curve, Line of Equality, and the Formula for Calculating a Gini Coefficient



Household Reranking

The distributional differences between analyses that rank households on the basis of *income before transfers and taxes* and on the basis of *before-tax income* can be significant, particularly at the bottom of the income distribution. To see how ranking households by income before transfers and taxes rather than before-tax income can shift a household from one income group to another, consider four hypothetical households and two income groups—"low income" and "high income" (see Figure 4). A household with $5,000 in income before transfers and taxes and $8,000 in means-tested transfers would be placed in the "high-income" group if the households were ranked by before-tax income. Ranking households by income before transfers and taxes instead, however, would move that household into the "low-income" group, and the highest-income household in the "low-income" group would be moved up into the "high-income" group.

Almost one-fifth of the households in the lowest quintile of income before transfers and taxes would have been in higher quintiles if means-tested transfers were included in the ranking measure (see Table 5). Because net movement into a higher income quintile entails a corresponding net movement out of those quintiles, more than one-fifth of the households in the second quintile of income before transfers and taxes would have been bumped down into the bottom before-tax income quintile. Because before-tax income excludes income in the form of means-tested transfers, almost one-fifth of the people in the lowest quintile of income before transfers and taxes were in higher before-tax income quintiles. There is no fundamental economic change represented by those changes in income groups—just a change in the income definition used to rank households. Because means-tested transfers predominantly go to households in the lower income quintiles, there is not much shuffling across income quintile thresholds toward the top of the distribution.

Trends in Income, Transfers, and Taxes Using CBO's New Framework

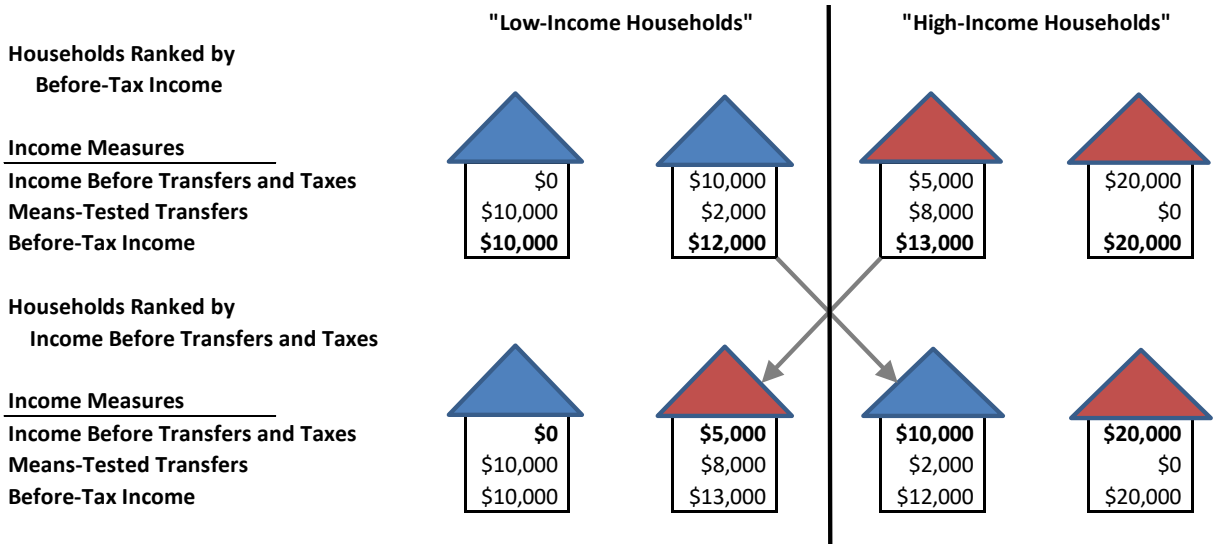
CBO's distributional analyses are built on a database of administrative tax data and household survey data for U.S. households. That database contains annual cross-sectional information going back to 1979—the year in which Census household survey data began to be collected on a consistent basis. The most recent CBO report on the distribution of household income and federal taxes used data through 2013.[18] Results presented here cover the same period.

Using *income before transfers and taxes* instead of *before-tax income* as the base income measure in the distributional framework will produce different trends in several key metrics used in CBO's analyses of the distribution of household income. Because the only difference between the two measures of income is whether they include means-tested transfers, which go predominantly to low-income households, the differences in the trends observed under the two frameworks will largely be confined to the bottom of the income distribution.

[18] Congressional Budget Office, *Distribution of Household Income and Federal Taxes, 2013* (June 2016), www.cbo.gov/publications/51361.

Figure 4.

Hypothetical Example of Household Reranking on the Basis of Income Before Transfers and Taxes and Before-Tax Income



Source: Congressional Budget Office.

Note: Income before transfers and taxes is market income plus social insurance benefits. Market income consists of labor income, business income, capital gains (profits realized from the sale of assets), capital income excluding capital gains, income received in retirement for past services, and other nongovernmental sources of income. Social insurance benefits consist of Social Security Old Age, Survivors, and Disability Insurance benefits, Medicare benefits (measured by the average cost to the government for providing those benefits), and unemployment insurance benefits.

Means-tested transfers consist of various cash and in-kind transfers; the two largest are Medicaid benefits (measured by the average cost to the government for providing those benefits) and Supplemental Nutritional Assistance Program benefits (formerly known as Food Stamps).

Before-tax income is income before transfers and taxes plus means-tested transfers.

Table 5.

Transition Matrix: Quintiles of Income Before Transfers and Taxes to Before-Tax Income Quintiles, 2013

Income Before Transfers and Taxes	Before-Tax Income: Lowest Quintile	Second Quintile	Middle Quintile	Fourth Quintile	Highest Quintile	Total
Lowest Quintile	**81.2**	15.1	3.4	0.2	0.0	100.0
Second Quintile	21.9	**69.8**	7.4	0.8	0.0	100.0
Middle Quintile	0.0	13.4	**82.3**	4.2	0.1	100.0
Fourth Quintile	0.0	0.0	6.2	**92.1**	1.6	100.0
Highest Quintile	0.0	0.0	0.0	1.9	**98.1**	100.0

Source: Congressional Budget Office.

Note: Income before transfers and taxes is market income plus social insurance benefits. Market income consists of labor income, business income, capital gains (profits realized from the sale of assets), capital income excluding capital gains, income received in retirement for past services, and other nongovernmental sources of income. Social insurance benefits consist of Social Security Old Age, Survivors, and Disability Insurance benefits, Medicare benefits (measured by the average cost to the government for providing those benefits), and unemployment insurance benefits.

Before-tax income is income before transfers and taxes plus means-tested transfers.

Means-tested transfers consist of various cash and in-kind transfers; the two largest are Medicaid benefits (measured by the average cost to the government for providing those benefits) and Supplemental Nutritional Assistance Program benefits (formerly known as Food Stamps).

Income groups are determined on the basis of income measures adjusted for household size. Quintiles contain equal numbers of people.

Cumulative Growth Rates

The differences between the patterns of cumulative growth observed under the two frameworks are primarily driven by changes in means-tested transfer rates and secondarily driven by changes in the ranking of households. Because means-tested transfers go predominantly to low-income households, the differences in the cumulative growth rates are most notable at the bottom of the income distribution and also emerge, to a lesser degree, in the middle of the income distribution (see Figure 5). In the top two quintiles of the respective distributions, there is little discernable difference between the cumulative inflation-adjusted 1979–2013 growth rates of income before transfers and taxes and before-tax income.

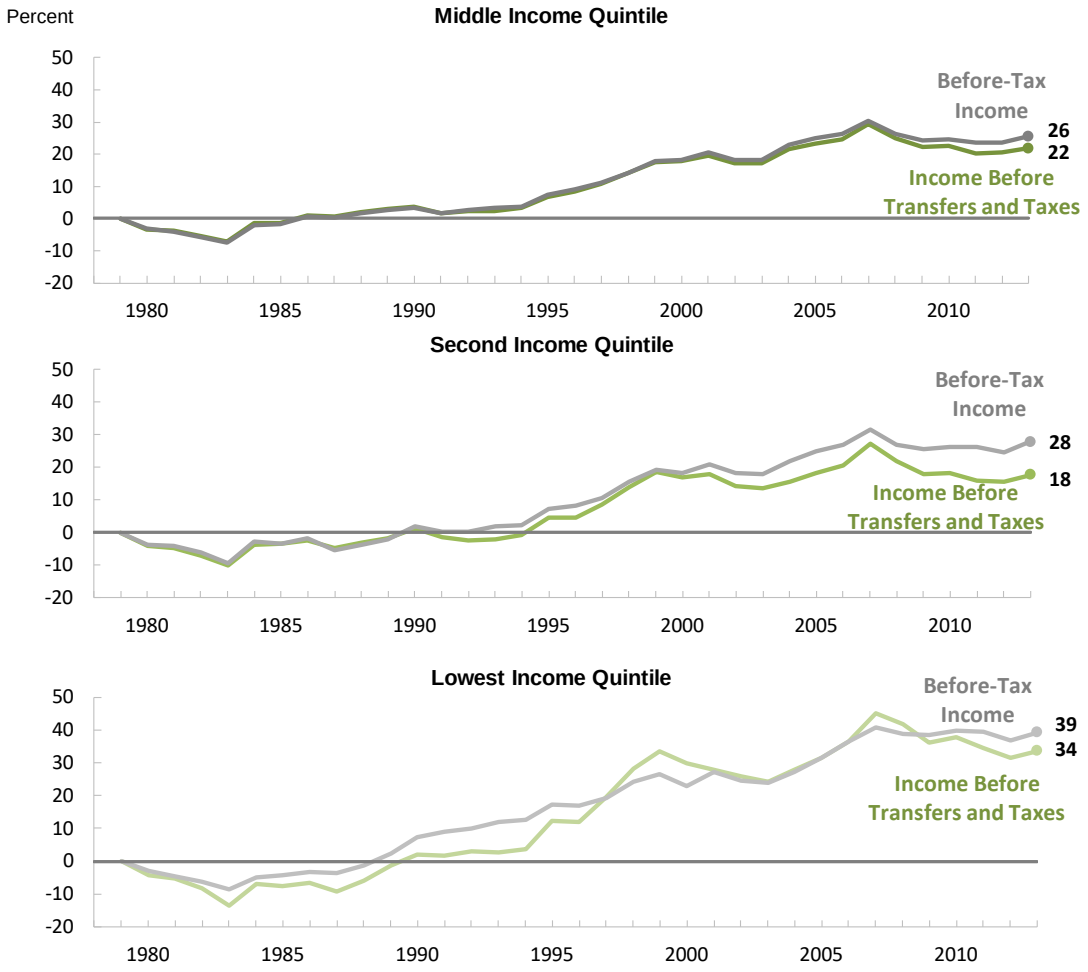
In the middle quintiles of the two income measures, the cumulative growth rates are nearly identical through the 1980s and 1990s. They start to diverge slightly after 2000, as means-tested transfers began to account for a larger share of income among households in the middle before-tax income quintile. Differences in the cumulative growth rates between the two income measures are most pronounced in the second income quintile. Through the 1980s, the growth rates for both income measures were negative, and nearly identically so. As means-tested transfers were expanded through the 1990s and 2000s, some of the benefits from those programs spread into the second quintile; however, there was also more reranking of households, which pushed the growth rate for income before transfers and taxes down relative to the growth rate for before-tax income.

Households in the lowest income quintile experienced negative cumulative growth in real (inflation-adjusted) income through the 1980s, using either income measure. Because of real growth in means-tested transfers over the 1979–2013 period, cumulative growth in before-tax income outpaced cumulative growth in income before transfers and taxes among households in the lowest income quintile for much of that period.[19]

[19] Means-tested transfers are generally underreported relative to administrative totals in the survey data used in this analysis. Furthermore, the degree to which means-tested transfers are underreported in the survey data increased over the period studied. Therefore, the observed degree to which before-tax income in the lowest quintile grew faster than income before transfers and taxes is likely an underestimate.

Figure 5.

Cumulative Growth in Average Inflation-Adjusted Income Before Transfers and Taxes and Before-Tax Income for Select Income Groups, 1979 through 2013



Source: Congressional Budget Office.

Note: Income before transfers and taxes is market income plus social insurance benefits. Market income consists of labor income, business income, capital gains (profits realized from the sale of assets), capital income excluding capital gains, income received in retirement for past services, and other nongovernmental sources of income. Social insurance benefits consist of Social Security Old Age, Survivors, and Disability Insurance benefits, Medicare benefits (measured by the average cost to the government for providing those benefits), and unemployment insurance benefits.

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Means-tested transfers consist of various cash and in-kind transfers; the two largest are Medicaid benefits (measured by the average cost to the government for providing those benefits) and Supplemental Nutritional Assistance Program benefits (formerly known as Food Stamps).

See Appendix A for more detailed definitions of the components of income included in those measures.

Income groups are determined on the basis of income measures adjusted for household size. Quintiles contain equal numbers of people.

Average Federal Tax Rates by Income Group

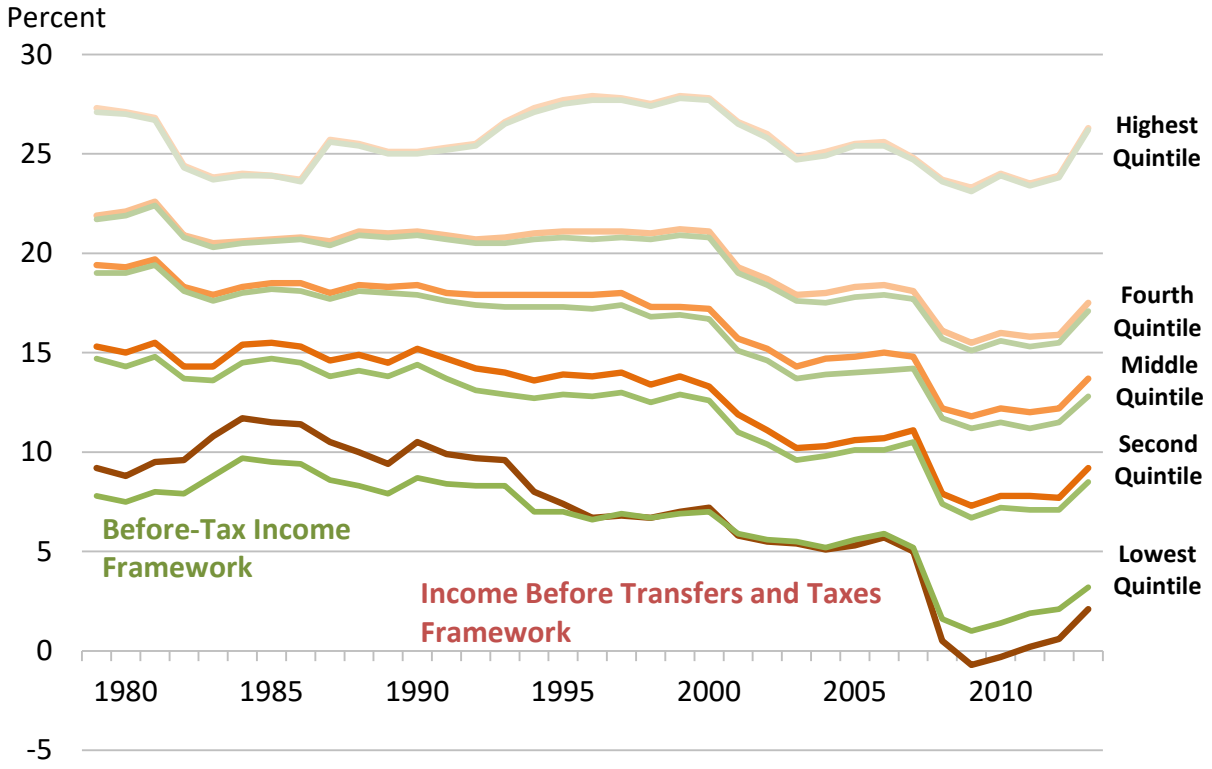
Using *income before transfers and taxes* instead of *before-tax income* as the basis for ranking households and as the denominator in average federal tax rate calculations produces only slightly different trends in average federal tax rates (see Figure 6). Like the differences in cumulative growth rates under the two frameworks, the most significant differences in average federal tax rates appear toward the bottom of the income distribution. Average federal tax rates among households in the lowest income quintiles are higher through the mid-1990s under the new framework based on income before transfers and taxes. From the mid-1990s through the mid-2000s, the average federal tax rates under the two frameworks are nearly identical. Significant changes in both average federal tax rates and means-tested transfer rates produce a divergence between the two frameworks after the Great Recession, which extended through 2013. The difference after the recession, however, is the opposite of the difference observed in the earlier part of the time series, such that average federal tax rates are higher under the previous framework based on before-tax income.

The difference in average federal tax rates by income quintiles under the two frameworks can be decomposed in two, somewhat offsetting, steps: moving from using before-tax income to using income before transfers and taxes, and then ranking households by income before transfers and taxes instead of before-tax income. Using a narrower income measure as the denominator will tend to push average federal tax rates up in the lower income quintiles. However, because of the correlation between receipt of means-tested transfers and eligibility for refundable tax credits (which can make individual income tax rates negative and may make total federal tax rates negative), reranking mitigates the increase in the average federal tax rate in the lowest income quintile caused by the change in the denominator alone.

The effect of changing the denominator in the calculation of average federal tax rates from before-tax income to income before transfers and taxes is most significant for households in the lowest before-tax income quintile (see Figure 7). For that quintile, the difference between average federal tax rates calculated using the two income measures was largest through the 1980s and early 1990s. It narrowed from the mid-1990s through the mid-2000s until the rates converged after the Great Recession, when several new refundable tax credits were introduced and existing refundable tax credits were expanded. As total federal taxes paid approaches zero, the difference between the two rates diminishes. In 2008, for example, households in the lowest before-tax income quintile paid about $370 in federal taxes, on average. For the same households, average income before transfers and taxes was about $18,500, and average before-tax income was about $23,500. Despite the $5,000 difference between the two income measures—which reflects the average amount of means-tested transfers received by the lowest income quintile in 2008—the average tax rates were very similar:1.8 percent when using income before transfers and taxes as the denominator and 1.6 percent when using before-tax income as the denominator.

Figure 6.

Average Federal Tax Rates, by Income Group, 1979 through 2013



Source: Congressional Budget Office.

Note: The average federal tax rate is equal to total federal taxes divided by either income before transfers and taxes or before-tax income.

Income before transfers and taxes is market income plus social insurance benefits. Market income consists of labor income, business income, capital gains (profits realized from the sale of assets), capital income excluding capital gains, income received in retirement for past services, and other nongovernmental sources of income. Social insurance benefits consist of Social Security Old Age, Survivors, and Disability Insurance benefits, Medicare benefits (measured by the average cost to the government for providing those benefits), and unemployment insurance benefits.

Before-tax income is income before transfers and taxes plus means-tested transfers.

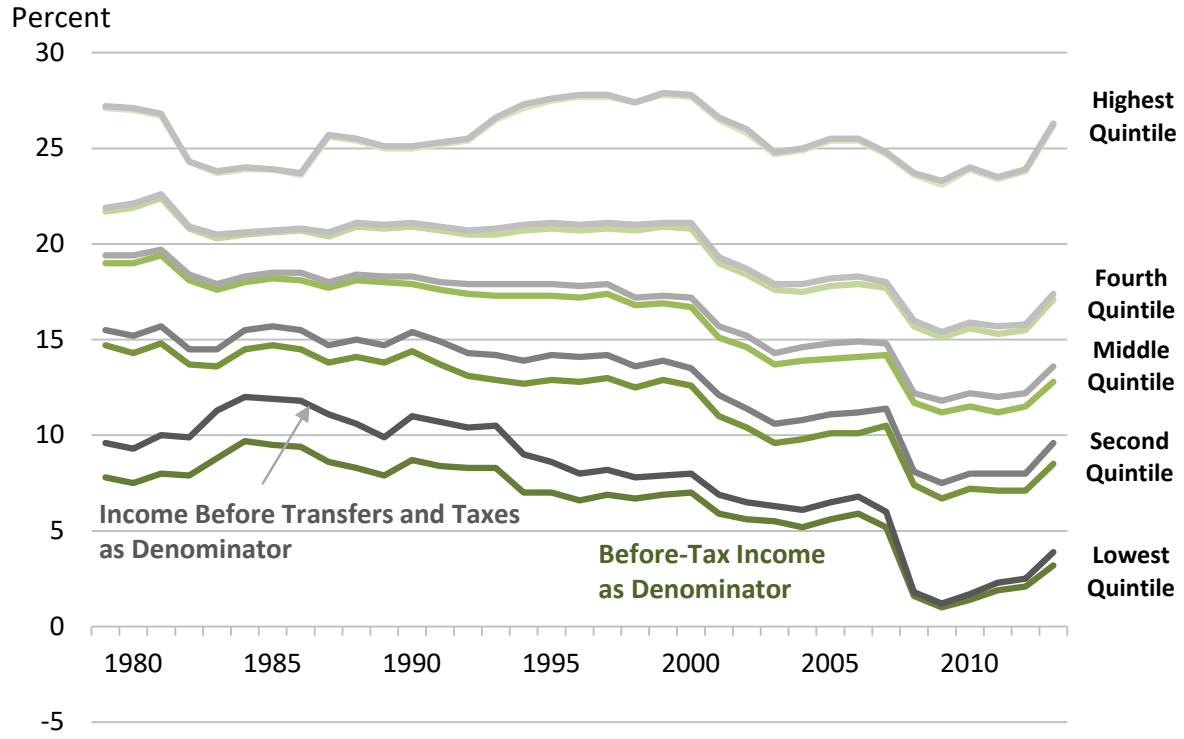
Means-tested transfers consist of various cash and in-kind transfers; the two largest are Medicaid benefits (measured by the average cost to the government for providing those benefits) and Supplemental Nutritional Assistance Program benefits (formerly known as Food Stamps).

See Appendix A for more detailed definitions of the components of income included in those measures.

Income groups are determined on the basis of income measures adjusted for household size. Quintiles contain equal numbers of people.

Figure 7.

Average Federal Tax Rates, by Before-Tax Income Group, 1979 through 2013



Source: Congressional Budget Office.

Note: Income before transfers and taxes is market income plus social insurance benefits. Market income consists of labor income, business income, capital gains (profits realized from the sale of assets), capital income excluding capital gains, income received in retirement for past services, and other nongovernmental sources of income. Social insurance benefits consist of Social Security Old Age, Survivors, and Disability Insurance benefits, Medicare benefits (measured by the average cost to the government for providing those benefits), and unemployment insurance benefits.

Before-tax income is income before transfers and taxes plus means-tested transfers.

Means-tested transfers consist of various cash and in-kind transfers; the two largest are Medicaid benefits (measured by the average cost to the government for providing those benefits) and Supplemental Nutritional Assistance Program benefits (formerly known as Food Stamps).

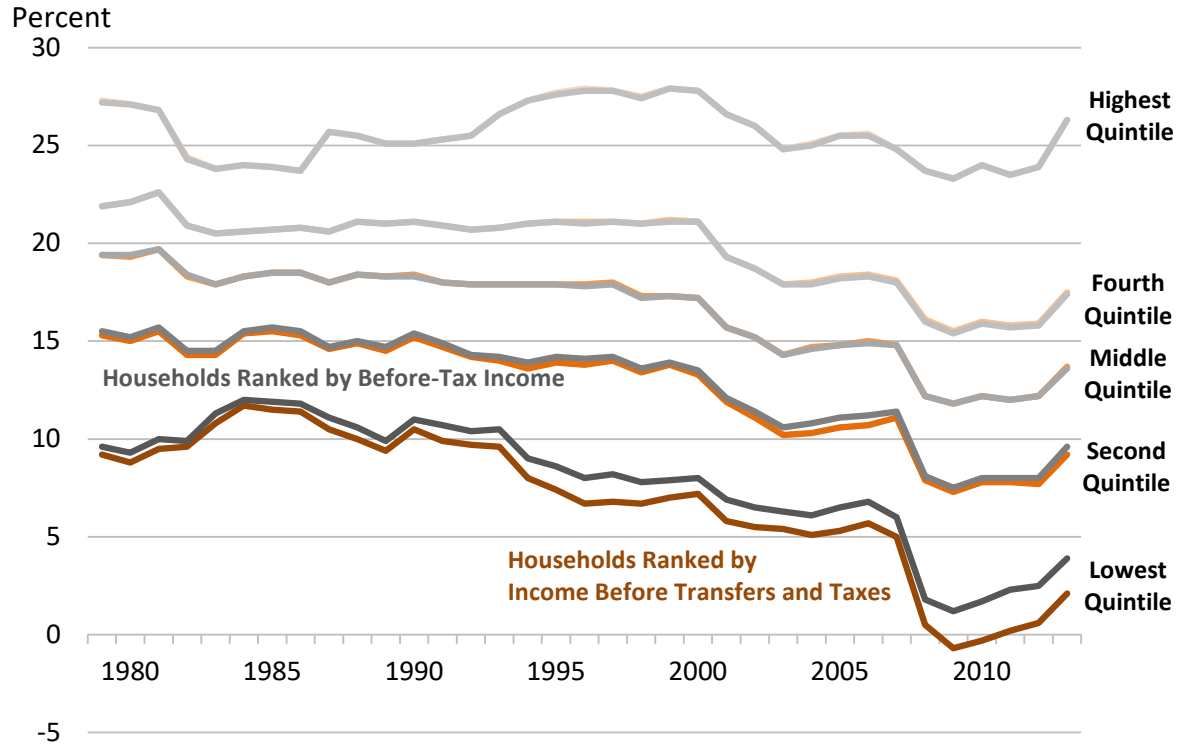
See Appendix A for more detailed definitions of the components of income included in those measures.

Before-tax income groups are created by ranking households by before-tax income, adjusted for household size. Quintiles contain equal numbers of people.

The second step in the decomposition is to examine the shift in average federal tax rates caused by ranking households on the basis of income before transfers and taxes instead of before-tax income (see Figure 8). Changing the denominator from before-tax income to income before transfers and taxes generally increases calculated tax rates; changing the ranking measure from before-tax income to income before transfers and taxes generally reduces calculated tax rates—most noticeably among households in the lowest income quintile. When both of those changes are applied, average federal tax rates in the lowest quintile of income before transfers and taxes are consistently lower than when before-tax income is used as the denominator in average federal tax rate calculations and as the basis for ranking households. At the height of the Great Recession, because households at the bottom of the income distribution paid so little in taxes and tended to receive means-tested transfers and refundable tax credits, their average federal tax rates under CBO's new framework were negative.

Figure 8.

Average Federal Tax Rates, by Income Group, 1979 through 2013



Source: Congressional Budget Office.

Note: Average federal tax rates are equal to total federal taxes divided by income before transfers and taxes.

Income before transfers and taxes is market income plus social insurance benefits. Market income consists of labor income, business income, capital gains (profits realized from the sale of assets), capital income excluding capital gains, income received in retirement for past services, and other nongovernmental sources of income. Social insurance benefits consist of Social Security Old Age, Survivors, and Disability Insurance benefits, Medicare benefits (measured by the average cost to the government for providing those benefits), and unemployment insurance benefits.

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See Appendix A for more detailed definitions of the components of income included in those measures.

Income groups are created by ranking households by either income before transfers and taxes or before-tax income, adjusted for household size. Quintiles contain equal numbers of people.

Means-Tested Transfer Rates

One of the benefits of a distributional analysis with a framework based on *income before transfers and taxes* is it allows means-tested transfers to be analyzed in a similar fashion as federal taxes. Most means-tested transfers share properties of refundable tax credits: They increase household resources; eligibility for them is based on a variety of income thresholds, often with associated phase-out ranges; and they distort decisions about labor force participation and savings.

Because those transfers are concentrated in households in the lowest income quintile, and because the average income of those households is so low, the means-tested transfer rates among households in the lowest income quintile are significantly higher than among households in higher quintiles (see Figure 9). In addition, because the growth in means-tested transfers exceeded the growth in income among households receiving such transfers over the period examined here, the average means-tested transfer rate grew, especially among households in the lowest income quintile.[20]

Between 1979 and 2013, the means-tested transfer rates for the lowest three quintiles of income before transfers and taxes increased substantially. Households in the lowest quintile had the highest and most volatile rate.[21] The differences in scale between the means-tested transfer rates among households in that quintile and in the second quintile obscures the fact that they both experienced similar growth patterns over the 1979–2013 period.

Although the means-tested transfer rate was relatively flat among households in the second quintile through the 1980s, the growth in the rate was steepest for those households from 1990 onward. In 1990, the means-tested transfer rate among households in that quintile was approximately 4 percent; by 2013, it had climbed to almost 10 percent. A similar pattern emerged among households in the middle quintile, although it is difficult to see in Figure 9 because of the significant differences in scale between means-tested transfer rates in that quintile and in the lower two quintiles: In 1990, the means-tested transfer rate among households in the middle quintile was a little over 1 percent; by 2013, the rate had grown to a little over 3 percent.[22]

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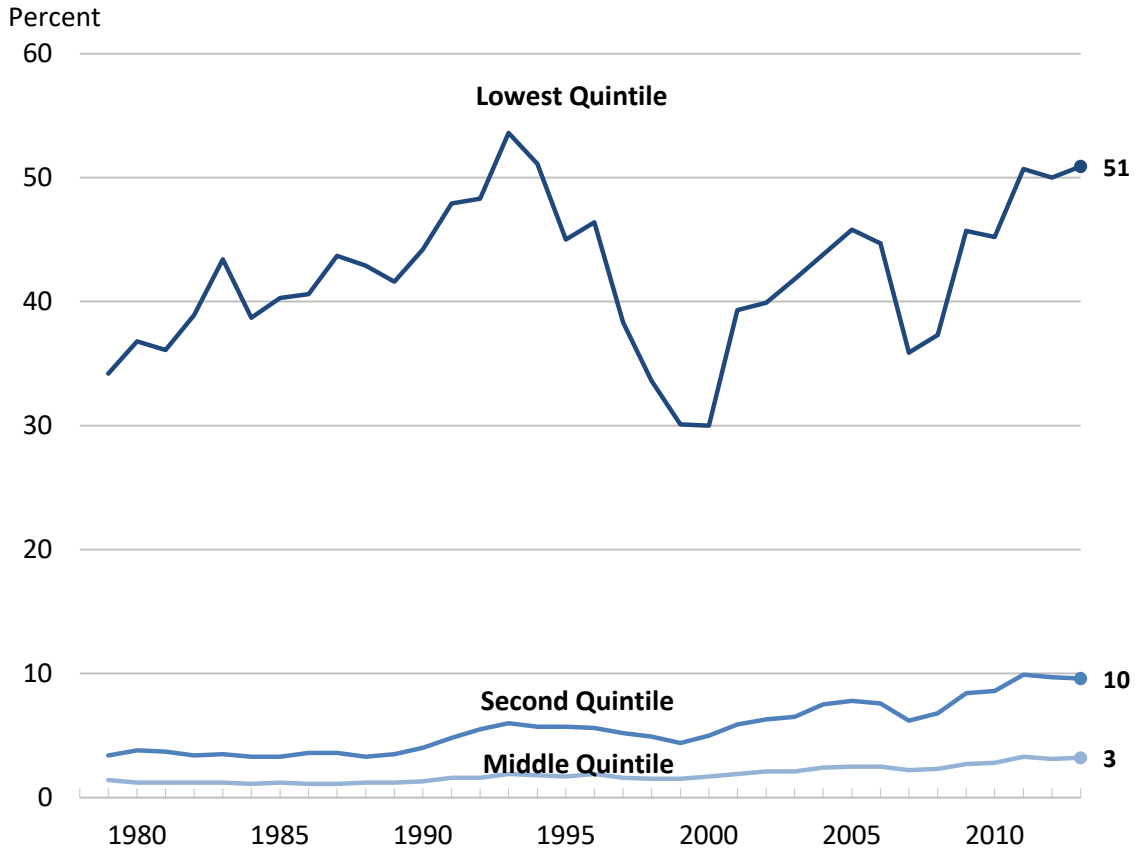
[20] See Congressional Budget Office, *Growth in Means-Tested Programs and Tax Credits for Low-Income Households* (February 2013), www.cbo.gov/publication/43934, for a more detailed examination of the growth of such transfers.

[21] CBO uses the value of means-tested transfers reported in the Census Bureau's Current Population Survey in the calculation of the means-tested transfer rate. Those data are known to be problematic, in that they reflect the survey's significant undercounting of the number of means-tested transfer recipients. Therefore, the data presented in Figure 9 likely reflect a lower bound on the actual rates. CBO is currently working to correct for the historical undercounting of means-tested transfer receipts in the Current Population Survey data.

[22] Among households in the fourth quintile of income before transfers and taxes, the means-tested transfer rate has grown from about 0.5 percent in 1990 to a little over 1 percent in 2013. Among households in the highest income quintile, there has been virtually no change in the rate over the 1979–2013 period.

Figure 9.

Means-Tested Transfer Rates for Select Income Groups, 1979 through 2013



Source: Congressional Budget Office.

Note: Means-tested transfer rates are equal to means-tested transfers divided by income before transfers and taxes.

Means-tested transfers are cash payments and in-kind benefits from government assistance programs designed to help low-income individuals, families, and households.

Medicaid and the Supplemental Nutrition Assistance Program (called the Food Stamps program until 2008) are the two largest means-tested government assistance programs. The data for those transfer programs come from the U.S. Census Bureau's Current Population Survey, which is known to undercount receipt of means-tested transfers. Therefore, the levels and trends presented here should be taken as lower bounds for the actual rates experienced by U.S. households over this period.

Income before transfers and taxes is market income plus social insurance benefits. Market income consists of labor income, business income, capital gains (profits realized from the sale of assets), capital income excluding capital gains, income received in retirement for past services, and other nongovernmental sources of income. Social insurance benefits are cash payments and in-kind benefits from government insurance programs; those benefits consist of Social Security, Medicare, and unemployment insurance benefits.

See Appendix A for more detailed definitions of the components of income included in those measures.

Income groups are created by ranking households by income before transfers and taxes, adjusted for household size. Quintiles contain equal numbers of people.

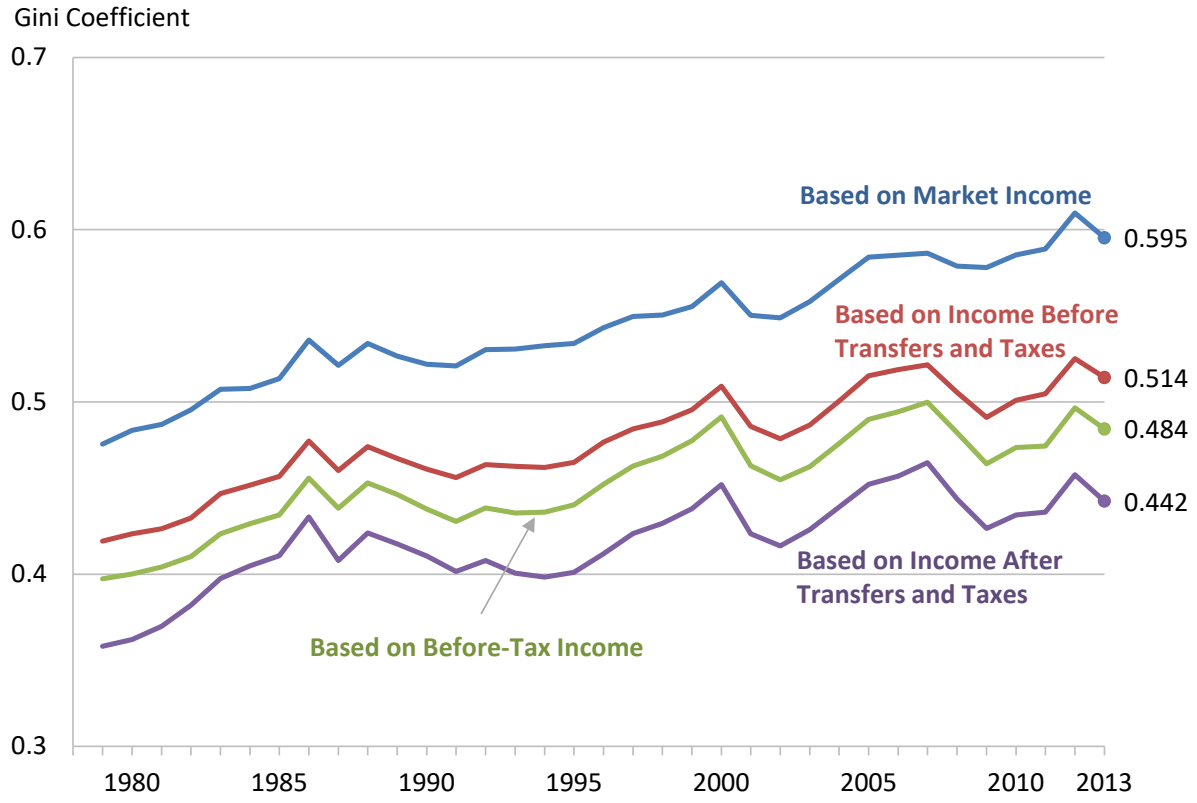
Income Inequality

Just as the change from a *before-tax income* framework to a framework based on *income before transfers and taxes* changes inequality (as measured by Gini coefficients) in 2013, it also produces slightly different trends in income inequality over the 1979–2013 period. The same general relationship holds throughout the period, though—that is, income inequality based on income before transfers and taxes is higher than income inequality based on before-tax income (see Figure 10).

Although means-tested programs are highly progressive and predominantly benefit households in the lowest income quintile, the aggregate spending on those transfer programs is small compared with total federal taxes collected. Therefore, the income-inequality-reducing effect of means-tested transfers—reflected by the difference between Gini coefficients based on income before transfers and taxes and based on before-tax income—is smaller than that of the federal tax system. The data on means-tested transfers, however, come from the Current Population Survey, which is known to undercount the number of people receiving means-tested transfers. If household survey data were corrected for that undercounting, it is likely that the Gini coefficients based on before-tax income and income after transfers and taxes would be lower than shown in Figure 10.

Figure 10.

Gini Coefficients Based on Market Income, Income Before Transfers and Taxes, Before-Tax Income, and After-Tax Income, 1979 through 2013



Source: Congressional Budget Office.

Note: The Gini coefficient is a measure of income inequality that ranges from zero (representing the most equal possible distribution) to one (representing the least equal possible distribution). Gini coefficients are calculated using income measures adjusted for household size.

Market income consists of labor income, business income, capital gains (profits realized from the sale of assets), capital income excluding capital gains, income received in retirement for past services, and other nongovernmental sources of income.

Income before transfers and taxes is market income plus social insurance benefits. Social insurance benefits are cash payments and in-kind benefits from government insurance programs; those benefits consist of Social Security, Medicare, and unemployment insurance benefits.

Before-tax income is income before transfers and taxes plus means-tested transfers.

Means-tested transfers are cash payments and in-kind benefits from government assistance programs; those programs are targeted toward low-income individuals, families, and households, so their eligibility requirements and benefit amounts are based on income. (Medicaid and the Supplemental Nutrition Assistance Program, formerly known as the Food Stamps program, are the two largest means-tested government assistance programs.) Income after transfers and taxes is income before transfers and taxes plus means-tested transfers minus federal taxes (individual income taxes, payroll taxes, corporate income taxes, and federal excise taxes).

See Appendix A for more detailed definitions of the components of income included in those measures.

Appendix A: CBO's Distributional Methodology

The Congressional Budget Office's analyses of the distribution of household income and federal taxes are counted among its major recurring reports and have been released semiregularly for almost 30 years.[23] This appendix provides details about the most important assumptions underlying those analyses.

Unit of Analysis

CBO uses the household as the unit of analysis in its distributional analyses. A household consists of the people who share a housing unit, regardless of their relationship.[24] The data used in CBO's analyses, however, come from two primary sources: one that provides data on tax-filing units and another that provides household-level data. A household can consist of more than one tax-filing unit, such as a married couple and their adult child. To incorporate the tax-filing unit data into the analysis, it is necessary to define tax-filing units within households. Once both data sources are at the same unit of analysis—tax-filing units—they are statistically matched to create a database with information from both data sources (see the next section for details on the statistical matching methodology). For the final presentation of distributional results, data for those statistically matched tax-filing units are summed back up to the household level.

Data

The core data in CBO's analysis come from the Statistics of Income (SOI), a nationally representative sample of individual income tax returns collected by the Internal Revenue Service. The number of returns sampled grew over the time period studied, ranging from roughly 90,000 in some of the early years to more than 300,000 in the later years. The data used in this report to produce illustrative examples comparing and contrasting CBO's prior and new distributional frameworks come from the 2006 public-use version of the SOI data.

Tax-return information is supplemented with data from the Annual Social and Economic Supplement of the Census Bureau's Current Population Survey (CPS), which contains survey data on the demographic characteristics and income of a large sample of households. The two sources are combined by statistically matching each SOI record to a corresponding CPS record on the basis of demographic characteristics and income. Each pairing results in a new record that takes on some characteristics of the CPS record and some characteristics of the SOI record.[25]

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[23] See Congressional Budget Office, "Major Recurring Reports," www.cbo.gov/about/products/major-recurring-reports, for links to reports in this series going back to 2001. Citations and links to earlier reports are provided below in the timeline of methodological changes.

[24] The U.S. Treasury's Office of Tax Analysis uses family units in its distributional analyses. Family units are similar to household units but exclude unrelated persons living together. The Internal Revenue Service, the Joint Committee on Taxation, and the Urban-Brookings Tax Policy Center all use tax-filing units as the unit of analysis in their distributional analyses.

[25] For a general description and evaluation of statistical matching, see Michael L. Cohen, "Statistical Matching and Microsimulation Models," in Eric A. Hanushek and Constance F. Citro (eds.), *Improving Information for Social Policy Decisions: The Uses of Microsimulation Modeling—Volume II: Technical Papers* (National Academy Press, 1991), http://dx.doi.org/10.17226/1853; and Marcello D'Orazio, Marco Di Zio, and Mauro Scanu, *Statistical Matching: Theory and Practice* (John Wiley & Sons, 2006), http://dx.doi.org/10.1002/0470023554.

The first step in the statistical matching process is to align the unit of analysis by constructing tax-filing units from CPS households. A tax-filing unit is a single person or a married couple plus any dependents. In CBO's analysis, CPS household heads (and their spouses, if present) are designated as tax-filing units. Tax rules are used to determine whether other members of the household can be claimed as dependents on the basis of their age, relationship with the primary tax-filing unit, and income.[26] People who meet those criteria are classified as dependents; those who do not are classified as separate tax-filing units within the household. When multiple people could potentially claim one member of a household as a dependent, we assume that the household chooses the arrangement that results in the most advantageous tax situation—for example, two unmarried, cohabitating partners with two children might each claim one child and file as a head of household if it lowers their combined taxes.

Next, we divide tax-filing unit records in each file into 15 demographic subgroups on the basis of marital status (married or single), number of dependents (zero, one, or two or more), whether the tax-filing unit can be claimed as a dependent (yes or no), and whether the tax filer and his or her spouse (if applicable) are 65 or older (neither, one, or both). Records from the two files are matched within the same demographic cell, with certain exceptions. Because the CPS file contains fewer head-of-household tax-filing units (single parents with dependent children) than the SOI file does, we match the SOI head-of-household records with a mix of single childless CPS records and married CPS records. The deficit in head-of-household filers in the CPS data likely reflects some combination of misreporting of filing status on the SOI and a failure of the algorithm that creates tax units for the CPS to account for complex living arrangements.

Within each demographic cell, we estimate an ordinary least squares (OLS) regression model of total income as a function of all the income items that are common to both the SOI and the CPS (wages, interest, dividends, rental income, business income and losses, pension income, and unemployment insurance). The OLS models are estimated using the SOI data. We apply the coefficients estimated from the regression models to the records in both files to construct a predicted total income variable. Tax-unit records in both files (independently within each demographic cell) are then sorted in descending order by predicted total income.

The SOI data and the CPS data come from samples, and therefore each record from both files has a sample weight associated with it. The sum of all the sample weights in the SOI file represents the total number of tax units that filed taxes in a given year. The sum of all the weights in the CPS file represents all the tax units in the United States—both those that filed a tax return and those that did not file a tax return. The SOI file contains many more records than the CPS file yet represents fewer total tax returns. Therefore, the average sample weight in the SOI file is lower than the average sample weight in the CPS file.

Because of those differences in sample weights, SOI and CPS records are not matched on a one-to-one basis. Within each demographic cell, the match starts with the record from each file with the highest predicted total income. Of the two records, the one with the lower sample weight is matched to only one corresponding record from the other file. The record with the higher weight is "split" and is available (with its weight reduced) to be matched to the next record in the other

[26] A dependent may be considered a tax-filing unit if he or she received income above a certain threshold in a given tax year.

file. (In practice, the highest-income SOI records have very low sample weights, so the matching algorithm matches the top SOI record to many CPS records.)

That process is repeated until all the SOI records are exhausted. Each matched pairing results in a new record with the demographic characteristics of the CPS record and the income reported in the SOI. Some types of income, such as certain types of transfer payments and in-kind benefits, appear only in the CPS records; values for those items are drawn directly from that survey. Income values for CPS records that represent nonfiling tax units are taken directly from the CPS. Residual CPS records (those with the lowest predicted income) are assumed to represent tax-filing units that did not file a tax return.

Finally, households are rebuilt from tax-filing units on the basis of relationships reported in the CPS. In general, CPS tax-filing units will have been matched to multiple SOI tax-filing units. When CPS tax-filing units are summed to the household level, multiple instances of a given household are created to cover all possible combinations of the matched SOI–CPS tax units. Each household instance is appropriately weighted so that the sum of all the instances equals the original CPS household-level sample weight.

Measuring Income

Most distributional analyses rely on a measure of annual income as the metric for ranking households from least economically secure to most economically secure. In CBO's analyses, information on taxable income sources comes from the SOI, whereas information on nontaxable income sources and incomes for tax-filing units that do not file individual income tax returns comes from the CPS.

The income measures used throughout this analysis are defined as follows:

Income Before Transfers and Taxes consists of market income plus social insurance benefits.

Market Income consists of the following components:

- *Labor income*: Cash wages and salaries, including those allocated by employees to 401(k) plans; employer-paid health insurance premiums (as measured by the CPS); the employer's share of Social Security, Medicare, and federal unemployment insurance payroll taxes; and the share of corporate income taxes borne by workers.
- *Business income*: Net income from businesses and farms operated solely by their owners, partnership income, and income from S corporations.
- *Capital gains*: Profits realized from the sale of assets. (Increases in the value of assets that have not been realized through sales are not included in market income.)
- *Capital income (excluding capital gains)*: Taxable and tax-exempt interest, dividends paid by corporations (but not dividends from S corporations, which are considered part of business income), positive rental income, and the share of corporate income taxes borne by capital owners.
- *Other income*: Income received in retirement for past services and other nongovernmental sources of income.

Social Insurance Benefits consists of the following components:

- Social Security benefits (which consists of benefits from Old Age, Survivors, and Disability Insurance).
- Medicare health insurance benefits (measured by the average cost to the government for providing those benefits).
- Unemployment insurance benefits.

Income After Transfers and Taxes is income before transfers and taxes plus means-tested transfers minus federal taxes.

Means-Tested Transfers consist of both cash and in-kind benefits provided through the following programs:

- Medicaid and the Children's Health Insurance Program (measured by the average cost to the government for providing those benefits);
- The Supplemental Nutrition Assistance Program (SNAP), formerly known as the Food Stamps program;
- Housing assistance programs;
- Supplemental Security Income (SSI);
- Temporary Assistance for Needy Families (TANF), and its predecessor, Aid to Families with Dependent Children (AFDC);
- Veterans' benefits;
- Workers' compensation benefits;
- Child nutrition programs;
- The Low Income Home Energy Assistance Program; and
- State and local government general assistance programs.

Federal Taxes consist of the following components:[27]

- Individual income tax liabilities,
- Payroll taxes (also known as social insurance taxes),[28]
- Corporate income taxes, and
- Excise taxes.

Incidence of Federal Taxes

CBO allocates the individual income taxes and the employee's share of payroll taxes to the households paying those taxes directly. CBO also allocates the employer's share of payroll taxes to employees because employers appear to pass on their share of payroll taxes to employees by paying lower wages than they would otherwise pay. Therefore, CBO also adds the employer's

[27] Federal taxes allocated to households in this analysis account for approximately 95 percent of all federal revenues, on average. The remaining federal revenue sources not allocated to U.S. households include the estate and gift tax, Federal Reserve investment returns remitted to the Treasury, and miscellaneous fees and fines.

[28] Payroll taxes include taxes that go toward funding the Social Security trust fund, the Medicare trust fund, and unemployment insurance trust funds. The federal portion of the unemployment insurance payroll tax covers only administrative costs for the program; state-collected unemployment insurance payroll taxes are not included in CBO's measure of federal taxes.

share of payroll taxes to households' earnings when calculating income before transfers and taxes.

CBO allocates excise taxes to households according to their consumption of taxed goods and services. Excise taxes on intermediate goods, which are paid by businesses, are allocated to households in proportion to their overall consumption. CBO assumes that CPS households spend similar amounts as households with comparable income and demographic characteristics from the Bureau of Labor Statistics' Consumer Expenditure Survey.

Far less consensus exists about how to allocate corporate income taxes (and taxes on capital income generally). CBO allocates 75 percent of the burden of corporate income taxes to owners of capital in proportion to their income from interest, dividends, rents, and adjusted capital gains. CBO adjusts capital gains by scaling them to their long-term historical level given the size of the economy and the tax rate that applies to them; this method reduces the effects of large year-to-year variations in the total amount of gains realized. The remaining 25 percent of the corporate income tax is allocated to workers in proportion to their labor income.

Adjusting Income to Account for Differences in Unit Size

Households with identical income can differ in ways that affect their economic status. For example, a larger household generally needs more income to support a given standard of living than a smaller one does. However, economies of scale in some types of consumption—housing in particular—can mean that two people generally do not need twice the income to live as well as one person who lives alone. Because of those known economies of scale, income is an imperfect measure of economic status.

In order to better rank households by their relative economic status, CBO adjusts the income measure, dividing household income by an adjustment factor known as an equivalence scale. There are various equivalence scales in use today and a significant, if somewhat dated, literature on why and how alternative equivalence scales should be calculated for the purpose of setting public policy parameters—specifically, those related to measuring poverty and means-tested programs.[29]

To account for household economies of scale, the equivalence scale should take a value between 1 and the number of people in the household. An equivalence scale equal to 1 would make no change to the income measure and would not account for the greater needs of larger households. At the other end of the spectrum, an adjustment factor equal to the number of people in the household would imply equal average household income per person, which would not capture the benefits of shared consumption—most significantly, housing expenses—within the household.

[29] See, for example, Patricia Ruggles, *Drawing the Line: Alternative Poverty Measures and Their Implications for Public Policy* (Urban Institute Press, 1990); C. Citros and R. Michaels, eds., *Measuring Poverty: A New Approach* (The National Academies Press, 1995), http://dx.doi.org/10.17226/4759; and OECD Project on Income Distribution and Poverty, "What Are Equivalence Scales?" (accessed September 11, 2017), www.oecd.org/els/soc/OECD-Note-EquivalenceScales.pdf (388 KB).

A generalized formula for calculating an equivalence scale can be expressed as follows:

$$ES = n^e,$$

where n is the number of people in the household and e is an elasticity parameter for household size that ranges from 0 and 1, with larger values implying smaller economies of scale.[30] To adjust household income for differences in household size, CBO uses an equivalence scale known as the square root scale. Using that method, adjusted household income is calculated as household income divided by the square root of the number of people in the household.

Calculating the equivalence scale as the square root of the number of people in the household is the same as setting the elasticity parameter for household size to 0.5 because $\sqrt{n} \equiv n^{0.5}$.

Using 0.5 as the elasticity parameter for household size is convenient for several reasons:

- It is the midpoint in the range of possible values for the parameter ($n^0 < \boldsymbol{n^{0.5}} < n^1$);
- It implies that each additional person increases the household's needs, but at a decreasing rate;
- The resulting household-size adjustment is relatively similar to the family size-adjustments the Census Bureau uses in setting U.S. poverty thresholds; and
- It is transparent and relatively easy to understand.

Table A-1 shows hypothetical examples of three types of households—consisting of a married couple with two children, a single person, and a married couple without children—with different unadjusted annual incomes but with a similar annual income after adjusting for differences in household size using the square root equivalence scale.[31]

[30] Some equivalence scales have additional parameters to differentiate between the needs of additional adults and additional children, in which case the formula would be $ES = 1 + (\alpha\, n_a + \gamma\, n_c)^e$, where α and γ are weights between 0 and 1 applied to the additional number of adults and children (n_a and n_c) in the household, respectively.

[31] The most recent distributional analyses by the Treasury and the Organization for Economic Co-operation and Development (OECD) also adjust for household or family size using the square root equivalence scale. By contrast, recent studies by U.K. and Australian government agencies use a more complex adjustment called the modified OECD equivalence scale (though no longer used by the OECD), which gives a full weight to the first adult in a household, a half weight to the second adult, and a 0.3 weight to each child. The Urban-Brookings Tax Policy Center, the Internal Revenue Service, Thomas Piketty and Emmanuel Saez, and the Joint Committee on Taxation all use tax units as their units of analysis and do not make any adjustments for differences in tax unit size.

Appendix Table 1.
Households with Similar Adjusted Incomes

Household Type	Unadjusted Income	Adjusted Income
Married couple with two children (4 people)	$80,000	$40,000 ($\$80{,}000/2 = \$40{,}000$)
Single (1 person)	$40,000	$40,000 ($\$40{,}000/1 = \$40{,}000$)
Married couple with no children (2 people)	$56,570	$40,000 ($\$56{,}570/\sqrt{2} \cong \$40{,}000$)

CBO adjusts income for household size using the square root equivalence scale only for the purpose of ranking households and assigning them to income groups. All other income measures presented in the agency's distributional analyses are unadjusted. CBO presents households in adjusted household income quintiles and provides additional detail for smaller, percentile-based groupings of households within the highest income quintile (the 81st through 90th percentiles, the 91st through 95th percentiles, the 96th through 99th percentiles, and the top 1 percent). Each quintile contains approximately 20 percent of the noninstitutionalized U.S. population, and each percentile contains approximately 1 percent of the population. However, because household sizes vary, the adjusted household income quintiles contain slightly different numbers of households.

Changes in CBO's Distributional Analyses Over Time

Over the past several decades, the frameworks and assumptions used by analysts conducting distributional analyses have evolved along several dimensions. The changes to CBO's framework considered in this paper are consistent with the broader research community's reassessments of the most informative way to treat various components of distributional analyses. There is a constant tension between how a researcher would optimally measure economic resources and the data and methods available to do so. Changes over time have been attributable to advances in data collection methods and new research on the economic incidence of various taxes.

Over the years, CBO has made such changes in its calculation and presentation of the distribution of household income and federal taxes. Some of those methodological changes have resulted in significant shifts in the interpretations of trends in household income. Below is a chronology of the major methodological changes made in CBO's distributional analyses taxes.

October 1987

CBO publishes *The Changing Distribution of Federal Taxes: 1975–1990*.[32] The analysis is based primarily on incomes reported in the CPS, though adjustments are made to ensure consistency with income in the SOI data. The analysis uses a measure of cash family income, which includes cash transfers but not in-kind transfers. Estimates of the employer contribution to payroll taxes as well as federal corporate income taxes are added to family income to create a pre-tax measure. Incomes are not adjusted for differences in family size. For most taxes, the incidence

[32] See www.cbo.gov/publication/16367.

assumptions are largely the same as those used in recent CBO reports. However, results are presented on the basis of two different assumptions about the incidence of the corporate income tax—allocating it all to capital income or all to labor income.

February 1988
CBO publishes *Trends in Family Income: 1970–1986*.[33] That analysis marks the beginning of CBO's practice of adjusting income for differences in family size. Those adjustments are made by dividing income by the poverty threshold for a family of that size. Incomes are adjusted for inflation using the CPI-X1 (an alternative consumer price index based on a rental-equivalence approach to measuring housing costs).

May 1998
CBO publishes *Estimates of Federal Tax Liabilities for Individuals and Families by Income Category and Family Type for 1995 and 1999*.[34] The primary tables in that publication present distributional results based on unadjusted family income and adjusted gross income, though an appendix contains estimates with family income adjusted for the size of the family. The analysis assumes that the burden of corporate income taxes falls on families and individuals in proportion to their realized income from capital.

October 2001
CBO publishes *Effective Federal Tax Rates, 1979-1997*.[35] That report introduces several changes to the methodology:

- Households, rather than families, are the primary unit of analysis.
- Income measures now include in-kind benefits from government transfer programs such as the Food Stamps program and the Supplemental Nutrition Assistance Program, housing assistance programs, Medicare, Medicaid, and the Children's Health Insurance Program (CHIP), as well as health insurance premiums paid by employers. (CBO uses the so-called fungible value of Medicare, Medicaid, and CHIP as defined and estimated by the Census Bureau.)
- Households are ranked by income adjusted for household size. That adjustment is made by dividing household income by the square root of household size.
- Both cash income and the payroll tax base include imputed pre-tax contributions made by families to 401(k)-type retirement funds.
- Dollar amounts are adjusted for inflation using the CPI-RS (the research series of the consumer price index for all urban consumers).
- SOI and CPS records were statistically matched; previous methods involved a series of adjustments to the CPS records to make income and tax totals consistent with the SOI data.

[33] See www.cbo.gov/publication/20884.

[34] See www.cbo.gov/publication/10811.

[35] See www.cbo.gov/publication/42875.

July 2012
CBO publishes *The Distribution of Household Income and Federal Taxes, 2008 and 2009*.[36] That report introduces several further changes to the methodology:

- CBO begins allocating 75 percent of the corporate income tax to capital income and 25 percent to labor income.
- The measure of household income is expanded to include the full value of Medicare, Medicaid, and CHIP benefits, defined to equal the Census Bureau's estimate of the average cost to the government for providing those benefits.
- CBO adjusts for the effects of inflation using the personal consumption expenditures price index.

[36] See www.cbo.gov/publication/43373.

Appendix B: The Range of Distributional Frameworks in Use Today

Distributional analyses provide important insights into how the economic well-being of different segments of the population is faring over time and how it is affected by changes in government tax and transfer policies. Distributional analyses are conducted by a wide range of individual researchers, public policy think tanks, and government agencies all around the world and garner broad interest from lawmakers, the media, policy advocates, and the public alike.

The numerous research groups involved in producing such analyses have generated a range of distributional frameworks. Those frameworks vary widely, in large part because they are founded on a variety of assumptions and are used to address a variety of questions. Researchers face practical limitations on the data available to them when they construct an income measure for distributional analyses. The choices that researchers make in deciding what income sources to include in that income measure can have significant effects on the conclusions drawn from those analyses.

Although they vary in their terminology and details, the most commonly used frameworks rank households by a measure of annual income defined somewhere along a continuum from market income (income before any government intervention) to final income (income after all government intervention, including all transfers and both direct and indirect taxes).

The many distributional frameworks in use today can be broadly classified into two groups according to the type of analysis for which they are used: tax analyses or fiscal incidence analyses. As their name implies, tax analyses focus almost exclusively on the distributional impact of tax policies and give little attention to the distributional impact of government transfer policies. By contrast, fiscal incidence analyses are more comprehensive and attempt to measure the distributional effects of both government transfers and taxes. Those analyses have largely been conducted by foreign government agencies. Although fiscal incidence studies are less prevalent in the United States, the literature contains several early papers and a few recent papers reporting U.S. fiscal incidence analyses.

Tax Analyses

Numerous researchers, public policy think tanks, and government agencies produce analyses of the distributional effects of federal taxes. Because their focus is on taxes and their intention is to assess the progressivity of the federal tax system, every group conducting this type of analysis bases its distributional framework on some form of before-tax income. There is, however, a range of before-tax income measures used in those analyses. The frameworks in those analyses can generally be divided into those that define before-tax income narrowly and those that define it broadly.

Narrow Income Definitions. Distributional tables produced by the Internal Revenue Service (IRS) rank taxpayers by adjusted gross income (AGI), one of the simplest and least inclusive income measures used in distributional analyses. AGI represents a subset of market income reported directly on tax returns. It excludes many forms of income—most significantly, both the

health insurance premiums and the taxes paid by employers on behalf of workers.[37] The IRS's primary mandate is the processing of tax returns as part of the federal government's revenue collection. For that reason, although the IRS releases detailed distributional tables showing numerous income sources and tax-related values by income class, it generally does not strive to produce economic analyses with those data.

Analyses by Piketty and Saez also used a measure of market income available on tax returns. That measure included statutory adjustments to AGI but excluded taxable Social Security benefits and all other government transfers. Piketty and Saez's choice of income measure was likely based on the availability of reliable tax return data over a long historical period and the ability to decompose income from tax sources into capital and labor components.[38]

Broad Income Definitions. The distributional framework used by the Joint Committee on Taxation employs a broader measure of market income. It includes nontaxable income that is excluded from AGI, such as tax-exempt interest and the health insurance premiums and taxes paid by employers on behalf of workers. The expanded income measure further includes federal retirement benefits—specifically, untaxed Social Security benefits and the imputed value of Medicare.[39]

Both the U.S. Treasury and the Urban-Brookings Tax Policy Center use even more expansive income measures that include market income, federal retirement income (although the Treasury excludes Medicare benefits from that category), and cash and near-cash government transfers (such as benefits from the Supplemental Nutrition Assistance Program).

Fiscal Incidence Analyses

Fiscal incidence analyses examine the combined distributional effects of taxes and government spending. Those analyses tend to be based on frameworks at either end of the income spectrum. Recent U.S. fiscal incidence studies have used distributional frameworks based on a measure of market income, whereas numerous fiscal incidence studies conducted by foreign governments

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[37] John A. Koskinen and others, *Statistics of Income—2013: Individual Income Tax Returns* (Department of the Treasury, Internal Revenue Service), www.irs.gov/pub/irs-soi/13inalcr.pdf.

[38] Thomas Piketty and Emmanuel Saez, "The Evolution of Top Incomes: A Historical and International Perspective," *AEA Papers and Proceedings: Measuring and Interpreting Trends in Economic Inequality*, vol. 96, no. 2 (May 2006), pp. 200–205, www.jstor.org/stable/30034642. For updated data, see Emmanuel Saez, "Striking It Richer: The Evolution of Top Incomes in the United States," working paper (University of California, Berkeley, March 2012), http://elsa.berkeley.edu/~saez/saez-UStopincomes-2010.pdf.

[39] See Joint Committee on Taxation, *Estimating Changes in the Federal Individual Income Tax: Description of the Individual Income Tax Model*, JCX-75-15 (April 2015), pp. 26–27, www.jct.gov/publications.html?func=startdown&id=4776; and *Overview of the Definition of Income Used by the Staff of the Joint Committee on Taxation in Distributional Analyses*, JCX-15-12 (February 2012), www.jct.gov/publications.html?func=startdown&id=4408.

and international organizations utilize some measure of market income plus the net value of direct taxes and cash transfers—usually referred to as disposable income.[40]

U.S. Analyses. There exists a sparse and dated body of work in which U.S. researchers attempted to expand beyond the narrow focus of the distributional effects of taxes to produce more comprehensive fiscal incidence analyses. That literature, however, grapples primarily with how to determine the economic benefits of governmental spending on public goods to U.S. households.[41] More recently, a few reports have allocated the full effects of the entire federal budget to U.S. households. Chamberlain and Prante conducted an extremely detailed analysis of how federal, state, and local taxes and spending affect U.S. households.[42] In 2013, CBO published a report on the 2006 distribution of federal taxes and spending; that report allocated nearly the entire federal budget to U.S. households.

In contrast to the fiscal incidence reports published by foreign governments, neither the Chamberlain and Prante study nor the CBO study used an after-tax income measure to rank households. Chamberlain and Prante ranked households by cash income, which consists of wages and salaries, self-employment income, and other market-based income as well as government cash transfers such as Social Security benefits, unemployment benefits, and other means-tested transfers. Their use of this measure was based on the expectation that legislators, policy analysts, and lay people would easily be able to understand it and to locate themselves in the study's distributional tables.[43] When calculating tax rates, Chamberlain and Prante used a much broader definition of income as a proxy for households' ability to pay tax liabilities. They also used that broad income measure as the denominator when calculating governmental spending rates among the cash income quintiles.

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[40] The range of taxes and spending programs included in fiscal incidence analyses varies from study to study. On the tax side of the budget, fiscal incidence analyses conducted by foreign governments and international research organizations generally omit corporate taxes. On the spending side of the budget, most fiscal incidence analyses limit the scope of analysis to spending on transfer programs, whereas others try to capture all government expenditures (including government spending on public goods).

[41] See, for example, W. Irwin Gillespie, "Effect of Public Expenditures on the Distribution of Income," in Richard A. Musgrave, ed., *Essays in Fiscal Federalism* (Brookings Institution, 1965), pp. 122–186; Henry Aaron and Martin McGuire, "Public Goods and Income Distributions," *Econometrica*, vol. 38, no. 6 (November 1970), pp. 907–920, www.jstor.org/stable/1909699; and Patricia Ruggles and Michael O'Higgins, "The Distribution of Public Expenditure Among Households in the United States," *Review of Income and Wealth*, vol. 39, no. 3 (June 1981), pp. 229–256, http://dx.doi.org/10.1111/j.1475-4991.1981.tb00207.x.

[42] Andrew Chamberlain and Gerald Prante, *Who Pays Taxes and Who Receives Government Spending? An Analysis of Federal, State, and Local Tax and Spending Distributions, 1991-2004*, Working Paper No. 1 (Tax Foundation, March 2007), https://taxfoundation.org/who-pays-taxes-and-who-receives-government-spending-analysis-federal-state-and-local-tax-and. That report was subsequently updated in 2014 to examine tax and spending policies over the 2000–2012 period; see Gerald Prante and Scott Hodge, *The Distribution of Tax and Spending Policies in the United States*, Special Report No. 211 (Tax Foundation, November 2014), http://taxfoundation.org/distribution-tax-and-spending-policies-united-states.

[43] Unlike many other distributional analyses, Chamberlain and Prante's did not make any household-size adjustments to income when ranking households.

The comprehensive fiscal incidence study published by CBO used market income as the basis for ranking households and as the denominator in calculations of federal tax and transfer rates.[44] Because ranking households by market income results in a distribution in which elderly households (that is, households in which the owner or renter of the home is 65 or older) are overrepresented in the lowest income quintile, CBO excluded those households in its analysis by market income quintiles.

Foreign Analyses. There exists a rich literature on fiscal incidence analyses conducted by foreign governments and international organizations. The United Kingdom's Office of National Statistics (formerly known as the Central Statistical Office), for example, has regularly produced detailed analyses of how its countries' fiscal policies affect their distributions of resources since the 1960s.[45] Currently, those U.K. fiscal incidence analyses use a measure of disposable income—market income plus direct transfers minus direct taxes—as the primary income measure to rank households in those analyses. Those analyses tend to focus on year-to-year changes and longer-term changes in the nominal distribution of resources and in measures of income inequality (specifically, changes in Gini coefficients over time).

The U.K. fiscal incidence analyses do not focus on tax and transfer rates, so they do not encounter any problems by including direct transfers and taxes in the income measure used to rank households and used as the denominator in tax and transfer rate calculations. The United Kingdom does, however, report measures of taxes as a proportion of gross income (that is, market income plus cash transfers) for each of the disposable income classes.[46]

The Australian Bureau of Statistics also has a long history of producing fiscal incidence analyses and has recently published them on a biannual basis. In its most recent analysis, the bureau provides fiscal incidence results based on at least five different income ranking measures, but it emphasizes results for household rankings based on private income (similar to market income), disposable income, and final income.[47]

Canadian and New Zealand statistical agencies have produced fiscal incidence analyses more sporadically. The most recent Canadian fiscal incidence analysis examines the comprehensive effects of the government tax and transfer system on a measure of family-level post-government

[44] Market income was adjusted for differences in household size when ranking households, but was not adjusted for calculation of various rates.

[45] For the first comprehensive analysis of the redistributive nature of tax and spending policies in the United Kingdom, see Tibor Barna, *Redistribution of Incomes Through Public Finance in 1937* (Oxford University Press, 1945).

[46] U.K. Office for National Statistics, *The Effects of Taxes and Benefits on Household Income: Financial Year Ending 2014* (June 2015), https://tinyurl.com/yagedbp6.

[47] Australian Bureau of Statistics, *Government Benefits, Taxes and Household Income, Australia, 2009-10* (June 2012), www.abs.gov.au/ausstats/abs@.nsf/mf/6537.0.

income.[48] The most recent New Zealand fiscal incidence analysis ranks households by disposable income.[49]

The International Monetary Fund and the Organization for Economic Co-Operation and Development have recently published reports on the income inequality and how it is affected by governmental policies. Those reports have primarily aimed to highlight international comparisons and have focused on measures of disposable income.[50]

[48] Dagmar Dyck, *Fiscal Redistribution in Canada, 1994-2000*, Working Paper 2003-2 (Department of Finance, Canada, 2003), www.fin.gc.ca/pub/pdfs/wp2003-22e.pdf.

[49] Omar Aziz and others, "The Effect on Household Income of Government Taxation and Expenditure in 1988, 1998, 2007 and 2010," *Policy Quarterly*, vol. 8, no. 1 (February 2012), pp. 29–38.

[50] Era Dabla-Norris and others, *Causes and Consequences of Income Inequality: A Global Perspective*, IMF Staff Discussion Note (International Monetary Fund, June 2015), www.imf.org/external/pubs/ft/sdn/2015/sdn1513.pdf.