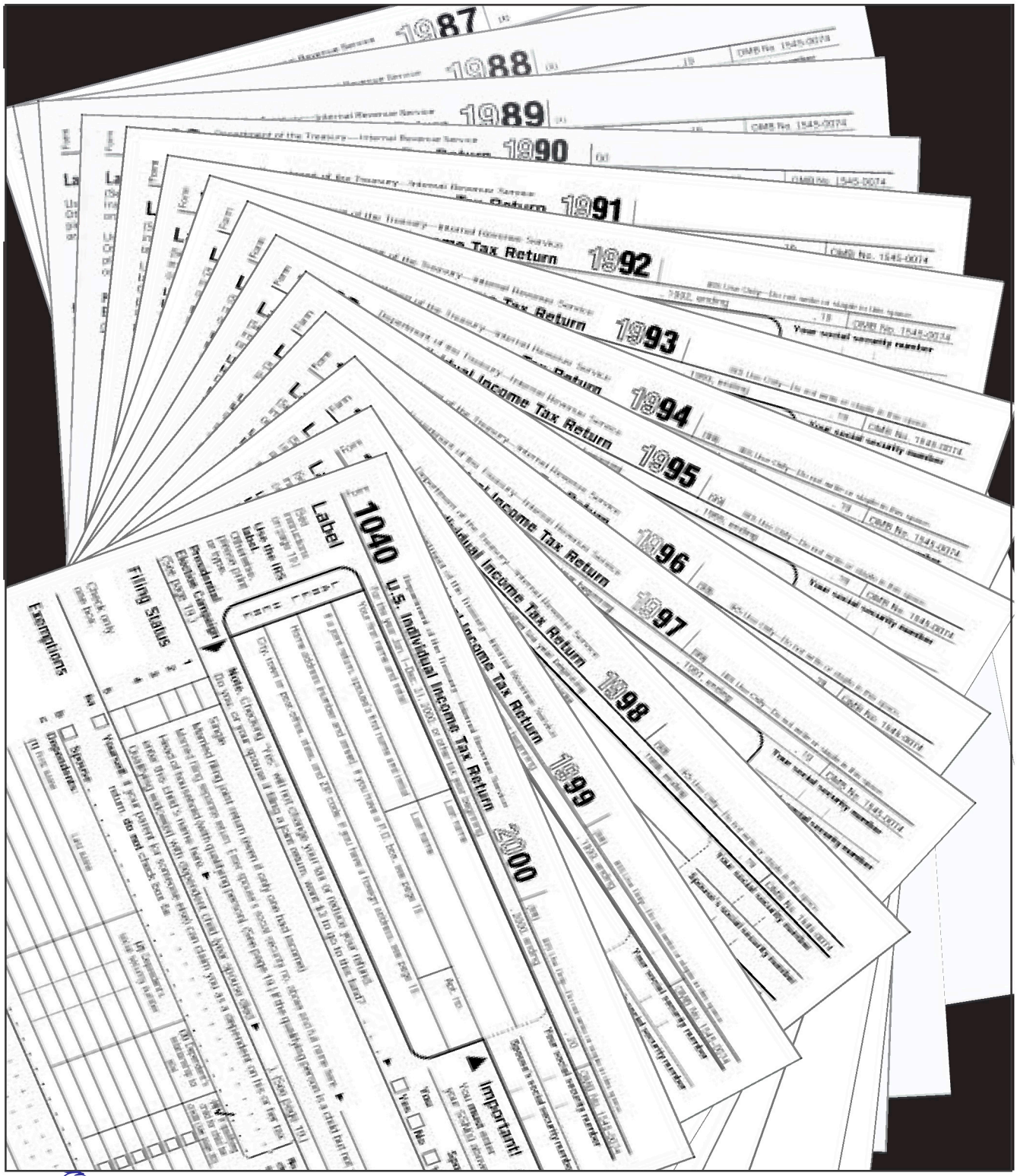
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Effective Tax Rates: Comparing Annual and Multiyear Measures

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PAPER

Effective Tax Rates: Comparing Annual and Multiyear Measures

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Notes

Numbers in the tables and text of this report may not add up to totals because of rounding.

Unless otherwise specified, all years are calendar years.

Preface

This Congressional Budget Office (CBO) paper, which was prepared at the request of the Chairman of the House Committee on Ways and Means, is the first of several papers that address methodological issues in distributional analyses. The analysis focuses on the choice of period used to assess the distribution of income and taxes and examines the effect of measuring income and taxes over periods longer than one year. It uses data from a panel of income tax returns to calculate both annual and multiyear (longitudinal) effective tax rates. But because income tax returns lack sufficient information about low-income taxpayers, the study also draws on the University of Michigan's Panel Study of Income Dynamics to extend the analysis to lower-income households.

Edward Harris, David Weiner, and Roberton Williams of CBO's Tax Analysis Division wrote the paper under the direction of G. Thomas Woodward. Dean R. Lillard of Cornell University reviewed a draft of the paper and provided valuable comments, as did John Sabelhaus, Douglas Hamilton, Paul Cullinan, and Arlene Holen of CBO. (The assistance of external participants implies no responsibility for the final product, which rests solely with CBO.)

Leah Mazade edited the paper, and Janey Cohen proofread it. Denise Williams typed early drafts of the manuscript, and Maureen Costantino both designed the cover and prepared the paper for publication. Lenny Skutnik produced the printed copies of the report, and Annette Kalicki prepared the electronic versions for CBO's Web site (www.cbo.gov).

Douglas Holtz-Eakin
Director

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Effective Tax Rates: Comparing Annual and Multiyear Measures

Introduction and Summary

The distribution of the economic burden of taxes is central to tax policy. In constructing measures of effective tax rates—the share of their income that people pay in taxes—analysts must confront a wide range of issues: what to include in measuring income, the range of taxes to be studied, the shifting and ultimate incidence of taxes (that is, on whom the ultimate burden of a tax falls), whether to study individuals or households, and the period that the analysis is to cover (see Box 1). This Congressional Budget Office (CBO) paper focuses on how the choice of a particular time frame affects distributional assessments of the burden of federal taxes.

People pay most federal taxes on the basis of annual accounting; the individual income tax, for example, is generally assessed on taxable income earned during a calendar year.[1] Because of that annual accounting period and because tax laws may change from one year to the next, most analyses of effective tax rates cover individual years. (CBO regularly publishes reports showing the annual distribution of income and taxes for specific years.)[2] How much of their income people pay in taxes fluctuates from year to year, in part because a rise or fall in income moves them into higher or lower tax brackets; in part because tax laws change; and in part because their filing status, amount of itemized deductions, or other circumstances change. At the same time, variability in people's income alters their capacity to pay taxes over time. In the face of such changes, focusing exclusively on the impact of taxes on an annual basis may provide a limited view of the relative tax burdens that people bear over time. As a broader view, for example, an analysis could compare the present value of taxes paid over a person's lifetime with the present value of his or her lifetime income.[3]

But current data do not allow actual lifetime measures of effective tax rates. The longest period for which information is available is that covered by the University of Michigan's Panel Study of Income Dynamics (PSID). The PSID has followed approximately 5,000 families since 1968, interviewing them almost annually, and that 5,000-family sample appears to represent roughly the entire population. But the PSID provides only limited information on taxes and covers relatively few individuals at the upper end of the income distribution—a segment of the population that is central to any analysis of federal tax revenues.

In contrast, the Internal Revenue Service's Statistics of Income (SOI) sample of tax returns provides rich detail on taxes and an extensive random sample of tax filers that includes those at the top of the income distribution. However, because people, particularly those at the bottom of the distribution, move onto and off the tax rolls from year to year, SOI data poorly represent the entire population over time and cannot consistently provide information on low-income taxpayers.

Nevertheless, even with such limitations, the two sources of data, especially when examined in concert, offer the

1. Some exceptions exist, such as the ability to carry unused business or capital losses into successive tax years and the ability to average income over several years, which was allowed under tax law prior to the Tax Reform Act of 1986.

2. See Congressional Budget Office, *Effective Federal Tax Rates, 1979-1997* (October 2001), and *Effective Federal Tax Rates, 1997 to 2000* (August 2003). An update in April 2004, which is available only on CBO's web site (www.cbo.gov), extends the series through 2001.

3. The present value is a single number that expresses a flow of current and future income (or payments) in terms of an equivalent lump sum received (or paid) today.

Box 1.

Distributional Analyses of Tax Systems

Distributional analyses of tax systems compare the different tax burdens that people bear, typically focusing on how those burdens vary among income groups. For example, in several reports, the Congressional Budget Office (CBO) has estimated how federal taxes are distributed annually among groups of households, which have been defined on the basis of their income. CBO's assessments rely on cross-sectional data covering single years; they do not consider how tax burdens may change over time with taxpayers' circumstances. Such longer-term measures of tax burdens require panel data—information collected annually, for many years, from the same group of people.

CBO's previous reports have presented summary statistics that include each group's average effective tax rate—tax liability as a percentage of total income—and the share of federal taxes that it paid. In 2001, for example, households in the lowest fifth (quintile) of the population paid 5.4 percent of their income in federal taxes and about 1 percent of the total federal tax bill. In contrast, households in the top quintile faced an average effective federal tax rate of 26.8 percent and paid about 65 percent of all federal taxes.

Several factors strongly influence any estimate of the distribution of taxes. They include the unit of analysis, the components of income measured, the period covered, and assumptions about the incidence of each tax—who actually bears the burden of it.

The Unit of Analysis

Analysts measure tax burdens over one of four kinds of units: individuals, taxpaying units (people included on a single tax return), families, or households. The key issue from an economic perspective is that taxes reduce consumption, so the appropriate unit of analysis should be some form of consumer unit—a group of people who combine their income to purchase goods and services. Yet even that simplification is problematic because the makeup of the groups often shifts for different purchasing choices. For example, students who share an apartment compose a single group to purchase housing but not necessarily a single group to buy food. Furthermore, consumer units are hard to identify. Available data typically report household and family relationships; to measure tax burdens on the basis of consumer units, analysts must infer the groups that actually make decisions about consumption.

The Income Measure

People typically think of their income as comprising their pay for working, returns on their investments (interest, dividends, rents, and capital gains), pension payments, and government transfer payments (such as Social Security benefits). However, researchers often use a broader concept, one that also includes the value of in-kind benefits, such as health insurance, food stamps, and housing assistance; income and payroll tax payments that are made by others (such as an employer) but that actually fall on individuals in the form of lower wages and salaries or smaller returns on investments; and the value of "services" provided by durable goods (for example, owner-occupied housing). In its most broadly construed but most difficult-to-measure form, income over a particular period equals the value of consumption of all kinds, including leisure, plus any change in wealth. Some analysts argue that consumption rather than income more accurately represents a person's well-being, even though that measure ignores savings.

Larger households generally consume more goods and services than smaller households do, and in distributional studies, many analysts adjust households' income to account for such variation.[1] For example, a couple needs more income than a single person does to consume at the same level. Measuring income per capita (total income divided by number of people) considers increased needs but ignores economies of scale: two people may not be able to live as cheaply as one, but they can live more cheaply together than they can live apart. In general, analysts use various ad-

1. Ways to adjust income are discussed in Roberton Williams, David Weiner, and Frank Sammartino, *Equivalence Scales, the Income Distribution, and Federal Taxes*, Technical Paper 1999-2 (October 1998), available from CBO's Tax Analysis Division or at www.cbo.gov/Tech.cfm.

Box 1.

Continued

justed measures of income that fall somewhere between unadjusted and per capita income.

The measure of income that analysts use for a distributional analysis and the adjustments they make for different-sized households can influence their results. Factors affecting those decisions include the purposes of the analysis, availability of data, and methods at hand for valuing noncash income or consumption.

The Measurement Period

Distributional analyses typically focus on annual measures of income and taxes—because the government generally assesses taxes annually, tax data usually cover a single year, and many taxpayers think about their income and taxes on an annual basis. A person's income may vary, however, and a single year may not accurately indicate a taxpayer's well-being. A spell of unemployment may temporarily lower income, for example, whereas the sale of a business may briefly raise it.

People's income also changes relative to that of others. Thus, a single year's assessment of income and taxes may be uncharacteristic of experience over longer periods. Income mobility stems in part from the fact that a person's income over his or her lifetime tends to follow a common pattern: it rises from low levels early in life, peaks during the most productive years, and then falls off during retirement. By measuring income over longer periods, perhaps over an entire lifetime, analysts take income mobility into account, minimize the effects of year-to-year fluctuations, and are better able to assess people's economic well-being.

Other factors that change over time affect the taxes that people pay. For example, families grow as they have children, and they shrink as children grow up and leave home. Those fluctuations produce parallel changes in both the number of dependent exemptions taxpayers can claim and their income tax liability. Therefore, even if a person's income is stable over time, other factors may lead to differences between taxes paid in a given year and average taxes paid over a longer period.

The Incidence of Taxes

Distributional assessments of tax systems require analysts to assign the burden of each tax to individuals. (The reason is that the actual burden of taxes may not fall on the people or businesses that pay them to the government. The burden may instead be shifted to others through lower wages, smaller returns on investments, or higher prices.) The assumptions used in assigning tax burdens can determine the results of an analysis. But researchers disagree about incidence—particularly for the corporate income tax and estate taxes. Furthermore, measuring incidence accurately may mean assessing not just taxes but rather taxes net of the benefits that the collected revenues pay for. For example, considering the distribution of Social Security taxes without accounting for the benefits that the taxpayer will receive in retirement may misrepresent the actual burden of the tax when the program is considered as a whole.

Most analysts agree that workers bear both the employee's and employer's share of payroll taxes—employees shoulder the latter tax burden through wages that are lower than they would be in the taxes' absence. There is less agreement about who bears other federal taxes. Some researchers maintain that the personal income tax falls entirely on the people whose income is taxed. Others argue that the portion of the tax that falls on income from capital ultimately reduces workers' income and is thus borne by workers rather than by the owners of capital. Experts similarly disagree about the corporate tax, with some asserting that it falls on income from capital, income from labor, or foreigners. Analysts' views also differ about who actually pays excise taxes and whether the burden of estate taxes falls on the person who dies or on his or her heirs.

best information with which to examine tax burdens longitudinally—that is, over periods longer than a year.

This analysis compared the distribution of income and taxes measured on an annual basis with the distribution measured longitudinally. Its key findings are as follows:

- Incomes and taxes when measured longitudinally are more evenly distributed than they are when measured annually. In addition, the distribution becomes more equal as the time horizon lengthens.

- When a one-year measure of income is used, incomes and tax rates for lower quintiles, or fifths, of the income distribution on average are lower than they are when a longer period of measurement is used. Thus, income in the second quintile when measured over 14 years is 26 percent higher than annual income over the same period, and the effective income tax rate is 3.5 percentage points higher.

- Incomes in the highest quintile are smaller when measured over a longer period than when measured annually. In the top quintile, income measured over 14 years is 4 percent below average annual income. However, for that quintile, the effective tax rate under either measurement period differs by only one-tenth of a percentage point.

- The effects of illustrative tax policy changes generally appear more evenly distributed when they are measured over multiple years than when they are assessed on an annual basis. For example, as measured on an annual basis, a doubling of the child credit would affect only 3 percent of taxpayers in the second quintile and lower the average tax rate in that quintile by 0.1 percentage points. Under longitudinal measures, almost 9 percent of taxpayers in that second quintile would see an effect, and their effective tax rate would be reduced by 0.2 percentage points. In the average year, 32 percent of taxpayers would be affected by that change, but 52 percent would be affected in at least one of 10 years. A policy that reduced the top two income tax rates would lower the effective rate only in the top quintile—by 1.0 percentage point when measured annually and by 1.1 percentage points when measured longitudinally. In the average year, only 2 percent of taxpayers would be affected by that change, but 6 percent would be affected in at least one of 10 years.

What Is Distributional Analysis?

Equity, or fairness, is a key consideration in evaluating tax policy, although there are many views on what "fairness" means. Distributional analysis, which shows how income and taxes are distributed among individuals, families, or households, is one widely used way to inform judgments about the fairness of changes in the tax system. Policymakers use such analyses to evaluate the existing distribution of tax burdens, study how the distribution has changed over time, and assess proposed changes to tax law.

Several governmental organizations, including CBO, periodically estimate the distribution of income earned and taxes paid in a given year.[4] The fundamental structure of those analyses is similar, although they differ in their details. In general, the approach is to combine information from a sample of tax returns for a year with survey data for the same year covering people who did not file tax returns. The resulting cross section of data represents the entire population for that year. Analysts assign tax payments to each taxpayer under specific assumptions about who bears the ultimate burden of each tax. (CBO, for instance, assumes that employees bear the burden of the employer's share of the payroll tax and that all owners of capital effectively pay the corporate income tax.) People are arrayed in income groups, usually by using a broad measure of income from both taxable sources (such as wages) and nontaxable sources (such as the health insurance premiums employers pay on behalf of employees). The analyses examine a number of indicators of tax policy, including the average income of each income group and the taxes each group pays—often expressed as a group's effective tax rate and share of total tax payments.

Those analyses of annual data show that the federal tax system is progressive—average effective tax rates increase as income rises. The individual income tax is especially progressive because its graduated rate structure taxes

4. See Congressional Budget Office, *Effective Federal Tax Rates, 1979-1997*, and *Effective Federal Tax Rates, 1997 to 2000*, for a detailed description of CBO's methodology. The methodology of the Department of the Treasury is described in detail in Julie-Anne Cronin, *U.S. Treasury Distributional Analysis Methodology*, OTA Paper 85 (Department of the Treasury, Office of Tax Analysis, September 1999). The Joint Committee on Taxation's methodology is outlined in Joint Committee on Taxation, *Distribution of Certain Federal Tax Liabilities by Income Class for Calendar Year 2001*, JCX-2-01 (February 27, 2001).

larger incomes at higher rates. Corporate income taxes also appear progressive under CBO's assumptions about incidence because income from capital is concentrated among people in higher-income groups.[5] Payroll taxes claim a roughly constant share of income for most groups in the income distribution, but that share declines for families with the highest income because their earnings exceed the maximum amount that is subject to tax. Excise taxes—in fact, consumption taxes generally—are regressive because lower-income groups spend a greater proportion of their income than higher-income groups spend on goods that are subject to tax.

Longitudinal Versus Annual Measures of Effective Tax Rates

Most distributional analyses consider annual measures of income and taxes. Federal income and payroll taxes are currently levied on income yearly, and annual collection periods for those revenues lead to yearly reporting of tax data. Many major surveys, such as the Bureau of the Census's Current Population Survey, also ask respondents about their income over the past year.

A one-year time horizon, however, provides a limited perspective on the distributional impact of federal taxes. Measuring income and taxes over a longer period, even over a lifetime, may assess overall economic well-being more accurately than an annual measure of income does. Annual income differs from lifetime income for many reasons, some relatively predictable and some transitory. Events in a person's life, such as marriage or divorce, may produce some of the differences; other factors relate to changes in earnings and savings over people's lifetimes. When individuals enter the workforce, they generally earn relatively low wages, but their earnings and other income rise as they gain experience and accumulate assets. Once they retire, their wages fall, and they begin to draw on their savings. Still other differences are transitory: someone may become temporarily unemployed or realize a large capital gain. As income fluctuates, tax payments change correspondingly. Thus, a person's income or taxes in any given year may not accurately represent that person's economic well-being over a longer period.

Because of such fluctuations, annual measures of income group together people who have different lifetime economic circumstances. For example, the bottom income quintile contains many people with a history of low earnings and with limited prospects for earnings in the future. But it may also include a medical student who is working part-time and borrowing against expected long-term income to defray living expenses. And it may contain retirees who have accumulated a substantial amount of wealth but have only limited income. All of those people have low annual income for the specific year being measured. Over their lifetime, however, some of them would not be found in the bottom quintile.

Analyses that use a one-year measure may cause the distribution of income and taxes to appear more unequal than it would seem in a comparable assessment that covered a longer period. In any one year, some people have a temporarily high level of income, and others have a temporarily low level. Measuring income over a longer time frame moderates those temporary effects, and the distribution of income appears more even. Also a factor with an annual measure is that if the size of the share of income that is transitory changes over time, the distribution of annual income might shift, even with no alteration in the distribution of longer-term income.

The extent to which the potential drawbacks of using cross-sectional (annual) analysis will matter depends on the actual pattern of changes in income. If taxpayers' incomes fluctuate greatly from year to year and people's lifetime incomes differ substantially from their income in any one year, then using distributional results based on cross-sectional analysis could lead to very different conclusions than those reached by using a longer-term income measure. However, if effects arising from transitory ups and downs in income and a taxpayer's stage in the life cycle are small relative to other differences among taxpayers, the annual distribution of income and taxes may be similar to the longer-term distribution.

Previous studies have examined the effects of measuring income and taxes over different periods. The Department of the Treasury recently developed a data set for a 10-year panel of families to use in analyzing tax proposals.[6] Its analysis found that income and taxes were somewhat

5. Some analysts argue that at least part of the burden of corporate income taxes falls on workers in the form of lower wages. In that view, the labor force has less capital with which to work because corporate taxes reduce investment in capital goods—lowering workers' productivity and hence their wages.

6. James Cilke and others, "Distributional Analysis: A Longer-Term Perspective," in National Tax Association, *Proceedings of the 93rd Annual Conference on Taxation* (Washington, D.C.: National Tax Association, 2001).

more evenly distributed when a 10-year measure of income was used in place of an annual measure, but overall, income and taxes were distributed similarly under both measures. Joel Slemrod, a researcher at the University of Michigan, also found that income distributions were similar under the two types of measures. (Slemrod compared "time-exposure" income—income measured over the multiyear 1979-1985 period—with annual income.)[7] He determined, however, that the share of income going to the bottom group was substantially greater under his longitudinal measure than it was under his annual measure.

The Framework of CBO's Analysis

This study followed a group of people over multiple years and compared the distribution of their income and taxes measured on an annual basis and measured longitudinally. Other facets of the analysis—the people considered, the definition of income, and the tax law that was applied to that income—were held constant to isolate the effects of measuring income and taxes over different periods (see Table 1 on page 18).

Sources of Data

The data for CBO's analysis came from two sources: the Internal Revenue Service's (IRS's) Continuous Work History Sample (CWHS), which is a random sample of individual income tax returns for the same taxpayers each year, and the University of Michigan's Panel Study of Income Dynamics (PSID).[8] The two data sets have different strengths and weaknesses. The CWHS contains detailed information about income and other tax-related characteristics (such as the amount of itemized deductions), which permits analysts to estimate income taxes accurately. However, the CWHS includes only people who file tax returns, and many lower-income families are thus excluded from the CWHS because they are not required to file returns. The CWHS has another drawback: it provides no information about untaxed income, such as means-tested transfer payments like food stamps or housing assistance. Because such income goes disproportionately to low-income households, its omission may significantly understate those households' total income and economic well-being.

In contrast, the PSID contains less-detailed information about income and no information on other tax-related characteristics, which reduces the accuracy of tax calculations from it. Furthermore, because the PSID is a survey, it is probably less reliable than tax-return data because of errors in reporting by the survey's respondents. In addition, incomes in the PSID are top-coded, or capped at certain levels, to preserve confidentiality, a feature that limits the survey's usefulness in examining upper-income families. However, the advantages of the PSID are that it covers the entire population and captures information about income from major cash transfer programs (such as the Temporary Assistance for Needy Families, or TANF, program).

Because of the relative strengths of the two data sets, CBO relied on the PSID in examining lower-income families and on the CWHS in considering middle- and upper-income taxpayers.

Unit of Analysis

CBO's study considered the income and taxes of taxpaying units, which are generally either individuals or married couples filing joint tax returns.[9] To make results from the PSID comparable with those from the CWHS, CBO created taxpaying units out of the PSID's families, essentially by including only the income of the head of the family and spouse. For families that had several taxpaying units, such as a multigenerational family, CBO considered only the primary unit (because the PSID does not provide the information necessary to track the income of secondary units). For a substantial majority of families, the primary taxpaying unit, the family, and the household were identical, so the choice of the unit of analysis in this study is unlikely to have a significant impact on its results.

7. Joel Slemrod, "Taxation and Inequality: A Time-Exposure Perspective," in James M. Poterba, ed., *Tax Policy and the Economy*, vol. 6 (Cambridge, Mass.: MIT Press, 1992).

8. The CWHS contains all taxpayers whose Social Security number ends in certain combinations. (In 2001, for example, each combination, which is a 1-in-10,000 sample of tax returns, contained about 13,000 returns.) The IRS has sampled a different number of combinations over the years, ranging from one in 1986 to five from 1998 to 2001. Its data differ from the Social Security Administration's records of earnings histories, which are also called the Continuous Work History Sample.

9. Taxpayers who file their own return but are claimed as a dependent on another return are excluded from the analysis.

Restrictions on the Sample

In this analysis, multiyear measures of income and taxes were compared with annual measures of those variables. Multiyear measures can be calculated only for taxpayers who appear in every relevant year of data; consequently, CBO restricted its analysis to those taxpayers. Yet that approach does not guarantee a representative sample. If taxpayers for whom data are available every year differ systematically from taxpayers for whom data are available only intermittently, that method might yield a misleading estimate of the experience of taxpayers who dropped out of the study (an issue that is discussed in more detail later).

CBO placed no other restrictions on the sample of taxpaying units that it considered. Taxpayers whose family structure changed, whether through marriage, divorce, or having children, were kept in the sample. Similarly, CBO retained taxpayers who reached retirement age and left the workforce as well as taxpayers who entered the workforce for the first time. Effectively, life-cycle transitions were considered part of a set of events that caused income to change over time. As a result, taxpayers who experienced such events were treated no differently than taxpayers who received a pay increase or realized a capital gain.[10]

Weighting

Weighting is a statistical tool that helps ensure that estimates derived from a sample can be "generalized"—deemed to apply—to an entire population. In the case of the CWHS, which is a simple random sample, CBO gave each return an equal weight because every tax return has an equal chance of being included in the sample. Weighting was more complex for the PSID data because of that sample's design. Families and individuals have different probabilities of being included in the PSID sample, so the survey includes weights that reflect those probabilities. The weights used in the PSID also adjust for differences in rates of response among the groups; thus, the weight for a family is different in every year of the sample. For its analysis, CBO applied to every year of a period the PSID's longitudinal weight for a family in the last year of that period.[11]

Definition of Income

The same definitions of income were used throughout the period that CBO examined. The income measure was as broad as possible, given the available data, but falls short of being comprehensive. For the tax-return data, income consists of wages and salaries, business income, taxable and tax-exempt interest, dividends, realized capital gains, unemployment compensation, rent and royalty income, taxable pensions, and other income reported on tax returns. The measure excludes Social Security benefits (because not all recipients are required to report that income on their tax returns); other untaxed income, such as TANF payments (because that information is not captured on a tax return); and in-kind transfers, such as food stamps.

CBO applied two definitions of income to the PSID data: first, taxable income, which includes wages, business income, interest, dividends, pension income, unemployment compensation, and rental income; and second, total income, which equals taxable income plus Social Security benefits and income from several cash transfer programs. Taxable income is the measure most analogous to that used for the CWHS sample, so CBO used it for the most part to facilitate comparisons between the two data sets. Total income is a broader measure that more closely approximates overall economic resources.

Measure of Tax Liability

For this analysis, CBO used a narrow measure that focused on federal individual income taxes. (The measure was intended to simplify the analysis, but in future studies, CBO may broaden the scope of its analysis to include other taxes.) Individual income taxes are the best choice for examining multiyear effective tax rates because they are the largest source of federal revenues, vary the most directly with income, and are most readily attributed to

10. Taxpayers who go through a major life-cycle change may have more-volatile income and tax payments than taxpayers who are not undergoing such transitions. As a result, their presence in the sample may increase the difference between the results of annual and longitudinal income and tax measures. In practice, however, their inclusion does not appear to be central to CBO's results. Table B-4 shows how two life-cycle-related restrictions affect the sample. The first limits the analysis to taxpayers who neither marry nor divorce during the study period. The second constrains it to taxpayers aged 25 to 60 during the period. Those restrictions had little effect on the differences between the results of annual and longitudinal income measures.

11. Applying the longitudinal individual—rather than family—weight made little qualitative difference to the study's results. For a more detailed discussion of the PSID's weights, see Martha S. Hill, *The Panel Study of Income Dynamics: A User's Guide* (Newbury Park, Calif.: Sage Publications, 1992).

individual taxpayers. Some other taxes, such as payroll taxes, would also be relatively straightforward to study. In contrast, excise taxes would be difficult to include in CBO's analytical framework because few data exist on individuals' consumption of specific goods over long periods.

To better assess changes in income separately from changes in tax law, CBO used a constant-law measure of tax liability: the liability that a taxpaying unit would have incurred if 2000 tax law had applied in the years being examined. CBO thus inflated incomes to 2000 levels and incorporated in its simulations the assumption that the 2000 tax code was in place.[12] Calculations of taxes using data from the PSID are necessarily more approximate because the survey collects no information about itemized deductions and capital gains.[13]

Construction of Multiyear Measures

For each taxpayer in the data, CBO constructed annual and multiyear measures of income and taxes. Annual measures are simply the values for each year that the data covered. Multiyear, or longitudinal, measures apply to longer periods of various lengths and are the average of annual incomes or taxes over the relevant period. Thus, for example, three-year income in CBO's analysis is one-third of total real (inflation-adjusted) income over a three-year period. A taxpayer who had income of $30,000 in year one and $60,000 in years two and three would have a three-year income of $50,000.

To compute an average effective tax rate, CBO took multiyear measures of taxes, averaged people's tax payments over multiple years, and divided by their average income. Suppose that the taxpayer who had a three-year income of $50,000 had tax liability of $3,000 in year one and $12,000 in years two and three. He or she would have a three-year tax liability of $9,000. Dividing that three-year average liability ($9,000) by three-year income ($50,000) yields a three-year effective tax rate of 18 percent. That multiyear rate represents the share of the taxpayer's total income that he or she would have paid in taxes, given the pattern of income, had 2000 law been in effect over the entire three-year period.

Other methods would generate different longitudinal effective tax rates. One alternative would compute the longitudinal rate by averaging the rates from each year. That method would weight the tax rate in each year equally—even though the tax rate in years when the person's income was higher would contribute more to the multiyear tax burden. Because of the progressivity of the tax system, that alternative method would generally make longitudinal tax rates appear lower than the rates generated by the measure used in this analysis.

Another approach would compute the longitudinal rate by estimating what taxes would have been had the person received his or her average income in every year of the period. Clearly, that method would not capture the interactions between the level of annual income and taxes. Because income taxes are assessed annually and income is subject to a schedule of increasing rates, taxpayers whose income is volatile generally face higher effective rates than those whose income is the same on average but more stable.

Definition of Income Categories

CBO's analysis assigned taxpayers to quintiles on the basis of their income, measured over single years or multiyear periods. The process for the PSID was straightforward because the data represent the entire population. Thus, for each year, analysts ranked all taxpaying units in the PSID cross section by income and divided the units into quintiles of equal size.

Calculating quintiles for the CWHS was more complicated.[14] Because the data exclude families who do not file

12. Incomes were adjusted for inflation through the consumer price index research series (CPI-U-RS).

13. Several simplifying assumptions were made to calculate taxes from the PSID data. First, the tax base was considered to comprise wages, business income, interest, dividends, pensions, unemployment compensation, and rental income. Second, all filers were assumed to take the standard deduction. Third, legally married couples in general were assumed to file a joint return and unmarried people to file either a single or a head of household return. (The exception was unmarried couples who lived together. The PSID treats those couples as married and does not report all income separately for them, so CBO treated them as filing a joint return.) Finally, if a family had children residing with their parents, the children were assumed to be qualifying children for purposes of the dependent exemption, head of household status, the earned income credit, and, if they were under 17 years old, the child credit. For a more detailed discussion of the issues in estimating taxes from the PSID, see Barbara A. Butrica and Richard V. Burkhauser, *Estimating Federal Income Tax Burdens for Panel Study of Income Dynamics (PSID) Families Using the National Bureau of Economic Research TAXSIM Model*, Aging Studies Program Paper No. 12 (Maxwell Center for Demography and Economics of Aging, Syracuse University, December 1997).

tax returns and the sample has experienced disproportionate "attrition" (departure from the sample as years passed) among lower-income taxpayers, the CWHS does not represent the full population (see Box 2). As a result, if CBO had constructed quintiles by dividing the CWHS sample into fifths of equal size, the income ranges of those quintiles would have differed from the ranges of quintiles created by dividing a representative sample into fifths. (For example, the bottom fifth of people who filed tax returns in consecutive years have substantially higher incomes than the bottom fifth of the entire population.) The misalignment of income ranges between the two sets of quintiles would have made it difficult to generalize results from a given CWHS quintile to the same quintile of the full population.

To address the CWHS's exclusion of families who do not file returns, CBO used data from a representative cross-section of the entire population to divide the tax-return sample into quintiles. Information from the entire tax-filing population in a given year was first combined with data for the same year from the Current Population Survey, forming a cross section that represented the entire population. The taxpaying units in the cross section were then ranked by income and divided into five equal-sized groups. (The ranking incorporated the assumption that all nonfilers fell into the lowest income quintile.) CBO then used the income range associated with each population quintile to assign members of the CWHS sample to income groups (see Appendix C). For example, if the lowest population-based quintile had income ranging from zero to $15,000, any CWHS taxpaying unit with income in that range would be assigned to the lowest quintile. The "quintiles" that resulted from that procedure did not each contain one-fifth of the CWHS sample; rather, they contained the members of the sample whose level of income put them in that particular population-based fifth. At the same time, the procedure resulted in too few taxpaying units to allow meaningful estimates for the lowest quintile. Consequently, CBO reports no findings for that income category based on the CWHS data.

14. In contrast to CBO's historical cross-sectional method, this analysis ranks taxpayers by their level of income without adjusting for the size of the taxpaying unit. Moreover, in this study, income quintiles are structured to have equal numbers of taxpaying units rather than equal numbers of people. Both of those choices reflect the fact that information on tax returns does not allow precise identification of the size of an economic unit.

Defining income quintiles based on longitudinal income is difficult because multiyear income can only be determined for a subset of the population—taxpayers who appear in every year of the data. That limitation makes it impossible to calculate the longitudinal income ranges for each fifth of the entire population. Instead, CBO created longitudinal quintiles that had the same average number of taxpayers as the average of the cross-sectional quintiles with which they were being compared (the average annual measure). That procedure ensured that observed differences between annual and longitudinal income and taxes for a particular quintile derived solely from changing the measurement period and not from changes in the number of taxpayers in each quintile.

Comparison of Annual and Longitudinal Distributions

CBO averaged values from all the cross sections in a period into a single measure, which it then compared with a longitudinal measure of income and taxes over the same span. That average cross-sectional measure provides a suitable basis for comparison because it covers the same period that the longitudinal measure covers, dividing the same total income and total taxes among the same group of taxpayers. An alternative to the average of annual measures would be to compare the longitudinal results with a single cross section. How to choose that comparison year, however, is not obvious, and whatever choice was made could influence the study's results. (Differences between the longitudinal measure and any one cross section would reflect the shifting of the cross-sectional distribution over time in addition to the length of time over which income and taxes were measured.)

For this analysis, the average annual measure was compared with two different longitudinal measures. The first, longitudinal with longitudinal ranking, combined income and taxes over multiple years into one longitudinal metric for each taxpaying unit and arrayed those units into quintiles on the basis of that metric. Essentially, the measure substitutes a multiyear time horizon for a one-year span, showing distributional results under the longer period.

The second longitudinal measure, longitudinal with first-year ranking, also calculates income and taxes on a multiyear basis, but it arrays taxpaying units into quin-

Box 2.

Sampling Issues Associated with Longitudinal Data

Cross-sectional surveys draw a sample of people that represents the entire population, and they collect information about those people at a single point in time. By comparison, longitudinal, or panel, studies begin with a cross-sectional sample and then follow those people over an extended period, collecting information about them at regular intervals. On the one hand, the multiyear aspect of such research makes longitudinal data valuable for examining dynamic processes or discerning cause-and-effect relationships. On the other hand, the extended nature of panel studies makes it more difficult to maintain a sample that represents the entire population.

One way in which a panel may become unrepresentative is through attrition—the disappearance of some people from the panel during some years. If participants who drop out differ fundamentally from those who do not, their omission may make the panel unrepresentative of the full population and bias results based on the panel. Statistical procedures can lessen the effects of attrition, but the problem always afflicts analyses that use panel data.

The University of Michigan's Panel Study of Income Dynamics (PSID), on which the Congressional Budget Office (CBO) based a substantial portion of this analysis of effective tax rates, reflects substantial attrition, even though study staff try to maintain contact with all of the families in the sample. About half of the original families in the PSID left the survey during its first 20 years—some moved and could not be located, others died, and still others declined to participate any longer.

Several studies have evaluated attrition in the PSID and found that it is concentrated among lower-income respondents.[1] Yet despite the loss of people from the panel, the distribution of income among the PSID's respondents is similar to the income distribution in the Bureau of the Census's March Current Population Survey for various years—which suggests that the PSID has remained roughly representative. Two factors account for that finding. First, the PSID contains attrition-adjusted weights that are intended to partially correct for different rates of attrition among the various demographic groups. Those adjustments are small but generally improve the survey's representativeness. Second, differences in the initial characteristics of the families who leave the study and the families who stay have faded over time, allowing the survivors on some dimensions to adequately represent those who have left.

Yet even if cross-sectional data gathered through the PSID remain roughly representative of the larger population, the pattern of changes in income—the focus of CBO's analysis—may differ systematically between those who remained in the sample and those who left it. No external benchmark exists against which that pattern might be compared. One way to measure the possible bias arising from attrition is to compare longitudinal and annual income of PSID respondents who remain in the sample for different lengths of time. Such a comparison shows that patterns are similar whether a respondent is required to be in the sample for nine years or only for three and suggests that attrition does not unduly influence results from the PSID (see Tables B-5 and B-6).

Attrition is a bigger problem in the Internal Revenue Service's (IRS's) tax data than in the PSID. Although most Americans file tax returns every year, many people move into and out of the tax system as their income rises and falls. For example, the proportion of taxpayers who appear in data for 1987 from the

1. John Fitzgerald, Peter Gottschalk, and Robert Moffitt, "An Analysis of Sample Attrition in Panel Data: The Michigan Panel Study of Income Dynamics," *Journal of Human Resources*, vol. 33, no. 2 (Spring 1998); Lee A. Lillard and Constantijn W. A. Panis, "Panel Attrition from the Panel Study of Income Dynamics: Household Income, Marital Status, and Mortality," *Journal of Human Resources*, vol. 33, no. 2 (Spring 1998); and Elena Gouskova and Robert F. Schoeni, "Comparing Estimates of Family Income in the Panel Study of Income Dynamics and March Current Population Survey, 1968-1999" (2002), available at http://psidonline.isr.umich.edu/Guide/Quality/psid_vs_cps.pdf.

Box 2.

Continued

IRS's Continuous Work History Sample (CWHS) and who also appear in the file for each of the subsequent 13 years is just 56 percent. People who are missing for one or more years may, among other reasons, have died, married and filed joint returns under their spouse's Social Security number, or had income below the level requiring a tax return. (Appendix A discusses attrition in the CWHS in more detail.) Regardless of the reason for their absence, those taxpayers are likely to differ in important ways from people who file a return every year, and their omission from a longitudinal analysis may bias its findings.

People who have low income are underrepresented in the CWHS. Their small numbers imply that conclusions about them that are based on the CWHS data may be unreliable—not only because of the small samples but also because low-income people who appear in multiple years may show up only because they are unique in some ways. (Specifically, their low-income status is more likely to be temporary than that of people who file intermittently.) The absence of nonfilers in the CWHS further means that some people who have the most volatile income may not be part of the sample. For example, in a study covering a multiyear period, someone who entered the workforce during that time would not appear in the study's initial years, when they were not employed. And someone who retired might not appear in later years when relying primarily on nontaxable benefits from Social Security.

Attrition does appear to affect comparisons of longitudinal and cross-sectional measures based on the CWHS, especially comparisons for the second quintile, or fifth, of the income distribution (see Tables B-1 and B-3). CBO's analysis covered 1987 to 2000. Restricting the study to returns that appear in each year's data over the period results in three-year longitudinal income, measured using the CWHS data, that is approximately 7 percent to 9 percent above average annual income; restricting the analysis to returns that appear in any three-year period leads to three-year longitudinal income that is 3 percent to 4 percent higher. Effective tax rates follow a similar pattern: the difference between longitudinal and cross-sectional rates appears greater when the CWHS is restricted to returns that appear in each of the 14 years. Thus, if an analysis requires that sample members' returns appear in every year of the data, the study's results for the second quintile may overstate the differences between longitudinal and annual income and tax rates.

However, comparisons of annual and longitudinal income that use the tax data are qualitatively similar to comparisons that use the PSID. That similarity suggests that conclusions drawn from the tax data may be generally valid, despite the attrition it sustains, if the PSID has in fact remained representative. To further test how attrition might be biasing results, CBO simulated in the PSID the attrition that occurs in the CWHS (see Appendix A for details). For likely filers, differences between cross-sectional and longitudinal income and taxes were comparable for the full population, which suggests that results outside of the lowest quintile might not be driven by attrition and that conclusions drawn from the tax data may be generally valid.

Another reason that a sample panel may become unrepresentative is that the underlying population changes over time while the panel remains constant. The sampling design of the CWHS—a simple random sample based on Social Security numbers—ensures that as new people enter the filing population, they will automatically be included in the panel so that the CWHS will reflect that population. The PSID's design requires that it follow all descendants of its initial sample, thus automatically capturing many aspects of shifts in population. The PSID's original design, however, did not include a method to account for new immigrants, and people who came to the United States after the initial sample was drawn in 1968 are not included. As a result, the PSID over time has become less and less representative of the entire population, although changes in the late 1990s added a sample of recent immigrants.

tiles on the basis of their income in the first year of the measurement period. This second metric shows the income and taxes that accrue to a fixed cross-sectional quintile over multiple years, as taxpayers' income and associated taxes change from one year to the next. By keeping taxpayers in their initial quintile, the measure provides a rough indicator of how likely taxpayers are to be "misclassified" in a cross section.

Limitations of the Analysis

Several shortcomings in the available data limit the conclusions that can be drawn from CBO's analysis. Most important is the issue of attrition. Both the CWHS and the PSID have suffered substantial attrition over time, which may bias results based on them in unknown ways. However, prior research has shown that despite attrition, the PSID remains representative at the cross-sectional level, and CBO's results from the tax data are similar to those from the PSID. Together, that evidence suggests that the attrition bias might not be severe.

A second major limitation involves the length of time that the analysis covered. The longest period over which income was measured was 14 years, a span that CBO considered long enough to mitigate the effects of transitory changes in people's income (such as realized capital gains or spells of unemployment). Even a 14-year period, however, does not fully capture income and tax liabilities over a person's lifetime. The youngest taxpayers will appear in the data only for their middle years, when their income is relatively low. Middle-aged taxpayers will generally show high earnings because they are in their peak income years. Other taxpayers may only appear during their retirement years, and their pensions and income may greatly understate their lifetime income. Unfortunately, no better measures currently exist.

A final cautionary note applies. The distributional methodology used in this analysis differs in some important respects from the methodology that CBO has used in other analyses of effective tax rates (see Table 1 on page 18). That earlier methodology, which remains CBO's primary approach to distributional analysis, relies on a combination of detailed income and tax data from tax returns and, from the Current Population Survey, information about the family relationships of different taxpaying units and the extent of their nontaxable income. No source of longitudinal data contains the same range of information, so this analysis cannot replicate the kind of results CBO's usual methodology provides. The findings reported below are thus not fully comparable with those from CBO's other distributional analyses. Within the limitations discussed above, however, the general conclusions should be valid.

Distribution of Annual and Longitudinal Income and Taxes

In this analysis, CBO examined income distributions and tax rates over several periods of varying lengths. A major finding is that longitudinal measures over such periods show that income and taxes are more evenly distributed among taxpaying units than annual measures show them to be. The largest difference between the two measures appears in the lower-income quintiles. Moreover, the longer the time frame used in longitudinal measurement, the more even the income distribution becomes.

During the three-year period from 1993 to 1995, the distribution of income and taxes as measured annually changed little (see Table 2 on page 19). For the middle three quintiles, incomes fluctuated around their respective averages over the three years. Income in the highest quintile was flat from 1993 to 1994; then, in 1995, it jumped by more than 5 percent—which pulled up the overall average. Also fluctuating within a fairly narrow range were effective tax rates for the middle three quintiles during the period. And in 1995, when income in the top quintile rose, the effective tax rate increased as well. As a result, the average annual distribution of income and taxes over the period looked much like the distribution in any one year. (Box 3 discusses the income measures used in Table 2 on page 19.)

At the bottom of the income distribution, income measured longitudinally was higher than average annual income; by comparison, in the highest quintile, longitudinal income was lower. For example, longitudinal income for the second quintile (the lowest quintile was excluded from the analysis) over the three years was $13,650—7 percent higher than the annual average of $12,750 over the same three years. In contrast, longitudinal income for the top quintile—$115,550—was 1 percent below the annual average of $116,750. In each yearly cross section, the lower income quintiles contained people with temporarily low income, and the top quintile contained some individuals with temporarily high income. Measuring income over three years moderates those temporary effects, raising incomes at the bottom and paring them back at the top.

Box 3.

Distributional Measures

This analysis uses several different metrics to show the distribution of income and taxes.

Annual, or cross-sectional, measures are one-year snapshots of the distribution of income and taxes. Families are grouped into quintiles (fifths of the distribution) on the basis of that one year's income.

Average annual measures combine several annual snapshots into one measure. For each quintile, annual income and taxes over several years are averaged together, even though the quintiles may contain different people in each year.

Longitudinal measures cover multiple years. Income and taxes over the multiyear period are averaged together into one longitudinal metric for each family, which is then used to rank families into quintiles. The longitudinal measure essentially substitutes a multiyear measurement period for a one-year period.

Longitudinal measures with first-year ranking are a hybrid of the cross-sectional and longitudinal measures. Such metrics rank taxpayers by their income in the first year (to define quintiles) but then average each taxpayer's income and taxes over the multiyear period. The measure thus shows the income and taxes that accrue to a particular cross-sectional quintile over the period.

Changes in the share of pretax income for each quintile when measured longitudinally mirrored changes in income levels, rising in the lower quintiles and falling in the top. Even though longitudinal income is noticeably higher at the bottom of the distribution, that quintile's small share of it means that a large percentage increase in income has little effect on overall income shares. For example, the second quintile received 2.3 percent of average annual income and 2.5 percent of longitudinal income. By contrast, the share of longitudinal income received by the highest quintile was close to 1 percentage point smaller than its share of average annual income.

The pattern of effective individual income tax rates was related to that of income. The biggest difference between average annual and longitudinal rates was in the second quintile, for which the changes in income were largest. Because longitudinal income for that group was higher and progressive income tax rates rise as income increases, the associated taxes were also higher.

Extending the analysis over a longer period revealed similar but larger effects (see Table 3 on page 21 and Table 4 on page 23). Over the seven years from 1991 to 1997, longitudinal income for the second quintile was 16 percent higher than the average of annual incomes over the same period. Measuring income over the 14 years (1987 to 2000) for which data were available showed longitudinal income exceeding the average annual measure by 26 percent in the second quintile. The differences were smaller for the middle and fourth quintiles; for the highest quintile, longitudinal income was less than average annual income. Again, differences in the shares of income under the two measures mirrored the differences in levels of income. The major effect of lengthening the measurement period was to further narrow the differences between quintiles in levels of income.

Tax rates for the middle three quintiles were higher under the longitudinal measures than under the annual measures, reflecting the quintiles' higher levels of income. In the top income group, longitudinal tax rates were either unchanged from or slightly higher than annually measured rates, despite the lower longitudinal income for that group. Under the annual measures, capital gains for the top quintile made up a larger share of income than they accounted for under the longitudinal measure. Since gains are taxed at lower rates than those that apply to ordinary income, they reduce the overall effective tax rate to a greater extent under the annual measures than under the longitudinal ones.

Analysis of income and taxes using data from the Panel Study of Income Dynamics also found that distributions were more even under longitudinal measures than under annual measures (see Box 4). Examining different periods

Box 4.

Measuring Income Longitudinally Using the Panel Study of Income Dynamics

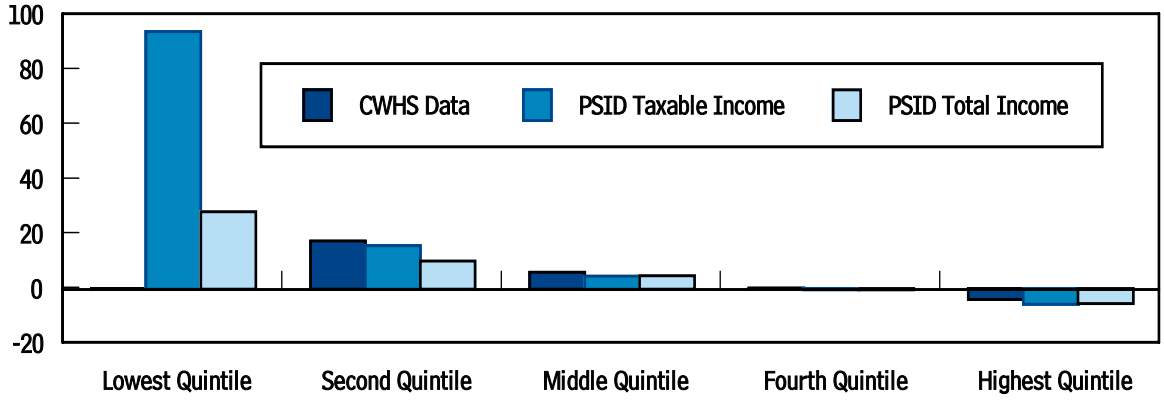
The Internal Revenue Service's Continuous Work History Sample (CWHS) is not well suited to examining the income of lower-income families, many of whom are not required to file tax returns in some years. By comparison, the University of Michigan's Panel Study of Income Dynamics (PSID) avoids some of the pitfalls inherent in the tax data, making it a superior source of information for examining the financial well-being of lower-income families.

As part of its analysis, the Congressional Budget Office (CBO) compared annual and longitudinal income from 1987 to 1995, using a measure of taxable income based on the CWHS and measures of taxable income and total income based on the PSID. The same general pattern appeared in both the CWHS and PSID measures: income measured longitudinally was more evenly distributed among quintiles than was income measured annually. Longitudinal income was substantially higher than annual income among families in the lower quintiles and slightly lower than annual income for families in the highest quintile (see the figure below).

Varying the definition of income produced substantially different results in the lowest quintile. Taxable income is very volatile for that income group; consequently, when measured longitudinally, it is almost double the amount of average annual taxable income. In contrast, total income measured longitudinally is only 25 percent higher than total income measured on an annual basis. Average annual taxable income among families in the bottom quintile is very low, averaging $1,650 over the nine-year period, so small changes in the dollar value of taxable income for that group produce large percentage changes. Because the bottom quintile relies more heavily on income from nontaxable sources, total income for that group varies less than does taxable income.

For the upper four quintiles, the three measures show similar differences between annual and longitudinal income regardless of whether data from the CWHS or PSID are used and whether total or taxable income is examined. Upper-income families are fully represented in both data sets, and they receive relatively little income from nontaxable sources. As a result, the choice of data set and income measure has little effect on the relationship between annual and longitudinal income and taxes for such families.

Difference Between Annual and Longitudinal Income Under Different Definitions of Income, 1987 to 1995 (Percent)



or varying the restrictions applied to the sample yielded similar conclusions about the relative distribution of annual and longitudinal income and taxes.[15]

Distributional Effects of Illustrative Policy Changes Under Longitudinal Measures

Changes in tax law affect taxpayers at different points in the income distribution in varying ways. Because people's financial circumstances fluctuate from year to year, changes in policy will affect a particular taxpaying unit differently over time. The distributional impact of a policy measured longitudinally will look somewhat different from the policy's effect as measured on an annual basis.

CBO's analysis examined the distributional effects of three illustrative policy changes: reducing the top two individual income tax rates, doubling the value of the child credit, and making the child credit fully refundable. The effects of the first two policies were simulated using data from the CWHS because those policies would primarily affect middle- to high-income families.[16] The third policy would affect mainly low-income families; therefore, CBO used data from the PSID for that simulation.

To assess the impact of the changes in policy over 10 years, CBO used three different measures of the distribution of income: average annual, longitudinal, and longitudinal with annual, or first-year, ranking (see Box 3 on page 13). For each policy, CBO compared the tax liabilities that each measure generated with a fixed base that reflected tax law in 2000. Comparing the results of the three measures demonstrated the effect of moving from an annual to a longitudinal assessment.

- The average annual measure combined the distributional effects for 10 different years measured separately. For each year, CBO ranked taxpayers into quintiles on the basis of that year's income; the effects of the illustrative policy change were then simulated and allocated to those cross-sectional quintiles. (That method is similar to approaches that are currently used to estimate the distributional effects of changes in tax policy.)

- The longitudinal measure showed the 10-year change in taxes, assigning taxpayers to their multiyear income quintile. That approach substituted a 10-year time frame for the annual period that is currently used and showed how tax changes affect the tax burdens of each income class.

- The third method, a longitudinal measure with first-year ranking, arrayed taxpayers into quintiles by their income in the first year but calculated their income and taxes for the full 10-year period. That approach measures how the policy changes affect a fixed cross-sectional income quintile over 10 years.

Reduce the Top Two Individual Income Tax Rates

The first illustrative scenario would reduce the top two tax rates under 2000 law—36 percent and 39.6 percent—to 31 percent. Those top rates, which were created by the Omnibus Budget Reconciliation Act of 1993 (OBRA-93), apply to the highest-income taxpayers. In 2000, the 36 percent rate applied to taxable income above $132,600 for single taxpayers and above $161,450 for married taxpayers filing a joint return. The 39.6 percent rate applied to both single and joint filers who had income above $288,350. This scenario would undo the changes made by OBRA-93, taxing income previously taxed at 36 percent or 39.6 percent at the new maximum rate of 31 percent.

The cross-sectional analysis of that change shows that all of its effects are concentrated in the top of the income distribution (see Table 5 on page 25). According to the average annual measure, the effective tax rate would change only for the highest quintile, dropping by 1 percentage point over 10 years. Taxpayers in the top 1 percent of the income distribution would see a reduction of 3.2 percentage points in their effective tax rate.

If taxpayers are ranked by their income in the first year of the measurement period and then income and tax changes are measured longitudinally, a somewhat differ-

15. Appendix B compares longitudinal and average annual distributions for each three- and seven-year period from 1987 to 2000 for taxpayers who appear in all 14 years of the data. Results are quite similar for all of those periods. The appendix also presents results for each three-year period when the restriction that a taxpayer appear in every year of the 14-year period is dropped. The differences between longitudinal and average annual income and taxes appear similar; for the lower quintiles, however, the difference in income between the measures is smaller.

16. In a separate analysis, the PSID data were used in simulating the first two policies and produced qualitatively similar results.

ent picture emerges (see the second column in the table). The scenario's effects would still be highly concentrated but at the same time slightly more dispersed. Again, the effective tax rate would change only for taxpayers in the highest quintile in the first year, but some people in the lower quintiles also would be affected by the lower rates—for example, 0.4 percent of taxpayers in the fourth quintile would face a lower tax rate. In addition, some people who had lower income in the base year would have higher income in subsequent years and benefit from the tax change at that point.

Measuring the tax scenario's effects longitudinally would result in no change in effective rates outside of the top quintile (see the third column in the table), although a few taxpayers outside of that income group would face reduced rates. Relative to the cross-sectional measure, a smaller share of taxpayers in the top percentile would be affected by this rate reduction policy under the longitudinal measure. But there is little difference between the two measures in the share of filers in the top 5 percent who would feel an effect, implying movement within the distribution's top few percentiles.

Many more people would be affected by the reduction in rates in any one year than would be affected in the average year. Over the 10-year period, the reduction would affect an average of 2.4 percent of taxpayers. But 6 percent would see a drop in their effective tax rate in at least one year, implying significant movement the falling rates. At the same time, the overall distribution of effects, measured by the change in the effective tax rate, would show smaller changes. That lesser impact would largely result because people who moved briefly into the affected income range would generally see a smaller drop in rates than those who were more permanently in that range.

Doubling the Child Credit

A second tax policy scenario would increase the child credit from $500 to $1,000 for each child aged 17 or younger in a family. As under 2000 law, the credit would begin to phase out when a single taxpayer's income exceeded $75,000 and a married taxpayer's income exceeded $110,000. The credit would not be refundable—that is, its value could be no greater than the taxpayer's income tax liability. Thus, taxpayers who owed little or no income tax before applying the credit would be little affected by it.

Under an average annual measure, the distributional effects of doubling the child credit would be concentrated in the top three quintiles (see Table 6 on page 26). Taxpayers at either end of the income distribution (that is, the bottom two quintiles and the top percentiles) would be less likely to be affected by the change than would taxpayers in the middle of the distribution. Taxpayers with lower income do not owe enough income tax to take full advantage of the credit, whereas taxpayers with the highest income fall above the phaseout range and hence cannot claim the credit.

Measuring the policy's impact longitudinally shows a distribution of effects that is similar to the distribution under annual measures, with the biggest change in rates in the middle and fourth quintiles. Under the longitudinal measures, the policy change would affect more taxpayers at the top and bottom of the income distribution than would be affected under the cross-sectional measure. For example, under the average annual measure, only 3.2 percent of taxpayers in the second quintile would receive the higher credit, compared with 8.6 percent under the longitudinal measure. As their income rose and fell, both low-income and the highest-income taxpayers would move into and out of the income range in which they could receive the credit. The effects of the illustrative policy appear most dispersed when measured longitudinally with first-year ranking.

Many more taxpayers would receive the credit in at least one year of the period than would receive it in the average year. Just under one-third of filers would get the credit in the average year; by contrast, more than half would receive it in at least one year. Income dynamics partially explain that outcome. In any given year, many taxpayers would have income that was too high or too low to receive the credit. But over a multiyear period, fluctuations in income would move them into the range in which the credit would affect their tax liability. Demographic changes would also contribute to the credit's being more widely distributed among the quintiles. Over the 10-year window, some families would have newborn children, making them newly eligible for the credit, whereas other families would see their children turn 18 and thus no longer qualify for it.

Under the average annual measure, only 3 percent of taxpayers in the second quintile would receive the higher credit, compared with 31 percent who would receive it in at least one year under the longitudinal measure. Yet that

difference may overstate the degree to which those taxpayers would experience a lower effective tax rate, because they would benefit only in years in which their income was high enough that they would owe income tax. Only 9 percent of taxpayers in the second longitudinal quintile would receive the credit in the average year, which implies that the average recipient in that quintile would get the credit in only three of the 10 years possible. In contrast, recipients in the third longitudinal quintile would receive the credit on average in five of the 10 years, while those in the fourth and fifth quintiles would get the credit in nearly seven years of the period.

Make the Child Credit Fully Refundable

Under the tax laws prevailing in 2000, the child credit is not refundable, so families that have no income tax liability cannot receive it. This third policy scenario would make the $500 child credit fully refundable, allowing such families—those with no earnings or income tax liability—to claim the full credit.[17]

Analysis of that policy using an average annual measure showed that the policy's effects would be heavily concentrated in the bottom of the income distribution (see Table 7 on page 27). The change would lower the effective tax rate in the bottom quintile by 2.8 percentage points; it would cut the effective rate in the second and middle quintiles by 0.6 and 0.1 percentage points, respectively. Some families in the fourth quintile who had very low levels of taxable income compared with their total income would also be affected by the change, although not by enough to change the quintile's effective tax rate.

Under the longitudinal measures, the distribution of the policy change's effects among the quintiles was similar to that under the average annual measure but somewhat more dispersed. The effective rate as measured using any of the three methods would change by more than a percentage point in the bottom quintile, by about half a percentage point in the second quintile, by one-tenth of a percentage point in the middle quintile, and not at all in the fourth and fifth quintiles. Under the longitudinal measures, some families in the fourth and highest quintiles would be affected by the policy because they may experience spells of unemployment, businesses losses, or some other decline in their income. Those circumstances might push their income below the level at which they would owe federal income taxes, allowing them to claim the credit because of its refundability.

The change in the effective rate for the lowest quintile is smaller when measured longitudinally than when measured annually. Lower-income families would receive about the same amount of credit under both longitudinal measures. However, because their longitudinal income would be much higher than their annual income, the tax reduction would represent a smaller percentage of their income under the longitudinal measures.

Many more families (over 16 percent) would receive the credit in at least one year than would receive it in the average year (fewer than 7 percent). As with the previous policy scenario, both fluctuations in income and changes in the families' composition would cause different families to benefit from the credit over time.

Conclusion

For each of the illustrative tax policy scenarios, the effects of the change were distributed more broadly when they were assessed under the longitudinal measures than when evaluated under an annual metric. CBO's results showed that income quintiles that were unaffected by a change in tax policy in a single year might be affected over longer periods, as income rose and fell. However, the choice of either a longitudinal or an annual metric to measure a potential policy's effects would not dramatically shift the overall distribution of any of the changes CBO examined. Policies that when measured annually would primarily affect the upper or lower portions of the income distribution showed roughly similar patterns in the longitudinal distributions.

17. CBO used data from the PSID for this part of its analysis because the policy change would primarily affect low-income families.

Table 1.

Selected Methods for Distributional Analyses

	Methods Used in This Longitudinal/Cross-Sectional Analysis		Method Used in Prior CBO Cross-Sectional Analyses
	Based on Tax Data	Based on Survey Data	
Source of the Data	Continuous Work History Sample (Internal Revenue Service)	Panel Study of Income Dynamics (University of Michigan)	Current Population Survey (Census Bureau) Statistics of Income (Internal Revenue Service)
Unit of Analysis[a]	Taxpaying unit	Taxpaying unit	Household
Restrictions on the Sample	Taxpaying unit must appear in every year	Taxpaying unit must appear in every year	None
Income Definition	Wages and salaries Self-employment income Rental income Interest and dividends Realized capital gains Retirement benefits	Wages and salaries Self-employment income Rental income Interest and dividends Cash transfer payments Retirement benefits	Wages and salaries Self-employment income Rental income Interest and dividends Realized capital gains Cash transfer payments Retirement benefits In-kind benefits[b] Taxes paid by businesses (Employer's share of social insurance taxes and corporate income taxes)[c] Employee's contributions to 401(k) retirement plans
Taxes Included and Assumptions About Their Incidence	Individual income tax under 2000 tax law, borne by payers	Individual income tax under 2000 tax law, borne by payers	Individual income tax under the law in each year, borne by payers Corporate income tax, borne by owners of capital Social insurance taxes, borne by employees[c] Excise taxes, borne by consumers
Time Horizon	Multiyear periods up to 14 years	Multiyear periods up to 10 years	One year
Computing Income Quintiles	No adjustments for size of the taxpaying unit Income quintiles have equal numbers of taxpaying units Quintile break points computed on cross section of the entire population	No adjustments for size of the taxpaying unit Income quintiles have equal numbers of taxpaying units Quintile break points computed on cross section of the entire population	Incomes adjusted by household size for purposes of ranking[d] Income quintiles have equal numbers of people Quintile break points computed on cross section of the entire population

Source: Congressional Budget Office.

a. Households are people who share a single housing unit, regardless of the relationships among them. Taxpayers who file dependent returns are considered part of the primary taxpaying unit and are not counted separately.

b. Includes Medicare and Medicaid benefits, employer-paid health insurance premiums, food stamps, school lunches and breakfasts, housing assistance, and energy assistance.

c. Social insurance taxes finance Social Security, Medicare, and federal unemployment insurance.

d. Adjusted by dividing by the square root of the household's size.

Table 2.

Annual and Longitudinal Income and Effective Tax Rates, 1993 to 1995

Income Group	Annual Measure			Multiyear Measures, 1993 to 1995		
	1993	1994	1995	Average Annual	Longitudinal	Difference[a]
			Average Pretax Income (2000 dollars)			
Lowest Quintile[b]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	12,650	12,600	12,950	12,750	13,650	7
Middle Quintile	24,200	24,200	24,600	24,350	25,050	3
Fourth Quintile	41,800	42,050	42,600	42,150	42,550	1
Highest Quintile	114,150	114,600	121,500	116,750	115,550	-1
All Quintiles	**60,400**	**60,900**	**64,100**	**61,800**	**61,800**	**0**
			Share of Pretax Income (Percent)			
Lowest Quintile[b]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	2.3	2.3	2.2	2.3	2.5	0.2
Middle Quintile	8.0	7.9	7.5	7.8	8.0	0.2
Fourth Quintile	20.3	20.1	19.4	19.9	20.1	0.2
Highest Quintile	70.0	70.2	71.4	70.6	69.8	-0.8
All Quintiles	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**0**
			Effective Individual Income Tax Rate (Percent)[c]			
Lowest Quintile[b]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	-2.9	-3.1	-2.4	-2.8	-1.5	1.3
Middle Quintile	4.9	5.2	5.3	5.1	5.6	0.5
Fourth Quintile	9.0	9.1	9.3	9.2	9.3	0.1
Highest Quintile	17.5	17.5	18.5	17.9	17.9	*
All Quintiles	**14.4**	**14.5**	**15.4**	**14.8**	**14.8**	**0**
			Share of Individual Income Tax Liabilities (Percent)[c]			
Lowest Quintile[b]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	-0.5	-0.5	-0.4	-0.4	-0.3	0.1
Middle Quintile	2.7	2.8	2.6	2.7	3.1	0.4
Fourth Quintile	12.7	12.7	11.7	12.4	12.7	0.3
Highest Quintile	85.1	85.0	86.1	85.4	84.6	-0.8
All Quintiles	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**0**

Continued

Table 2.

Continued

Income Group	Annual Measure			Multiyear Measures, 1993 to 1995		
	1993	1994	1995	Average Annual	Longitudinal	Difference[a]
	Share of Taxpaying Units (Percent)					
Lowest Quintile[b]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	11.0	11.1	11.1	11.1	11.1	0
Middle Quintile	20.1	19.8	19.6	19.8	19.8	0
Fourth Quintile	29.4	29.2	29.1	29.2	29.2	0
Highest Quintile	37.0	37.3	37.7	37.3	37.3	0
All Quintiles	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**0**

Source: Congressional Budget Office based on the Internal Revenue Service's Continuous Work History Sample.

Notes: The analysis is limited to taxpaying units that appear in the CWHS in every year from 1987 to 2000. "Share" refers to a portion of the sample, not the overall population. Quintiles are defined using income ranges from the entire population, including nonfilers, in the applicable period and may not contain one-fifth of taxpaying units that appear in multiple years. Table C-1 shows the income ranges associated with each quintile. For the longitudinal measure, each quintile contains the same number of taxpayers that it does under the average annual measure with which it is being compared.

Income includes only what can be consistently measured on a tax return—wages, salaries, self-employment income, rents, taxable and nontaxable interest, dividends, realized capital gains, taxable retirement benefits, and unemployment benefits.

Shares of income received and taxes paid by upper-income quintiles will appear higher in the sample than in the population because in the sample, lower-income families are underrepresented.

n.a. = not applicable; * = between -0.05 and 0.05.

a. The difference (longitudinal minus average annual) is calculated as a percentage for income and as percentage points for effective tax rates and for shares of pretax income, individual income tax liabilities, and taxpaying units.

b. Values are not shown (because of the small size of the sample) but are included in the totals.

c. Taxes were calculated under the law prevailing in 2000 by increasing incomes and deductions to the 2000 level using the rate of inflation.

Table 3.

Annual and Longitudinal Income and Effective Tax Rates, 1991 to 1997

Income Group	Annual Measure			Multiyear Measures, 1991 to 1997		
	1991	1994	1997	Average Annual	Longitudinal	Difference[a]
			Average Pretax Income (2000 dollars)			
Lowest Quintile[b]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	13,450	12,600	13,500	13,100	15,150	16
Middle Quintile	24,800	24,200	25,450	24,650	26,300	7
Fourth Quintile	42,150	42,050	44,150	42,600	43,350	2
Highest Quintile	111,800	114,600	136,200	120,500	117,600	-2
All Quintiles	**59,000**	**60,900**	**70,900**	**63,300**	**63,300**	**-1**
			Share of Pretax Income (Percent)			
Lowest Quintile[b]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	2.6	2.3	2.1	2.3	2.7	0.4
Middle Quintile	8.6	7.9	7.1	7.8	8.2	0.4
Fourth Quintile	20.8	20.1	17.8	19.6	19.8	0.2
Highest Quintile	69.0	70.2	73.4	71.0	69.5	-1.5
All Quintiles	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**0**
			Effective Individual Income Tax Rate (Percent)[c]			
Lowest Quintile[b]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	-2.8	-3.1	-1.5	-2.5	*	2.5
Middle Quintile	5.2	5.2	5.9	5.3	6.1	0.8
Fourth Quintile	9.0	9.1	9.7	9.3	9.5	0.2
Highest Quintile	17.3	17.5	18.8	18.0	18.0	*
All Quintiles	**14.2**	**14.5**	**15.9**	**14.9**	**14.9**	**0**
			Share of Individual Income Tax Liabilities (Percent)[c]			
Lowest Quintile[b]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	-0.5	-0.5	-0.2	-0.4	*	0.4
Middle Quintile	3.1	2.8	2.6	2.7	3.3	0.6
Fourth Quintile	13.3	12.7	10.8	12.2	12.6	0.4
Highest Quintile	84.2	85.0	86.8	85.5	84.0	-1.5
All Quintiles	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**0**

Continued

Table 3.

Continued

Income Group	Annual Measure			Multiyear Measures, 1991 to 1997		
	1991	1994	1997	Average Annual	Longitudinal	Difference[a]
	Share of Taxpaying Units (Percent)					
Lowest Quintile[b]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	11.2	11.1	11.2	11.1	11.1	0
Middle Quintile	20.3	19.8	19.7	20.0	20.0	0
Fourth Quintile	29.2	29.2	28.6	29.1	29.1	0
Highest Quintile	36.4	37.3	38.2	37.3	37.3	0
All Quintiles	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**0**

Source: Congressional Budget Office based on the Internal Revenue Service's Continuous Work History Sample.

Notes: The analysis is limited to taxpaying units that appear in the CWHS in every year from 1987 to 2000. "Share" refers to a portion of the sample, not the overall population. Quintiles are defined using income ranges from the entire population, including nonfilers, in the applicable period and may not contain one-fifth of taxpaying units that appear in multiple years. Table C-1 shows the income ranges associated with each quintile. For the longitudinal measure, each quintile contains the same number of taxpayers that it does under the average annual measure with which it is being compared.

Income includes only what can be consistently measured on a tax return—wages, salaries, self-employment income, rents, taxable and nontaxable interest, dividends, realized capital gains, taxable retirement benefits, and unemployment benefits.

Shares of income received and taxes paid by upper-income quintiles will appear higher in the sample than in the population because in the sample, lower-income families are underrepresented.

n.a. = not applicable; * = between -0.05 and 0.05.

a. The difference (longitudinal minus average annual) is calculated as a percentage for income and as percentage points for effective tax rates and for shares of pretax income, individual income tax liabilities, and taxpaying units.

b. Values are not shown (because of the small size of the sample) but are included in the totals.

c. Taxes were calculated under the law prevailing in 2000 by increasing incomes and deductions to the 2000 level using the rate of inflation.

Table 4.

Annual and Longitudinal Income and Effective Tax Rates, 1987 to 2000

Income Group	Annual Measure			Multiyear Measures, 1987 to 2000		
	1987	1994	2000	Average Annual	Longitudinal	Difference[a]
			Average Pretax Income (2000 dollars)			
Lowest Quintile[b]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	12,700	12,600	14,400	13,450	17,000	26
Middle Quintile	24,900	24,200	27,300	25,300	28,250	11
Fourth Quintile	42,950	42,050	47,200	43,600	44,850	3
Highest Quintile	106,500	114,600	160,100	126,000	121,150	-4
All Quintiles	**54,750**	**60,900**	**77,950**	**64,850**	**64,850**	**0**
			Share of Pretax Income (Percent)			
Lowest Quintile[b]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	3.3	2.3	2.4	2.4	3.1	0.7
Middle Quintile	9.4	7.9	6.8	7.9	8.8	0.9
Fourth Quintile	21.9	20.1	16.8	19.3	19.9	0.6
Highest Quintile	65.8	70.2	74.8	71.0	68.3	-2.7
All Quintiles	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**0**
			Effective Individual Income Tax Rate (Percent)[c]			
Lowest Quintile[b]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	-1.6	-3.1	0.2	-1.7	1.8	3.5
Middle Quintile	5.5	5.2	6.8	5.6	7.0	1.4
Fourth Quintile	8.9	9.1	10.2	9.4	9.8	0.4
Highest Quintile	16.5	17.5	19.9	18.1	18.2	0.1
All Quintiles	**13.3**	**14.5**	**17.1**	**15.1**	**15.1**	**0**
			Share of Individual Income Tax Liabilities (Percent)[c]			
Lowest Quintile[b]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	-0.4	-0.5	*	-0.3	0.4	0.7
Middle Quintile	3.9	2.8	2.7	2.9	4.1	1.2
Fourth Quintile	14.6	12.7	10.0	12.0	13.0	1.0
Highest Quintile	81.7	85.0	87.2	85.3	82.6	-2.7
All Quintiles	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**0**

Continued

Table 4.

Continued

Income Group	Annual Measure			Multiyear Measures, 1987 to 2000		
	1987	1994	2000	Average Annual	Longitudinal	Difference[a]
	Share of Taxpaying Units (Percent)					
Lowest Quintile[b]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	14.1	11.1	13.0	11.8	11.8	0
Middle Quintile	20.7	19.8	19.3	20.1	20.1	0
Fourth Quintile	27.9	29.2	27.8	28.7	28.7	0
Highest Quintile	33.8	37.3	36.4	36.5	36.5	0
All Quintiles	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**0**

Source: Congressional Budget Office based on the Internal Revenue Service's Continuous Work History Sample.

Notes: The analysis is limited to taxpaying units that appear in the CWHS in every year from 1987 to 2000. "Share" refers to a portion of the sample, not the overall population. Quintiles are defined using income ranges from the entire population, including nonfilers, in the applicable period and may not contain one-fifth of taxpaying units that appear in multiple years. Table C-1 shows the income ranges associated with each quintile. For the longitudinal measure, each quintile contains the same number of taxpayers that it does under the average annual measure with which it is being compared.

Income includes only what can be consistently measured on a tax return—wages, salaries, self-employment income, rents, taxable and nontaxable interest, dividends, realized capital gains, taxable retirement benefits, and unemployment benefits.

Shares of income received and taxes paid by upper-income quintiles will appear higher in the sample than in the population because in the sample, lower-income families are underrepresented.

n.a. = not applicable; * = between -0.05 and 0.05.

a. The difference (longitudinal minus average annual) is calculated as a percentage for income and as percentage points for effective tax rates and for shares of pretax income, individual income tax liabilities, and taxpaying units.

b. Values are not shown (because of the small size of the sample) but are included in the totals.

c. Taxes were calculated under the law prevailing in 2000 by increasing incomes and deductions to the 2000 level using the rate of inflation.

Table 5.

Distributional Effects of Reducing the Top Two Individual Income Tax Rates

Income Group	Average Annual Measure	Longitudinal Measures	
		With First-Year Ranking	With Longitudinal Ranking
	Change in Effective Tax Rate (Percentage points)[a]		
Lowest Quintile[b]	n.a.	n.a.	n.a.
Second Quintile	*	*	*
Middle Quintile	*	*	*
Fourth Quintile	*	*	*
Highest Quintile	-1.0	-1.1	-1.1
All Quintiles	**-0.7**	**-0.7**	**-0.7**
Top 10 Percent	-1.4	-1.5	-1.4
Top 5 Percent	-1.8	-2.0	-1.9
Top 1 Percent	-3.2	-3.0	-3.2
	Percentage of Taxpaying Units Yearly That Have a Lower Effective Tax Rate[a]		
Lowest Quintile[b]	n.a.	n.a.	n.a.
Second Quintile	*	0.1	*
Middle Quintile	*	0.1	*
Fourth Quintile	*	0.4	*
Highest Quintile	7.3	7.2	7.2
All Quintiles	**2.4**	**2.4**	**2.4**
Top 10 Percent	14.1	13.5	13.9
Top 5 Percent	27.3	24.0	26.2
Top 1 Percent	80.9	63.0	70.2
	Percentage of Taxpaying Units That Have a Lower Effective Tax Rate in Any Year[a]		
Lowest Quintile[b]	n.a.	n.a.	n.a.
Second Quintile	n.a.	0.7	0.1
Middle Quintile	n.a.	0.9	*
Fourth Quintile	n.a.	1.7	0.3
Highest Quintile	n.a.	16.6	17.8
All Quintiles	**n.a.**	**6.0**	**6.0**
Top 10 Percent	n.a.	29.6	33.1
Top 5 Percent	n.a.	48.6	59.0
Top 1 Percent	n.a.	93.0	96.2

Source: Congressional Budget Office based on the Internal Revenue Service's Continuous Work History Sample.

Notes: The analysis is limited to taxpaying units that appear in the CWHS in every year from 1991 to 2000. Annual quintiles are defined using income ranges from the entire population, including nonfilers, in the applicable period and may not contain one-fifth of taxpaying units that appear in multiple years. Table C-1 shows the income ranges associated with each quintile. For the measure with longitudinal ranking, each quintile contains the same number of taxpayers that it does under the average annual measure.

Income includes only what can be consistently measured on a tax return—wages, salaries, self-employment income, rents, taxable and nontaxable interest, dividends, realized capital gains, taxable retirement benefits, and unemployment benefits.

n.a. = not applicable; * = between -0.05 and 0.05.

a. Taxes were calculated under the law prevailing in 2000 by increasing incomes and deductions to the 2000 level using the rate of inflation.

b. Values are not shown (because of the small size of the sample) but are included in the totals.

Table 6.

Distributional Effects of Doubling the Child Credit

Income Group	Average Annual Measure	Longitudinal Measures	
		With First-Year Ranking	With Longitudinal Ranking
	Change in Effective Tax Rate (Percentage points)[a]		
Lowest Quintile[b]	n.a.	n.a.	n.a.
Second Quintile	-0.1	-0.4	-0.2
Middle Quintile	-0.5	-0.6	-0.6
Fourth Quintile	-0.8	-0.7	-0.7
Highest Quintile	-0.3	-0.3	-0.3
All Quintiles	**-0.4**	**-0.4**	**-0.4**
Top 10 Percent	-0.2	-0.2	-0.2
Top 5 Percent	-0.1	-0.1	-0.1
Top 1 Percent	*	*	*
	Percentage of Taxpaying Units Yearly That Have a Lower Effective Tax Rate[a]		
Lowest Quintile[b]	n.a.	n.a.	n.a.
Second Quintile	3.2	15.4	8.6
Middle Quintile	21.9	26.7	23.4
Fourth Quintile	40.4	38.3	39.0
Highest Quintile	46.2	40.9	44.1
All Quintiles	**31.6**	**31.6**	**31.6**
Top 10 Percent	39.0	34.2	38.2
Top 5 Percent	22.6	22.7	24.1
Top 1 Percent	0.2	4.0	3.1
	Percentage of Taxpaying Units That Have a Lower Effective Tax Rate in Any Year[a]		
Lowest Quintile[b]	n.a.	n.a.	n.a.
Second Quintile	n.a.	37.8	30.9
Middle Quintile	n.a.	49.9	47.8
Fourth Quintile	n.a.	56.9	59.2
Highest Quintile	n.a.	60.6	63.7
All Quintiles	**n.a.**	**52.3**	**52.3**
Top 10 Percent	n.a.	55.4	59.4
Top 5 Percent	n.a.	45.4	48.8
Top 1 Percent	n.a.	14.5	18.0

Source: Congressional Budget Office based on the Internal Revenue Service's Continuous Work History Sample.

Notes: The analysis is limited to returns that appear in the CWHS in every year from 1991 to 2000. Annual quintiles are defined using income ranges from the entire population, including nonfilers, in the applicable period and may not contain one-fifth of taxpaying units that appear in multiple years. Table C-1 shows the income ranges associated with each quintile. For the measure with longitudinal ranking, each quintile contains the same number of taxpayers that it does under the average annual measure.

Income includes only what can be consistently measured on a tax return—wages, salaries, self-employment income, rents, taxable and nontaxable interest, dividends, realized capital gains, taxable retirement benefits, and unemployment benefits.

n.a. = not applicable; * = between -0.05 and 0.05.

a. Taxes were calculated under the law prevailing in 2000 by increasing incomes and deductions to the 2000 level using the rate of inflation.

b. Values are not shown (because of the small size of the sample) but are included in the totals.

Table 7.

Distributional Effects of Making the Child Credit Fully Refundable

Income Group	Average Annual Measure	Longitudinal Measures	
		With First-Year Ranking	With Longitudinal Ranking
	Change in Effective Tax Rate (Percentage points)[a]		
Lowest Quintile	-2.8	-1.6	-2.0
Second Quintile	-0.6	-0.4	-0.5
Middle Quintile	-0.1	-0.1	-0.1
Fourth Quintile	*	*	*
Highest Quintile	*	*	*
All Quintiles	**-0.1**	**-0.1**	**-0.1**
	Percentage of Taxpaying Units Yearly That Have a Lower Effective Tax Rate[a]		
Lowest Quintile	21.7	19.6	19.3
Second Quintile	13.2	11.4	11.9
Middle Quintile	4.1	5.4	4.9
Fourth Quintile	0.4	1.7	1.4
Highest Quintile	*	0.6	0.4
All Quintiles	**6.6**	**6.6**	**6.6**
	Percentage of Taxpaying Units That Have a Lower Effective Tax Rate in Any Year[a]		
Lowest Quintile	n.a.	33.3	31.2
Second Quintile	n.a.	28.6	26.9
Middle Quintile	n.a.	17.3	19.6
Fourth Quintile	n.a.	7.9	8.7
Highest Quintile	n.a.	4.2	3.2
All Quintiles	**n.a.**	**16.3**	**16.3**

Source: Congressional Budget Office based on the University of Michigan's Panel Study of Income Dynamics.

Notes: The analysis is limited to taxpaying units that responded to the study in every year from 1987 to 1996. Annual quintiles are defined using income ranges from the entire population, including nonfilers, in the applicable period and may not contain one-fifth of taxpaying units that appear in multiple years. Table C-1 shows the income ranges associated with each quintile. For the measure with longitudinal ranking, each quintile contains the same number of taxpayers that it does under the average annual measure.

The income measure is total income, which comprises wages, business income, interest, dividends, pension income, unemployment compensation, rental income, Social Security benefits, and income from several cash transfer programs (such as food stamps).

n.a. = not applicable; * = between -0.05 and 0.05.

a. Taxes were calculated under the law prevailing in 2000 by increasing incomes and deductions to the 2000 level using the rate of inflation.

APPENDIX

A

Attrition in the Continuous Work History Sample

The Continuous Work History Sample (CWHS) is a longitudinal data set embedded in the Internal Revenue Service's Statistics of Income sample. The CWHS is a random sample of tax filers and is generally representative of that population. It cannot, however, represent the population that does not file tax returns.

Every year, all tax returns whose primary Social Security numbers end in specific four-digit combinations are included in the sample. Two such combinations have been included in every year from 1987 to 2000; those returns, which potentially cover 14 years of tax filings, form the basis of the Congressional Budget Office's (CBO's) analysis.[1]

Examining income over a multiyear period requires information on a taxpayer's income for all of the relevant years. However, many taxpayers in the CWHS are absent from the sample for one or more years, a phenomenon known as attrition. Taxpayers may drop out of the sample for many reasons, such as if they die, become the secondary taxpayer on the return, or fail to file a tax return (either because their income is below the filing threshold or because of other factors). Failure to file in fact accounts for the most attrition in the CWHS (see Table A-1). Because in many instances nonfiling results when a taxpayer's income drops below the tax threshold, the absence of records in the CWHS for nonfilers imparts a bias by excluding many households with low and volatile income.

Because of attrition, taxpayers who remain in the sample for a long time differ noticeably from taxpayers who do not file a tax return every year (see Table A-2). Long-time filers tend to have substantially higher income than nonfilers and are more likely to be married.[2] In fact, of the taxpaying units that appear in the data in every year from 1987 to 2000, only 2 percent have income low enough to place them in the bottom quintile of the population. Thus, results from the CWHS must be viewed with caution. Because the taxpayers who file over the whole period are demonstrably different from those who do not, findings based on the CWHS may not be generalizable to the entire population of tax filers.

Low-income households are clearly underrepresented in the CWHS. Indeed, so few returns were available for the bottom quintile that CBO does not report results based on the CWHS for that income group. However, comparisons of annual and longitudinal income that are based on the tax data are qualitatively similar to comparisons that use data from the University of Michigan's Panel Study of Income Dynamics (PSID), which is not limited to tax filers. For the second quintile, the difference between income measured longitudinally and measured on an annual basis is greater when the tax data are used for the analysis than when the PSID is used—a difference that may reflect the attrition bias in the CWHS. For the remaining quintiles, the differences between annual and longitudinal income are quite similar regardless of whether the CWHS or the PSID is used. The similarity suggests that conclusions drawn from the tax data may be valid despite the potential attrition bias.

One way to evaluate that possible bias is to use data from the PSID to simulate the attrition that occurs in the

1. The CWHS actually dates back to 1979. However, in 1984 and 1986, the Internal Revenue Service sampled only one combination of Social Security numbers. Thus, to examine data on returns earlier than 1987 would effectively cut the size of the sample in half.

2. Charles W. Christian and Peter J. Firschmann ("Attrition in the Statistics of Income Panel of Tax Returns," *National Tax Journal,* vol. 42, no. 4, December 1989) perform formal statistical tests that demonstrate that attrition in the CWHS is systematically related to a taxpayer's age, income, and marital status.

Table A-1.

Causes of Attrition in the Continuous Work History Sample for 1987

(As a cumulative percentage of records lost)

Year	Taxpayer Died	Individual Became the Secondary Taxpayer	Taxpayer Became a Dependent	Taxpayer Stopped Filing for Unknown Reasons	All Reasons Combined
1987	0	0	0	0	0
1988	1	2	1	4	8
1989	2	3	1	7	12
1990	2	4	1	9	17
1991	3	5	1	11	21
1992	4	6	1	14	25
1993	5	6	1	16	28
1994	6	7	1	17	31
1995	7	7	1	18	34
1996	8	7	1	19	36
1997	9	8	2	20	38
1998	10	8	2	21	40
1999	11	8	2	22	42
2000	12	8	2	23	44

Source: Congressional Budget Office based on the Internal Revenue Service's Continuous Work History Sample.

CWHS. The difference between results from a simulation that uses the full PSID and results from a simulation that uses the PSID with taxpayers who would not have appeared in a panel of tax returns indicates how attrition in the CWHS probably affects the results. In analyzing those simulations, CBO found that attrition affects results in the bottom quintile but has little effect on the other quintiles.

CBO used a multistep process to simulate the pattern of attrition that was expected with the PSID. The starting point was all taxpaying units in that data set for a given year. Analysts estimated whether each unit would be expected to file a tax return in every year of a 10-year period. They assumed that a PSID unit would not file a return if it had no income from wages or had taxable income below the relevant filing threshold for the year.[3] Analysts also assumed that when single taxpayers married during the period, half would become secondary filers who would drop out of the sample.

The rates of attrition from the simulations analysis were quite similar to the rates observed in the CWHS (see Table A-3). Over a 10-year period, 38 percent of taxpaying units in the CWHS would be absent for at least one year, compared with 37 percent in the simulations analysis. The magnitude of the various causes of attrition were also roughly comparable for the two analyses. In the simulations that used data from the PSID, CBO found that 22 percent of units that filed in the first year would not file a tax return in at least one of the nine successive years (because their income would have dropped below the level at which they were required to file). In the CWHS, 22 percent of initial filers dropped out for unknown reasons, presumably because they did not have reason to file a tax return in those years.

Differences between annual and longitudinal income and taxes that are taken from analyses using the full PSID and analyses using only likely filers from that panel exhibit comparable patterns (see Table A-4). For the second through fifth quintiles, differences between longitudinal and annual income and taxes are quite similar for the full population and for likely filers. In the lowest quintile, however, differences between annual and multiyear measures deviate for the two types of analyses, reflecting the disproportionate effect of attrition in that quintile. Those findings imply that with the exception of the bottom quintile, results from a sample of tax returns, such as the CWHS, are likely to provide reasonably unbiased estimates of the differences between annual and longitudinal income and taxes.

3. People with wages may file tax returns even if they owe no tax so that they can have any taxes that were withheld by their employers refunded to them.

Table A-2.

Characteristics of Taxpayers in the Continuous Work History Sample for 1987

Characteristic	Taxpayers Present in 1987	Taxpayers Present in All Years[a]
Age		
Average	42.6	40.6
Percentage under 25	17	13
Percentage over 65	11	6
Filing Status (Percent)		
Single	39	30
Married	49	60
Tax Information		
Average AGI (Dollars)	28,984	37,845
Percentage of taxpayers who itemized	37	50
Average effective income tax rate (Percent)	13.4	14.5
Memorandum:		
Population	95,530,000	53,405,000
Size of the Sample	19,106	10,681

Source: Congressional Budget Office based on the Internal Revenue Service's Continuous Work History Sample.

Note: AGI = adjusted gross income.

a. The period covered is 1987 to 2000.

Table A-3.

Ten-Year Attrition Rates in the Continuous Work History Sample

(Percent)

Cause of Attrition	CWHS	PSID Used to Simulate Attrition in the CWHS
Death	8.8	6.2
Marriage	7.7	7.0
Income Dropped Below Filing Threshold/Other	21.8	21.6
Total	**38.2**	**34.8**

Source: Congressional Budget Office based on the Internal Revenue Service's Continuous Work History Sample and the University of Michigan's Panel Study of Income Dynamics.

Table A-4.

Annual and Longitudinal Income and Effective Tax Rates, 1986 to 1995

Income Group	Using Records from the PSID: Average Annual Measure	Using Records from the PSID: Longitudinal Measure	Using Records from the PSID: Difference[a]	Using PSID Records to Simulate CWHS Attrition: Average Annual Measure	Using PSID Records to Simulate CWHS Attrition: Longitudinal Measure	Using PSID Records to Simulate CWHS Attrition: Difference[a]
			Taxable Income			
			Average Pretax Income (2000 dollars)			
Lowest Quintile	1,657	4,032	143	3,770	8,353	122
Second Quintile	15,171	18,465	22	16,325	19,877	22
Middle Quintile	31,286	33,448	7	31,459	33,579	7
Fourth Quintile	52,278	52,674	1	52,476	52,629	*
Highest Quintile	116,784	110,367	-5	117,812	111,983	-5
All Quintiles	**49,424**	**49,424**	**0**	**63,572**	**63,572**	**0**
			Effective Individual Income Tax Rate (Percent)[b]			
Lowest Quintile	-10.3	-4.1	6.2	-22.3	-9.4	13.0
Second Quintile	-0.2	4.3	4.5	0.3	3.8	3.5
Middle Quintile	8.0	8.9	0.9	7.9	8.6	0.7
Fourth Quintile	11.1	11.8	0.8	10.9	11.5	0.6
Highest Quintile	20.9	20.9	-0.1	21.0	20.8	-0.2
All Quintiles	**15.8**	**15.8**	**0**	**16.4**	**16.4**	**0**
			Total Income			
			Average Pretax Income (2000 dollars)			
Lowest Quintile	7,847	10,339	32	9,422	12,805	36
Second Quintile	20,915	23,695	13	21,808	24,464	12
Middle Quintile	35,189	37,448	6	35,448	37,814	7
Fourth Quintile	54,981	55,522	1	55,176	55,670	1
Highest Quintile	119,478	113,294	-5	120,443	115,119	-4
All Quintiles	**53,483**	**53,483**	**0**	**66,138**	**66,138**	**0**
			Effective Individual Income Tax Rate (Percent)[b]			
Lowest Quintile	-4.3	-1.4	2.9	-9.8	-4.2	5.6
Second Quintile	1.8	3.9	2.1	2.9	5.0	2.1
Middle Quintile	6.7	7.5	0.8	7.2	7.9	0.6
Fourth Quintile	10.5	11.2	0.7	10.5	11.0	0.5
Highest Quintile	20.5	20.5	*	20.6	20.5	-0.1
All Quintiles	**14.6**	**14.6**	**0**	**15.7**	**15.7**	**0**

Source: Congressional Budget Office based on the University of Michigan's Panel Study of Income Dynamics.

Notes: The analysis is limited to taxpaying units that responded to the study in every year from 1986 to 1995. Quintiles are defined using income ranges from the entire population, including nonfilers, in the applicable period and may not contain one-fifth of taxpaying units that appear in multiple years. Table C-1 shows the income ranges associated with each quintile. For the longitudinal measure, each quintile contains the same number of taxpayers that it does under the average annual measure with which it is being compared.

Taxable income encompasses what can be consistently measured on a tax return—wages, salaries, self-employment income, rents, taxable and nontaxable interest, dividends, realized capital gains, taxable retirement benefits, and unemployment benefits. Total income comprises taxable income plus Social Security benefits and income from cash transfer programs (such as food stamps).

CWHS = Continuous Work History Sample; * = between -0.05 and 0.05.

a. The difference (longitudinal minus average annual) is calculated as a percentage for income and as percentage points for effective tax rates.

b. Taxes were calculated under the law prevailing in 2000 by increasing incomes and deductions to the 2000 level using the rate of inflation.

APPENDIX

B

Alternative Measures of the Distribution of Annual and Longitudinal Income and Taxes

In its analysis, the Congressional Budget Office (CBO) tested the sensitivity of its results by comparing the longitudinal and annual distributions of income and taxes over multiple periods and under different sampling restrictions. Annual and longitudinal distributions were assessed for each three- and seven-year period from 1987 to 2000 for taxpayers who appeared in the data in every year of the 14-year period (see Tables B-1 and B-2). CBO also compared the distributions for each three-year period after removing the restriction that a taxpaying unit appear in the data every year (see Table B-3). An additional comparison assessed the 14-year longitudinal and cross-sectional income and tax distributions under CBO's current methodology (which includes all taxpaying units that appear in multiple years) against the distributions from a methodology that limited the sample to taxpaying units whose marital status did not change and to filers who were aged 25 to 60 over the entire period (see Table B-4). Finally, CBO compared longitudinal and annual income and effective tax rates for respondents in the Panel Study of Income Dynamics who were in the sample for different lengths of time (see Tables B-5 and B-6).

Table B-1.

Annual and Longitudinal Income and Tax Rates for Taxpayers in All Possible Three-Year Periods, 1987 to 2000

	1987-1989	1988-1990	1989-1991	1990-1992	1991-1993	1992-1994	1993-1995	1994-1996	1995-1997	1996-1998	1997-1999	1998-2000
						Average Annual Income (2000 dollars)						
Lowest Quintile[a]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	13,350	13,700	13,700	13,500	13,150	12,850	12,750	12,900	13,200	13,650	14,000	14,300
Middle Quintile	25,300	25,450	25,250	24,950	24,550	24,400	24,350	24,500	24,900	25,550	26,250	26,850
Fourth Quintile	43,350	43,350	42,900	42,500	42,100	42,050	42,150	42,550	43,250	44,350	45,600	46,600
Highest Quintile	112,250	113,750	111,700	113,050	114,000	114,950	116,750	121,500	128,700	141,150	148,500	156,500
All Quintiles	**57,800**	**59,100**	**58,750**	**59,500**	**60,100**	**60,750**	**61,800**	**64,000**	**67,350**	**72,300**	**75,100**	**77,450**
						Longitudinal Income (2000 dollars)						
Lowest Quintile[a]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	14,450	14,850	14,850	14,650	14,200	13,850	13,650	13,850	14,250	14,700	14,950	15,300
Middle Quintile	25,950	26,050	25,950	25,650	25,300	25,150	25,050	25,200	25,600	26,300	27,050	27,600
Fourth Quintile	43,650	43,650	43,200	42,800	42,450	42,450	42,550	42,950	43,650	44,850	46,050	47,100
Highest Quintile	110,850	112,350	110,300	111,650	112,700	113,600	115,550	120,250	127,450	139,700	147,100	155,050
All Quintiles	**57,800**	**59,100**	**58,750**	**59,500**	**60,100**	**60,750**	**61,800**	**64,000**	**67,350**	**72,300**	**75,100**	**77,450**
						Difference (As a percentage of average annual income)						
Lowest Quintile[a]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	8.1	8.2	8.3	8.6	8.2	7.8	7.3	7.3	8.0	7.7	6.9	7.2
Middle Quintile	2.5	2.4	2.7	2.8	2.9	3.2	2.9	2.8	2.8	2.9	2.9	2.8
Fourth Quintile	0.7	0.7	0.7	0.7	0.9	0.9	0.9	0.9	0.9	1.1	1.1	1.0
Highest Quintile	-1.2	-1.2	-1.3	-1.2	-1.2	-1.2	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
All Quintiles	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
						Average Annual Income Tax Rate (Percent)[b]						
Lowest Quintile[a]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	-1.6	-1.8	-2.3	-2.7	-2.8	-2.9	-2.8	-2.4	-1.9	-1.1	-0.6	-0.1
Middle Quintile	5.6	5.6	5.5	5.3	5.1	5.1	5.1	5.2	5.5	5.8	6.2	6.5
Fourth Quintile	8.9	8.9	9.0	9.0	9.0	9.1	9.1	9.3	9.5	9.7	9.9	10.1
Highest Quintile	17.0	17.0	17.0	17.2	17.5	17.6	17.8	18.0	18.5	18.5	19.0	19.4
All Quintiles	**13.8**	**13.9**	**13.9**	**14.2**	**14.4**	**14.5**	**14.8**	**15.0**	**15.5**	**15.7**	**16.2**	**16.6**

Continued

Table B-1.
Continued

	1987-1989	1988-1990	1989-1991	1990-1992	1991-1993	1992-1994	1993-1995	1994-1996	1995-1997	1996-1998	1997-1999	1998-2000
						Longitudinal Income Tax Rate (Percent)[b]						
Lowest Quintile[a]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	0	0.1	-0.8	-0.8	-1.6	-1.6	-1.5	-1.1	-0.7	0.1	0.7	1.2
Middle Quintile	6.0	5.8	5.9	5.6	5.6	5.6	5.6	5.8	6.1	6.3	6.6	7.0
Fourth Quintile	9.0	9.1	9.1	9.1	9.2	9.2	9.3	9.4	9.5	9.9	10.1	10.4
Highest Quintile	17.0	17.0	17.0	17.3	17.6	17.6	17.9	18.1	18.5	18.5	19.0	19.4
All Quintiles	**13.8**	**13.9**	**13.9**	**14.2**	**14.4**	**14.5**	**14.8**	**15.0**	**15.5**	**15.7**	**16.2**	**16.6**
						Difference (Percentage points)						
Lowest Quintile[a]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	1.6	1.9	1.5	1.9	1.2	1.3	1.3	1.3	1.2	1.2	1.3	1.3
Middle Quintile	0.4	0.2	0.4	0.3	0.5	0.5	0.5	0.6	0.6	0.5	0.4	0.5
Fourth Quintile	0.1	0.2	0.1	0.1	0.2	0.1	0.2	0.1	*	0.2	0.2	0.3
Highest Quintile	*	*	*	0.1	0.1	*	0.1	0.1	*	*	*	*
All Quintiles	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Source: Congressional Budget Office based on the Internal Revenue Service's Continuous Work History Sample.

Notes: The analysis is limited to taxpaying units that appear in the CWHS in every year from 1987 to 2000. Quintiles are defined using income ranges from the entire population, including nonfilers, in the applicable period and may not contain one-fifth of taxpaying units that appear in multiple years. Table C-1 shows the income ranges associated with each quintile. For the longitudinal measure, each quintile contains the same number of taxpayers that it does under the average annual measure with which it is being compared.

Income includes only what can be consistently measured on a tax return—wages, salaries, self-employment income, rents, taxable and nontaxable interest, dividends, realized capital gains, taxable retirement benefits, and unemployment benefits.

n.a. = not applicable; * = between -0.05 and 0.05.

a. Values are not shown (because of the small size of the sample) but are included in the totals.

c. Taxes were calculated under the law prevailing in 2000 by increasing incomes and deductions to the 2000 level using the rate of inflation.

Table B-2.

Annual and Longitudinal Income and Tax Rates for Taxpayers in All Possible Seven-Year Periods, 1987 to 2000

	1987-1993	1988-1994	1989-1995	1990-1996	1991-1997	1992-1998	1993-1999	1994-2000
				Average Annual Income (2000 dollars)				
Lowest Quintile[a]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	13,300	13,350	13,250	13,100	13,100	13,200	13,350	13,600
Middle Quintile	25,000	24,900	24,800	24,650	24,650	24,900	25,200	25,650
Fourth Quintile	42,750	42,600	42,500	42,400	42,600	43,100	43,700	44,500
Highest Quintile	112,850	114,000	114,550	116,900	120,500	127,200	132,050	138,500
All Quintiles	**58,900**	**59,800**	**60,400**	**61,550**	**63,300**	**66,150**	**68,250**	**70,750**
				Longitudinal Income (2000 dollars)				
Lowest Quintile[a]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	15,700	15,550	15,350	15,200	15,100	15,200	15,350	15,600
Middle Quintile	26,650	26,550	26,450	26,300	26,250	26,500	26,700	27,100
Fourth Quintile	43,250	43,200	43,200	43,150	43,400	44,050	44,600	45,400
Highest Quintile	110,050	111,200	111,750	114,150	117,850	124,500	129,400	135,750
All Quintiles	**58,900**	**59,800**	**60,400**	**61,550**	**63,300**	**66,150**	**68,250**	**70,750**
				Difference (As a percentage of average annual income)				
Lowest Quintile[a]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	15.6	16.6	15.8	14.6	15.4	14.5	12.3	10.3
Middle Quintile	4.9	6.0	6.0	6.0	6.4	5.6	4.4	3.5
Fourth Quintile	0.6	0.9	1.3	1.4	1.8	1.6	1.3	0.7
Highest Quintile	-2.6	-2.8	-2.6	-2.5	-2.2	-2.5	-2.4	-3.1
All Quintiles	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
				Average Annual Income Tax Rate (Percent)[b]				
Lowest Quintile[a]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	-2.2	-2.4	-2.6	-2.6	-2.5	-2.1	-1.7	-1.2
Middle Quintile	5.4	5.3	5.3	5.2	5.3	5.4	5.6	5.9
Fourth Quintile	9.0	9.0	9.1	9.1	9.2	9.4	9.5	9.7
Highest Quintile	17.2	17.3	17.5	17.6	18.0	18.1	18.4	18.8
All Quintiles	**14.0**	**14.2**	**14.4**	**14.6**	**14.9**	**15.2**	**15.5**	**15.9**

Continued

Table B-2.
Continued

	1987-1993	1988-1994	1989-1995	1990-1996	1991-1997	1992-1998	1993-1999	1994-2000
				Longitudinal Income Tax Rate (Percent)[b]				
Lowest Quintile[a]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	0.6	0.6	*	-0.2	*	0.4	0.8	1.1
Middle Quintile	6.3	6.1	6.2	6.0	6.0	6.2	6.5	6.8
Fourth Quintile	9.2	9.3	9.4	9.5	9.5	9.7	9.8	10.0
Highest Quintile	17.2	17.4	17.5	17.7	18.0	18.2	18.5	18.8
All Quintiles	**14.0**	**14.2**	**14.4**	**14.6**	**14.9**	**15.2**	**15.5**	**15.9**
				Difference (Percentage points)				
Lowest Quintile[a]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	2.4	2.9	2.5	2.2	2.5	2.5	2.2	1.9
Middle Quintile	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.8
Fourth Quintile	0.2	0.2	0.3	0.4	0.3	0.3	0.3	0.2
Highest Quintile	*	*	*	0.1	*	0.1	*	*
All Quintiles	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Source: Congressional Budget Office based on the Internal Revenue Service's Continuous Work History Sample.

Notes: The analysis is limited to taxpaying units that appear in the CWHS in every year from 1987 to 2000. Quintiles are defined using income ranges from the entire population, including nonfilers, in the applicable period and may not contain one-fifth of taxpaying units that appear in multiple years. Table C-1 shows the income ranges associated with each quintile. For the longitudinal measure, each quintile contains the same number of taxpayers that it does under the average annual measure with which it is being compared.

Income includes only what can be consistently measured on a tax return—wages, salaries, self-employment income, rents, taxable and nontaxable interest, dividends, realized capital gains, taxable retirement benefits, and unemployment benefits.

n.a. = not applicable; * = between -0.05 and 0.05.

a. Values are not shown (because of the small size of the sample) but are included in the totals.

b. Taxes were calculated under the law prevailing in 2000 by increasing incomes and deductions to the 2000 level using the rate of inflation.

Table B-3.

Annual and Longitudinal Income and Tax Rates for Taxpayers in Any Three-Year Period, 1987 to 2000

	1987-1989	1988-1990	1989-1991	1990-1992	1991-1993	1992-1994	1993-1995	1994-1996	1995-1997	1996-1998	1997-1999	1998-2000
						Average Annual Income (2000 dollars)						
Lowest Quintile[a]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	12,800	13,000	12,950	12,700	12,400	12,150	12,100	12,250	12,550	13,000	13,500	13,900
Middle Quintile	24,950	25,050	24,800	24,500	24,100	23,900	23,850	24,000	24,450	25,050	25,800	26,350
Fourth Quintile	42,950	42,900	42,500	42,050	41,600	41,500	41,550	41,950	42,650	43,700	44,950	45,950
Highest Quintile	110,600	111,800	110,100	111,000	111,350	112,350	114,000	117,800	124,250	135,050	141,100	145,850
All Quintiles	**45,350**	**44,500**	**43,700**	**44,100**	**44,450**	**44,850**	**45,500**	**46,800**	**49,100**	**52,350**	**54,500**	**56,900**
						Longitudinal Income (2000 dollars)						
Lowest Quintile[a]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	13,350	13,550	13,350	13,250	12,900	12,550	12,500	12,750	13,050	13,450	14,100	14,400
Middle Quintile	25,200	25,200	24,900	24,750	24,450	24,100	24,050	24,150	24,650	25,250	26,050	26,500
Fourth Quintile	42,950	42,950	42,400	42,000	41,750	41,500	41,600	41,950	42,750	43,600	45,150	46,100
Highest Quintile	108,850	110,050	108,500	109,250	110,000	110,650	112,550	116,300	122,850	132,900	139,650	143,950
All Quintiles	**45,350**	**44,500**	**43,700**	**44,100**	**44,450**	**44,850**	**45,500**	**46,800**	**49,100**	**52,350**	**54,500**	**56,900**
						Difference (As a percentage of average annual income)						
Lowest Quintile[a]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	4.3	4.2	3.1	4.3	4.0	3.3	3.3	4.1	4.0	3.5	4.4	3.6
Middle Quintile	1.0	0.6	0.4	1.0	1.5	0.8	0.8	0.6	0.8	0.8	1.0	0.6
Fourth Quintile	*	0.1	-0.2	-0.1	0.4	*	0.1	*	0.2	-0.2	0.4	0.3
Highest Quintile	-1.6	-1.6	-1.5	-1.6	-1.2	-1.5	-1.3	-1.3	-1.1	-1.6	-1.0	-1.3
All Quintiles	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
						Average Annual Income Tax Rate (Percent)[b]						
Lowest Quintile[a]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	-0.4	-0.7	-1.2	-1.8	-2.3	-2.8	-3.0	-3.0	-3.0	-2.9	-2.9	-3.0
Middle Quintile	5.8	5.8	5.7	5.5	5.3	5.3	5.2	5.3	5.5	5.7	6.1	6.2
Fourth Quintile	9.2	9.2	9.3	9.4	9.4	9.4	9.4	9.5	9.6	9.8	9.9	10.1
Highest Quintile	16.8	16.9	16.9	17.2	17.3	17.4	17.6	17.8	18.2	18.3	18.6	19.5
All Quintiles	**12.8**	**12.8**	**12.7**	**12.9**	**13.0**	**13.1**	**13.3**	**13.5**	**13.8**	**14.1**	**14.4**	**15.1**

Continued

Table B-3.
Continued

	1987-1989	1988-1990	1989-1991	1990-1992	1991-1993	1992-1994	1993-1995	1994-1996	1995-1997	1996-1998	1997-1999	1998-2000
						Longitudinal Income Tax Rate (Percent)[b]						
Lowest Quintile[a]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	0.7	0.5	-0.3	-0.6	-1.3	-1.8	-2.1	-1.8	-1.9	-1.6	-1.4	-1.7
Middle Quintile	6.0	6.0	6.0	5.8	5.7	5.6	5.6	5.6	5.9	6.0	6.3	6.5
Fourth Quintile	9.2	9.3	9.3	9.5	9.4	9.4	9.4	9.5	9.7	9.9	10.1	10.3
Highest Quintile	16.8	16.9	16.9	17.2	17.4	17.4	17.7	17.8	18.2	18.3	18.7	19.5
All Quintiles	**12.8**	**12.8**	**12.7**	**12.9**	**13.0**	**13.1**	**13.3**	**13.5**	**13.8**	**14.1**	**14.4**	**15.1**
						Difference (Percentage points)						
Lowest Quintile[a]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	1.1	1.2	0.9	1.2	1.0	1.0	0.9	1.2	1.1	1.3	1.5	1.3
Middle Quintile	0.2	0.2	0.3	0.3	0.4	0.3	0.4	0.3	0.4	0.3	0.2	0.3
Fourth Quintile	*	0.1	*	0.1	*	*	*	*	0.1	0.1	0.2	0.2
Highest Quintile	0	*	*	*	0.1	*	0.1	*	*	*	0.1	*
All Quintiles	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Source: Congressional Budget Office based on the Internal Revenue Service's Continuous Work History Sample.

Notes: The analysis is limited to taxpaying units that appear in the CWHS in any three-year period from 1987 to 2000. Quintiles are defined using income ranges from the entire population, including nonfilers, in the applicable period and may not contain one-fifth of taxpaying units that appear in multiple years. Table C-1 shows the income ranges associated with each quintile. For the longitudinal measure, each quintile contains the same number of taxpayers that it does under the average annual measure with which it is being compared.

Income includes only what can be consistently measured on a tax return—wages, salaries, self-employment income, rents, taxable and nontaxable interest, dividends, realized capital gains, taxable retirement benefits, and unemployment benefits.

n.a. = not applicable; * = between -0.05 and 0.05.

a. Values are not shown (because of the small size of the sample) but are included in the totals.

b. Taxes were calculated under the law prevailing in 2000 by increasing incomes and deductions to the 2000 level using the rate of inflation.

Table B-4.

Annual and Longitudinal Income and Effective Tax Rates Under Different Sampling Restrictions, 1987 to 2000

Income Group	No Sample Restrictions			Restriction of No Marital Status Change			Restriction of Age Requirement[a]		
	Average Annual Measure	Longitudinal Measure	Difference[b]	Average Annual Measure	Longitudinal Measure	Difference[b]	Average Annual Measure	Longitudinal Measure	Difference[b]
				Average Pretax Income (2000 dollars)					
Lowest Quintile[c]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	13,450	17,000	26	13,450	16,900	25	13,500	17,150	27
Middle Quintile	25,300	28,250	12	25,300	28,100	11	25,550	28,400	11
Fourth Quintile	43,600	44,850	3	43,650	44,900	3	43,950	45,250	3
Highest Quintile	126,000	121,150	-4	128,850	124,150	-4	123,050	118,050	-4
All Quintiles	**64,850**	**64,850**	**0**	**66,550**	**66,550**	**0**	**70,300**	**70,300**	**0**
				Share of Pretax Income (Percent)					
Lowest Quintile[c]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	2.4	3.1	0.7	2.4	3.1	0.7	1.6	2.1	0.5
Middle Quintile	7.9	8.8	0.9	7.6	8.5	0.9	6.2	6.8	0.6
Fourth Quintile	19.3	19.9	0.6	18.2	17.9	-0.3	18.8	19.0	0.2
Highest Quintile	71.0	68.3	-2.7	72.3	70.5	-1.8	73.8	72.0	-1.8
All Quintiles	**100.0**	**100.0**	**0**	**100.0**	**100.0**	**0**	**100.0**	**100.0**	**0**
				Effective Individual Income Tax Rate (Percent)[d]					
Lowest Quintile[c]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	-1.7	1.8	3.5	-1.4	2.2	3.6	-4.8	-0.2	4.6
Middle Quintile	5.6	7.0	1.4	5.8	7.2	1.4	4.7	6.2	1.5
Fourth Quintile	9.4	9.8	0.4	9.4	10.0	0.6	8.6	9.1	0.5
Highest Quintile	18.1	18.2	0.1	18.3	18.3	*	17.6	17.6	*
All Quintiles	**15.1**	**15.1**	**0**	**15.4**	**15.4**	**0**	**14.8**	**14.8**	**0**

Continued

Table B-4.
Continued

Income Group	No Sample Restrictions: Average Annual Measure	No Sample Restrictions: Longitudinal Measure	No Sample Restrictions: Difference[b]	Restriction of No Marital Status Change: Average Annual Measure	Restriction of No Marital Status Change: Longitudinal Measure	Restriction of No Marital Status Change: Difference[b]	Restriction of Age Requirement[a]: Average Annual Measure	Restriction of Age Requirement[a]: Longitudinal Measure	Restriction of Age Requirement[a]: Difference[b]
	Share of Individual Income Tax Liabilities (Percent)[d]								
Lowest Quintile[c]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Second Quintile	-0.3	0.4	0.7	-0.2	0.4	0.6	-0.5	*	0.5
Middle Quintile	2.9	4.1	1.2	2.9	4.0	1.1	2.0	2.8	0.8
Fourth Quintile	12.0	13.0	1.0	11.2	11.6	0.4	10.9	11.6	0.7
Highest Quintile	85.3	82.6	-2.7	86.2	84.0	-2.2	87.7	85.7	-2.0
All Quintiles	**100.0**	**100.0**	**0**	**100.0**	**100.0**	**0**	**100.0**	**100.0**	**0**

Source: Congressional Budget Office based on the Internal Revenue Service's Continuous Work History Sample.

Notes: The analysis is limited to taxpaying units that appear in the CWHS in every year from 1987 to 2000. "Share" refers to a portion of the sample, not the overall population. Quintiles are defined using income ranges from the entire population, including nonfilers, in the applicable period and may not contain one-fifth of taxpaying units that appear in multiple years. Table C-1 shows the income ranges associated with each quintile. For the longitudinal measure, each quintile contains the same number of taxpayers that it does under the average annual measure with which it is being compared.

Income includes only what can be consistently measured on a tax return—wages, salaries, self-employment income, rents, taxable and nontaxable interest, dividends, realized capital gains, taxable retirement benefits, and unemployment benefits.

Shares of income received and taxes paid by upper-income quintiles will appear higher in the sample than in the population because in the sample, lower-income families are underrepresented.

n.a. = not applicable; * = between -0.05 and 0.05.

a. The sample was restricted to taxpayers who were aged 25 to 60 during the 1987-2000 period.

b. The difference between the average annual and longitudinal measures is calculated as a percentage for income and as percentage points for shares of pretax income, effective tax rates, and individual income tax liabilities.

c. Values are not shown (because of the small size of the sample) but are included in the totals.

d. Taxes were calculated under the law prevailing in 2000 by increasing incomes and deductions to the 2000 level using the rate of inflation.

Table B-5.

Annual and Longitudinal Income and Tax Rates for PSID Respondents in All Possible Three-Year Periods, 1987 to 1995

	1987-1989	1988-1990	1989-1991	1990-1992	1991-1993	1992-1994	1993-1995
				Average Annual Income (2000 dollars)			
Lowest Quintile	7,950	8,000	7,800	7,700	7,600	7,700	7,900
Second Quintile	20,600	20,250	19,900	20,200	20,750	21,450	21,800
Middle Quintile	34,700	34,350	33,850	34,450	35,150	36,200	36,500
Fourth Quintile	54,100	53,850	53,150	54,100	55,250	57,050	57,300
Highest Quintile	114,900	114,500	113,550	115,350	121,300	128,100	131,300
All Quintiles	**50,400**	**50,900**	**50,700**	**52,050**	**53,200**	**54,650**	**55,500**
				Longitudinal Income (2000 dollars)			
Lowest Quintile	8,950	8,950	8,850	8,900	9,100	9,250	9,350
Second Quintile	21,350	21,300	21,000	21,550	22,200	23,000	23,300
Middle Quintile	35,300	35,050	34,500	35,300	36,000	37,100	37,600
Fourth Quintile	54,450	54,050	53,250	54,100	55,600	57,700	57,600
Highest Quintile	112,450	111,900	111,250	112,650	117,950	124,200	127,650
All Quintiles	**50,400**	**50,900**	**50,700**	**52,050**	**53,200**	**54,650**	**55,500**
				Difference (As a percentage of average annual income)			
Lowest Quintile	12.6	12.0	13.1	15.3	20.1	20.1	18.5
Second Quintile	3.5	5.2	5.5	6.7	7.0	7.2	6.9
Middle Quintile	1.6	2.1	2.0	2.5	2.5	2.5	3.0
Fourth Quintile	0.6	0.4	0.2	-0.1	0.6	1.2	0.5
Highest Quintile	-2.2	-2.2	-2.1	-2.3	-2.8	-3.0	-2.8
All Quintiles	**0**	**0**	**0**	**0**	**0**	**0**	**0**
				Average Annual Income Tax Rate (Percent)[a]			
Lowest Quintile	-3.6	-3.6	-3.6	-3.4	-3.2	-3.0	-2.7
Second Quintile	2.7	2.5	2.2	2.5	2.5	2.6	2.7
Middle Quintile	7.3	7.2	7.0	7.1	7.3	7.3	7.3
Fourth Quintile	11.0	10.9	10.7	10.8	10.9	11.2	11.3
Highest Quintile	20.6	20.5	20.4	20.4	21.0	21.2	21.4
All Quintiles	**14.5**	**14.6**	**14.5**	**14.6**	**15.0**	**15.3**	**15.5**

Continued

Table B-5.
Continued

	1987-1989	1988-1990	1989-1991	1990-1992	1991-1993	1992-1994	1993-1995
				Longitudinal Income Tax Rate (Percent)[a]			
Lowest Quintile	-2.2	-2.6	-2.6	-1.8	-1.5	-1.3	-1.2
Second Quintile	3.3	3.3	3.2	3.7	4.0	3.8	3.6
Middle Quintile	7.5	7.7	7.4	7.6	7.6	7.9	7.8
Fourth Quintile	11.4	11.1	11.0	11.1	11.4	11.5	11.6
Highest Quintile	20.6	20.5	20.3	20.3	20.9	21.2	21.5
All Quintiles	**14.5**	**14.6**	**14.5**	**14.6**	**15.0**	**15.3**	**15.5**
				Difference (Percentage points)			
Lowest Quintile	1.5	1.0	1.0	1.5	1.7	1.8	1.5
Second Quintile	0.6	0.8	1.0	1.2	1.5	1.2	0.9
Middle Quintile	0.2	0.5	0.4	0.5	0.3	0.6	0.5
Fourth Quintile	0.4	0.2	0.3	0.3	0.4	0.3	0.3
Highest Quintile	*	*	*	-0.1	*	*	0.1
All Quintiles	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Source: Congressional Budget Office based on the University of Michigan's Panel Study of Income Dynamics.

Notes: The analysis is limited to taxpaying units that responded to the study in every year from 1987 to 1995. Quintiles are defined using income ranges from the entire population, including nonfilers, in the applicable period and may not contain one-fifth of taxpaying units that appear in multiple years. Table C-1 shows the income ranges associated with each quintile. For the longitudinal measure, each quintile contains the same number of taxpayers that it does under the average annual measure with which it is being compared.

The income measure is total income, which comprises wages, business income, interest, dividends, pension income, unemployment compensation, rental income, Social Security benefits, and income from several cash transfer programs (such as food stamps).

* = between -0.05 and 0.05.

a. Taxes were calculated under the law prevailing in 2000 by increasing incomes and deductions to the 2000 level using the rate of inflation.

Table B-6.

Annual and Longitudinal Income and Tax Rates for PSID Respondents in Any Three-Year Period, 1987 to 1995

	1987-1989	1988-1990	1989-1991	1990-1992	1991-1993	1992-1994	1993-1995
				Average Annual Income (2000 dollars)			
Lowest Quintile	8,000	7,950	7,750	7,650	7,500	7,650	7,850
Second Quintile	20,500	20,150	19,850	20,100	20,600	21,300	21,650
Middle Quintile	34,750	34,350	33,850	34,400	35,050	36,050	36,350
Fourth Quintile	53,900	53,750	53,000	53,950	55,100	56,900	57,100
Highest Quintile	114,050	112,850	111,550	113,850	119,900	126,700	129,600
All Quintiles	**47,400**	**47,350**	**46,750**	**48,500**	**49,900**	**51,150**	**51,650**
				Longitudinal Income (2000 dollars)			
Lowest Quintile	8,900	8,950	8,800	8,800	9,050	9,250	9,400
Second Quintile	21,200	21,150	20,850	21,350	21,900	22,650	23,050
Middle Quintile	35,250	34,950	34,350	35,050	35,800	36,900	37,250
Fourth Quintile	54,150	53,750	52,900	53,850	55,350	57,400	57,250
Highest Quintile	111,500	110,200	109,100	111,050	116,250	122,400	125,550
All Quintiles	**47,400**	**47,350**	**46,750**	**48,500**	**49,900**	**51,150**	**51,650**
				Difference (As a percentage of average annual income)			
Lowest Quintile	11.6	12.1	13.3	15.4	20.8	21.5	19.8
Second Quintile	3.4	4.8	4.9	6.1	6.2	6.5	6.4
Middle Quintile	1.5	1.8	1.5	1.9	2.2	2.4	2.5
Fourth Quintile	0.4	0.1	-0.1	-0.2	0.5	0.9	0.3
Highest Quintile	-2.3	-2.4	-2.2	-2.5	-3.0	-3.4	-3.1
All Quintiles	**0**	**0**	**0**	**0**	**0**	**0**	**0**
				Average Annual Income Tax Rate (Percent)[a]			
Lowest Quintile	-3.4	-3.2	-3.4	-3.4	-3.2	-3.2	-2.9
Second Quintile	2.5	2.6	2.5	2.7	2.9	3.0	3.2
Middle Quintile	7.2	7.1	7.1	7.4	7.7	7.7	7.7
Fourth Quintile	11.0	11.0	10.8	10.9	11.1	11.4	11.5
Highest Quintile	20.5	20.3	20.2	20.3	20.9	21.1	21.3
All Quintiles	**14.1**	**14.0**	**13.9**	**14.2**	**14.7**	**14.9**	**15.0**

Continued

Table B-6.
Continued

	1987-1989	1988-1990	1989-1991	1990-1992	1991-1993	1992-1994	1993-1995
				Longitudinal Income Tax Rate (Percent)[a]			
Lowest Quintile	-2.2	-2.2	-2.4	-1.8	-1.4	-1.3	-1.2
Second Quintile	3.2	3.2	3.4	3.8	4.3	4.2	4.1
Middle Quintile	7.5	7.8	7.5	7.9	7.9	8.3	8.2
Fourth Quintile	11.4	11.1	11.1	11.2	11.6	11.7	11.8
Highest Quintile	20.5	20.3	20.1	20.2	20.8	21.1	21.4
All Quintiles	**14.1**	**14.0**	**13.9**	**14.2**	**14.7**	**14.9**	**15.0**
				Difference (Percentage points)			
Lowest Quintile	1.2	1.1	1.0	1.5	1.8	1.9	1.7
Second Quintile	0.7	0.7	0.9	1.1	1.4	1.2	1.0
Middle Quintile	0.3	0.6	0.4	0.5	0.2	0.5	0.4
Fourth Quintile	0.3	0.2	0.3	0.3	0.5	0.3	0.3
Highest Quintile	*	*	-0.1	-0.1	-0.1	*	0.1
All Quintiles	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Source: Congressional Budget Office based on the University of Michigan's Panel Study of Income Dynamics.

Notes: The analysis is limited to taxpaying units that responded to the study in any three-year period from 1987 to 1995. Quintiles are defined using income ranges from the entire population, including nonfilers, in the applicable period and may not contain one-fifth of taxpaying units that appear in multiple years. Table C-1 shows the income ranges associated with each quintile. For the longitudinal measure, each quintile contains the same number of taxpayers that it does under the average annual measure with which it is being compared.

The income measure is total income, which comprises wages, business income, interest, dividends, pension income, unemployment compensation, rental income, Social Security benefits, and income from several cash transfer programs (such as food stamps).

* = between -0.05 and 0.05.

a. Taxes were calculated under the law prevailing in 2000 by increasing incomes and deductions to the 2000 level using the rate of inflation.

APPENDIX

C

CBO's Method for Deriving Income Quintiles

Because the Internal Revenue Service's Continuous Work History Sample—the tax-return data that the Congressional Budget Office (CBO) mainly used for this analysis—does not represent all taxpayers, CBO relied on data from a representative cross section of the entire population to divide the tax-return sample into quintiles (basically fifths of the income distribution). CBO first combined information from the entire tax-filing population in a given year with data for the same year from the Census Bureau's Current Population Survey, forming a cross section that represented the full population. The taxpaying units in the cross section were then ranked by income and divided into five groups of equal size. (The ranking incorporated the assumption that all nonfilers fell into the lowest income quintile.) CBO then used the income range associated with each population-derived quintile to assign members of the tax-return sample to income groups. Table C-1 shows the income ranges that were used to make that assignment.

Table C-1.

Minimum Income by Quintile

(2000 dollars)

	Quintile				
Year	Lowest	Second	Middle	Fourth	Highest
1987	0	6,376	17,913	32,039	54,901
1988	0	7,220	19,220	33,654	57,568
1989	0	8,272	20,139	35,225	60,324
1990	0	8,539	20,885	36,569	62,313
1991	0	8,735	21,163	37,029	63,432
1992	0	8,546	21,466	37,922	65,708
1993	0	8,185	21,289	38,103	66,358
1994	0	8,081	21,792	38,946	68,576
1995	0	8,755	22,800	40,564	71,337
1996	0	8,742	23,494	41,871	73,967
1997	0	9,413	24,886	44,210	77,654
1998	0	10,561	26,422	46,223	81,688
1999	0	10,652	27,228	47,906	85,392
2000	0	11,421	28,606	50,183	89,092

Source: Congressional Budget Office based on data from the Internal Revenue Service's Statistics of Income data set and the Bureau of the Census's Current Population Survey.

Notes: The minimum income is the lower income boundary for each quintile. Quintiles (fifths of the income distribution) are defined on the basis of the full population, including nonfilers, who are assumed to fall into the lowest quintile.

Income includes only what can be consistently measured on a tax return—wages, salaries, self-employment income, rents, taxable and nontaxable interest, dividends, realized capital gains, taxable retirement benefits, and unemployment benefits.