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February 2, 2009

Congressional Research Service

Report RL32693

*Distribution of the Tax Burden Across Individuals: An  
Overview*

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December 13, 2004

**Abstract.** The first section of this report, which is normative in nature, therefore discusses different philosophies about how the tax burden should be distributed, and what those philosophies imply for the shape of the tax system. In particular, it addresses the question of the justifications for a progressive tax system (one where the share of income collected as a tax rises as income rises). This section is presented for the interested reader, but is not a necessary preliminary to examining the analysis in the second section, which presents estimates of the distribution of the federal and total U.S. tax burden. The third section of the report discusses the measures that can be used to characterize the distributional effects of tax changes.

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# Distribution of the Tax Burden Across Individuals: An Overview

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June 23, 2008

<http://wikileaks.org/wiki/CRS-RL32693>

Congressional Research Service

7-5700

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RL32693

## Summary

Distributional issues often lie at the center of tax policy debates. Distributional analysis may address several issues: How should the tax burden be distributed or, are progressive (increasing as a share of income as income rises) taxes justified? What is the estimated distribution of the current system? How does a particular proposal change that distribution?

Unlike many analyses that study optimal behavior related to allocative issues and economic efficiency, economic analysis cannot be used to answer the questions of how the tax burden should be distributed. Such an answer would depend on social preferences. Economic analysis can, however, identify trade-offs and frame the issue analytically. For example, a number of plausible answers to this question could justify progressive tax structures.

Methodological issues, such as the income classifier, the unit of analysis, and assumptions regarding incidence all affect the estimates of the distribution of the current tax burden. Yet all show a similar qualitative result: the federal tax system is progressive throughout its range, although it tends to get much flatter at the top. This pattern is primarily due to the individual income tax, which is quite progressive, and actually provides subsidies at lower income levels. The other major tax is the payroll tax, which is a larger burden than the individual income tax for more than 80% of the population. This tax is first progressive and then regressive (effective tax rates fall with income). The corporate income and the estate taxes, while much smaller, are also progressive, while excise taxes are regressive. This overall progressive pattern has been in place historically, and is expected to continue in the future, although effective tax rates are currently low compared to other periods.

Unlike the federal tax system, state and local taxes tend to be regressive. Thus, a progressive federal tax system would be necessary to prevent overall U.S. taxes from being regressive. The combined taxes appear slightly progressive. Looking at taxes from a lifetime perspective would move the system more towards a proportional tax because average lifetime incomes reduces the variability of income. Studies have suggested that overall lifetime taxes are roughly proportional to income.

Many different measures have been used to characterize the effects of a particular tax change on the distribution of income. One may obtain a very different impression of tax changes depending on the measure used. One popular measure, the percentage change in tax, can be misleading, because as taxes become very small even a negligible absolute change in taxes leads to a very large percentage change. For measuring the relative distribution of income, percentage change in disposable income provides a better measures of how resources are distributed. By this measure, the recent tax cuts made incomes less equal.

This report will not be updated.

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**D**istributional effects are often central policy issues in debates over tax legislation. While economic analysis can be used to estimate the distribution of the tax system, or a tax change (a positive or descriptive analysis), it cannot be used to provide a normative or prescriptive analysis. Descriptive analyses indicate the expected effects of policies, but normative analyses indicate the optimal policy. Most normative analysis in economics is focused on efficiency. Even in the case of distribution issues, however, economic analysis can be used to facilitate the understanding of desirable distributions, measure them correctly, and determine the implications of different assumptions about social welfare for the optimal distribution of the tax burden.

The first section of this report, which is normative in nature, therefore discusses different philosophies about how the tax burden should be distributed, and what those philosophies imply for the shape of the tax system. In particular, it addresses the question of the justifications for a progressive tax system (one where the share of income collected as a tax rises as income rises). This section is presented for the interested reader, but is not a necessary preliminary to examining the analysis in the second section, which presents estimates of the distribution of the federal and total U.S. tax burden. The third section of the report discusses the measures that can be used to characterize the distributional effects of tax changes.

## **Is a Progressive Federal Tax Structure Justified?**

There are two separate, albeit related, questions about tax burden distribution. One of them is how to pay for the goods that the government provides (such as national defense, or highways). The second issue is whether the tax system should be used for direct income redistribution; in that case the optimal tax burden depends on the degree to which redistribution is deemed desirable.

## **How Should Taxes be Levied to Pay for Government Spending?**

Even if an economy had no redistribution, it would be necessary to provide “public goods” (such as defense, roads, etc.)—and to determine how taxes should be collected to pay for these goods. A public good, in its purest form, is one that each person can enjoy without detracting from anyone else’s consumption and where there is no way to exclude a person from enjoying it. As a result of the last effect, in most cases such goods would not be provided by the private market or would not be provided efficiently.

Many goods are not pure public goods, but have aspects of public goods in that person A benefits from person B’s expenditure—such quasi-public goods (or goods with positive external effects) would be provided in the private economy but not in sufficient amounts. To supply these and pure public goods it is necessary to raise revenues through taxes and distribute the resultant taxes’ burden somehow among the society’s members.

The distribution of the tax burden with respect to taxpayers’ incomes may be characterized as progressive, proportional, or regressive. The behavior of the effective tax rate—the share of income paid in taxes—determines this classification. If the share rises with income, the distribution is called progressive, if it stays constant, it is proportional, and if the share falls the distribution is called regressive.

Federal taxes, taken one by one, fall into all of the three categories. For the working population, the payroll tax is first proportional, then regressive, because its rate falls once the ceiling of taxable wages is reached. For the population as a whole, the payroll tax rate rises initially, and would therefore be first progressive, then essentially proportional, and for higher income ranges, regressive. Excise and sales taxes are generally regressive, especially those imposed on products primarily consumed by lower income individuals, such as cigarettes. The income tax is progressive, and even provides subsidies (negative taxes) for lower income working individuals, often through the earned income credit. The corporate income tax is imposed on corporate profits as a proportional tax, but its burden on individuals depends on behavioral responses, as discussed subsequently in the “Incidence assumptions” subsection of this report.

Most people would judge that a tax-collection system is fair if it satisfies two limited criteria: horizontal and vertical equity. The criteria state respectively that it is desirable (i) for taxpayers with the same “capacity to pay” to face the same tax liability in dollar terms and (ii) for liability to increase with ability to pay. The application of both depends critically on definitions of the same “capacity to pay,” which is difficult to determine for the families of different size and other characteristics.

Even under a regressive tax system, a higher income taxpayer may pay higher taxes in dollar terms than a lower-income taxpayer. What decreases is the share of the tax paid to the income. Therefore a regressive system could still satisfy the principles of vertical and horizontal equity.

## **Two Alternative Principles of Burden Distribution**

Traditionally there are two theoretical notions of how tax payments should be assigned. One is the benefit principle and another is the “ability to pay” principle.

### **Benefit Principle**

The benefit principle simply states that taxpayers who benefit from government services should bear the burden of the tax used to finance the services. The benefit principle seemingly has its roots in market-inspired solutions to paying for public goods. It is commonly associated with such taxes as the gasoline tax, used to finance highways. While such taxes are not voluntary, as free-market purchases are, they are directly related to the value individuals receive from public goods.

The benefit principle has a much broader reach, if one allows individuals to pay variable prices reflecting their willingness to pay, rather than each individual paying the same amount.<sup>1</sup> Higher income individuals have a greater willingness to pay for social goods because they have more income. They also might find some goods, such as defense and police protection, more valuable because they have more property to protect.

Under this principle, the distribution may be regressive, proportional, or progressive, depending on whether the taxpayers’ income elasticity is greater than, equal to, or less than the price

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<sup>1</sup> In theory, one can use a model to determine both the quantity of a public good and the share paid for by each individual, which is called a Lindahl equilibrium. See E. Lindahl, “Just Taxation—A Positive Solution,” in *Classics in the Theory of Public Finance*, Richard Musgrave and A.T. Peacock, eds. (New York, St. Martin’s Press), 1958.

elasticity.<sup>2</sup> Unfortunately, it is difficult to estimate these elasticities, particularly for national level expenditures where there is no cross-sectional variation. Some studies of municipal spending or spending on local education generally indicate that income elasticity exceeds the price elasticity, providing some support for progressive taxes using the benefit principle.<sup>3</sup> There is also some international evidence that tax shares rise as income rises: according to the World Bank<sup>4</sup>, high income countries have taxes as a share of output that are over twice as high as low income countries, and expenditure shares that are almost twice as large.

## Ability to Pay

The “ability to pay” principle suggests that people with higher incomes should pay more than those with lower incomes. Yet the standard does not answer the question of how much more. Its policy implications are based on a diminishing marginal benefit of a dollar assumption—the widely-accepted belief that the value of an additional dollar of income falls, as income rises, i.e. a rich man values an additional dollar less than a poor.

Notions of ability to pay have generally appealed to some measure of equal sacrifice. Potential measures of “equal sacrifice” include equal absolute sacrifice (each person’s welfare declines by the same amount), equal proportional sacrifice (each person’s welfare declines by the same proportion), and equal marginal sacrifice (each person’s “displeasure” from taking away an additional dollar is the same).

Equal absolute sacrifice would suggest proportional taxation if the marginal benefits of a dollar of income fell proportionally with income. That is, following this principle, if person A with five times as much income as person B values a dollar approximately a fifth as much as B, then for every dollar one collects from B, one collects \$5 from A. In this example, the principle implied a proportional tax system. If the marginal benefit of a dollar diminishes, but at a fairly slow rate, a regressive tax system could also be consistent with the principle, while if it diminishes at a faster rate, a progressive tax would be appropriate.

An alternative measure of sacrifice is equal proportional sacrifice. This method is much more likely to justify a progressive tax system, but it too depends on how fast the value of an additional dollar declines with income. There are many reasonable functional forms that do not support progressivity.<sup>5</sup>

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<sup>2</sup> This follows from the fact that the income elasticity is the percentage change in quantity demanded divided by the percentage change in income, and the price elasticity is the percentage change in quantity demanded divided by the percentage change in price; hence the percentage change in price divided by the percentage change in income is the ratio of the income elasticity to the price elasticity.

<sup>3</sup> Theodore C. Bergstrom and Robert P. Goodman, “Private Demand for Public Goods,” *American Economic Review*, vol. 63, June 1973, pp. 280-296; Theodore C. Bergstrom, Daniel L. Rubinfeld, and Perry Shapiro, “Micro-Based Estimates of Demand functions for Local School Expenditures,” *Econometrica*, vol. 50, September 1982, pp. 1183-1205; Edward M. Gramlich and Daniel L. Rubinfeld, “Micro Estimates of Public Spending Demand Functions and Tests of the Tiebout and Median-Voter Hypotheses,” *Journal of Political Economy*, vol. 90, June, 1982, pp. 536-560.

<sup>4</sup> This information can be found on the World Bank website, at <http://devdata.worldbank.org/external/dgsector.asp?W=0&RMDK=110&SMDK=473892>.

<sup>5</sup> For example, a utility function of the form  $u = y^a$ , where  $u$  is utility (an index of individual’s welfare or “happiness”),  $y$  is income and  $a$  is a constant greater than zero and less than one, would suggest a regressive tax structure if equal absolute sacrifice were used, a proportional tax structure if equal proportional sacrifice were used, and a progressive tax structure if equal marginal sacrifice were used.

The equal marginal sacrifice principle suggests steeply progressive taxes that will collect the least valued dollars in the economy. The result also uses the assumption that the value of a dollar falls as income rises. Under this principle, in contrast with the previous two cases, the progressivity does not depend on the rate with which the value declines.

Thus, without further information on the nature of welfare and the exact standard to be used, the ability to pay criterion does not necessarily justify regressive, proportional, or progressive taxes. The equal marginal sacrifice principle suggests an extreme degree of progression.

## **Distribution as a Public Good**

Before discussing general principles of a “just” income distribution we discuss direct redistribution itself as a public good.

There is normally a natural conflict between equity and efficiency objectives when the equity criterion suggests redistribution or progressive tax rates. That conflict occurs because taxes distort behavior and reduce economic efficiency. It means that the “size of the pie” becomes smaller. There are, however, circumstances in which redistribution can enhance rather than reduce efficiency—when redistribution itself is a public good. Recall that a pure public good can be characterized as a good where one person can benefit from the good without detracting from another’s benefit.

Redistribution can, in fact, be characterized as a public good.<sup>6</sup> Suppose that higher and middle income individuals care about the poor and their welfare—that is, they benefit from knowing that the poor have more income. In this case, redistribution is a public good because A’s contribution to the poor benefits B. Such redistribution is under-supplied in an open economy, and so there is justification for redistributing to the poor—based not on a concern about the welfare of the poor, but rather about the welfare of the rich.

The non-poor may also benefit in other ways from providing income to the poor, such as a reduction in crime.

Secondly, some redistribution that occurs in the economy may be justified as insurance in circumstances where private insurance markets do not work well. A social safety net may be regarded as insurance against falling, for whatever reason, on hard times. Certain features of our social safety net, such as unemployment compensation, need-based transfers (such as food stamps and Medicaid), and retirement benefits (Social Security and Medicare) may be justified in part as an attempt to deal with failure of private insurance markets.

## **How Should Income in the Economy be Distributed?**

It is possible to go beyond the issue of the provision of public goods (including redistribution) and ask a more general question: should income in society be redistributed to achieve a more equitable society—that is, a “just income distribution.”

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<sup>6</sup> This argument was made in a famous economics article: Harold M. Hochman and James D. Rogers, “Pareto Optimal Redistribution,” *American Economic Review*, vol. 59, September 1969, pp. 542-557.

There are three basic philosophical approaches to the question of a just income distribution: the endowment approach, the utilitarian approach, and the egalitarian approach. There are also permutations of each approach.<sup>7</sup>

## **Endowment, Utilitarian, and Egalitarian Approaches**

The endowment approach says that people should get what they earn. In its simplest form, it would imply no redistribution at all. Variations include allowing people to get what they earn in a competitive economy, so that excess profits arising from market power should be redistributed; to keep their labor earnings, so that assets and earnings from assets should be redistributed; or to keep what they would earn if they started equally in terms of wealth and family status. The last would, in theory, permit differences in income based on effort and willingness to take risk and innate earning ability, in contrast to the first approach that would also permit differences in income based on inherited wealth. While the endowment philosophy does not support direct redistribution to yield a just society, the benefit principle is philosophically consistent with endowment notions of income redistribution and may support progressive taxation.

The endowment approach suggests there should be little or perhaps no redistribution, which is difficult to argue as a case of distributive justice. For example, it suggests that people with mental and physical disabilities that prevent them from working at a normal wage and who have no family to rely upon, should have little or no income. Given that people do have different innate physical endowments, many would argue that there is nothing especially fair about a system that allows individuals to have varied earnings based on inherited characteristics. At the same time, it seems unfair to penalize higher income people who have those incomes because they worked harder or undertook more risk. On the whole, there may be a lot of support in our culture for allowing people to keep most of the fruits of their labor, but also a distaste for allowing individuals limited by circumstances of birth to suffer poverty.

The absolute lack of redistribution may also be inefficient, because of the presence of public goods in externalities in the real world, as discussed above. It means that everyone can be made better off, or not worse off, by allowing some redistribution.

The utilitarian approach says that society chooses to maximize welfare in the economy—a “greatest good for the greatest number” philosophy. The simplest utilitarian welfare measure is simply one that adds up all the welfare of the individuals in the economy and tries to make shifts that will make that welfare sum the greatest. Such an approach suggests that income should be shifted to those who are able to benefit the most from it at the margin.

This sort of assumption also implies an extremely progressive tax system in some circumstances: if we assume that all individuals are otherwise identical and that the value of each dollar of income declines as income rises (i.e. a dollar is more valuable to a poor man than to rich one), and ignore behavioral responses, then total welfare is greatest when all individuals incomes are equal. This redistribution would require a 100% tax on incomes above a certain level to be redistributed until everyone has the same income—a super-progressive tax system, with positive taxes at the top and negative taxes at the bottom.

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<sup>7</sup> The discussion in this section can be found in public finance textbooks. See, for example, Richard and Peggy Musgrave, *Public Finance in Theory and Practice*, 5<sup>th</sup> ed. (New York: McGraw-Hill), 1989 and Harvey Rosen, *Public Finance*, 6<sup>th</sup> ed. (New York, McGraw-Hill Irwin), 2002.

While the idea of the “greatest good for the greatest number” sounds attractive, its practical implementation is ambiguous, because there is no objective measure of “welfare” and no objective method of describing a maximum social welfare. The assumption of identical individuals may be a reasonable approximation for policy-making, but in reality individuals are not identical.

The third type of approach is the egalitarian approach, which says that everyone should be equally happy. In this case, the government would make transfers to the poor and also transfer more money to those who enjoy it less so as to raise their level of happiness. As with the case of the utilitarian measure, if one assumes all people are identical and that the value of an additional dollar of income falls as income rises, an aggressive redistribution scheme should be called for to equalize everyone’s income. Both utilitarian and egalitarian welfare functions are consistent with the ability-to-pay principle.

A variation of the egalitarian approach which takes into account behavioral responses is called the “maximin” or “Rawlsian” criteria. With this approach, society redistributes so as to maximize the welfare of the poorest individual. With no behavioral responses, and identical enjoyments of income, society would again equate income by taxing away all income above the average and giving it to those below the average, but with behavioral response, a 100% marginal tax on the rich would not work because it would cause individuals to reduce their work effort. In the Rawlesian system one would raise the tax just high enough so that the revenue to be distributed was greatest. It has been argued that this approach would reflect the choices risk-averse individuals would make as a social contract if they had to decide on the distribution of income before they knew which position they would fill in society.

One of the problems with using a welfare function, such as the utilitarian function, which might be persuasive to people as a practical guide to dealing with income distribution, is that it does not take account of the possibility that income varies because people differ in their work effort and risk taking. While many people might feel it is appropriate to redistribute income to lower income individuals because they do not have the capabilities to earn a higher income, they are less likely to favor redistribution to people who earn less because they work less or because they do not work as hard as the average person.

Similarly, even if everyone were identical in wealth, and innate ability and work effort, incomes would vary if some people took more risks than others. Taxing away the returns to risky projects and providing a guaranteed cushion against any risk would make risk-taking irrelevant to economic decisions. As a result, individuals might be willing to take more or less risk than appropriate, and an optimal level of risk-taking is important to the efficient operation of an economy. Since differences in income that arise from innate capabilities or inherited wealth (whether financial and physical wealth, or human wealth provided by one’s family) cannot easily be separated from those that arise from work effort and risk-taking, it is more difficult to assess the appropriate level of redistribution. Nevertheless, it is clear that appeals to a social welfare function do suggest that income redistribution may be appropriate. The U.S. tax system including all government layers actually engages in very little means-based redistribution, however.

## **What are the Implications for Tax Burden Distribution?**

Unfortunately, these guidelines about redistribution and about rules for paying for government expenditures do not provide a concrete answer as to how the tax burden should be distributed. What is perhaps most interesting about the analysis is that certain social welfare philosophies that

might seem compelling do potentially support progressive taxation, as does the benefit principle of charging for public goods. The ability to pay criteria for charging for public goods, while often invoked to support progressive taxes, however, provides little guidance without more information on individuals' preferences, unless the marginal equal sacrifice form is assumed.

It is also important to keep in mind that even if the federal tax is progressive, such progressivity may be needed to offset state and local taxes that tend to be regressive, in order to avoid an overall regressive U.S. tax system.

## **The Estimated Distribution of the Tax Burden**

Several public and private organizations have produced distributional tables. The governmental entities include the Treasury Department, the Congressional Budget Office (CBO), and Joint Committee on Taxation (JCT). Some of the private researchers involved in this work include the Urban Institute and Brookings Institution Tax Policy Center (TPC), and the Institute on Taxation and Economic Policy (ITEP) of Citizens for Tax Justice (CTJ).

Their analyses vary in several ways, including how they define income, the definition and ordering of tax units, and the taxes included. The following several sections discuss the rationale behind certain methodological choices and report the results of distributional analyses for different organizations, for different time periods, and for different kinds of taxes.

We present these measures as effective tax rates, which makes comparison meaningful despite the methodological differences. The effective rates are simply the ratio of taxes paid to the income measure. They are different from the statutory marginal rates that apply to an extra dollar of taxable income only. When effective tax rates rise with income a tax system is progressive, it is proportional when effective tax rates are relatively constant, or regressive, if effective tax rates fall as income increases.

## **The Concept of Income**

The theoretical discussion of the previous sections operated with a concept of "income," but what is the practical meaning of this word? There are several "incomes" mentioned in instructions to a single tax form—gross, adjusted gross, and taxable—to mention just three of them. Most states have state-specific income measures, such as "Wisconsin Income," usually different from the federal analogs. Other, non-tax, entities may use their own definitions of income better suited to their objectives.

Economic income encompassing all sources regardless of their taxability would be the best descriptor of the taxpayer's access to economic resources, but, unfortunately, none of the accounting or tax concepts of income exactly matches it. The discrepancy may happen for many reasons; one of them is statutory exclusions of certain items from income. For example, employees may have an option of purchasing their medical insurance through their employers with "pre-tax" dollars. "Pre-tax dollars" clearly represent income in the economic sense of this word, because employees can use them to consume, in this case—medical coverage. Yet they do not enter the calculation of "gross income" for individual income tax purposes, because of the special treatment of these transactions by law.

Organizations providing distributional analyses use measures of income that are expanded from tax measures, such as adjusted gross income (AGI). They estimate a more comprehensive income using various techniques. One of them, Treasury's Office of Tax Analysis (OTA), used Family Economic Income (FEI) as taxpayers' income measure in a 1999 paper.<sup>8</sup> The starting point of the intended income measure was the definition of income as the sum of consumption and the change in net-worth in a given period—commonly referred to as Haig-Simons income. This measure would include both cash and non-cash income, such as imputed rent on owner-occupied homes—the payments homeowners would have to make if they rented their dwellings instead of owning them.

OTA modified this definition in several ways. First, under the definition some retirees drawing largely on their savings would appear to have no or little income, because their consumption would be offset by a change in their net worth. At the same time, this money may be taxable, depending on the savings vehicle used. Their tax burden relative to their comprehensive income would appear extremely high because for several types of retirement accounts income is taxed on withdrawal. To correct for this mismatch, Treasury includes pension benefits in FEI. Another departure from the definition of income is exclusion of non-cash transfers, such as Medicare benefits, caused primarily by data limitations.

Other analyses use measures of income that may not be as broad as economic income, but broader than AGI. In its distributional table in 2003,<sup>9</sup> Treasury used a slightly narrower measure than in its 1999 study, cash income. CBO measures income as pretax cash income plus in-kind transfers.<sup>10</sup> JCT expanded AGI by adding tax-exempt interest, employer contributions for health plans and life insurance, employer share of FICA tax, worker's compensation, nontaxable social security benefits, insurance value of Medicare benefits, alternative minimum tax preference items, and excluded income of U.S. citizens living abroad.<sup>11</sup> The Brookings Urban Tax Policy Center initially used a narrower measure, but their current measures use both economic income and cash income. The choice of the income measure is influenced by data availability and other technical considerations as well as the types of taxes being distributed.

Using an expanded adjusted gross income (AGI) or cash income measure is simpler and requires fewer assumptions, but it can mislead. For example, individuals may be accruing huge gains in assets, such as their houses, relative to their cash income. These problems with measuring income are reduced, however, when distributions are reported based on population shares (such as quintiles) rather than dollar amounts. On the other hand, dollar amounts lend a concreteness to a distribution table.

The overall tax burden measured as a share of AGI, or expanded AGI, would always appear higher than when measured as a share of comprehensive income. Also, any change in the distribution would appear to be more pronounced when measured as a percentage of AGI,

<sup>8</sup> Julie-Anne Cronin, *U.S. Treasury Distributional Analysis Methodology*, U.S. Department of Treasury, Office of Tax Analysis, OTA Paper 85, September 1999, p. 7.

<sup>9</sup> This distributional table was issued as a press release on May 22, 2003 and examined the effects of the 2003 tax cut. It did not provide data, however, for measuring the effective tax rate, because it did not include a measure of income.

<sup>10</sup> Congressional Budget Office, *Effective Federal Tax Rates Under Current Law, 2001 to 2014*, August 2004, p. 2.

<sup>11</sup> See U.S. Congress, Joint Committee on Taxation, *Distribution of Certain Federal Tax Liabilities by income Class for Calendar Year 2001*, JCX-2-01, February 27, 2001, for details on methodology and pre-EGTRRA distribution tables for 2001, and CRS Report RL31907, *The 2003 Tax Cut: Proposals and Issues*, by David L. Brumbaugh and Don C. Richards, for the JCT's 2003 and 2008 estimates.

because AGI would normally be lower than comprehensive income. For example, the comparison between AGI and FEI measures for 2000 shows that the former is smaller than the latter: \$5,649 billion versus \$8,419 billion.<sup>12</sup> This relationship between the two measures is likely to persist across time.

Some distributions may be reported based solely on AGI, which may be a good choice for a quick “back-of-an-envelope” analysis, but it is preferable to use more comprehensive income measures whenever technically feasible. None of the organizations engaged in regular distributional analysis rely solely on AGI, however.

The measure of income can also affect impressions of tax burden unless distributional tables are presented based on population shares rather than measures of income.

## Unit of Analysis

Another question facing the researchers is how to measure the unit of analysis, and also whether and how to account for differences in tax unit composition, especially when ordering data by population share (such as lowest quintile, second quintile, etc.). The unit may be the family, the household, or the taxpayer unit. In many cases, these units would be the same, but in others they would not. For example, an adult working child living in the parent’s home may be part of the household, but would be a separate tax-filing unit.

In addressing unit composition, regardless of method of classification, issues arise with respect to ordering taxpayers. It is obvious that a large family may have more income than a single person, but still have the same ability to pay. Where is that family to be placed in ordering units for distributional analysis—with the same families by ability to pay or with the same by income but of different size? Researchers differ in their answers.

The first approach, used by most organizations, is not adjusting for the size of the unit at all. This approach can be argued to implicitly assume that income necessary to maintain a given standard of living for one person is the same as the one for four persons, which is certainly not realistic. Nevertheless, this approach is common. It is straightforward, eliminates some sources of ambiguity, and is the easiest to implement from a technical standpoint.

If households’ positions in the income distribution are to be adjusted by family or household size, researchers must determine how to make adjustments. One possibility is dividing the burden by the number of persons, in other words conducting the analysis on a per capita basis. This approach fails to recognize the economies of scale larger tax units enjoy: buying a four-bedroom residence is usually less than twice as expensive as buying a two-bedroom unit. A price of a bedroom in the first case would be lower than in the second. In a way, the purchasing power of a dollar would be higher for a large household compared to a small one.

Several adjustment methods lie between these extremes. CBO orders households by ability to pay using this method: it divides income by the square root of the household’s size.<sup>13</sup> In this case a

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<sup>12</sup> Cronin, *U.S. Treasury Distributional Analysis Methodology*, p. 12.

<sup>13</sup> Robertson Williams, David Weiner, and Frank Sammartino, *Equivalence Scales, the Income Distribution, and Federal Taxes*, CBO Technical Paper 1999-2, October 1998.

four-person family would need to have twice as much income as a single taxpayer to be as well off.

Another methodology is to normalize income by expressing it in terms of the applicable poverty level. For example, if the poverty level for a single person is \$9,000, and for a four-person family—\$19,000, then a single taxpayer with \$27,000 of income would be equated to the four-person family earning \$57,000, because both of them would be making three times the poverty level for a household of the respective size.

These ordering procedures and unit measures probably do not make a great deal of difference in the overall qualitative pattern of the effective tax rates.

### Incidence assumptions

Another important factor in distributional analysis is the economic incidence of taxes. It reflects the notion that a tax burden is not necessarily borne by the taxpayers legally responsible for paying the tax. For example, imposing an excise tax may lead to a price increase. Thus, even though the seller would be legally responsible for paying the tax, the economic cost would be split between the sellers and the buyers in some way, possibly with the buyers bearing all of it.

Researchers have to make reasonable assumptions about incidence, because calculating the precise shares in every case is impossible. They depend on factors specific to every market segment and may fluctuate across segments and in time within every market. **Table 1** lists the assumptions about tax incidence incorporated in the models of OTA, CBO, JCT, and TPC.

**Table 1. Comparison of Tax Incidence Assumptions Used by OTA, CBO, JCT, and TPC**

	OTA (1999)	CBO	JCT	TPC
<b>Individual income tax</b>	Payors	Payors	Payors	Payors
<b>Employee's share of payroll tax</b>	Payors	Payors	Payors	Payors
<b>Employer's share of payroll tax</b>	Families, for whom paid	Households, for whom paid	Taxpayers, for whom paid	Tax units, for whom paid
<b>Excise taxes on final goods</b>	Families, adjusting for the relative price effects, but allocated to income	Households, based on the consumption of taxable items	Households, based on the consumption of taxable items	NA
<b>Excise taxes on intermediate goods (business purchases)</b>	Families, allocated to capital and labor income	Households, allocated according to overall consumption	Households, according to overall consumption	NA
<b>Corporate income tax</b>	Families, allocated according to the share of capital income	Households, allocated according to the share of capital income	NA	Tax units, allocated according to the share of capital income
<b>Estate and gift tax</b>	Decedents	NA	NA	Decedents

**Sources:** Assumptions reflect Cronin, *U.S. Treasury Distributional Analysis Methodology*; Congressional Budget Office, *Effective Federal Tax Rates: 1979-2001* April 2004; Thomas A. Barthold, James R. Nunns, and Eric Toder,

http://wikileaks.org/wiki/CRS-RL32693

“A Comparison of Distributional Methodologies, in *Distributional Analysis of Tax Policy*, David Bradford, ed. (Washington, D.C., The AEI Press) 1995, pp. 96-110, and personal contacts.

Even though the variations in income, unit definition and incidence assumptions would cause the quantitative results to be different in every case, the implications about the tax system are actually quite similar.

The incidence of the corporate tax, in particular, has been the subject of a considerable economic literature, with the distributional effects depending on the responses of investors and workers and the technology of the firm.<sup>14</sup> The incidence of all taxes, even individual income and payroll taxes, depends, however, on behavioral responses. If savings and labor supply are relatively insensitive to taxes, as much evidence suggests, these taxes will fall on the individual who pays them.<sup>15</sup>

Note that the same assumptions about incidence are used (given the tax is distributed at all) for the different taxes except in the case of excise taxes. CBO and JCT allocate the tax based on the consumption of the taxed items. The Treasury allocates the tax to income, and also adjusts at the consumption level by imposing a burden for taxed items and a benefit for non-taxed items that nets to zero.<sup>16</sup>

## Measures of Tax Burden Distribution

### Current Federal Effective Tax Rates

**Tables 2 and 3** reproduce the burden distribution estimates from different sources for 2000 and 2005 ordered by population shares. Due to the methodological differences described above the data are not precisely comparable. In addition, there is also timing discrepancy. TPC does not have a 2000 law distribution table using 2000 incomes, so the appropriate column uses 2004 incomes but 2000 law. OTA does not have the table for 2005. Note that the absolute measures of effective tax rates can be affected by the income measure and the composition of included taxes.

At the same time, all sources depict a similar qualitative picture about the progressivity of the federal tax burden distribution. For example, in every case the effective tax rates for the lowest quintile are estimated in the low to middle single digits. The highest quintile in 2000 faced an effective rate of close to or above 25%. The numbers for other quintiles and the general pattern seem consistent, too. Tax rates rise more slowly, however, at the top of the distribution.

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<sup>14</sup> See CRS Report RL32517, *Distributional Effects of Taxes on Corporate Profits, Investment Income, and Estates*, by Jane G. Gravelle, and CRS Report RL34229, *Corporate Tax Reform: Issues for Congress*, by Jane G. Gravelle and Thomas L. Hungerford.

<sup>15</sup> *Ibid.*, and also see CRS Report RL31949, *Issues in Dynamic Revenue Estimating*, by Jane G. Gravelle, for survey of the literature.

<sup>16</sup> The Treasury appeared to have adopted this methodology in order to keep the price level constant (consistent with their revenue estimating assumptions) and have the tax passed back to owners of factors of production (wages and capital) rather than forward to consumers. But allocating the tax to income is not the same as the actual theoretical incidence, however,—namely that the tax falls on wages and on the owners of capital existing at the time the tax is initially imposed (through a fall in value). It is not easy to convert this concept into an annual incidence measure, although the closest way to do so would appear to be to allocate it to consumption rather than income, because the burden is not realized until the asset is converted into consumption.

**Tables 4 and 5** present data from the Joint Committee on Taxation, reflecting the tax burden at 2003 levels of income, based on tax law prior to the 2003 tax cut and the tax burden in 2008 without incorporating the 2008 rebates. The tables are arrayed by income level rather than population proportion, but again present a very similar picture of the federal total effective tax rates.

**Table 2. Tax Burden Distribution Estimates for 2000 by Different Research Organizations**

Source	Effective Federal Tax Rates	Effective Federal Tax Rates (Excludes Estate Taxes)	Effective Tax Rates, 2004 Cash Income (Excludes Excise Taxes)
	OTA	CBO	TPC
Lowest Quintile	5.9	6.4	3.8
Second Quintile	11.7	13.0	9.3
Middle Quintile	17.4	16.7	16.0
Fourth Quintile	20.1	20.5	20.5
Highest Quintile	24.6	28.0	27.3
All	21.5	23.1	23.0
Top 10%	25.7	29.7	28.8
Top 5%	26.6	31.1	30.2
Top 1%	29.1	33.2	32.8

**Sources:** U.S. Treasury, Office of Tax Analysis, Congressional Budget Office, Urban Institute and Brookings Institution Tax Policy Center.

**Table 3. Tax Burden Distribution Estimates for 2005 by Different Research Organizations**

	Average Effective Federal Tax Rates Under Current Tax Law, (Excludes Estate Tax)	Average Effective Federal Tax Rates, Economic Income (Excludes Excise Taxes)
	CBO	TPC
Lowest Quintile	4.3	2.1
Second Quintile	9.9	7.1
Middle Quintile	14.2	13.5
Fourth Quintile	17.4	17.7
Highest Quintile	25.5	21.4

	<b>Average Effective Federal Tax Rates Under Current Tax Law, (Excludes Estate Tax)</b>	<b>Average Effective Federal Tax Rates, Economic Income (Excludes Excise Taxes)</b>
All	20.5	18.4
Top 10%	27.4	22.0
Top 5%	28.9	22.4
Top 1%	31.2	23.8

**Sources:** Congressional Budget Office, Urban Institute and Brookings Institution Tax Policy Center.

**Table 4. Distribution of Taxes for 2003, Prior to the 2003 Tax Cut, JCT**

<b>Income Class (thousands of dollars)</b>	<b>Share of Population</b>	<b>Effective Federal Tax Rate (excludes corporate and estate taxes)</b>
Less than 10	14.1	7.2
10-20	17.1	6.0
20-30	13.9	10.2
30-40	11.4	13.8
40-50	8.4	15.8
50-75	15.2	17.5
75-100	8.9	19.9
100-200	8.7	23.5
200 +	2.3	28.3
All	100.0	19.9

**Sources:** Data on population share from Joint Committee on Taxation, Estimates of Federal Tax Expenditures for Fiscal Years 2004-2008, JCS-8-03, December 22, 2003. Data on Effective Tax Rates, from CRS Report RL31907, *The 2003 Tax Cut: Proposals and Issues*, by David L. Brumbaugh and Don C. Richards.

**Table 5. Distribution of Taxes for 2008, Prior to the 2008 Tax Rebate, JCT**

<b>Income Class (thousands of dollars)</b>	<b>Share of Population</b>	<b>Effective Federal Tax Rate (excludes corporate and estate taxes)</b>
Less than 10	9.0	3.9
10-20	16.3	3.8
20-30	11.3	9.3
30-40	10.5	12.1
40-50	9.2	14.4
50-75	17.1	16.3
75-100	10.9	18.2
100-200	13.6	22.5
200 +	2.1	25.9
All	100.0	19.6

**Source:** Derived from Joint Committee on Taxation, JCX-14-08 <http://www.jct.gov/x-14-08.pdf>

## Burden Distribution of Different Kinds of Federal Taxes

The federal tax system contains two major types of taxes, payroll and income taxes, and two minor ones, excise and estate taxes. Income taxes can be divided into individual taxes which are applied to wage income, passive capital income (interest, dividends and capital gains), and profits of unincorporated businesses, along with a separate flat rate tax on corporate profits. Each kind of tax has a different degree of progressivity (or regressivity) and therefore, the distribution of the burden depends on the mix of taxes within the system. **Tables 6 and 7** show the distribution of the tax burden by type, before the 2001-2003 changes. **Table 6** reports the Treasury (1999) estimates and **Table 7** reports the CBO estimates, for all but the estate tax. **Table 8** report the distribution for 2005.

The slight differences in the two 2000 distributions reflect differences in the income measures, in the taxes covered, and in the way in which families are ordered. For example, CBO places more larger families in the lowest quintile because they order by ability to pay, while Treasury orders by income. Since large families are likely to have larger benefits from the earned income credit, the tax rates of the individual tax are larger negatives in the CBO analysis than in the Treasury analysis. This effect also causes the lowest quintile to have higher payroll taxes because larger families are more likely and elderly individuals less likely to be represented in the CBO ordering.

The updated numbers in **Table 8** show similar patterns by tax types from the Congressional Budget Office (data are not available from Treasury), but with some changes. Most significant is the income tax, whose burden is smaller at every level, but particularly at higher incomes, due to the 2001 tax cuts. Some effects are due to the shifting of income across the brackets as well, which reduces income (and effective tax rates) in the lower incomes and raises them in the higher ones. Without these incomes shifts, the tax cuts would be smaller in the higher brackets and larger in the lower ones. This effect due to income redistribution can be seen with the corporate tax, whose overall level rose due in part to cyclical factors, but whose burden at lower income shares fell.

**Table 6. Effective Federal Tax Rates by the Type of Tax, 2000 (Treasury)**

	Individual income	Social Insurance	Corporate Income	Excise	Estate and Gift	Total Federal
Lowest Quintile	-2.4	2.3	0.9	0.7	0.0	5.9
Second Quintile	0.8	8.7	1.4	0.8	0.0	11.7
Middle Quintile	5.6	9.3	1.6	0.9	0.0	17.4
Fourth Quintile	7.8	9.8	1.6	0.9	0.0	20.1
Highest Quintile	13.7	6.7	2.8	0.9	0.0	24.6
All	10.1	7.9	2.3	0.9	0.5	21.5

	Individual income	Social Insurance	Corporate Income	Excise	Estate and Gift	Total Federal
Top 10%	15.4	5.5	3.3	0.9	0.7	25.7
Top 5%	16.9	4.1	3.8	0.9	0.9	26.6
Top 1%	20.2	2.1	4.6	0.9	1.3	29.1

**Sources:** Treasury, Cronin, et al.

**Table 7. Effective Federal Tax Rates by the Type of Tax, 2000 (CBO)**

	Individual Income	Social Insurance	Corporate Income	Excise	Total Federal
Lowest Quintile	-4.6	8.2	0.5	2.2	6.4
Second Quintile	1.5	9.4	0.6	1.4	13.0
Middle Quintile	5.0	9.6	1.0	1.2	16.7
Fourth Quintile	8.1	10.4	1.0	0.9	20.5
Highest Quintile	17.5	6.3	3.7	0.6	28.0
All	11.8	7.9	2.5	0.9	23.1
Top 10%	19.7	5.0	4.5	0.5	29.7
Top 5%	21.6	3.8	5.4	0.4	31.1
Top 1%	24.2	1.9	6.8	0.3	33.2

**Source:** Congressional Budget Office, *Effective Federal Tax Rates: 1979-2001*, April 2004.

**Table 8. Effective Federal Tax Rates by the Type of Tax, 2005 (CBO)**

	Individual Income	Social Insurance	Corporate Income	Excise	Total Federal
Lowest Quintile	-6.5	8.3	0.4	2.1	4.3
Second Quintile	-1.0	9.2	0.5	1.3	9.9
Middle Quintile	3.0	9.5	0.7	1.0	14.2
Fourth Quintile	6.0	9.7	1.0	0.8	17.4
Highest Quintile	14.1	6.0	4.9	0.5	25.5
All	9.0	7.6	3.1	0.8	20.5
Top 10%	16.0	4.8	6.1	0.4	27.4
Top 5%	17.6	3.5	7.4	0.3	28.9
Top 1%	19.4	1.7	9.9	0.2	31.2

**Source:** Congressional Budget Office, *Historical Effective Federal Tax Rates*: December 2007.

**Tables 6, 7, and 8** both show that the degree of progressivity is very different among the types of federal taxes. The effective rate of the individual income tax rises from a negative tax in the lowest quintile to 20% or so for the top 1%. As noted earlier, the earned income credit can lead to subsidies at low levels. Payroll, or social insurance, taxes rise slightly and then fall. This pattern occurs because the tax rate is flat with a dollar ceiling, but only applies to workers. Tax rates are

lower at the bottom of the distribution because of the greater share of retired people, and are lower at the top because of the dollar ceiling. So the tax is regressive at the higher end of the distribution. Another important observation is that for the four bottom quintiles the effective rates of payroll taxes are higher than for the income tax.

Conversely, the effective rates of the corporate income tax increase with income from 0.9% to 2.8% in the Treasury analysis, and from 0.5% to 3.7% in the CBO 2000 analysis and 0.4% to 4.9% in the CBO 2005 analysis. The rates are even higher for the top 10%, top 5%, and top 1%. These rates are well below the statutory rates, because a relatively small share of taxpayers receive income from the source, and their tax payments are dispersed among all taxpayers in the class. The progressivity of the corporate tax is due not to the progressive tax structure, but to the allocation of capital income to higher income individuals.

Excise taxes' effective rates vary markedly between the two research organizations, reflecting the allocation of the tax to factor incomes for the Treasury and to consumption for CBO. The Treasury analysis depicts this tax as largely proportional, while the CBO analysis shows it to be regressive. (The CBO approach, which is also used by JCT, is probably the more widely used in distributional analysis). The regressivity of consumption taxes under this incidence assumption occurs because consumption tends to decline with income.

The estate tax is the most progressive of all, although it is small. Since most estates are exempt or largely exempt from the estate tax, only relatively high income people pay this tax. (The estate tax does not appear in **Tables 7** and **8** because CBO does not include the estate and gift tax in its analysis.)

### Distribution over Time

Another important issue is the change in the distribution in time. This issue is particularly relevant after the recent tax law changes of 2001-2003, but even in a more stable statutory environment the distribution evolves continually in response to economic and demographic developments. **Table 9** shows the historic effective rates for selected years made in December 2007.

The years shown include the first year that CBO provided such analysis, and years after major tax changes and economic changes (the 1981 tax cut phased in over three years, the 1986 tax reform phased in 1987-88, the 1993 tax increase, the year prior to the 2001 tax cuts, and the most recent year). Over this period the tax system continued to be progressive, although overall taxes today are slightly lower than was typical earlier.

**Table 9. Historical Effective Federal Tax Rates, Selected Years, 1979-2004**

(Effective Federal Tax Rates for All Households)

	1979	1984	1988	1994	2000	2005
Lowest Quintile	8.0	10.2	8.5	6.6	6.4	4.3
Second Quintile	14.3	14.6	14.3	13.1	13.0	9.9
Middle Quintile	18.6	18.0	17.9	17.3	16.6	14.2
Fourth Quintile	21.2	20.4	20.6	20.4	20.5	17.4
Highest Quintile	27.5	24.3	25.6	27.4	28.0	25.5

	1979	1984	1988	1994	2000	2005
All	22.2	21.0	21.8	22.3	23.0	20.5
Top 10%	29.6	25.2	26.7	29.4	29.6	27.4
Top 5%	31.8	26.1	27.8	31.3	31.0	28.9
Top 1%	37.0	28.2	26.7	35.8	33.0	31.2

**Source:** Congressional Budget Office, *Effective Federal Tax Rates: 1979-2005*, December 2007.

**Table 10** examines the current and projected burden around the period of the recent tax changes and into the future. Tax rate cuts are still being phased in as one moves from 2004 to 2008, with 2008 the last year for the lower capital gains taxes and dividend taxes. 2010 is the year that the original 2001 tax cut is fully phased in. As currently scheduled, none of the tax cuts would be effective in 2014. Note that effective tax rates are higher in 2014 than in 2000 because of real bracket creep—the failure to adjust the tax system parameters to the real income growth. It affects the lower quintiles most, while the legislative changes have benefitted the higher income groups the most, and that effect would be more pronounced if the CBO burden tables included the estate tax, which, according to **Table 6**, accounted for 1.3% of income of the top 1% prior to recent tax changes.

The estimates in **Table 10** reflect current federal law; the actual pattern of tax changes will depend on whether and to what extent the 2001 and 2003 tax cuts are made permanent and what changes might be made to the alternative minimum tax, which, if it is not addressed, will eventually apply to a very large fraction of taxpayers, especially those with large families.

**Table 10. Effective Federal Tax Rates in Select Years Before and After 2001-2003 Changes in the Tax Law**

(Effective Federal Tax Rates for All Households)

	2000	2004	2008	2010	2014
Lowest Quintile	6.4	5.2	5.8	5.8	8.3
Second Quintile	13.0	11.1	12.4	12.3	14.7
Middle Quintile	16.7	14.6	15.9	16.1	18.2
Fourth Quintile	20.5	18.5	20.1	20.5	22.4
Highest Quintile	28.0	23.8	26.4	27.1	28.8
All	23.1	19.6	21.7	22.1	24.1
Top 10%	29.7	24.9	28.0	28.5	30.3
Top 5%	31.1	25.6	29.3	29.7	31.6
Top 1%	33.2	26.7	31.2	31.2	33.6

**Source:** Congressional Budget Office, *Effective Federal Tax Rates Under Current Law, 2001 to 2014*, Aug. 2004.

## State and Local Tax Burden

Consideration of the tax burden would be incomplete without taking into account the burden from state and local taxes. It is very difficult to draw consistent comparisons among all states, because their public finance systems are different. ITEP calculated U.S. average effective combined state and local rates for non-elderly taxpayers. **Table 11** presents these results.

**Table 11. State and Local Taxes in 2002, Shares of Family Income for Non-Elderly Taxpayers, U.S. Averages**

		Effective Tax Rates (total taxes, before federal deduction offset)	Effective Tax Rates (total taxes, after federal deduction offset)
Lowest Quintile		11.4	11.4
Second Quintile		10.4	10.3
Middle Quintile		9.9	9.6
Fourth Quintile		9.4	8.8
Highest Quintile	Next 15%	8.9	7.7
	Next 4%	8.1	6.5
	Top 1%	7.3	5.2

**Source:** Institute on Taxation and Economic Policy, Citizens for Tax Justice.

**Table 11** demonstrates that the overall state and local taxation system is regressive, at least as far as non-elderly taxpayers are concerned. It is difficult to make broad generalizations, but the main reasons for the result may be a relative “flatness” of state and local income tax schedules, high reliance on sales and use taxes, and the relative importance of excise taxes. Both sales and excise taxes are regressive when allocated to consumption.

States and localities are not as flexible as the federal government in their ability to choose their tax structure, because they face competition from other states and localities. It is relatively easy to move from one state to another, and even easier to move across local jurisdictions. Large differences in tax rates would induce taxpayers, especially higher income taxpayers, to move to states with lower taxes. Thus, one can argue that it is primarily the federal government’s role to ensure that the overall burden distribution is progressive, if progressivity is desired.

The combined total U.S. tax system appears to be progressive but not steeply so, as regressive state and local taxes are combined with the progressive federal tax.

## Lifetime Tax Burden

So far, discussion in this report has centered around the analysis of the tax burden at a single point in time, but there is an alternative view that cumulative lifetime tax burden is a better representation of the concept. Lifetime tax burden is simply the sum of all taxes paid each year during the lifetime. In most cases, individual income grows with time and then drops after retirement. That pattern means that the lowest percentile may include a very heterogeneous taxpayer mix: younger people still in school, retirees, and mid-career low-income earners.

From the policy perspective, each of these groups is different and bundling them together makes little practical sense. For example, a policy redistributing the tax burden from the higher to the lower quintiles may have different effect on a younger taxpayer and a retiree. It is conceivable that a younger taxpayer may welcome the policy, because of the lower tax on an anticipated higher future income. In the meantime, a retiree would be unambiguously worse off, because he or she has a small chance of benefitting from the lower future burden.

The issue of lifetime burden distribution is especially important in the analysis of intergenerational fairness, and in conjunction with national debt issues. The debt incurred today would have to be paid off in the future, meaning that the taxes of the future generations could be lower in its absence.

At the same time, the approach does not take into account the fact that a marginal unit of money is likely to have a higher value to the lower income individuals than to the higher income ones. Even though a younger taxpayer in the previous example may pay a lower aggregate lifetime tax bill, he or she might still prefer to pay less taxes when income is low rather than when it is high. So, in order to compensate the taxpayer for the reduction in his or her disposable income today, the increase in the disposable income in the future should be more than today's loss. Each taxpayer's rate of intertemporal substitution is different, and incorporating it into the analysis would add another hard-to-verify assumption.

Another reason that simple addition of tax liabilities throughout lifetime is not an ideal indicator is the time value of money principle. Under this principle, a dollar today is worth more than a dollar tomorrow. While the complication can be circumvented in theoretical analysis, it may be another source of contention in the analysis of real-life events.

Nevertheless, examining tax burdens from a lifetime perspective is likely to reduce the progressivity of the tax system, as some of the progressivity observed in a single cross section reflects the tendency of individuals to have lower incomes in the early and later years of life.<sup>17</sup>

## How to Measure Changes in Tax Distribution

While it is straightforward to describe what makes a tax system regressive, proportional, or progressive, it is more difficult to characterize changes to an existing tax system. Indeed, it is difficult even to determine the degree of progressivity or regressivity of a system so that the old and new tax systems can be compared based on their degree of progressivity. While a variety of progressivity indices and measures have been proposed, none has been entirely satisfactory and they can lead to different conclusions about relative progressivity.<sup>18</sup> This report will instead examine the measures that are often used to characterize tax changes.

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<sup>17</sup> A lifetime study of the total tax system found a close to proportional system. See Don Fullerton and Diane Rogers, *Who Bears the Lifetime Tax Burden?* (Washington, DC, The Brookings Institution) 1993.

<sup>18</sup> These indices and issues are summarized in Donald W. Kiefer, "Progressivity, measures of," in Joseph J. Cordes, Robert D. Ebel, and Jane G. Gravelle, eds., *The Encyclopedia of Taxation and Tax Policy*, ed. (Washington, D.C., The Urban Institute), 1999. See also Donald W. Kiefer, "Distributional Tax Progressivity Indexes," *National Tax Journal*, vol. 37, December 1984, pp. 497-513.

Reports of the distributional effects of tax cuts sometimes appear to depict the same tax change very differently. This difference in how the cut is perceived for distributional purposes arises from the choice of distributional measure. Some of the measures that have been presented include (1) the share of taxpayers benefitted that fall below an income level; (2) the percentage reduction in taxes paid; (3) the tax cut as a percentage of income (both pre-tax and disposable); (4) the distribution of the tax cut by income class; and (5) the average tax cut. The first of these measures is most likely to tend to depict a tax change as favoring lower income individuals relative to higher income ones; the second measure is next most likely, and so forth.

## **An Illustrative Example**

To illustrate this point, consider a 10% across-the-board income tax cut (all positive net tax liabilities reduced by 10%). Assuming that the bottom quintile of the distribution does not have tax liability, one could describe this tax cut as one in which three quarters of the beneficiaries have cash income below \$80,000, which might make the cut appear not to be particularly targeted to high income individuals. Almost any tax cut that is a general one will benefit, in numbers, those outside the high income taxpayers, because high income taxpayers are, by definition, not very numerous. But this description of the tax cut does not tell us anything about how much of a tax cut different groups receive. **Table 12** illustrates how such quantitative measures of the types described above would look assuming everyone in each quintile and group has the same average income (an assumption that allows the calculation of measures in the lower brackets where some individuals have negative tax liability because of the earned income tax credit).

Based on percentage changes reported in the second column, the tax cut as a percentage of income tax liabilities, the tax cut may appear to be fairly equal across income classes (except for the lowest group). But that measure does not reveal very much about distribution, because people in the lower income categories may have extremely small tax liabilities and a tiny change in tax could result in a very big percentage change. Expanding the measure to a percentage reduction in all taxes shows that a proportional cut in income taxes reduces total taxes proportionally more for high income individuals. Even in this case, however, measuring the percentage reduction in tax liability has not demonstrated anything about the effect on income equality; it merely reveals that individual income taxes are more progressive than total taxes.

In discussing these measures that do relate to effects on income inequality, it is important to distinguish between absolute measures and relative measures. For example, average tax reductions per unit provide information on the absolute size of a tax benefit across the income classes, which is a straightforward measure, and is shown in the last column of **Table 12**. In this example, the second quintile has a tax cut of \$21 per person and the highest quintile a cut of \$2,841.

Another way of examining this same effect is to compare the distribution of the tax benefit with the distribution of the population in the first column of **Table 12**. If each taxpayer class is getting 20% (one fifth) of the benefit, then the benefits are evenly distributed. But the 10% tax cut distributes benefits disproportionately to higher income individuals, indicating that incomes are becoming more unequal on an absolute basis. Both of these measures can inform us about how a tax cut is changing income without being misleading, although it is important to remember that existing income and tax payments are more concentrated among high income individuals. Thus there is a tendency for absolute measures to show most across-the-board tax cuts as favoring higher income individuals—because these individuals have a larger proportion of the income and

pay an even larger fraction of the income tax. Moreover, unless a tax provision is refundable, it will have little benefit for the bottom fifth of the population.

**Table 12. Alternative Measures of Distribution for a Ten Percent Across-the-Board Rate Cut**

	<b>% Change Income Tax Liability</b>	<b>% Change Total Tax Liability</b>	<b>% Change Pre-Tax Income</b>	<b>% Change After-Tax Income</b>	<b>Share of Tax Cut (%)</b>	<b>Tax Cut Per Return (\$)</b>
Lowest Quintile	0.0	0.0	0.0	0.0	0.0	0
Second Quintile	-10.0	-0.7	0.1	0.1	0.6	21
Middle Quintile	-10.0	-3.1	0.6	0.7	7.0	259
Fourth Quintile	-10.0	-3.7	0.8	1.0	16.3	607
Highest Quintile	-10.0	-5.1	1.4	1.9	76.4	2,841
All	-10.0	-4.4	1.0	1.3	100.0	738
Top 10%	-10.0	-5.5	1.5	2.1	61.4	4,562
Top 5%	-10.0	-5.8	1.7	2.4	49.0	7,223
Top 1%	-10.0	-6.2	2.0	3.0	29.5	20,991

**Source:** Calculated based on data from U.S. Treasury Distributional Analysis Methodology, by Julie-Anne Cronin, U.S. Department of Treasury, OTA Paper 85, September 1999. The term "Total Tax Liability" refers to all federal taxes plus state and local income taxes. The top of the first four quintiles is \$17, \$34, \$59, and \$100 thousand. Measured by cash income, the top of the first four quintiles is \$16, \$30, \$50, and \$80 thousand.

A different type of measure is a relative one that tries to examine how the tax benefit is changing the overall relative distribution of income in the country—that is, is it making income shares more equal or less equal? In this case, a tax change that does not alter distribution provides tax benefits to different income classes in proportion to some measure of income. (Higher income individuals would still receive high absolute tax cuts, but not higher tax cuts as a percentage of income.) In general, the best method for measuring this type of effect on inequality is to examine the percentage change in disposable (after-tax) income. If the percentage change is equal, then the tax change is not making incomes shares more equal or less equal. If the percentages are higher among higher income individuals the change is making income shares less equal. Clearly, the across-the-board proportional tax cut is increasing inequality measured by the relative concept: incomes in the lower brackets are increased by considerably less than 1%, while incomes in the higher brackets are increased by 2% or more.

## Illustrations from Recent Tax Legislation

These different measures have been used to report different tax cuts, sometimes with very different depictions, which we illustrate from distributional data provided for two recent individual tax cuts: the 2001 tax cut (originally H.R. 1836) and the 2003 tax cut (originally H.R. 2).

## 2001 Tax Cut

The 2001 tax cut was a multi-year phased in tax cut, which sunsets after 2010. **Tables 13, 14, and 15** provide data from the three sources we are aware of that provided distributional data for the 2001 tax cut. The first table presents data from the Joint Tax Committee for the latest year provided, 2006, when most provisions would be fully phased in. The percentage change in federal tax liability was reported directly. The percentage change in after-tax, or disposable, income, the measure suggested above as conceptually the best measure of changes in distribution, was derived from data in the JCT table.

As suggested in the previous section, the percentage change in federal tax liability shows the largest percentage changes at the lower income and the smaller ones at higher levels, except for the very top level. These numbers give the appearance of a tax cut favoring lower income individuals. The numbers showing the percentage change in after-tax income suggest, however, that the largest benefit was in the highest income class. Both patterns show that benefits fell, and then rose at very high income levels, but the percentage change in tax liability suggests the biggest benefits for the lower income class, while the percentage change in after-tax income measure shows the biggest benefits for the top measure.

**Table 13. Distributional Effects of the 2001 Tax Cut for 2006**

Income Class (thousands of dollars)	Percentage Change in Federal Tax Liability, %	Percentage Change in After-Tax Income, %
Less than 10	-0.9	0.1
10-20	-13.6	1.1
20-30	-11.4	1.8
30-40	-7.9	1.5
40-50	-6.5	1.4
50-75	-6.0	1.4
75-100	-5.8	1.6
100-200	-5.1	1.6
200+	-6.1	2.4
Total	-6.1	1.8

**Source:** Column 2 is reported directly while column 3 is derived from Joint Committee on Taxation, Distributional Effects of the Conference Agreement for H.R. 1836, May 26, 2001, JCX-52-01. See **Table 4** in the previous section for a notion of the shares of the population represented by their income measure; for example, the under \$10 thousand group is about 14% of the population, while the over \$200,000 group is about 2%. The table for 2006 did not provide the data to calculate that distribution.

The next table, **Table 14**, shows the percentage increase in after-tax income, based on data from the Congressional Budget Office. CBO provided effective tax rates and distributional shares, but did not present any direct comparisons of the effects of tax changes; our distributional measures could be derived from their data, however. We have approximated the effect of the 2001 tax cut by comparing 2010 and 2011, since the provisions of the 2002 and 2003 tax cuts that add to the 2001 cuts would be phased out before 2010. The analysis indicates that the largest percentage changes in after tax income were received by the highest income classes.

**Table 14. Percentage Change in After-Tax Income by Quintiles, 2001 Tax Changes Fully Phased in, at 2001 Income Levels**

AGI Class	Percentage Change in After-Tax Income
Lowest Quintile	2.1%
Second Quintile	2.2%
Middle Quintile	1.8%
Fourth Quintile	1.6%
Highest Quintile	1.9%
All	1.9%
Top 10%	2.2%
Top 5%	2.6%
Top 1%	3.8%

**Source:** CRS calculations derived from data in Congressional Budget Office, Effective Federal Tax Rates Under Current Law, 2001, August 2004. The calculations compare 2010 and 2011.

**Table 15** shows a distribution of the tax cut measure provided directly and a percentage of income that was derived from the Citizens for Tax Justice (CTJ) data. The CTJ measures are a percentage of pre-tax income rather than disposable income, which tends to make all percentages slightly smaller. In contrast with the JCT table, the CTJ data show fully phased-in taxes. Unlike both the JCT and the CBO data, it also included the effect of the cut in estate taxes, which was a significant part of the 2001 tax cut. The distribution of the tax cut shows, as one might expect, a very large share of the cut going to high income individuals—almost 40% went to the top 1% of individuals. The tax cut as a percentage of income, a measure similar to the last column of **Table 13**, shows the lowest decile with the smallest amount, the broad middle receiving slightly less than average, and higher benefits in the top decline, particularly the top 1%—clearly showing a cut skewed to the rich. The larger effect for the top 1% as compared to **Table 14** probably reflects the estate tax.

**Table 15. Distributional Effects of the 2001 Tax Cut, Fully Phased in, at 2001 Income Levels**

Income Class	Share of Cut, %	Percent of Income, %
Lowest Quintile	0.9	0.71
Second Quintile	5.3	1.82
Third Quintile	8.5	1.74
Fourth Quintile	14.5	1.82
Highest Quintile	Next 15%	23.7
	Next 4%	9.5
	Top 1%	37.6
Total	100	2.43

**Sources:** Citizens for Tax Justice and CRS calculations based on their data, as reported in CRS Report RL30973, *2001 Tax Cut: Description, Analysis, and Background*, by David L. Brumbaugh et al.

http://wikileaks.org/wiki/CRS-RL32693

## 2003 Tax Cut

For the 2003 tax cut, the JCT did not produce a distributional table, but the Treasury Department did. CBO's effective tax rate tables cannot be used because they mix phase-ins from 2001 in the data. For the Treasury data, the only measure of distributional change presented (and no other could be derived from their data) was the percentage change in individual income taxes. Like the JCT, they present a percentage change in taxes, but unlike the JCT the change is confined to income taxes. Note that, unlike the analysis presented in their 1999 study, the income measure is cash income, rather than economic income.

The Treasury analysis, shown in **Table 16**, confronted a problem that illustrates the difficulty of reporting distributional effects through percentage change when the base can approach zero or become negative, as in the case with percentage change in income tax liability. The lower part of the income distribution actually had negative taxes, when refundable items such as the child credit and earned income credit were taken into account. Therefore, what Treasury actually reports for that class is a percentage increase in negative taxes; technically speaking (as a mathematical issue) the percentage increase should have been positive change, because negative taxes became larger. There is really no way to compare this number with the other changes; moreover, the class of under \$30,000 probably accounts for almost half (about 40%) of the population. So it is difficult to know what to make of this analysis. For the remaining classes, however, the measure appears to favor the lower income individuals.

**Table 16. Comparison of the Distribution of Total Individual Income Taxes, 2003**

Cash Income Class	Distribution of Total Individual Income Taxes		Percent Change in Individual Income Taxes
	Prior Law	Law with 2003 Tax Cut	
less than \$30,000	-2.0%	-2.6%	-15.5%
30,000 to 40,000	2.1%	1.9%	-19.3%
40,000 to 50,000	3.7%	3.6%	-14.0%
50,000 to 75,000	11.6%	11.7%	-11.1%
75,000 to 100,000	12.1%	12.0%	-12.7%
100,000 to 200,000	27.6%	27.9%	-11.0%
more than 200,000	44.8%	45.4%	-10.8%
Total	100.0%	100.0%	-11.9%

**Source:** Excerpt from a table prepared by the Department of the Treasury, released May 22, 2003.

A very different picture is presented with the distributional effect measured as a change in after tax income based on analysis by the Brookings-Urban Tax Policy Center (TPC), using the measure they favor, percentage change in after tax income. The next two **Tables 17** and **18** present this data for income classes and population shares. At that point, the TPC was using adjusted gross income as their income measure, although they later developed expanded income measures.

**Table 17. Percentage Change in After-Tax Income from 2003 Tax Cut, Calendar Year 2003**

Adjusted Gross Income (AGI)	Percentage Change in After-Tax Income
Less than \$10,000	Less than 0.05%
10,000 to 20,000	0.3%
20,000 to 30,000	0.8%
30,000 to 40,000	1.0%
40,000 to 50,000	1.1%
50,000 to 75,000	1.2%
75,000 to 100,000	2.1%
100,000 to 200,000	2.2%
200,000 to 500,000	2.2%
500,000 to 1,000,000	3.5%
More than 1,000,000	4.4%
All	1.8%

Source: Urban-Brookings Tax Policy Center

**Table 18. Percentage Change in After-Tax Income by Percentiles, 2003**

AGI Class		Percentage Change in After-Tax Income
Lowest Quintile		less than 0.05%
Second Quintile		0.3%
Middle Quintile		0.8%
Fourth Quintile		1.1%
Highest Quintile	Next 10%	1.8%
	Next 5%	2.3%
	Next 4%	2.2%
	Top 1%	3.6%
All		1.8%

Source: Urban-Brookings Tax Policy Center.

Among a variety of statistics released by the Urban-Brookings Tax Policy Center, one statistic presented is the average tax change among income quintiles. Their discussion cautions the reader in using this measure (as would the authors of this report), but it is included here for comparison purposes and to lend some concreteness to understanding the problem with percentage change in tax liability. As **Table 19** demonstrates, the average tax change in the lowest quintile, a group accounting for about half of the under \$30,000 cash income group in the Treasury table, is only a dollar. Clearly, this group gained essentially nothing from the tax change. The entire under \$30,000 group probably gained an average of about \$20—again, a very negligible amount. Thus, while the Treasury table seems to suggest that this group benefitted more than average (“15%” as compared to an overall benefit of 11%), many people would not characterize the relative benefits in this way. The percentage change in after tax income, by contrast, suggests that these lower

income groups gained very little. It is particularly in these lower income classes where average tax liabilities are small or negative, that percentage changes in tax liability can be highly misleading.

**Table 19. Average Tax Change by Income Percentile, 2003**

AGI Class		Average Tax Change
Lowest Quintile		-\$1
Second Quintile		-\$38
Middle Quintile		-\$217
Fourth Quintile		-\$482
Highest Quintile	Next 10%	-\$1,270
	Next 5%	-\$2,125
	Next 4%	-\$3,145
	Top 1%	-\$20,786
All		-\$715

**Source:** Urban-Brookings Tax Policy Center.

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