



**THE ECONOMIC EFFECTS  
OF COMPREHENSIVE TAX REFORM**

**JULY 1997**

The Congress of the United States  
Congressional Budget Office

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**NOTE**

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

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# Preface

A number of recent proposals for fundamental tax reform would replace the current federal income tax system with a comprehensive consumption-based tax. Objectives of tax reform include stimulating economic activity and promoting a more efficient allocation of resources. Many common features of recent proposals could achieve those results—for example, a broader tax base, more uniform rates, and a tax on consumption rather than income.

This Congressional Budget Office (CBO) study analyzes the major economic effects of several tax reform plans and finds that much uncertainty surrounds the likelihood and magnitude of the economic gains from tax reform. The study focuses on the effects on saving and investment, output, and the allocation of resources within the economy, as well as the ultimate impacts of those changes on social well-being. The study was prepared at the request of Senators Pete Domenici, Robert Bennett, Joseph Biden, and Robert Kerrey and former Senator Sam Nunn.

The analysis was carried out by Diane Lim Rogers of CBO's Tax Analysis Division under the direction of Rosemary Marcuss and Frank Sammartino and by Joyce Manchester of CBO's Macroeconomic Analysis Division under the direction of Robert Dennis and Doug Hamilton. John Sturrock of the Macroeconomic Analysis Division was the internal reviewer and, along with Frank Sammartino and Doug Hamilton, made extensive contributions to the study. Additional comments were provided by Leonard Burman, Kim Kowalewski, Benjamin Page, William Randolph, Pearl Richardson, John Sabelhaus, Kent Smetters, and Robertson Williams of CBO. Outside comments and suggestions on the study came from Alan Auerbach, Barry Bosworth, and David Bradford.

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July 1997



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# Contents

	SUMMARY	ix
ONE	INTRODUCTION	1
	Taxing the Returns from Saving, Investment, and Work	1
	How to Get There from Here: The Significance of Transition	5
	Evaluating Comprehensive Tax Reform	6
TWO	RECENT TAX REFORM PROPOSALS	7
	An Overview of the Alternatives	7
	Common Elements of Recent Proposals for Comprehensive Tax Reform	19
THREE	EFFECTS ON THE MACROECONOMY	23
	The Effect of Tax Reform on Saving	23
	The Effect of Tax Reform on Capital Flows and Domestic Investment	25
	The Effect of Tax Reform on Labor	28
	The Effect of Tax Reform on Economic Output	31
	The Effect of Tax Reform on Interest Rates	33
	Conclusion	34
FOUR	EFFECTS ON THE ALLOCATION OF RESOURCES	37
	The Effect of Tax Reform on Incorporation, Asset Mix, and the Cost of Capital	37
	The Effect of Tax Reform on the Use of Capital and Labor	41
	The Effect of Tax Reform on Financial Decisions	43
	The Effect of Tax Reform on Other Sectors of the Economy	44
	Conclusion	47

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FIVE	EFFECTS ON ECONOMIC EFFICIENCY	49
	Economic Efficiency and Tax Policy	49
	Would a Switch to a Consumption-Based Tax Enhance Economic Efficiency?	50
	Estimating the Gains in Efficiency from a Proportional Consumption-Based Tax	52
	What Accounts for the Gains in Efficiency from a Proportional Consumption-Based Tax?	55
	Evidence from Other Studies	59
	Conclusion	61
APPENDIXES		
A	What Will a Consumption-Based Tax Do to the Price Level and the Value of Existing Assets?	65
B	Simulation Models and the Saving Response	69
C	The Fullerton-Rogers General-Equilibrium Model	73

## TABLES

1.	Comparing Individual-Level Taxes Under Current Law and Alternative Proposals	8
2.	Comparing Business-Level Taxes Under Current Law and Alternative Proposals	10
3.	Allocation of Types of Capital by Industry and Sector	38
4.	Impact of a Consumption Tax on Effective Tax Rates and Allocation of Capital, by Sector and Type of Capital	40
5.	Changes in Industries' Output Levels and Capital Intensity from a Switch to a Proportional Consumption Tax	42
6.	Debt as a Percentage of Capital Stock	44
7.	Tax Rates Associated with a Switch to a Proportional Consumption Tax	53
8.	Comparing Gains in Efficiency from a Broad-Based Proportional Consumption Tax and a Wage-Based Income Tax	56
9.	Comparing Gains in Efficiency Under Various Consumption Tax Bases	57
10.	Comparing Gains in Efficiency Under Consumption and Income Tax Bases	58
11.	Comparing Gains in Efficiency from a Proportional Value-Added Tax Under Current Law and Gains Before the Tax Reform Act of 1986	60

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**BOXES**

1.	Comparing Taxes on Savings Under an Income Tax and Various Types of Consumption Taxes	20
2.	Destination-Based Versus Origin-Based Taxes	28
3.	The Effect of Tax Reform on Rates of Return	34
4.	Using the Fullerton-Rogers Model to Predict Changes in the Allocation of Resources	41
5.	Calculating Gains in Efficiency	54
B-1.	A Key Factor in the Simulation Models: The Intertemporal Elasticity of Substitution	70

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# Summary

Proponents of comprehensive tax reform voice the sentiment that the federal income tax system is beyond repair. It is, they argue, too complicated and has too much influence on the economic decisions of households and businesses. The tax code makes so many distinctions among different types of income and expenses that people easily find ways to reduce the taxes they owe: for example, by rearranging their personal investments or postponing the sale of an asset.

At a more fundamental level, economists often voice concern about the effects of the income tax system on saving and investment. Any income tax tends to discourage saving and investment by taxing capital income. The present system also affects the types of investments undertaken and the allocation of that capital throughout the economy through special provisions in the tax code that treat some assets and types of businesses differently from others. For those reasons, many of the recent proposals for federal tax reform call for a switch to a comprehensive consumption-based tax—a tax that would exempt the expected return from capital and treat all forms of investment more uniformly.

Economists also focus attention on the effects of the tax system on whether and how much people choose to work. An income tax system includes a tax on earnings and thus can discourage people from working. A switch to a consumption-based tax system would not avoid that effect. But a switch to a broader-based tax, whether on income or consumption, might allow a lower tax rate on income from labor and encourage work compared with the present income tax system.

Thus, a broad-based tax on consumption would seem to be an attractive alternative to the present income tax system. For that reason, many of the recent proposals call for just that. Consumption-based tax replacements proposed by the Congress include the Gibbons value-added tax, the Arney-Shelby flat tax, and the Unlimited Savings Allowance (USA) tax. One proposal, the Gephardt 10 percent tax, calls for a switch to a broader-based income tax. That proposal is based on the principle that much of the benefit of fundamental tax reform might come from broadening the tax base and lowering tax rates.

Unfortunately, reform of the tax system is much easier in theory than in practice. Although a comprehensive consumption tax, once in place, might be simpler to administer and have a smaller effect on economic decisions than the current income tax system, getting there could prove to be immensely complicated.

Consider one issue: the switch from an income tax to a consumption tax would impose a tax on existing savings. That tax might be considered unfair, since it would be unexpected at the time the saving took place and difficult to avoid after the tax change. Thus, some of the proposals provide "transition relief" for existing assets. But the upshot of such relief would be added complexity, a narrower tax base, and higher tax rates, all of which could significantly reduce the economic benefits from tax reform.

Another issue is that although early versions of proposals would all broaden the tax base by eliminating many types of existing tax preferences, any such ver-

sion is unlikely to be enacted. Thus, a consumption-based tax that survives the tax reform process is apt to retain many of the present system's special provisions and is therefore unlikely to produce the same level of economic benefits as the comprehensive versions examined in this study.

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## Capital Accumulation, Labor Supply, and Economic Output

A switch from income-based to consumption-based taxes could potentially boost household saving, which would be highly desirable in light of the low rate of national saving in the United States—the result of both increased deficits by the federal government and reduced saving by households and businesses. More saving would lead to higher investment, greater productivity, and more output in the long run. Yet how much additional saving would result from comprehensive tax reform depends in part on how much interest rates would change and how much people would increase saving because of a change in the net return from saving. The evidence suggests that household saving would be likely to rise under a consumption-based tax, although different economic models predict a broad range of possible increases. The current tax system already favors some types of saving, such as pensions and retirement accounts, and by so doing it tends to lower the expected magnitude of the saving response to tax reform. Granting transition relief to consumption from previously accumulated wealth would also be likely to reduce the saving response.

Moreover, a switch to consumption-based taxes would probably spur investment in physical capital. The cost of capital under a consumption-based tax would be less than under an income tax because consumption-based tax systems either remove the tax on capital income or make a provision for immediately writing off (expensing) investments. Moreover, a comprehensive consumption-based tax would remove the bias that now exists for certain types of investments over others. For example, investment in housing would no longer be tax-favored over investment in business capital, and the subsequent reallocation of resources could improve future productivity and output.

Moving to a flatter tax rate structure could spark other types of economic activity, such as the supply of labor. A consumption-based tax would continue to tax the returns from work either directly or indirectly as earnings were spent. If tax reform sufficiently broadened the tax base by eliminating various preferences, the tax rate on labor income could be reduced. Evidence suggests that even though the overall effect of decreased marginal tax rates on labor supply is likely to be small, some groups (in particular, married women) could increase their labor force participation and hours of work substantially. If tax reform does not sufficiently broaden the tax base, then with a switch to a consumption base, the tax rate on earnings must climb to maintain the same amount of revenues as the current system. In that case, labor supply could change in either direction. On the one hand, a consumption-based tax could make current consumption more expensive, which would diminish the incentive to work. On the other hand, a consumption-based tax would lower the relative price of future consumption, thereby encouraging people to work more now in order to consume more later.

In the short run, a switch to a consumption-based tax could cause labor supply to increase faster than capital stock, reducing real wages. In the long run, however, capital stock would expand, causing real wages to rise.

The probable hikes in capital stock, coupled with smaller changes in labor supply, indicate that the level of national output would rise in the long run as the economic growth rate increased temporarily. Most simulation models suggest increases on the order of 1 percent to 10 percent. The exact amount depends critically on assumptions about how responsive households and firms would be to the changes in returns from capital. Unfortunately, tax reform is unlikely to raise the growth rate of the economy permanently. Moreover, the increase in output would be greater than the increase in well-being, since higher output involves less leisure and also less consumption per unit of output.

A bevy of economic studies of tax reform have produced widely different estimates of the effects on interest rates. Because those studies focus on different measures of the interest rate, use different models of saving response, and make different assumptions in their cal-

culations, confusion is often the outcome. Nonetheless, researchers agree on one point: comprehensive tax reform would lower the marginal product of capital (the amount of output produced by the last unit of capital invested) and would lift the after-tax return from saving. But the effects of reform on other rates of return—such as the market return from equity or the interest rate on corporate debt—remain uncertain.

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## Changes in the Allocation of Economic Resources

Although a switch to a consumption-based tax would probably yield modestly higher output in the economy as a whole, such a reform would more significantly affect the composition of the national economy. In other words, it would alter the mix of what is produced and how it is produced. Particular features of fundamental tax reform point to a number of types of reallocations.

First, current proposals would improve the coordination of business- and personal-level taxes and would "level the playing field" among different forms of financing and types of capital. The current income tax system favors financing through debt over equity, encourages retaining earnings over disbursing dividends, taxes noncorporate businesses and owner-occupied housing at lower rates than corporate businesses, and treats equipment and intangible capital more generously than other forms of capital. Most proposals for fundamental tax reform would remove, or at least substantially alleviate, those tax inequalities. The result would be a more economically efficient allocation of resources. In the short run, costs of capital for incorporated businesses that rely on equity would fall. In the longer run, the corporate share of production would be likely to increase and less investment would be made in previously tax-preferred forms of capital.

Second, the switch to a consumption-based tax would reduce the effective tax rate on capital income and encourage the use of capital in production. Although the current tax system gives preferential treatment to some forms of saving and investment, a switch to a consumption-based tax would reduce still further the taxation of capital. Thus, the switch would encourage investment and expansion of output for those firms

and industries undertaking such investment. In the long run, industries that were able to employ capital-intensive production technologies would attract more investment, and the economy's capital-to-labor ratio would generally increase.

Finally, most fundamental tax reform proposals would remove many of the explicit tax preferences present in the current system, such as various itemized deductions, exclusions, and credits. Although those tax reductions may serve other policy objectives, they can induce people to engage more heavily in the favored activities, which may not be the best way to allocate society's economic resources.

Most proposals for fundamental tax reform would expunge nearly all of those preferences. For example, if the mortgage interest deduction was eliminated and owner-occupied housing services were taxed, the demand for owner-occupied housing would fall, and resources would be reallocated to rental housing or other forms of investment or consumption. Estimates based on simulation models suggest that in the short run the stock of housing would fall, although in the long run increased capital accumulation would drive up the overall quantity of housing. Reducing the supply of owner-occupied housing would dampen some of the depressing effect on housing prices. Removing other tax preferences—such as the deductions for state and local income and property taxes and charitable contributions, and the exclusion for employer-provided fringe benefits—would be likely to reduce the activities they finance as well. At the same time, some new preferences might be created in the switch to a consumption-based tax, if only because certain types of activities are more difficult to capture under a consumption tax.

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## Economic Efficiency

Changes in saving and investment, economic output, and the allocation of resources are not, of course, ends in themselves; they are instead avenues by which society as a whole may become better off. By mitigating the effects of taxation on relative prices and economic decisions, fundamental tax reform would enhance economic well-being (or "utility") and reallocate resources to more productive uses. Some people would lose, however, so whether society as a whole was better off—

that is, whether "economic efficiency" would increase—becomes an empirical issue, depending on the size of gains to winners relative to the size of losses to losers. For the purposes of this analysis, general-equilibrium, utility-based models of taxation are used to estimate the potential magnitude of any gains in efficiency and the extent to which those gains result from each particular feature of fundamental tax reform.

Those models suggest that with a switch from the current income tax system to a comprehensive consumption-based tax, younger generations stand a greater chance of being better off, although the other side of the coin is that older generations could be worse off. More specifically, society as a whole (accounting for effects on all generations) is likely to gain. However, it is unlikely to gain by very much, and under some reasonable assumptions it could even experience a loss. The model used here indicates that the gain in social welfare, in terms of present value, is unlikely to be more than 1 percent of lifetime income, although other models suggest somewhat higher gains.

Simulations from those models also indicate that any form of relief during the transition period would lighten the tax burden on existing wealth and make a consumption-based tax more like a wage-income tax. The result would substantially reduce the gains in efficiency from fundamental tax reform. Switching to a progressive rather than a proportional consumption-based tax would not necessarily cut overall gains in efficiency, but the outcome depends on the way in which tax relief is given to lower-income households.

Comparing gains from a comprehensive consumption-based tax with those from a switch to a broad-based income tax reveals that the relative merits of a consumption-based tax would depend heavily on how sensitive consumers would be in their decisions about when to consume and about whether and how much to work within a period of time. In particular, if the timing of consumption does not respond much to the changes brought about by a revamped tax system, then switching from the current system to a more comprehensive income tax could improve social welfare just as much as a switch to a consumption-based tax.

# Introduction

**J**ust over a decade after the Tax Reform Act of 1986 accomplished a surprising amount of change by broadening the tax base and reducing tax rates, current thinking is headed far beyond that. Most proposals now call for scrapping the entire federal income tax system of corporate- and personal-level taxes and starting over from scratch.

Although the sponsors of those proposals hope to achieve a variety of goals, including a simpler tax code, a common expectation is that a restructured tax system would bring more saving, investment, and work, leading to a higher level of economic output. That expectation rests on the beliefs that the current income tax system impedes those economic activities and that a restructured system would remove such obstacles.

Most current comprehensive tax reform proposals share three key features: they would replace the current federal income tax with a tax on consumption; they would impose lower and more uniform tax rates; and they would broaden the tax base by eliminating many of the deductions and exclusions that current law now permits. Although the proposals offer strikingly different tax systems in form and operation, most of their economic characteristics and implications are remarkably similar.

Such dramatic change, of course, carries with it serious economic effects. The transition from the current income tax to a restructured system could very well involve economic losses in the short term that, if significant and persistent, could offset most or all of the potential long-term economic gains. Finally, any new tax system would face the same competing pres-

ures that have shaped the current system and thus could in the end fail to achieve even the long-term economic gains associated with an ideal tax structure.

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## Taxing the Returns from Saving, Investment, and Work

Why are some people so willing to abandon the federal income tax system? One common complaint is that the present system has too much influence on the economic decisions of households and businesses and that, in particular, the levels of saving, investment, and labor supply in the economy are less than they would be if another tax system were in place.

The total impact of a tax on economic behavior represents a combination of effects stemming from changes in relative prices and effects resulting from changes in household purchasing power. All taxes must reduce real income if they are to collect tax revenue, although other gains should match those reductions as tax revenues are spent. But taxes will differ in how much they change relative prices in the process of collecting that revenue. Those changes can cause economic losses if they encourage allocating resources away from the most productive uses.

### Saving

The base of an income tax includes income from both labor (earnings) and capital (such as rent, interest, dividends, or capital gains). Taxing the return from capi-

tal tends to tilt prices in favor of current consumption and against future consumption, thus discouraging saving. For example, not consuming \$1.00 today would make it possible for a person to consume \$1.10 in the future if the interest rate was 10 percent and if interest income was not subject to tax. In contrast, with a tax of 20 percent on interest income, giving up \$1.00 of consumption today would yield only \$1.08 of consumption in the future, after one paid the tax on interest income. Hence, a tax on capital income reduces the return from postponing consumption.

All consumption-based taxes have one feature in common—they do not tax the normal return from saving and investment. As a result, the expected after-tax rate of return to the saver generally equals the expected before-tax rate of return from investment. That fundamental feature distinguishes taxes on consumption from taxes on income.

Although the change from an income-based to a consumption-based tax would reduce the effective taxation of saving, that reduction does not necessarily guarantee that a large increase in household saving would follow. First, the amount of additional saving would depend on how households react to an increase in the after-tax return from saving. Some evidence indicates that changes in the after-tax return may have only a moderate effect on saving (see Chapter 3).

Second, characterizing recent proposals as a fundamental switch from taxing income to taxing consumption is an overstatement. The current U.S. income tax system is really a hybrid of an income tax and a consumption tax: it already taxes many forms of saving as they would be taxed under a consumption-based tax. For example, taxpayers can deduct saving for retirement from taxable income—either through employment-related pension plans, individual retirement accounts (IRAs), or 401(k) plans—and pay tax on the principal and interest from those accounts only on withdrawal. The result is that normal returns from pension saving are not taxed—the same treatment as under a consumption-based tax. Indeed, the hybrid nature of the U.S. tax system means that the potential for large increases in overall savings is not as great as it would be if this country had a pure income tax.

## Investment

The base of an income tax includes the net returns from capital investments. The cost to purchase an investment is deducted from taxable income over time as the value of that investment depreciates. If deductions were equal to the true loss of value (economic depreciation), then in each year the gross income from an investment would be compared with the cost of producing that income, and the difference between them (the net return) would be taxed at the statutory rate. If deductions exceeded economic depreciation, however, the net return would be taxed at less than the statutory rate.

A tax with a comprehensive consumption base differs from an income tax in that it eliminates the tax on the expected net return from new capital. Under a consumption-based tax, purchases of new capital are immediately deducted (expensed) at the time they are acquired. The future stream of gross income from that capital is subject to tax. However, because those taxes are just equal in present value to the up-front deduction of the purchase cost, the expected net returns are untaxed.<sup>1</sup>

A change from an income-based tax to a consumption-based tax would reduce the effective taxation of income from new capital. But again, given that the current system already affords favorable treatment to many types of investment, switching from the current income-based tax may have only moderate effects on investment. For example, implicit income from owner-occupied housing is not taxed at all under the current income tax. Income from other assets is taxed at less than the statutory rate because tax depreciation usually exceeds economic depreciation. To cite one illustration, most of the costs of investment in research and experimentation can be written off immediately, even though the benefits from those investments may well continue for a number of years. The

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1. A numerical example of this outcome is shown in Box 1 in Chapter 2. Deducting investment is similar to the current tax treatment of deductible individual retirement accounts. Deposits to IRAs are deductible against current taxable income, with the principal and interest taxed only on withdrawal.

more that allowances for depreciation are accelerated in that fashion, the closer the treatment of investment comes to a consumption tax in which all investment expenses can be deducted immediately.<sup>2</sup>

Although accelerated depreciation and expensing for some assets tend to lessen the tax on capital income under the current system, inflation tends to increase it. Deductions for depreciation are based on the cost of investments at the time they are made. Because inflation erodes the value of those deductions over time, the total amount deducted may be quite a bit less than the amount of true economic depreciation. By allowing firms to deduct the costs of investment at the time those investments are made, a consumption-based tax would eliminate the interaction between inflation and taxes. Similarly, a consumption-based tax would insulate from inflation the tax treatment of interest payments and the cost of goods sold.

An income-based tax affects not only how much investment takes place but also the mix of investment in different types of assets. By taxing different types of assets at different effective tax rates, the present tax system creates incentives to invest more in less heavily taxed capital assets. For example, the favorable treatment of owner-occupied housing encourages more investment in housing and less in other types of assets. As another example, allowances for depreciation do not necessarily match the rate at which assets actually depreciate, and firms can write off some types of investments more quickly than others. The result of current tax law is that assets that are depreciated over a longer period of time end up being taxed more heavily than those with a shorter depreciation period. Those differences encourage firms to substitute investment in assets with shorter useful lives (such as in research and experimentation or in equipment) for investment in longer-lasting assets (such as in structures

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2. In separate studies, Roger Gordon and Joel Slemrod, and John Shoven present evidence that because of favorable treatment for some types of investment, accelerated depreciation, and the deductibility of nominal interest, capital income is taxed at an effective rate close to zero, on average, under the current system. See Roger H. Gordon and Joel Slemrod, "Do We Collect Any Revenues From Taxing Capital Income?" in Lawrence H. Summers, ed., *Tax Policy and the Economy*, vol. 2 (Cambridge, Mass.: National Bureau of Economic Research and the MIT Press, 1988), pp. 89-130; and John Shoven, "Using the Corporate Cash Flow Tax to Integrate Corporate and Personal Taxes," in National Tax Association/Tax Institute of America, *Proceedings of the Eighty-Third Annual Conference on Taxation* (Columbus, Ohio: NTA-TIA, 1991), pp. 19-27.

and land). The resulting economic cost of the altered mix of assets could be significant.<sup>3</sup>

Switching to a consumption-based tax could potentially increase tax neutrality among different types of capital assets. A consumption-based tax would treat all kinds of normal returns from investment uniformly, subjecting them all to a zero rate at the margin. In replacing the income tax only, however, some nonneutral treatment of other types of taxes (such as the property tax) may remain. However, greater neutrality among different types of investment is possible by modifying the current income tax. By way of illustration, although it did not eliminate all differences, the Tax Reform Act of 1986 did reduce differences in effective tax rates for various types of capital by repealing the investment tax credit and making allowances for depreciation less generous.

The current income tax system also affects investment in different types of capital by failing to tax income at the business and household level in a coordinated manner. A separate corporate income tax applies to corporations but not other businesses. As a result, corporate firms face higher effective tax rates than do noncorporate firms. Because the tax system favors noncorporate over corporate investment, it affects decisions about the way in which businesses organize. Economists who have studied the effects of the corporate income tax have concluded that it carries a high cost in efficiency, with the additional burden equal to over one-half of the tax revenues collected from the corporate income tax.<sup>4</sup>

Some effects of the corporate income tax are financial in nature. For instance, the corporate tax al-

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3. Don Fullerton and Yolanda Kodrzycki Henderson use a highly disaggregated general-equilibrium model to compare the effect of tax distortions on assets, industries, and the corporate and noncorporate sectors of the economy. They conclude that the current income tax causes less distortion among industries and sectors than it does to the mix of assets. They also find that the total welfare cost for all of those distortions is still below 1 percent of income. See Fullerton and Henderson, "A Disaggregate Equilibrium Model of the Tax Distortions Among Assets, Sectors, and Industries," *International Economic Review* (May 1989), pp. 391-413.

4. Jane Gravelle, *The Economic Effects of Taxing Capital Income* (Cambridge, Mass.: MIT Press, 1994), pp. 75-93; and Don Fullerton and Diane Lim Rogers, *Who Bears the Lifetime Tax Burden?* (Washington, D.C.: Brookings Institution, 1993), pp. 180-184. Those studies emphasize, however, that the cost in efficiency is rather small relative to national income because the extra revenue yielded by the corporate tax is quite small.

lows firms to deduct payments of interest but not dividends. At the same time, interest, dividends, and capital gains are all taxed at the personal level. Hence, because interest is not taxed at the business level, the present system favors debt over equity finance. In fact, the effective tax rate on debt capital can often be negative. When the corporate marginal tax rate exceeds the personal rate, interest on debt is deducted at a rate higher than that at which it is taxed. In addition, because the full nominal payment is deductible, inflation makes debt relatively attractive. In contrast, dividends are taxed at both the corporate and personal levels. As a result, the combined effective tax rate on equity can exceed 50 percent.<sup>5</sup>

The current income tax system also encourages companies to retain earnings rather than pay out dividends. Although both retained earnings and dividends are taxed at the corporate level, any taxing of retained earnings at the personal level is deferred until those earnings are eventually paid out or until the stockholder sells his or her interest in the company and realizes a capital gain.

Most proposals for comprehensive tax reform would do more than just shift the basis of taxation from income to consumption. A significant feature of many of those proposals is to improve coordination of taxes at the business and personal levels. That aspect of the proposals by itself would remove many of the distortions caused by the present system and would reallocate resources away from previously tax-favored activities or industries.

## Earnings

An income tax includes earnings—the returns from working—in the tax base. Indeed, earnings are the single most important piece of the current individual income tax base, accounting for over 80 percent of it.

A tax on earnings affects people's decisions about how much to work. People can avoid the tax on earn-

ings by reducing their hours of paid employment in favor of other activities such as child care, housework, or leisure. The relative "price" of an hour of other activities is the forgone after-tax wage rate. Thus, if the net wage rate was reduced by a tax on labor income, the price of not working would effectively become cheaper, and people might choose to work less or not at all. However, with a lower after-tax wage, people's total earnings would be reduced, and they might decide to work more to restore some of that lost income. Hence, the net effect of a tax on earnings is uncertain.

A consumption-based tax would continue to tax earnings either directly, as under some comprehensive reform proposals, or indirectly, by taxing the goods and services that people buy with their earnings. If there were no other changes to the tax system and if tax revenues were held constant, a switch from the current income tax to a consumption-based tax would in fact raise the tax on earnings. By way of example, consider that a simple definition of consumption is income less saving. A consumption-based tax removes saving from the tax base. To maintain the same amount of revenue, the remaining piece of income, which is primarily earnings, must be taxed at a higher rate than before.

Although a higher tax on current earnings would create an incentive for people to work less, it does not necessarily follow that the number of hours they work would fall. If people could save current earnings, the higher return from saving under a consumption-based tax would mean that each dollar of their current earnings could buy more goods and services in the future. Thus, although the switch from an income tax to a consumption-based tax would reduce the return from work by increasing the price of current consumption, it would simultaneously increase the return from work by reducing the price of future consumption. In other words, even with a higher tax rate on earnings, people might choose to work more now in order to save more and thus consume more later.

Of course, the reality of a change from an income-based to a consumption-based tax would be quite different from simple definitions of income and consumption. Many forms of income are not currently taxed because of exclusions and deductions from the current income tax. Most proposals for comprehensive tax reform would not only switch from an

5. Gravelle, *The Economic Effects of Taxing Capital Income*, p. 59. Gravelle shows effective tax rates on corporate debt as low as -84 percent and rates on corporate equity as high as 53 percent; those examples are based on pre-1993 tax law. The 1993 law raised the highest corporate statutory marginal tax rate to 35 percent and so made the difference between debt and equity even larger.

income-based tax to a consumption-based tax but also expand the tax base by eliminating many of those exclusions. Expanding the base in that way could permit a lower overall tax rate on earnings even if saving was no longer taxed.

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## How to Get There from Here: The Significance of Transition

In the short term, a comprehensive consumption-based tax would tax consumption that was paid for out of current wages and out of existing savings. That outcome would have the effect of taxing existing savings more heavily than they would be taxed under the current income tax. Take, for example, a couple who had saved for their retirement by holding shares in a mutual fund that was not part of a 401(k) plan or some other type of retirement account. Under current law, when the couple sold their shares in the fund to pay for their consumption needs, they would be taxed only on the appreciation of those shares—the excess of the selling price over the original purchase price. If a consumption tax with no transition relief was put in place before they had sold their shares, they would in effect have to pay tax on the entire sales price of the shares.

Under some forms of a consumption tax, the effects of transition would fall on the value of business assets. For example, a firm that purchased a piece of machinery just before the transition would lose future deductions for depreciation. Because the firm was not able to deduct the full cost of the machine at the time of purchase—as it would have been able to do if the purchase came after the transition—it would end up paying tax on the gross (rather than the net) return from its investment.<sup>6</sup> Owners or shareholders of the firm would pay for the increased tax through lower profits.

In the transition period from the current income tax to a consumption-based tax, people who held existing assets at the time of the tax change could face a

significant increase in their tax liabilities. Such a burden imposed on people with existing assets might be considered unfair because the tax was unexpected at the time the saving took place. Moreover, the tax would be difficult—if not impossible—to avoid after the change in policy. Thus, some of the current proposals for consumption-based taxes have been modified with "transition rules" to alleviate or eliminate taxing existing wealth.

Relief during the transition could take various forms. One form would allow those individuals and businesses with existing capital to take remaining allowances for depreciation when calculating investment income or to deduct the remaining basis when calculating capital gains subject to taxation. In such a case, the economic returns from that capital would be taxed as they would have been under an income tax, although they might be subject to a different rate. Another, more extreme form of relief during the transition would totally exempt all of the cash flows from existing capital. Doing so would give income from existing capital more favorable treatment than it would receive under the current income tax. Many other versions of relief are possible. But whatever their intentions, actual proposals would probably either fall short of eliminating the levy on capital or overcompensate.

A consumption-based tax that exempts the cash flow from existing capital is very similar—but not identical—to a tax on wages. Both taxes would exempt income from existing capital in the transition period. Both would exempt the normal return from new investment that took place under the new system. A wage tax, however, would exempt all capital income, including above-expected and supernormal returns, even in the long run after all capital was subject to the new tax rules. (See page 27 for a discussion of supernormal returns.) In contrast, even with relief provided during the transition period, a consumption-based tax, if collected according to business cash flows or personal consumption, would tax any above-expected and supernormal returns (and subsidize below-expected returns) from new capital investment.

A consumption-based tax with complete relief for the transition period would have a substantially narrowed tax base and correspondingly higher tax rates to maintain revenue neutrality. Therefore, the very feature of consumption-based taxes that might be consid-

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6. For a complete discussion of transition issues, see David F. Bradford, *Consumption Taxes: Some Fundamental Transition Issues*, Working Paper No. 5290 (Cambridge, Mass.: National Bureau of Economic Research, October 1995).

ered unfair—the unanticipated and unavoidable nature of the tax on existing assets—is also the feature that could make consumption taxes more economically efficient and more stimulative of economic growth than income taxes on wages. Any tax relief given to people with existing assets is thus likely to erode some of the economic benefits of fundamental tax reform.

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## Evaluating Comprehensive Tax Reform

Taxes often lead to undesirable economic effects because they induce people to change their behavior to avoid or lessen tax liabilities and thereby cause resources to be allocated in ways they would not otherwise be. As already noted, a tax on capital income can discourage people from saving. A tax on income that excludes employer-provided fringe benefits, such as health insurance, can encourage more expenditures on those benefits. In short, resources are diverted to tax-preferred uses rather than being used more productively. The more that the tax system distinguishes in such ways between various uses or sources of income, the more the system will alter people's decisions. That outcome will lead to greater inefficiency in allocating resources and additional economic costs beyond the revenue collected.

A consumption base, lower and more uniform tax rates, and a more comprehensive and better integrated tax base are all features that could reduce the influence of taxes on economic decisions. Growth in the economy's resource base, and a more efficient allocation of that base, should make at least some people better off. However, some people could be made worse off during the transition to the new tax system. Measures of gains in economic efficiency indicate whether society on average is better off—whether the gains to winners outweigh the losses to losers. This study attempts to keep the analysis as simple as possible by focusing on certain economic effects of a switch to generic, comprehensive consumption-based

taxes. It does, however, point out differences among various comprehensive tax reform proposals that may lead to somewhat different outcomes. Even so, the real-world experience with fundamental tax reform would be much more complicated than this basic story for a number of reasons.

First, comparing the current income tax system to an idealized—very comprehensive and uniform—version of a consumption-based tax is not particularly realistic simply because such a version is unlikely to be enacted. Eliminating all existing tax preferences under any tax system would be formidable, to say the least. Moreover, doing so may not even be desirable. Hence, any alternative tax plan that is put in place is likely to have more limited base-broadening efforts than those currently proposed. Some forms of consumption, such as consumption from existing housing and durable goods, may be too difficult to tax from an administrative perspective. Thus, any consumption-based tax that survives the tax reform process is apt to be less-than-perfectly comprehensive and less-than-perfectly uniform.

Second, even if the switch to a comprehensive consumption-based tax would lead to desirable economic effects, such favorable outcomes do not imply that every consumption-based tax would be superior to the current income-based tax. As mentioned earlier, the adverse effect of taxes on labor supply could become worse if the consumption base was not broad enough and hence would not lead to a reduction in marginal tax rates. Moreover, many of the gains in efficiency from a comprehensive consumption-based tax might also be obtained from a more comprehensive income tax.

Finally, social welfare depends not only on economic efficiency, or whether gains outweigh losses so that winners can potentially compensate losers, but also on how changes in real incomes or well-being are actually distributed—to wit, how the "economic pie" is cut up. Distributional goals may, however, conflict with goals to increase efficiency.

# Recent Tax Reform Proposals

Recent tax reform proposals introduced in the 104th Congress offer numerous versions of broader-based and lower-rate taxes (for greater detail on the proposals, see Tables 1 and 2).<sup>1</sup> Most proposals would replace both personal and corporate federal income taxes. Moreover, most of the proposals would switch from an income-based tax to a consumption-based tax. Some of them would tax all consumption at a single, uniform tax rate; others would continue to have a series of graduated tax rates. All of the proposals, however, would try to broaden the tax base by eliminating or curtailing many of the exclusions and deductions available under current law. A few proposals specify rules for handling the transition from the current system to a new one, but many do not. Some similar proposals have been introduced in the 105th Congress.

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## An Overview of the Alternatives

Most recent proposals for comprehensive tax reform would replace the current income tax with a tax on consumption. Some analysts and policymakers would use a retail sales tax (RST) or a value-added tax (VAT) to tax consumption. The RST and the VAT are examples of "indirect" taxes—namely, taxes that are levied on transactions instead of people. Because indirect taxes are not levied directly on people, they cannot be person-

alized so that the amount of tax depends on the circumstances and characteristics of the taxpayer.

Indirect taxes work well when they are levied at a single, uniform rate. Because they are collected only at the business level, one of their advantages is that individual taxpayers would no longer need to file returns or make payments to the Internal Revenue Service. Although that potentially makes indirect taxes much simpler to administer, some people see it as a disadvantage because the public would no longer be aware of exactly how much they pay in taxes each year. Nevertheless, most states and all of the major trading partners of the United States use indirect consumption taxes.

Other proposals would tax consumption through "direct" taxes on individuals. Those proposals do not require each family to keep track of and report all of its expenditures during the year. Rather, direct consumption taxes rely on the definition that consumption is equal to income less saving. Hence, a direct tax on consumption can be levied by taxing income but exempting saving. Some proposals exempt saving by allowing a deduction for income that is saved, whereas others achieve the same result by not taxing the return from saving. Because income is the starting point for measuring consumption, most direct consumption taxes look similar in form and operation to the current income tax. They can be personalized to reflect the individual economic circumstances of different families. Unfortunately, an example is lacking: at present, no direct consumption tax has ever been put into general practice.

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1. See also Joint Committee on Taxation, *Impact on State and Local Governments and Tax-Exempt Organizations of Replacing the Federal Income Tax*, JCS-4-96 (April 30, 1996), pp. 22-48; Joint Committee on Taxation, *Impact on International Competitiveness of Replacing the Federal Income Tax*, JCS-5-96 (July 17, 1996), pp. 66-91; and Henry J. Aaron and William G. Gale, eds., *Economic Effects of Fundamental Tax Reform* (Washington, D.C.: Brookings Institution, 1996), pp. 6-14.

## National Retail Sales Tax

A retail sales tax is a tax on the sale of goods and services from businesses to households. Under an ideal

**Table 1.**  
**Comparing Individual-Level Taxes Under Current Law and Alternative Proposals**

Tax Provision	Current Law	National Retail Sales Tax	Value-Added Tax
Summary	Graduated-rate tax on wage and capital income with exemptions and deductions	No general individual-level tax (wages of government employees subject to a tax)	No general individual-level tax (supplemental income tax on higher-income households)
Tax Base			
Wages and salaries	Yes	n.a.	n.a.
Interest on state and local bonds	No	n.a.	n.a.
Other interest, dividends, rent, royalties	Yes	n.a.	n.a.
Realized capital gains	Yes (At preferred rates)	n.a.	n.a.
Employers' health insurance contributions	No	n.a.	n.a.
Employers' pension contributions	No	n.a.	n.a.
Accumulation in pensions	No	n.a.	n.a.
Pension receipts	Yes	n.a.	n.a.
Social Security	Yes	n.a.	n.a.
Deductions			
IRA and 401(k) plan contributions	Yes (Within limits)	n.a.	n.a.
Nonpension savings	No	n.a.	n.a.
Mortgage interest	Yes	n.a.	n.a.
Charitable contributions	Yes	n.a.	n.a.
Property taxes	Yes	n.a.	n.a.
State and local taxes	Yes	n.a.	n.a.
Medical expenses	Yes (Within limits)	n.a.	n.a.
Education expenses	No	n.a.	n.a.
Tax Rates (Percent)			
1997	15/28/31/36/39.6	n.a.	n.a.
Fully phased in	Same	n.a.	n.a.
Exempt Range (1996 dollars)			
Single person	6,550	n.a.	n.a.
Married couple	11,800	n.a.	n.a.
Family of four	16,900	n.a.	n.a.
Earned Income Tax Credit			
	Yes	n.a.	n.a.
Child Care Credit			
	Yes	n.a.	n.a.
Payroll Tax Credit			
	No	n.a.	n.a.

(Continued)

**Table 1.**  
**Continued**

Tax Provision	Flat Tax	Unlimited Savings Allowance Tax	Ten Percent Tax
Summary	Single-rate tax on wages and pension distributions with large exemptions and no deductions	Graduated-rate tax on wage and capital income less saving and other deductions	Broadens base and reduces rates relative to current system
Tax Base			
Wages and salaries	Yes	Yes	Yes
Interest on state and local bonds	No	No	Yes
Other interest, dividends, rent, royalties	No	Yes	Yes
Realized capital gains	No	Yes	Yes
Employers' health insurance contributions	No	No	Yes
Employers' pension contributions	No	No	Yes
Accumulation in pensions	No	No	No
Pension receipts	Yes	Yes	Yes
Social Security	No	Yes	Yes
Deductions			
IRA and 401(k) plan contributions	No	Yes	No
Nonpension savings	No	Yes	No
Mortgage interest	No	Yes	Yes
Charitable contributions	No	Yes	No
Property taxes	No	No	No
State and local taxes	No	No	No
Medical expenses	No	No	No
Education expenses	No	Yes (Within limits)	No
Tax Rates (Percent)			
1997	20	15/26/40	10/20/26/32/34
Fully phased in	17	8/19/40	Same
Exempt Range (1996 dollars)			
Single person	10,700	6,950	7,750
Married couple	21,400	12,500	13,850
Family of four	31,400	17,600	19,350
Earned Income Tax Credit			
	No	Yes	Yes
Child Care Credit			
	No	No	No
Payroll Tax Credit			
	No	Yes	No

SOURCE: Congressional Budget Office adapted from Henry J. Aaron and William G. Gale, eds., *Economic Effects of Fundamental Tax Reform* (Washington, D.C.: Brookings Institution, 1996), pp. 8-11.

NOTE: n.a. = not applicable; IRA = individual retirement account.

**Table 2.**  
**Comparing Business-Level Taxes Under Current Law and Alternative Proposals**

Tax Provision	Current Law	National Retail Sales Tax	Value-Added Tax
Summary	Corporations pay tax on net income; other businesses pay tax under the individual income tax	Single-rate tax on business sales to consumers	Single-rate tax on all business sales except exports, less the cost of purchases from other businesses
Tax Base			
Sales of goods and services	Yes	Yes	Yes
Financial income	Yes	No	No
Foreign-source income	Yes	No	No
Deductions			
Wages and salaries	Yes	No	No
Employers' pension contributions	Yes	No	No
Investment	Depreciated	No	Expensed
Payroll taxes	Yes	No	No
Other taxes	Yes	No	No
Interest paid	Yes	No	No
Health insurance contributions	Yes	No	No
Charitable contributions	Yes	No	No
Tax Rates (Percent)			
1997	12/25/34/35	17	17
Fully phased in	Same	Same	Same
Research and Experimentation Credit	Yes	No	No
Rebate to Households	No	Yes (15 percent of the lesser of wages or poverty-level income)	Yes (Families with income less than \$30,000)
Foreign Trade	In general, taxes export sales	Taxes imports; exempts exports	Taxes imports; exempts exports

(Continued)

retail sales tax, businesses would make tax payments only on sales to households. Businesses such as petroleum refineries and steel manufacturers engaged solely in producing and selling intermediate goods and services to other businesses would have no involvement in the tax system. Moreover, businesses that purchase from retailers (such as from a gas station) would not pay tax on those purchases or else would receive reimbursement for any taxes paid.

The retail sales tax is the most familiar form of consumption tax to U.S. consumers. Although no general retail sales tax exists at the federal level, 44 states and the District of Columbia levy one. Retail sales taxes are generally levied at a single rate, with a zero tax rate for certain items. Of course, sales tax rates could vary for different products, although that would reduce economic efficiency and increase administrative complexity.

**Table 2.**  
**Continued**

Tax Provision	Flat Tax	Unlimited Savings Allowance Tax	Ten Percent Tax
Summary	Single-rate tax on all business sales, less the cost of purchases from other businesses, wages, and employers' pension contributions	Single-rate tax on all business sales except exports, less the cost of purchases from other businesses	Retains current tax
Tax Base			
Sales of goods and services	Yes	Yes	Yes
Financial income	No	No	Yes
Foreign-source income	No	No	Yes
Deductions			
Wages and salaries	Yes	No	Yes
Employers' pension contributions	Yes	No	Yes
Investment	Expensed	Expensed	Depreciated
Payroll taxes	No	Credit	Yes
Other taxes	No	No	Yes
Interest paid	No	No	Yes
Health insurance contributions	No	No	Yes
Charitable contributions	No	No	Yes
Tax Rates (Percent)			
1997	20	11	Current law
Fully phased in	17	Same	Same
Research and Experimentation Credit	No	No	Yes
Rebate to Households	No	No	No
Foreign Trade	Taxes exports; exempts imports	Taxes imports; exempts exports	Same as current law

SOURCE: Congressional Budget Office adapted from Henry J. Aaron and William G. Gale, eds., *Economic Effects of Fundamental Tax Reform* (Washington, D.C.: Brookings Institution, 1996), pp. 8-11.

NOTE: n.a. = not applicable.

Retail sales taxes are levied on sales to households, but distinguishing those sales from sales to other businesses is at times difficult. If sales to other businesses were taxed as well, retail sales taxes would cascade, causing some items to be taxed more than once. For

example, a computer store may sell to both households and business purchasers, such as to the owner of a hardware store who wishes to use the computer to keep track of inventory. If the retail sales tax applied to all computer sales, then the tax would cascade on pur-

chases from the hardware store: the tax on computers would increase the store's cost of doing business, which would be passed along in the price of hammers, rakes, and garden hoses.

Retail sales taxes can also cascade if used goods are taxed without making any adjustments for taxes paid at the time of original purchase. For example, a tax on the sale of a used motor vehicle by a dealer would tax that vehicle more than once if the original owner did not receive a partial tax rebate when he or she traded in the vehicle or sold it back to the dealer.

Most states try to prevent retail sales taxes from cascading by not taxing sales to registered business users, although by some estimates taxes on business purchases account for about two-fifths of current tax receipts from retail sales.<sup>2</sup> But distinguishing business use from personal use poses another problem. For example, the hardware store owner might use the computer to conduct personal business, such as recordkeeping for a fantasy baseball league. The retail sales tax should properly apply only to the portion of the sales price that represents the personal use of the computer. Distinguishing between personal and business use is a familiar problem under the current income tax that would persist under a retail sales tax. Most states also eliminate the cascading taxes on resales of used motor vehicles by deducting trade-in allowances from the purchase price of new vehicles for tax purposes. The treatment of resales of other used goods varies.

**Incidence.** Businesses making retail sales to households would be responsible for remitting the tax to the government and thus in a literal sense would pay the tax. In an economic sense, however, households would pay the tax as part of the overall price they pay for goods and services. Although the tax would be quite visible, much as state and local sales taxes are now listed separately on sales receipts, households would nonetheless need to keep meticulous records if they wanted to know exactly how much tax they were paying over the course of a year.

Because lower-income households tend to spend more of their income than middle- and higher-income

households, a retail sales tax tends to be regressive—that is, lower-income families pay a larger portion of their income in sales taxes than do higher-income families. Remedying the regressivity is difficult because such a tax is hard to personalize. Attempts to make retail sales taxes less regressive by not taxing certain expenditures, such as those on food or household utilities, are only partially successful. After all, identifying particular goods and services that lower-income families purchase disproportionately is a formidable task at best.

**Hard-to-Tax Goods and Services.** Unless a retail sales tax applied to all goods and services, households would probably change their spending patterns and buy more of those goods and services that were not taxed. Although such a result might be acceptable in some instances, producers of the taxed goods and services would be at a disadvantage.

Applying a retail sales tax to all goods and services is not a simple matter in all cases. Financial services are one example. Financial institutions often do not charge observable fees, or the fees do not necessarily reflect the true value of their services. Compensation to banking institutions, for example, may come in the form of the spread between the interest rate charged on loans and the interest rate paid to depositors so that banks are able to provide checking services with no explicit fees involved. Life insurance companies are compensated by returns from the investment of premiums, so the explicit premiums are far from a full reflection of the value of the insurance service.

To tax the value of financial services to consumers properly, financial institutions would have to determine the value of the services they provide to all of their customers, separate the portion of the value that went to businesses, and pay tax only on the amount provided to consumers. Even if financial services could be properly valued, allocating the value of services between consumers and businesses would be difficult.

Taxing government services is also hard because they are seldom financed by user fees that reflect their true cost. The same is true for the services that non-profit organizations provide. Proper treatment under a retail sales tax would be to tax government and non-profit provision of goods and services. Otherwise, those goods and services would be subsidized relative

2. Raymond Ring, "The Proportion of Consumers' and Producers' Goods in the General Sales Tax," *National Tax Journal*, vol. 42 (June 1989), pp. 167-179.

to private production, and there would be incentives to allocate more economic resources toward the government and nonprofit sectors. Such an outcome can be acceptable when governments and nonprofit organizations provide certain public goods, such as education or charitable services, that have spillover benefits to everyone. But it is a problem when the goods and services provided compete directly with those of for-profit firms.

In many cases, however, no identifiable transaction in providing government and nonprofit services exists, making taxation infeasible.<sup>3</sup> Usually, the best that can be done is to have governments and nonprofit groups value resources at the same prices as the private sector by taxing sales from businesses to those entities.

**Taxing Exports and Imports.** Because retail sales taxes would be levied only on sales to U.S. households, exports would not be subject to the tax. Imports would be subject to the retail sales tax so as not to place domestically produced products at a disadvantage. Imports of intermediate goods and services purchased by businesses would not be taxed, however, to prevent the tax from cascading when the final product was sold to households.

**Proposals.** The National Retail Sales Act of 1996 (H.R. 3039), introduced by Congressmen Dan Schaefer, Billy Tauzin, and others, proposed a broad-based national retail sales tax of 15 percent. Under that proposal, all goods and services sold would be subject to the tax except those purchased for resale, for use in producing other goods and services, or to be exported from the United States. To lighten the tax burden on lower-income households, the proposal includes a family rebate equal to the lesser of the family's income from wages or the poverty level for a family of that size.

The tax would apply to explicitly and implicitly imposed charges of financial institutions. Governmental units would not be exempt from tax on the sale, purchase, or use of a taxable good or service. The proposal would apply a 15 percent excise tax to the wages of government employees, which would be collected

from their employers. Without an additional adjustment, that provision would result in an extra tax on government-provided goods and services that were explicitly taxed at the time of sale to the public.

Nonprofit organizations would pay the sales tax on their purchases from businesses, except for purchases for resale or for use in producing other goods and services. The sales tax generally would not apply to dues, contributions, or other payments to qualified nonprofit organizations, except for goods and services that are commercially available or are not substantially related to the tax-exempt purpose of the organization.

## Value-Added Tax

The value-added tax is essentially a sales tax on consumer purchases that businesses collect in stages. In general, businesses owe VAT on the difference between their sales and their purchases from other businesses. More than 50 countries, including all member countries of the Organization for Economic Cooperation and Development (OECD) except Australia and the United States, use a VAT.

Although most VATs rely on the credit method to calculate the amount of tax, a number of the current proposals for reform would use the subtraction method. Under a credit-method VAT, businesses pay tax on the total value of their sales but receive a credit for the VAT paid on their purchases of goods and services from other businesses. That type of VAT is generally preferred over a sales tax for two reasons: first, the rebate mechanism on business purchases prevents taxes from cascading, and second, the system of credits and invoices can reduce tax evasion. Unlike the credit-method VAT, a subtraction-method VAT does not require invoices that show how much VAT was paid on purchases and charged on sales. Instead, businesses simply subtract their purchases from their sales and pay tax on the difference. A subtraction-method VAT works well when all goods are taxed at the same rate. However, most countries using a VAT have zero or reduced rates on many goods, which makes using the subtraction method impractical.<sup>4</sup>

3. John L. Mikesell, "Sales Taxation of Nonprofit Organizations: Purchases and Sales," in William F. Fox, ed., *Sales Taxation: Critical Issues in Policy and Administration* (Westport, Conn.: Praeger Publishing, 1991), pp. 121-130.

4. For more detail on the mechanics of a value-added tax, see Congressional Budget Office, *Effects of Adopting a Value-Added Tax* (February 1992), pp. 5-19.

**Incidence.** The incidence of a VAT would be the same as a retail sales tax—households would ultimately pay the tax through higher prices for the goods and services they purchase. A VAT faces the same problem as a retail sales tax: lower-income households tend to spend a higher portion of their income and thus would pay a higher tax relative to their income than other families. Moreover, it is difficult to personalize or tailor a VAT according to the composition or economic circumstances of different households. Most countries using a VAT try to lessen the impact on lower-income households by taxing selected goods and services at a zero or reduced rate. Unfortunately, the zero-rating of necessities such as food, housing, and utilities only slightly reduces the VAT's regressivity.<sup>5</sup>

**Hard-to-Tax Goods and Services.** A VAT faces the same problems as a retail sales tax in trying to apply the tax to all goods and services. Once again, taking financial services as an example, the problem is not simply for financial institutions to place a value on those services, but also for them to allocate a portion of the value among their business customers so that each of those customers can take an explicit or implicit credit for the VAT charged on the financial services they use.

Because of that measurement problem, most European countries that use value-added taxes have chosen to remove financial services from the tax base. Purchases of financial services can either be zero rated, in which case the zero-rated institution pays no tax but receives a credit for taxes paid on intermediate inputs, or exempted, in which case the exempted institution neither pays a tax nor receives a credit for the taxes paid on intermediate inputs (goods and services purchased from other businesses).

Exemption is simpler because the exempt institution does not have to participate in the tax system at all: it pays no tax and receives no credits. But on the negative side, exemption causes taxes paid on intermediate goods to cascade because they are never offset by a credit. Under the subtraction-method VAT, the method generally proposed in recent comprehensive tax reform plans for the United States, exemption does not cause taxes to cascade. Any exemption for financial services would, however, encourage the consumption of those services over other goods and services, and in that re-

spect the VAT would fall short of an ideal neutral consumption tax.

Arguably, financial services should not be taxed at all under a VAT. Critics maintain that purchasing financial services is not consumption; rather, it is merely a means to consumption (or an intermediate input rather than a final product). Such a view suggests that financial services should not be included in a consumption base because taxing such services would cause taxes to cascade, just as they would if other intermediate products were subject to tax.<sup>6</sup>

A VAT would tax some portion of the value of goods and services provided by governments and non-profit institutions even if those institutions were not liable for tax on their sales to the public. Under a VAT, even if government entities were exempted (which means they did not have to register as businesses and collect the VAT), they would still pay tax on the value of their purchases from registered businesses. The same would be true for nonprofit organizations. They would pay no tax, however, on their own value added.

**Taxing Exports and Imports.** A VAT can be levied either on the basis of origin (goods and services are taxed where they are produced, so the United States taxes production in the United States) or on the basis of destination (goods and services are taxed wherever they are consumed, so the United States taxes consumption in the United States). Because a VAT is collected in stages as goods are produced, a border tax adjustment is generally required to tax exports and imports on the basis of their destination. A border tax adjustment refunds the VAT that has accumulated on the production of exports and imposes the VAT that would have accumulated on imports if they had been produced domestically. The choice between an origin- or destination-based tax should have little effect on the level of U.S. trade over the long run (see Chapter 3).

**Proposals.** Legislation introduced by former Congressman Sam Gibbons (H.R. 4050) proposed a value-added tax on businesses at a single rate of 20 percent. The tax would not only replace the current individual and corporate income tax but the Social Security pay-

5. Ibid., pp. 31-47.

6. Harry Grubert and James Mackie, *An Unnecessary Complication: Must Financial Services Be Taxed Under a Consumption Tax?* (Department of the Treasury, Office of Tax Analysis, August 1996).

roll tax as well. The VAT would be calculated using the subtraction method and would impose border tax adjustments. As a way to achieve greater progressivity, the proposal includes a supplemental individual income tax that would apply only to individuals with high incomes. Low-income households would get a refundable credit to offset their VAT payments.

The proposal attempts to make the base of the VAT as broad as possible. The base would include not only virtually all sales by businesses to consumers, but also sales of nonprofit organizations, state and local governments, and the federal government. Very small businesses (those with gross receipts of less than \$12,000 a year) would be exempt from the tax. The VAT would be levied on both rental and owner-occupied housing. For rental housing, the tax base would include rents. For owner-occupied housing, it would include new construction, renovations, and repairs.

Most businesses would use the subtraction method to calculate their VAT liability. To avoid the difficulties that are involved in determining the value of financial services under the subtraction method, the proposal would tax such services using an alternative method based on financial cash flow. Typically, banks and other financial institutions would be taxed on the "spread" between their gross income from loans and investments and their cost of borrowing funds. Although that calculation would capture the value of financial services in the tax base, it would cause the tax on financial services used by businesses to cascade.

## A Bifurcated Value-Added Tax

A bifurcated VAT is similar to a subtraction-method VAT, except that businesses would also subtract wage payments from their sales when calculating their tax base. Wages would then be taxed directly at the personal level. Personal exemptions and a standard deduction would tailor the wage tax to family size. In effect, with the same tax rate on the business and wage portion of the tax, a bifurcated VAT is an ordinary VAT with an implicit refund that would depend on a family's size and wage earnings.

The flat tax proposed by economists Robert Hall and Alvin Rabushka is an example of this type of VAT. They describe the tax in the following way.

Here is the logic of our system stripped to basics: We want to tax consumption. The public does one of two things with its income—spends it or invests it. We can measure consumption as income minus investment. A really simple tax would just have each firm pay tax on the total amount of income generated by the firm less that firm's investment in plant and equipment. The value-added tax works just that way. But a value-added tax is unfair because it is not progressive. That's why we break the tax in two. The firm pays tax on all the income generated at the firm except the income paid to its workers. The workers pay tax on what they earn, and the tax they pay is progressive.<sup>7</sup>

**Incidence.** A bifurcated VAT has an advantage over an ordinary VAT in that the impact of the tax on lower-income households can be mitigated through the wage tax. Because the wage tax is an individual-level tax, it can be designed to vary according to the composition and economic conditions of different households. The flat tax proposed by Hall and Rabushka achieves some progressivity by providing a family allowance that increases with the number of dependents. However, the wage portion of the tax could certainly be levied at graduated rates, making the overall tax even more progressive. David Bradford has proposed another version of a bifurcated VAT, which he labels the X-Tax, that is much like the Hall and Rabushka proposal except that it would apply graduated rates to the wage tax.<sup>8</sup>

**Hard-to-Tax Goods and Services.** A bifurcated VAT solves some of the problems with an ordinary VAT by taxing wages at the individual level. Because wage payments account for a large portion of the value added attributable to governments and nonprofit organizations, a bifurcated VAT provides generally consistent treatment for those institutions and private businesses.

7. Robert E. Hall and Alvin Rabushka, *The Flat Tax*, 2nd ed. (Stanford, Calif.: Hoover Institution Press, 1995), p. 55.

8. David F. Bradford, "On the Incidence of Consumption Taxes," in Charles E. Walker and Mark A. Bloomfield, eds., *The Consumption Tax: A Better Alternative?* (Cambridge, Mass.: Ballinger, 1987), pp. 243-261.

**Taxing Exports and Imports.** The General Agreement on Tariffs and Trade allows border tax adjustments on indirect taxes such as a VAT, but it does not permit them for direct taxes such as the individual income tax. Despite its similarity to an ordinary VAT, border tax adjustments are unlikely to be permissible for the wage portion of a bifurcated VAT.<sup>9</sup> Under the Hall and Rabushka plan, traded goods and services would be taxed on an origin basis—no rebate would be given for exports and no tax levied on imports.

**Proposals.** House Majority Leader Richard Armey and Senator Richard Shelby proposed a version of the Hall and Rabushka flat tax—the Freedom and Fairness Restoration Act of 1995 (H.R. 2060 and S. 1050). The proposal would tax all businesses at a single rate of 20 percent initially and 17 percent in future years on the proceeds from sales, less purchases of inputs from other businesses, and less all salaries, wages, and pension contributions. Payments for fringe benefits other than pension contributions, state and local taxes, and payroll taxes would not be deductible from the business tax base.

State and local governments and nonprofit organizations would not be subject to the business tax, except on unrelated business activities. Thus, nonwage compensation for those organizations would escape taxation at both the business and personal levels were it not for a special tax on the value of employee compensation other than wages and retirement contributions for such organizations.

A personal-level tax at the same single rate as the business-level tax would apply to wages, salaries, pensions, and unemployment compensation above an exemption level that would vary by marital status and family size and would be indexed for inflation. The exempted amount would equal \$31,400 for a family of four in 1996.

Senator Arlen Specter proposed a flat tax (S. 488) similar to H.R. 2060 and S. 1050. His proposal, however, would retain a limited level of itemized deductions for mortgage interest and charitable contributions up to specified limits. To offset that reduction in the tax

base, the proposal would maintain a 20 percent tax rate indefinitely.

## A Personal Cash Flow Tax

A personal cash flow tax is levied on income less net saving and is collected entirely from individuals. For the typical taxpayer, the personal cash flow tax would be similar to the current individual income tax except that all of the taxpayer's financial assets would be treated as if they were individual retirement accounts. Tax-deductible deposits to such individual retirement accounts could be made at any time in any amount, and taxable withdrawals could be made for any reason without penalty.

Borrowing would be treated as negative saving. Thus, the proceeds of any loan would be added to the tax base. At the same time, payment of interest and repayment of principal would be deductible.

**Incidence.** All taxes would be collected at the personal level. Thus, unlike the VAT, the burden of the personal cash flow tax could be personalized and made progressive; that is, the tax could allow for exemptions based on family size and economic circumstances. A single tax rate or graduated rates similar to current law would be available. As a result, a personal cash flow tax could be either more or less progressive than the current system.

**Hard-to-Tax Goods and Services.** The appropriate treatment of housing and durable goods presents problems for a tax on personal cash flow similar to those under the current income tax.<sup>10</sup> If housing was treated as any other investment under the tax on cash flow, the price of a home would be deducted at the time of purchase, whereas returns from the investment in housing—the flow of housing services—would be taxable. Loans and withdrawals from saving to purchase the house would be added to the tax base, but repayment of loans (both principal and interest) would be deductible as those payments were made.

9. Gary Clyde Hufbauer assisted by Carol Gabyzon, *Fundamental Tax Reform and Border Tax Adjustments* (Washington, D.C.: Institute for International Economics, 1996).

10. Henry J. Aaron and Harvey Galper, "The Cash-Flow Income Tax," in Aaron and Galper, *Assessing Tax Reform* (Washington, D.C.: Brookings Institution, 1985), pp. 66-107.

Because a tax on personal cash flow is unlikely to include the implicit returns from housing in the tax base, an alternative way to tax housing consumption would be to exclude it completely. The tax would not allow any deduction for housing purchases, and imputed returns would not be included in the base. Mortgage loans would not be added to the tax base, but payment of principal and interest would not be deductible. However, that treatment poses a nettlesome problem: although mortgage loans would not be added to the tax base, withdrawals from savings used to make a down payment would. Consequently, tax liability at the time a house was purchased would bulge, unless some provision was made to smooth out the increase in the tax base over a number of years.

Because all taxes are collected at the individual level, a tax on personal cash flow avoids the problems inherent in indirect taxes such as a retail sales tax or a VAT, including the problems of cascading and of taxing goods and services that governments and nonprofit organizations provide.

**Proposals.** Senator Pete Domenici and former Senator Sam Nunn proposed a tax on personal cash flow together with a business-level VAT in the Unlimited Savings Allowance (USA) Tax Act of 1995 (S. 722). In addition to replacing corporate and personal income taxes, the USA tax would give businesses and households a tax credit for the payroll taxes they pay. At the business level, a subtraction-method VAT would be applied to the difference between proceeds from sales and purchases of goods and services from other businesses, including capital input and land.

At the personal level, the tax base would be calculated as income less net saving and specified exemptions and deductions. Taxable income would include wages, salaries, pensions, most fringe benefits, alimony, child support, and income from assets, except for interest earned on municipal bonds. Net deductible saving would include the value of newly acquired savings assets, deposits to savings accounts, payments for life insurance policies, and contributions to pension plans or other retirement accounts. Sales of capital assets, proceeds from life insurance policies, distribution and withdrawals from retirement plans, and withdrawals from other savings accounts would reduce net deductible saving, and such saving would not include investment in land, art, collectibles, or vacation homes.

A negative value for net saving would further add to a taxpayer's liability.

Borrowed funds would be taxable to the extent that they reduced an individual's deduction for net saving, although they could not reduce it below zero. Repayment of taxable borrowing—principal and interest—would be deductible. Certain types of borrowing would not be taxed, including all mortgages on principal residences, up to \$25,000 of borrowing for purchases of consumer durable goods (such as automobiles and home furnishings), and up to \$10,000 of additional borrowing for any purpose. Subsequently, with the exception of mortgage interest, repayment of principal and interest on nontaxable borrowing would not reduce tax liabilities.

The USA tax would retain deductions for mortgage interest and charitable contributions and would add a new deduction for postsecondary educational expenses. Unlike itemized deductions under the current income tax, taxpayers could take those deductions in addition to the standard deduction. Home buyers could deduct interest payments on their principal residence, even though mortgages on principal residences would not be included in taxable income. That treatment would create an incentive for taxpayers to borrow as much as possible on their home and would treat owner-occupied housing more favorably than other investments. Individuals could deduct contributions to charitable, religious, or educational institutions as defined under current law. Those deductions could not exceed half of an individual's taxable income in a given year. But taxpayers could carry forward unused deductions for up to five years and deduct them in future years. Families could deduct up to \$2,000 for each family member (but no more than \$8,000 per year) for postsecondary education and training each year. No deduction would be allowed for state and local taxes of any kind under the proposal.

Taxpayers could claim a standard deduction of \$7,400 (in 1996 dollars) for married couples filing jointly, \$5,400 for a single head of household, or \$4,400 for a single filer, and an additional deduction of \$2,550 for each family member. Those amounts would be indexed for inflation. The USA tax would retain a system of graduated rates, equal to 8 percent, 19 percent, and 40 percent once the tax was fully in place. Graduated rates would enable people to deduct saving

when their tax rates were high to finance consumption later when their tax rates were low, thus subsidizing saving relative to a tax with uniform rates.

The proposal would create a system of rules during the transition period that would be designed to prevent individuals and businesses with assets that were taxed under the income tax from being taxed on those assets again under the USA tax system. It would do so by allowing tax-free recovery of the "tax basis" of assets purchased before the USA tax system became law. The tax basis is that portion of the value of an asset that has already been taxed.

## A More Comprehensive Income Tax

Past efforts at comprehensive tax reform generally have retained an income-based system while attempting to broaden the tax base and lower tax rates. A good example is the Tax Reform Act of 1986 (TRA), which eliminated a number of deductions and exclusions in the income tax, including the two-earner deduction, the IRA deduction for high-income taxpayers, and the partial exclusion of long-term capital gains. It also restricted itemized deductions and limited the ability of taxpayers to offset their income from other sources with partnership and rental losses. On the corporate side, the TRA broadened the tax base by repealing the investment tax credit and limiting certain allowances for depreciation. The act reduced the maximum income tax rate from 50 percent to 28 percent, and the maximum corporate tax rate from 46 percent to 34 percent.<sup>11</sup>

Deductions and exclusions in the tax code further certain policy objectives, such as increased home ownership and broader health insurance coverage. Arguably, some deductions provide adjustments for a taxpayer's ability to pay, for example, by allowing deductions for unusually large medical expenses.

Reducing deductions and exemptions treats taxpayers in similar economic circumstances more equally—a principle known as horizontal equity. For example, under current tax rules, employers' contributions for health insurance benefits are not treated as taxable income to the worker. A similar employee who must purchase his or her own insurance receives no deduction and is taxed on the full amount of income.

Itemized deductions under the current income tax not only treat taxpayers differently depending on whether they have deductible expenses but also differentiate on the basis of income. For example, homeowners who do not carry a mortgage are not able to claim the deduction for home mortgage interest. The deduction is available only to taxpayers with mortgage interest payments sufficiently large that, combined with other itemizable deductions, they exceed the standard deduction for that taxpayer. Even among taxpayers who take the deduction, the tax savings (which equals the amount deducted times the taxpayer's marginal tax rate) is larger for taxpayers with higher income.

Reducing deductions and exclusions not only improves horizontal equity but also, by increasing the size of the tax base, permits the same amount of revenue to be collected with lower tax rates. Lower tax rates reduce the incentives for taxpayers to engage in tax-motivated behavior, such as sheltering income or reducing real economic activity, and thereby increase the economic efficiency of the tax system.

An important component of a more comprehensive income tax is better integration between business and individual taxes. Under the current system, some income is taxed first at the business level as part of corporate earnings and then at the individual level when those earnings are distributed to shareholders. Most members of the Organization for Economic Cooperation and Development, all of which have income taxes in addition to broad-based consumption taxes, integrate the corporate- and individual-level tax to some degree.<sup>12</sup>

House Minority Leader Richard Gephardt proposed a broader-based and flatter version of the current income tax—the 10 Percent Tax Plan. That proposal

11. Although the Tax Reform Act reduced the top individual tax rate to 28 percent, it also contained provisions to recapture the benefits of personal exemption and the lower tax rates in the bottom bracket, resulting in an income tax rate of 33 percent over certain income ranges. For a discussion of suggestions for further steps toward comprehensive tax reform, see Joseph A. Pechman, "The Future of the Income Tax," *American Economic Review*, vol. 80, no. 1 (March 1990), pp. 1-20.

12. Department of the Treasury, *Integration of the Individual and Corporate Tax Systems: Taxing Business Income Once* (January 1992).

would broaden the personal income tax base by eliminating the tax exclusion for state and local bond interest, employer-provided fringe benefits such as health insurance, and all current itemized deductions (except the mortgage interest deduction). It would tax employer-provided pension contributions when those contributions were made and eliminate the current tax deduction for IRA contributions. It would end the child care and elderly credits. The broader tax base would allow for reduced tax rates. The majority of taxpayers would face a 10 percent marginal tax rate, although higher-income households would face graduated rates ranging from 20 percent up to 34 percent. The proposal would eliminate or restrict a number of unspecified business tax preferences but would keep intact a separate, nonintegrated corporate income tax.

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## Common Elements of Recent Proposals for Comprehensive Tax Reform

The proposals just cited—a national retail sales tax, a value-added tax, a bifurcated VAT, a tax on personal cash flow, and a more comprehensive income-based tax—sound quite different. On the surface, they appear to take a variety of approaches to comprehensive tax reform. But in fact, many of their distinctions are not particularly significant from an economic standpoint. More important, the proposals actually have many common elements that may contribute to desirable economic changes.

### A Tax on Consumption Rather Than Income

With the exception of a more comprehensive income tax, all of the proposals outlined above replace the current income-based system, which includes capital as well as labor income in the tax base, with a consumption-based system in which savings are deductible or the expected return from capital is exempt.

The basic distinction between income and consumption taxes is that an income tax generally will affect decisions about the timing of consumption, but a

consumption tax will not (see Box 1).<sup>13</sup> That "inter-temporal neutrality" of a tax can be achieved either by initially deducting the amounts saved or invested and later taxing the withdrawals or proceeds ("immediate deduction") or by exempting the yield from such saving or investment in each period ("yield exemption").

Under certain assumptions, either type of tax would have a similar effect on the lifetime budget constraints and timing decisions of households. A savings deduction would be equivalent to a yield exemption if income was known with certainty, tax rates were stable, and capital markets were "perfect" in that the taxpayer had an unlimited ability to borrow or lend against future income at a single interest rate.<sup>14</sup> However, because in any given year the yield-exemption base includes only wage income, not consumption, it is more accurately considered a wage tax rather than a consumption tax, at least from an annual perspective.

Shifting to a consumption base would obliterate the current tax incentive to consume now instead of later. Because the base of an income tax includes capital income, it encourages present consumption by reducing the net reward (the after-tax return) for postponing consumption. Thus, on the one hand, moving to a consumption base might encourage people to save more and would reduce the effects of taxes on the timing of consumption. On the other hand, a comprehensive consumption-based tax is not entirely free of influences on economic behavior. In particular, people can still avoid a consumption tax by reducing the number of hours worked and increasing their leisure time, which is untaxed under either a consumption or an income tax. Moreover, because savings are removed, a consumption base is generally smaller than an income base. Thus, a higher overall tax rate may be necessary, making the

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13. If the consumption tax has a single tax rate, it will totally eliminate the effect of taxes on the timing of consumption. But with multiple tax rates, such as "graduated" tax rates that increase with the level of consumption, there will still be an intertemporal effect, in the sense that people can reduce their tax liability on consumption by shifting consumption to low-tax-rate periods. Even with the graduation in tax rates, however, a switch to a consumption-based tax is likely at least to reduce the intertemporal effect of taxes.

14. See Michael J. Graetz, "Implementing a Progressive Consumption Tax," *Harvard Law Review*, vol. 92, no. 8 (June 1979); and Edith Brashares and Laura T.J. Kalambokidis, "Assessing the Equivalence of Different Forms of a Consumption Tax," in National Tax Association/Tax Institute of America, *Proceedings of the Eighty-Eighth Annual Conference on Taxation, 1995* (Columbus, Ohio: NTA-TIA, 1996), pp. 248-253.

**Box 1.**  
**Comparing Taxes on Savings Under an Income Tax  
 and Various Types of Consumption Taxes**

In their effects on saving, income and consumption taxes are distinct from each other, whereas various types of consumption taxes are similar to each other. First, compare a saver and nonsaver under an income tax. Both earn \$50,000, and both face a 20 percent tax rate.

As the table at right shows, the nonsaver allocates all earnings to current consumption. After paying \$10,000 in taxes, the nonsaver has \$40,000 to spend this year. The saver allocates \$45,000 of earnings to current consumption and \$5,000 to saving. Because all earnings are taxable under the income tax, the saver also pays \$10,000 in taxes, leaving her or him with \$36,000 to spend this year and net savings of \$4,000. At an interest rate of 7 percent, those savings (\$4,000) grow to \$4,280 by the following year. Because her or his interest income of \$280 is taxable under an income tax, the saver has \$4,224 to spend after taxes. Thus, by giving up \$4,000 of consumption in the first year, the saver can have \$4,224 of consumption in the second year—a return on postponed consumption of 5.6 percent.

Compare that situation with what happens to the saver under various types of consumption-based taxes. Under an indirect consumption tax such as a retail sales tax or a value-added tax (VAT), taxes are collected only on the income that is spent. Thus, the \$5,000 of earnings allocated to saving is not taxed, and the taxpayer is able to save the entire amount. At an interest rate of 7 percent, that savings will grow to \$5,350 by the following year, which will pay for \$4,280 of consumption, net of indirect taxes at a 20 percent rate. Thus, by giving up \$4,000 of consumption in the first year, the saver can have \$4,280 of consumption in the second year, a return of 7 percent.

Under a direct tax with an immediate deduction for saving, the result is much the same as under a VAT or sales tax. The saver can again save the full \$5,000 of

earnings allocated to saving because saving is immediately deducted from the tax base. That savings grows to \$5,350, which is fully taxable in the second year when withdrawn. After paying tax on the amount removed from savings, the taxpayer is left with \$4,280 to spend in the second year.

Under a direct consumption tax that exempts the return on capital (the yield-exemption form), all earnings are taxable in the first year. As in the example of the income tax, the saver has only \$4,000 to save after taxes. But the key difference is that, unlike the income tax, the interest on those savings is not taxable. Thus, when those savings grow to \$4,280 by the second year, the saver can spend the entire amount without paying any additional taxes.

From the government's point of view, tax collections from an immediate-deduction consumption-based tax are equal to collections from a yield-exemption consumption-based tax in this example. In both cases, the government collects \$9,000 in the first year from the tax on earnings that are spent. It also collects \$1,000 in the first year from the tax on earnings that are saved in the case of a yield-exemption tax and no additional taxes in the first year from the tax with an immediate deduction for savings. However, in the second year, the government collects \$1,070 in taxes when the savings under the immediate-deduction tax are withdrawn and spent. As long as the government can borrow funds at the same rate at which the savings grow, the two taxes will yield the same revenues in present value. Another way to think about the immediate-deduction example is that instead of saving the full \$5,000 for herself or himself, the saver allocates \$1,000 of savings to a separate account for the government, in effect paying the tax in the first year. In the second year, the government collects the total funds in its account, which includes both the principal and interest.

**Comparing Taxes on Savings Under an Income Tax and Various  
Types of Consumption-Based Taxes (In dollars)**

	Income Tax		Consumption-Based Tax		
	Nonsaver	Saver	Indirect (RST or VAT)	Direct Immediate Deduction <sup>a</sup>	Yield Exemption
Total Earnings in a Year	50,000	50,000	50,000	50,000	50,000
Earnings Spent That Year	50,000	45,000	45,000	45,000	45,000
Less tax on earnings spent	10,000	9,000	n.a.	9,000	9,000
After-tax spending	40,000	36,000	45,000	36,000	36,000
Less tax on spending	n.a.	n.a.	9,000	n.a.	n.a.
After-tax consumption	40,000	36,000	36,000	36,000	36,000
Earnings Saved That Year	n.a.	5,000	5,000	5,000	5,000
Less tax on earnings saved	n.a.	1,000	n.a.	n.a.	1,000
After-tax savings	n.a.	4,000	5,000	5,000	4,000
Withdrawal from Savings the Following Year					
Principal	n.a.	4,000	5,000	5,000	4,000
Annual yield on savings (7 percent)	n.a.	<u>280</u>	<u>350</u>	<u>350</u>	<u>280</u>
Total Withdrawal	n.a.	4,280	5,350	5,350	4,280
Less tax on savings yield	n.a.	56	n.a.	70	n.a.
Less tax on savings principal	n.a.	n.a.	n.a.	1,000	n.a.
Additional spending the following year	n.a.	4,224	5,350	4,280	4,280
Less tax on additional spending	n.a.	n.a.	1,070	n.a.	n.a.
Additional Consumption the Following Year	n.a.	4,224	4,280	4,280	4,280
Rate of Return on Postponed Consumption (Percent)	n.a.	5.6	7.0	7.0	7.0

SOURCE: Congressional Budget Office adapted from J.E. Meade, *The Structure and Reform of Direct Taxation* (London: Institute for Fiscal Studies, 1978), pp. 36 and 153.

NOTE: RST = retail sales tax; VAT = value-added tax; n.a. = not applicable.

a. A tax under which earnings were fully taxed but businesses were allowed to deduct the full amount of new investment would be equivalent to an immediate deduction for saving. See Meade, *The Structure and Reform of Direct Taxation*, pp. 154-156.

tax's net effects on the trade-off between leisure and consumption greater compared with those of an income tax.

In addition to removing the influence of taxes on the timing of consumption, another advantage of a consumption-based tax is that it avoids the problem of trying to measure capital income. In general, what makes capital income so difficult to measure properly is the mismatch in timing between actual income and observable cash flows. Measuring capital income is particularly complicated during periods of inflation because of the need to use information on market transactions made at different times. The Herculean task of coming up with perfect measures of all types of capital income leads to an income-tax system that unavoidably taxes some types of capital income more heavily than others.

## More Uniform Tax Rates

Many recent reform proposals advocate moving to a single-rate, or flat, structure, with one tax rate applied to all income or consumption above an exemption level. One can contrast those single-rate systems with the current system in which marginal tax rates increase with income level.<sup>15</sup> Most proposals would also apply the same tax rate to different types of income or consumption. Consequently, whatever income fell in the definition of the tax base would be taxed at the same rate.

Greater uniformity in tax rates would reduce incentives to change the timing or form of transactions. However, eliminating the graduation in marginal tax rates by income level, even if a certain amount of income is exempted from taxation, typically implies that the distribution of the tax burden among families with different incomes will change.

Except for the Gephardt 10 Percent Tax Plan, most proposals for fundamental tax reform would eliminate the distinction between corporate and noncorporate

businesses by using a general business-level tax instead of a tax specific to corporations. Doing so would wipe out the present tax incentive to engage in noncorporate activities or purchase noncorporate products. In addition, the proposals attempt to coordinate business and personal taxes more effectively, both in terms of rate structures and what is included in the tax bases. As a result, the two levels of taxation put together would uniformly tax a single, comprehensive base. That so-called "integration" of the two levels of taxation would reduce the influence of taxes on the organizational and financial decisions of businesses.

## A Broader Tax Base and Lower Tax Rates

Most of the proposals for fundamental tax reform would not merely switch to a consumption base: at the same time, they would increase the size of the tax base by eliminating many preferences that the current system grants to certain forms or uses of income. The flat tax, for example, would remove all types of itemized deductions while also expanding the definition of taxable income by including employer-paid fringe benefits. The USA tax would not totally eliminate deductions (for example, the deductions for mortgage interest and charitable contributions would remain), but it would still broaden the definition of gross income in a manner similar to the flat tax.

By including more economic transactions in the tax base, recent proposals for comprehensive tax reform (whether they are proposals for consumption-based taxes or not) could for the most part achieve lower overall tax rates while raising the same amount of revenue. Base broadening also implies a more similar treatment of different sources and uses of income. Both of those features suggest a tax system that would have less effect on people's economic behavior. Lower tax rates imply that individuals and firms would have less incentive to shift to activities that are more lightly taxed because the differences in tax rates would be reduced. Individuals and firms would also find it more difficult to substitute tax-exempt activities for taxable ones if nearly everything was brought into the tax base.

15. The marginal tax rate is the rate applied to the next dollar of income.

# Effects on the Macroeconomy

**C**ould a switch to a broad-based consumption tax stimulate national saving, domestic investment, and labor supply? If so, increases in economic output would be likely as well. The effects on market interest rates may be difficult to predict, but such effects are of secondary importance.

Any increases in capital accumulation and hours of work depend on certain features of the tax proposals. As described earlier, most proposals to replace federal income taxes make three fundamental changes: shift from an income tax base to a consumption tax base; move toward lower and more uniform tax rates; and broaden the tax base by eliminating both deductions and exclusions.

The switch to a consumption tax base is likely to encourage capital accumulation by removing the taxation of capital income and hence the incentive to consume sooner rather than later. More uniform tax rates will also eliminate some tax differences that encourage less productive uses of capital in the current system. A broader tax base could increase the labor supply if the broadening was sufficient to allow a reduction in overall marginal tax rates. Without broadening the base, a revenue-neutral switch from an income base to a consumption base would lower the tax on saving and investment but would increase the tax rate on labor.

The precise impact of switching to consumption-based taxes cannot, however, be predicted with accuracy. Simulation models using particular assumptions about changes in behavior yield some insight into what could happen if the assumptions of the particular models prove correct. Unfortunately, those models are not

sufficiently advanced to provide a reliable set of bottom-line estimates.

Although comprehensive tax reform could lead to substantial revenue shortfalls or bring in more revenue than the current system, the analysis in this study assumes that all of the proposals are revenue neutral. That assumption implies that reform will not change the initial level of after-tax income of the private sector as a whole.

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## The Effect of Tax Reform on Saving

Saving is how a nation provides for the future. Through saving, it can build up a stock of assets and support higher levels of consumption in the future. The U.S. national saving rate—that is, the percentage of national income that is saved—declined substantially in the 1980s, and it has dropped even more in the early 1990s, raising deep concerns among policymakers and analysts. Although many factors, including those beyond the control of government policies, contribute to the low saving rate, replacing the current tax system with a more efficient one could boost saving.

Shifting toward any of the consumption-based taxes discussed in Chapter 2 would probably increase national saving and ultimately raise the living standards of future generations. But the magnitude of that response is highly uncertain. The proposals are complex, and economists still have a rather rudimentary under-

standing of the factors that influence saving. Nonetheless, the designers of a consumption-based tax would inevitably face a number of issues raised in the discussion below.

## Why Would Saving Increase?

The proposals for a consumption-based tax could increase saving for two reasons. First, by eliminating taxes on new saving, they would reduce the price of future consumption compared with current consumption. In itself, that outcome would also raise people's lifetime resources, allowing them to consume more today and tomorrow. But if the reform is revenue neutral, the tax rate on consumption must be correspondingly higher. As a result, total lifetime resources will initially remain the same as they are under the current system. Thus, on average, the change in relative prices gives people an incentive to reduce current consumption and save more for the future.

Second, the proposals might redistribute lifetime resources from low savers to high savers. Among the various ways that tax reform might redistribute income, the effects of redistribution are particularly relevant to two groups: people of different ages, and people with different levels of income.

Consumption-based taxes impose a levy on existing business assets, which are largely held by older people (see Appendix A). At the same time, because the proposals are revenue neutral, the lighter tax burdens on younger people offset the added burdens on older people. Redistributing tax burdens from the young (including future generations) to the old could increase total saving because older people tend to consume a larger fraction of their lifetime resources than do younger people.

Two factors, however, lighten—and perhaps completely offset—that redistributive effect among generations. First, some of the proposals provide relief for holders of existing capital during the transition period. That relief eliminates much of the redistribution of resources between low and high savers. Second, holders of existing assets may be in a better position to take advantage of the investment incentives under a consumption-based tax. For example, ongoing firms have significant advantages over newcomers in most indus-

tries. If so, those advantage would tend to put upward pressure on the market value of firms. In principle, that effect could offset the negative impacts of the additional tax on the value of those firms' existing stock. Some economists suggest that stock prices might therefore rise.<sup>1</sup> But other analysts argue that for adjustment costs to be high enough to more than offset the levy on capital, share prices of firms would have to be implausibly high in relation to the per-share value of their capital. Thus, the argument continues, without transition relief the value of existing assets would fall.<sup>2</sup>

Some proposals might also end up redistributing income within generations if they flattened the rate structure. However, such a flattening would tend to increase the tax burden on lower-income families and reduce the burden on higher-income families compared with the present tax system. That type of redistribution would also encourage saving because higher-income families tend to be bigger savers than lower-income families, even on a lifetime basis.

## How Much Would Saving Increase?

How much private saving would change is difficult to judge. Even a comprehensive version of a consumption-based tax, with no relief for the owners of existing capital, could produce a broad range of estimated responses in saving. Any proposal that provided relief to owners of existing capital would lead to a significantly smaller effect on saving.

Economists Alan Auerbach and Laurence Kotlikoff estimate that if a proposal completely eliminated the tax on existing capital, 70 percent of the increase in saving from tax reform could be lost.<sup>3</sup> In the end, tax reformers confront a trade-off: if they want to ease the

1. David M. Cutler, "Tax Reform and the Stock Market: An Asset Price Approach," *American Economic Review*, vol. 78, no. 5 (December 1988), pp. 1107-1117; and Andrew B. Lyon, "The Effect of the Investment Tax Credit on the Value of the Firm," *Journal of Public Economics*, vol. 38 (March 1989), pp. 227-247.
2. Alan Auerbach, "Tax Reform, Capital Allocation, Efficiency, and Growth," in Henry J. Aaron and William G. Gale, eds., *Economic Effects of Fundamental Tax Reform* (Washington, D.C.: Brookings Institution, 1996), pp. 29-73.
3. Eliminating the tax on existing assets would effectively convert a consumption tax to a wage tax. See Alan J. Auerbach and Laurence J. Kotlikoff, *Dynamic Fiscal Policy* (Cambridge, England: Cambridge University Press, 1987).

additional tax burden on existing assets and on the older Americans who own the largest portion of those assets, they must be willing to accept substantial reductions in the long-run economic benefits to younger people and future generations.

**Direct Empirical Evidence.** The most direct way to determine how saving might react to a switch to a comprehensive consumption-based tax is to examine how people have responded to changes in incentives to save in the past. Unfortunately, existing empirical studies provide a bewildering range of estimates. Some studies find that saving responded markedly to changes in after-tax rates of return; still others find no response.

One problem is the difficulty in measuring the key variable—the net real rate of return on saving. In principle, the rate of return depends on factors that cannot be observed, such as people's expectations of future inflation and effective tax rates. Early studies ignored those measurement problems altogether and thus do not provide reliable estimates.<sup>4</sup> More recent studies make assumptions about how people anticipate future inflation. In one of the first papers to account for taxes and inflationary expectations, Michael Boskin reported a rather strong positive response by saving to increases in after-tax rates of return.<sup>5</sup> In that paper, other things being equal, a 10 percent rise in the real after-tax rate of return would cause people to raise their gross saving by 4 percent. Moreover, if the real value of existing assets fell at the same time, saving would rise even more. But other empirical studies that also attempted to address the measurement problems found that interest rates seemed to have little effect on consumption and saving.<sup>6</sup>

Another problem with studies that use the direct approach is that they do not account for the demographic factors that can also influence saving behavior. For example, how workers respond to changes in the rates of return depends on how long they expect to live

and when they expect to retire. Thus, the response of saving is not a fixed parameter, as assumed by the direct studies. Instead, it depends on the demographic structure of the population, which changes over time.<sup>7</sup> The direct studies also ignore the reverberating effects that tax reform would have throughout the economy. To address both of those issues, economists use computer simulation models.

**Simulation Models.** Simulation models suggest that switching to a comprehensive consumption-based tax is likely to increase saving. The models reviewed for this study suggest that the saving rate could increase by as little as 3 percent or as much as 25 percent in the long run. The empirical evidence suggests, however, that consumer saving responds less to changes in interest rates than those models generally assume. Moreover, few of the results of the models account for the saving incentives in the current tax system or the effects of uncertainty on saving behavior. As a result, the rise in saving is unlikely to be in the upper end of that range. The response would be lower still if significant relief for owners of existing capital lessened the tax on existing capital. (See Appendix B for a more complete discussion of the simulation models.)

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## The Effect of Tax Reform on Capital Flows and Domestic Investment

The United States is part of the world economy in which savers are relatively free to invest in many different countries. Because saving can flow across borders, the level of domestic saving does not constrain domestic investment in the United States. If U.S. national saving fell short of domestic investment, capital from abroad would fill the gap. Conversely, if U.S. saving exceeded domestic investment, the difference would be invested abroad.

The free movement of capital across borders has significant implications for the effects of tax reform. If the economy was closed to the outside world, saving

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4. Paul David and John L. Scadding, "Private Saving: Ultra-Rationality, Aggregation, and Denison's Law," *Journal of Political Economy*, vol. 82, no. 2, part 1 (March-April 1974), pp. 225-249.

5. Michael Boskin, "Taxation, Saving, and the Rate of Interest," *Journal of Political Economy*, vol. 86 (April 1978), pp. S3-S27.

6. Alan S. Blinder and Angus Deaton, "The Time-Series Consumption Function Revisited," *Brookings Papers on Economic Activity*, no. 2 (1985), pp. 465-511.

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7. Douglas W. Elmendorf, *The Effect of Interest-Rate Changes on Household Saving and Consumption: A Survey*, FEDS Working Paper 96-27 (Federal Reserve Board, July 1996).

would always have to equal investment. In that case, no fundamental difference would exist between a tax policy that stimulated investment and one that stimulated saving. In the end, the real effects of the two policies on the economy would be the same. But in an open economy, incentives for investment are not equivalent to incentives for saving. Incentives for saving encourage domestic savers whether they invest at home or abroad. In contrast, incentives for investment encourage both foreign and domestic savers to invest in domestic firms.

Compared with current policy, all of the proposals described in the previous chapter encourage both saving and investment. The saving incentives come from the increase in the after-tax return from postponing consumption. The investment incentives stem from a reduction in the cost of capital to businesses.

## Tax Reform and the Cost of Capital

Businesses will undertake new investments if those investments yield a sufficient return after taking account of all costs, including operating expenses, depreciation, and taxes. The cost of capital is the pretax rate of return that is necessary to yield the prevailing after-tax return, once all costs are paid. Current proposals to replace the income tax make several changes that, when taken together, would probably reduce the overall cost of capital.

First, the full expensing that takes place under cash-flow consumption taxes (such as the value-added tax, Armey-Shelby flat tax, and Unlimited Saving Account tax) allows businesses to deduct any purchases of capital immediately. That deduction directly lowers the cost of capital and stimulates demand for investment. Second, integrating personal- and corporate-level taxes would remove the double taxation of corporate equity and hence tend to reduce the cost of corporate capital. Finally, broadening the tax base implies lower overall marginal tax rates. Consequently, the overall cost of capital could fall.<sup>8</sup>

However, the proposals would probably have bigger effects on the costs of some forms of capital than of others simply because the current tax system does not treat all forms of capital equally. (See Chapter 4 for a closer examination of the effects on the costs and allocation of different types of capital).

## Risk Taking

Economic activities do not all receive the same after-tax return, even after adjusting for differences in risk. Some do better than others; some do worse. Taxing unexpectedly high returns from investment can have seemingly paradoxical effects on investment decisions.

Under current law, taxes on capital income generally discourage investment because they reduce the expected net return from investment. They also increase risk taking (the riskiness of a given dollar invested) because they reduce the variation of net returns. If the investment yields an unexpectedly high return, the government receives higher revenues. Yet if yields fall below expectations, revenues do also. In effect, the government bears some of the risk of the investment by sharing unexpectedly good or bad outcomes, the marginal tax rate being the government's share.

The incentive for taking risks would change under a consumption-based tax. Because the expected net returns from capital are untaxed under a consumption tax, the level of investment should be higher than under current law. However, the excess of actual returns above expected returns would be subject to tax. Moreover, any shortfall of actual returns below expected returns would reduce tax liability. The government still bears some risk. Thus, although overall investment should be encouraged after switching to a consumption tax, the riskiness of investments could increase or decrease depending on whether the tax rate on unexpected capital income was higher or lower than under the current income tax system. Decreases in marginal tax rates, accomplished by broadening the base and flattening the overall rate structure, would make it more likely that a replacement for a consumption tax would discourage risk taking while encouraging overall investment.

8. The cost of corporate and overall capital could fall even under an income-based tax replacement. The Gephardt proposal, however, might not be as likely to cause reductions in the cost of capital. That proposal does not integrate personal and corporate taxes and eliminates some business tax preferences.

## Investment and Economic Rents

Some investments deliver economic rents (or supernormal returns) because they can take advantage of the power of their monopoly in the marketplace. Those monopolies sometimes arise when product markets do not work perfectly. Yet they also come from innovations that create new products and markets. In general, those economic rents are taxed under current law.

All of the proposed consumption-based taxes would continue to tax economic rents, although to varying degrees. Expensing would eliminate any tax on the normal returns from an investment. Under a consumption tax, the cost of an investment is fully deductible (expensed) at the time of purchase. The future income from an investment would be subsequently taxed. But for a normal investment (one without economic rents), the present value of that income stream is the same as the cost of the investment. Making the initial investment deductible is thus equivalent to not taxing the income from the investment.

The supernormal returns earned by firms with market power would still be subject to tax, however. Any tax collected on supernormal returns would raise revenue but would not affect investment decisions at the margin (that is, for each additional dollar of investment).

## International Capital Flows and Trade

The balance between saving and investment in the United States will determine the amount borrowed from abroad. If tax reform stimulates more investment than saving, capital flows into the United States will initially rise. But if saving increases more than investment, capital inflows will fall.

The MSG multicountry (or MSG2) model is a macroeconomic forecasting model that offers some insights into the possible effects of switching from an income tax to a value-added tax in an open economy. The model reflects the key interactions among the major industrialized countries. After the change in tax policy, the MSG2 model predicts that rising demand for investment would outweigh the increasing supply of saving for almost 20 years. As a result, capital inflows would rise, which initially would make the dollar appreciate

and net exports fall. The way in which reform treats imports and exports would not, however, affect the trade balance appreciably. Despite the apparent difference between destination- and origin-based value-added taxes, they have about the same effect on the trade balance in the long run (see Box 2).

If interest rates rise, the openness of the United States economy will ease the transition to an economy with greater capital intensity. Access to international capital markets means that the nation can build up its capital stock without cutting consumption as much. In essence, U.S. residents will be borrowing from abroad to smooth their consumption over time.<sup>9</sup> In the long run, however, the debts to foreigners must be serviced, and the income from imported capital will largely accrue to foreigners.

Although analyses that treat the U.S. economy as a closed one may understate the increase in capital formation that would occur following a switch to a consumption tax, the simplest specifications of open-economy models tend to err in the opposite direction in a more extreme way. Models that treat the United States as a small open economy (in which changes in the U.S. capital stock have no effect on world interest rates) often suggest implausibly large increases in capital formation. Acknowledging that the United States is really a large open economy moderates the expected increases in the capital stock. In fact, the evidence on international capital flows does not generally suggest that they are large given the magnitude of the capital stock.<sup>10</sup>

Relaxing certain unrealistic assumptions under an open-economy framework tends to bring results closer to those of a closed economy.<sup>11</sup> Moreover, openness introduces the possibility that the U.S. capital stock might contract because debt capital might flow out as equity capital flows in.

9. For a more extended discussion of these effects, see Enrique G. Mendoza and Linda L. Tesar, *Supply-Side Economics in a Global Economy*, Working Paper No. 5086 (Cambridge, Mass.: National Bureau of Economic Research, April 1995).

10. See possible explanations discussed in Roger H. Gordon and A. Lans Bovenberg, "Why Is Capital So Immobile Internationally: Possible Explanations and Implications for Capital Income Taxation," *American Economic Review*, vol. 86, no. 5 (December 1996), pp. 1057-1075.

11. Jane G. Gravelle, "Simulation of Economic Effects for Flat Rate Income and Consumption Tax Proposals" (draft, Congressional Research Service, 1996).

**Box 2.**  
**Destination-Based Versus Origin-Based Taxes**

Consumption-based taxes can be designed using a destination-based or origin-based system, but that choice is not particularly important for capital flows or the trade balance in the long run.<sup>1</sup> An origin-based tax system, such as that under the flat tax, taxes domestic production and hence permits a deduction only for saving that takes the form of domestic business capital. A destination-based tax system, such as that under the Unlimited Saving Allowance tax or retail sales tax, taxes domestic consumption and hence allows a deduction for U.S. capital investment abroad, while taxing domestic consumption of income earned abroad.

Under a destination-based system, any consumption-based tax would be rebated on exports and charged on imports. At first blush, that treatment might seem to favor the location of production domestically and encourage exports while discouraging imports, but that argument is without merit. For example, the domestic consumer would see no change in the relative prices of domestic and imported cars because the prices of both would rise by the percentage of the tax. In other words, a 5 percent tax rate would raise all car prices by 5 percent. Similarly, the price of exports would not rise in relation to the price of their foreign counterparts because exports are not subject to the consumption tax. No adjustments in pretax prices, exchange rates, or the balance of trade need occur.

The mechanism is different under a consumption-based tax with an origin basis (in which the tax is imposed where the item is made), but the result is the same. Initially, prices of U.S. cars in Japan would rise by the percentage of the tax, whereas the price of Japanese, German, and Swedish cars there would remain unchanged. Demand for U.S. cars would drop until the

prices became competitive once again. That price change could occur either by a depreciation of the dollar exchange rate or by domestic producers cutting back on pretax prices. Because exporters and importers would be similarly affected, the exchange rate would most likely do most of the adjustment. Ultimately, as long as prices and exchange rates were flexible, no border adjustments would be necessary to maintain relative prices.

The differences in treatment of the origin-based and destination-based tax systems do matter during the transition period, however, because of the treatment of foreign investments made before the new tax scheme was adopted. For a country that is a net debtor, as the United States has become in recent years, an origin-based tax system will raise more revenue by denying a deduction for the future trade surpluses needed to service that debt.<sup>2</sup>

Harry Grubert and T. Scott Newlon conclude that although taxes based on origin and taxes based on destination have the same effect on international investment and trade at the margin, they do differ in their taxation of above-normal returns from crossborder investments. In particular, under the origin principle, some multinational corporations may have incentives to locate production in low-tax countries to avoid a tax on supernormal returns. The authors argue, however, that such an incentive is apt to be weaker than under the current tax system because overall investment in U.S. assets should be boosted by the switch to a consumption base.<sup>3</sup>

1. Statement of Alan J. Auerbach, University of California at Berkeley, *Flat Taxes: Some Economic Considerations*, before the Senate Committee on Finance, April 5, 1995.

2. For further discussion of this point, see Joint Committee on Taxation, *Impact on International Competitiveness of Replacing the Federal Income Tax*, JCS-5-96 (July 17, 1996).

3. Harry Grubert and T. Scott Newlon, "The International Implications of Consumption Tax Proposals," *National Tax Journal*, vol. 48, no. 4 (December 1995), pp. 619-647.

## The Effect of Tax Reform on Labor

The effect of reform on labor depends to a significant extent on the details of the tax proposal. Some propos-

als could increase the supply of labor; others could reduce it. The more that policymakers broaden the tax base by eliminating current tax preferences, the lower will be marginal tax rates on labor income, and hence the greater the likelihood that the supply of labor will increase under tax reform.

## Labor Supply

Decisions regarding how much labor to supply ultimately depend on calculating the relative benefits of work over leisure. In simple terms, people work in order to finance consumption both today and in the future. Thus, the return from work is how much current and future consumption the person can obtain by giving up an hour of leisure today. In that view, the incentive to work depends not only on the after-tax wage, but also on the relative price of current versus future consumption. Consumption taxes will affect both after-tax wages and the relative price of future consumption. In addition, tax reform may redistribute income in ways that affect the total supply of labor. Sometimes those effects will work in the same direction; sometimes in opposite directions.

**Marginal Tax Rates on Labor.** Marginal tax rates on labor directly reduce the after-tax wage and hence reduce the relative cost of leisure. Thus, people have an incentive to work less.

The effect of tax reform on the marginal tax rate depends critically on the details of the proposal. If reform does not broaden the tax base by eliminating various preferences, the marginal tax rate on labor must increase in order to raise the same amount of revenue as the current system. The reason is that the base for a consumption tax is smaller than that for an income tax, the difference being saving. In such a situation, tax reform might lead to a decrease in the supply of labor. In contrast, if reform also eliminated tax preferences, it might be able to broaden the tax base by enough to permit a reduction in the tax rate on labor. In that situation, reform could increase the incentives to work.

Further, what matters for the labor supply is the marginal tax rate on total compensation, not just the marginal tax rate on wages received. Total compensation includes fringe benefits, such as health insurance and pension benefits, as well as payroll taxes paid by the employer. Fringe benefits are excluded from tax under current law, and thus the effective marginal tax on compensation is much less than the statutory tax rate on wages. That aspect of current law should be taken into account when estimating how reform changes incentives to work. If a proposal expands the definition of taxable compensation, labor supply is more likely to decline.

The various proposals for a consumption-based tax also differ in the extent to which they provide transition relief to holders of existing capital, which will also ultimately influence marginal incentives to work. As discussed earlier, a pure consumption tax imposes a tax on people who hold existing capital. Because that tax burden is effectively a lump-sum tax on wealth, it does not distort economic choices. In contrast, relief for transition reduces the size of that lump-sum tax. But nothing is free, and higher taxes on labor must inevitably finance transition relief.

Empirical studies indicate that workers are modestly responsive to revenue-neutral changes in after-tax wages.<sup>12</sup> For the workforce as a whole, a 10 percent rise in after-tax wage rates could increase the labor supply between 2 percent and 4 percent.<sup>13</sup> About half of that increase results from people joining the labor force; the remainder reflects an increase in average hours worked.

The effect of tax changes on the labor supply varies significantly among different groups of workers. For example, a decrease in tax rates would have more impact on the labor supply of married women than of men, single women, or female heads of households. In response to a revenue-neutral policy that increased after-tax wage rates by 10 percent, evidence suggests that men and single women would increase their hours of work by 1 percent to 2 percent. In contrast, second earners in two-worker families, who are mostly married women, could increase their labor supply by 6 percent to 9 percent. Thus, if tax reform prompts any large change in labor supply, it will probably occur among married women.

**Changes in the Relative Price of Consumption.** The second effect on labor arises because a switch to a consumption-based tax would reduce the price of future consumption in terms of current consumption. With a higher after-tax rate of return from saving, people get more future consumption for each current dollar they save (do not consume). That change effectively in-

12. For a more extended discussion of these issues, see Congressional Budget Office, *Labor Supply and Taxes*, CBO Memorandum (January 1996).

13. Because the proposal is revenue neutral, this estimate is based on the compensated wage elasticity.

creases the after-tax return from work and stimulates labor supply.

The idea that changes in the price of future consumption could affect incentives to work today may seem puzzling at first. But most people work because they want to be able to consume goods and services. Moreover, although most income is consumed in the same year that it is earned, some of it is saved to finance future consumption. Thus, when the price of future consumption falls, workers can effectively purchase a larger basket of future goods and services. In essence, the decline in the price of future consumption encourages people to work more now because they can consume more later—that is, they substitute future consumption for current leisure.

Models that account for substitution over time can capture that "intertemporal" effect on labor supply. If that effect is significant, a consumption-based tax is likely to stimulate labor supply to a greater degree than an income-based tax would. For example, one analysis suggests that labor supply is encouraged slightly under a switch to a flat-rate consumption tax but discouraged under a switch to a flat-rate income tax.<sup>14</sup>

**Redistributive Effects on Labor Supply.** The proposals may initially redistribute resources (lifetime income) among different types of people. An increase in such income, with given prices and wage rates, will lead people to decrease labor supply (increase leisure). With more lifetime resources, people can consume more without having to work as much. For instance, assume resources are shifted from people whose labor supply is less sensitive to changes in lifetime income to people whose supply is more sensitive. Other things being equal, the supply of labor will initially fall, even though total resources are unaffected when the reform is revenue neutral.

## Productivity, Wages, and Unemployment

Although tax reform could cause labor supply to increase, most estimates suggest that capital will expand even more in the long run.<sup>15</sup> As a result, the overall capital intensity of the economy will rise, which will in turn push up productivity and wage rates. On average, labor should eventually benefit from increased capital accumulation.

In fact, simulation models provide a range of results for the effects of tax reform on real wages. Using a life-cycle model, Alan Auerbach finds that the before-tax real wage rate increases by 4 percent to 6 percent in the long run, depending on the proposal. Using a different life-cycle model, Don Fullerton and Diane Lim Rogers find that the real wage rate rises by 2 percent to 7 percent, depending on how responsive households are in their timing of consumption. Finally, using a precautionary-saving model that shows smaller increases in the ratio of capital to labor, Eric Engen concludes that the pretax real wage rate increases by just 1 percent in the long run.<sup>16</sup>

In the transition, however, some workers are likely to experience unemployment as the economy adjusts. In addition, the reallocation of resources to capital-intensive production may well lead to the permanent displacement of certain types of workers. For example, such displacement can occur if growing industries use laborers who have different skills from those used in shrinking industries. In other words, although labor overall is apt to benefit in the long run from increased capital accumulation, the overall gain may consist of a larger number of gainers and a smaller number of losers.

Moreover, because labor markets tend to adjust more quickly to incentives than capital markets do, labor supply may increase more than capital supply in the short run. That development would lower the ratio of

14. Alan J. Auerbach and others, *Fundamental Tax Reform and Macroeconomic Performance* (paper prepared for the Joint Committee on Taxation, January 1997).

15. This is the message suggested by most of the simulation models featured in a symposium on tax modeling held by the Joint Committee on Taxation on January 17, 1997. Labor supply would increase between zero and 7 percent, while the capital stock would increase by as much as 30 percent.

16. Numbers from these three models come from unpublished reports and from results appearing in Aaron and Gale, eds., *Economic Effects of Fundamental Tax Reform*.

capital to labor and thus reduce productivity and real wages during the early years of the transition.

## Human Capital

Improving the skills and knowledge of workers, or "human capital," is one of the most important elements influencing the long-run performance of the economy. More questions are being raised about how changes in tax policy could affect the accumulation of human capital.

The accumulation of human capital involves both direct and indirect costs to individuals and firms. The direct costs are cash expenses, such as tuition, fees, books, and other out-of-pocket costs. The indirect costs are the income that people lose (or output that firms lose) when people spend time at school or in training rather than working.

The indirect costs are, in effect, deducted from taxable income under the current income tax system because the lost income reduces the taxable income of the individual (or firm) dollar for dollar. In addition, firms can also write off their direct training costs. In contrast, individuals receive no preferential tax treatment under the current system for their direct cash expenses, although the government tends to subsidize some of those costs.

All proposals for consumption-based taxes would preserve the current treatment of indirect costs and the direct costs of firms. They differ, however, in their ability to relieve the current tax on the direct costs of human capital for individuals. The USA tax would give individuals a deduction for a portion of those direct costs. Under a national sales tax, schools and other educational institutions could be exempted. However, in the case of a value-added tax, how the taxes on those direct costs for human capital could be eliminated completely is far from clear. Although schools and other educational institutions could be exempted from paying the tax on their own value added, they would still end up paying some of the tax indirectly in their purchase of goods and services from nonexempt firms. Moreover, at the base of any such effort lies a significant administrative problem in defining what constitutes a legitimate investment in human capital.

For those reasons, and because human capital already is largely taxed on a consumption basis, tax reform is unlikely to have much effect on the supply of human capital. But reform will significantly reduce the tax rate on tangible capital investments—and thus change the relative incentive to invest in physical capital. Consequently, physical capital would become more attractive than human capital.

Alternatively, accumulating human capital may be encouraged if higher levels of skill are necessary for employees to work with new, perhaps higher-tech, physical capital. In such a case, human capital might be considered more of a complement to physical capital than a substitute for it.

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## The Effect of Tax Reform on Economic Output

What would be the effects on output of replacing the current income tax with a comprehensive consumption-based tax? The outcome would hinge on what happens to the supply of inputs and how efficiently those inputs are used. Evidence seems to support the prediction of positive effects on saving and capital accumulation. Even though the effect on labor supply depends on the details of the policy, most economic models also predict a positive effect on the level of national output from an increased labor supply.

Simulation models can provide some insights into the effects of fundamental tax reform on total output and consumption. This section will consider results from two classes of models. The first class is represented by general-equilibrium models, which assume that the economy is always at full employment. The second class of models has so-called "structural features" in which workers can become unemployed if total demand is insufficient.

### General-Equilibrium Models

Recent studies using general-equilibrium models suggest long-run increases in output of 1 percent to 10 percent. One study finds that output could increase between 2 percent and 9 percent, depending on the partic-

ular details of the policy.<sup>17</sup> Another study predicts increases in output of between 1 percent and 6 percent, depending on how sensitive consumers would be to changes in the rate of return from capital.<sup>18</sup> Still another study predicts an increase in output of about 3 percent.<sup>19</sup> An earlier study found that reform could raise output by as much as 19 percent. However, that study was based on tax law in 1980, which had a narrower base and higher rates than current law. In addition, that study assumed a saving response higher than what recent empirical evidence supports.<sup>20</sup>

A large part of saving, including all saving through pensions, is already exempt from taxation under current law. Most earlier studies omit that feature of the current tax system and thereby miss an important feature of the starting point for tax reform. However, a recent model explicitly takes into account the hybrid nature of the current tax system and finds an increase in output of 7.5 percent in the long run.<sup>21</sup>

## Structural Macroeconomic Models

Although tax reform raises the long-run level of gross domestic product (GDP), the economy could experience some short-term increases in unemployment. Analysts at Data Resources, Inc., used their model to investigate the impacts of flat-tax legislation assumed to be in

place in 1996.<sup>22</sup> Their starting point was a 15 percent decline in housing prices that would occur when payments for mortgage interest and property taxes were no longer tax-deductible. Growth would slow sharply in the first few years because the reductions in consumer and housing spending would occur promptly, whereas the capital spending boom would take time to develop. In the period from 2000 through 2005, however, real GDP would be almost 1 percent higher on average than in the baseline.

Another model with structural features, the MSG2 model, also predicts that tax reform would lead to short-run losses in economic output. With the changes beginning in 1998, the MSG2 model predicts lower output than in the baseline for 1999 through 2002, but higher output thereafter. In the long run, the model predicts, output would be about 10 percent above the baseline level. But consumption would fall more than 10 percent below its baseline value in the early years and would not return to the baseline until 2022.

In all of those models, although tax reform ultimately increases the level of GDP, it does not permanently raise the growth rate of the economy. To be sure, the economy has to grow somewhat faster during the transition period in order to reach that higher level. However, once the economy reaches that higher level, it grows at the same rate that it would have if policy had not changed. Although some recent research has suggested that some policy changes might be able to raise long-term growth rates, support for those theories is weak.<sup>23</sup>

Whatever the increase in output, long-run consumption would increase by less. Some of the gains to gross domestic product would have to be used to cover the additional depreciation of the higher level of capital, and people would consume a smaller fraction of net income than they do now.

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17. Alan Auerbach, "Tax Reform, Capital Allocation, Efficiency, and Growth," in Aaron and Gale, eds., *Economic Effects of Fundamental Tax Reform*.
  18. Don Fullerton and Diane Lim Rogers, "Lifetime Effects of Fundamental Tax Reform," in Aaron and Gale, eds., *Economic Effects of Fundamental Tax Reform*; and Diane Lim Rogers, "Assessing the Effects of Fundamental Tax Reform with the Fullerton-Rogers General-Equilibrium Model" (paper prepared for the Joint Committee on Taxation, January 1997).
  19. Dale W. Jorgenson and Peter J. Wilcoxon, "The Long-Run Dynamics of Fundamental Tax Reform" (paper prepared for the American Economic Association annual meeting, January 1997).
  20. Lawrence H. Summers, "Capital Taxation and Accumulation in a Life Cycle Growth Model," *American Economic Review*, vol. 71 (September 1981), pp. 533-544; and Owen J. Evans, "Tax Policy, the Interest Elasticity of Saving, and Capital Accumulation," *American Economic Review*, vol. 73 (June 1983), pp. 398-410.
  21. Auerbach and others, "Fundamental Tax Reform and Macroeconomic Performance."

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22. Roger Brinner, Mark Lasky, and David Wyss, "Market Impacts of Flat Tax Legislation," in DRI/McGraw Hill, *Review of the U.S. Economy* (Lexington, Mass.: DRI/McGraw Hill, June 1995), pp. 29-37.
  23. Congressional Budget Office, *Recent Developments in the Theory of Long-Run Growth: A Critical Evaluation*, CBO Paper (October 1994).

## The Effect of Tax Reform on Interest Rates

Studies of tax reform have differed wildly in their estimates of the effect of tax reform on interest rates. Some researchers predict that interest rates would fall; others see them going up. Much of the confusion about the effects of tax reform on interest rates is a product of an abundance of studies that focus on different measures of the interest rate, use different models of the saving response, and make different assumptions in their calculations.

Despite that confusion, researchers agree that the switch to a consumption-based tax would raise the after-tax return from saving and would lower the marginal product of capital (the amount of output produced by the last unit of capital invested). But the effects of reform on other rates of return—such as the market return from equity or the interest rate on corporate debt—are ambiguous (see Box 3).

In any case, how tax reform would affect rates of return is much less important than how it would affect the ratio of capital to labor. On that point, most researchers agree: moving to a consumption-based tax would increase capital intensity, which would boost the real wage rate and increase the standard of living in the long run. The effects on market interest rates are of secondary importance.

### Results of Model Simulations

Because of the uncertainty about the effect of tax reform on rates of return, using model simulations to analyze the role of various factors can be helpful. The simulations show that if saving is assumed to be more elastic, significant reductions in rates of return in the long run become more likely. But the results crucially depend on assumptions about the relative tax rates on debt and equity and the size of the risk premium. Moreover, comparing the results of different analyses is difficult because they focus on different rates of return.

Using a precautionary-saving model with a small saving elasticity, one study found that the before-tax return from capital (essentially a weighted average of

the rates on debt and equity) could decline by as little as zero or as much as 11 percent in the long run, depending on the details of the proposal.<sup>24</sup> Even bigger effects—18 percent to 24 percent in the long run—came from one study using a life-cycle model that has a large saving elasticity.<sup>25</sup> In addition, Robert Hall and Alvin Rabushka, the architects of the consumption-based flat tax, estimate that the market rate of interest would fall by approximately 20 percent if the United States adopted a consumption tax similar to the Arme-y-Shelby flat tax.<sup>26</sup> (Those results are stated in percentage terms, not percentage points. A 20 percent change in an interest rate that was initially 10 percent would move rates by 200 basis points.) In the short run, however, Alan Auerbach found that tax reform would stimulate labor supply more than capital supply. That outcome would cause the marginal product of capital—and the pretax rate of return from capital—to increase temporarily. Other models do not predict such a response.<sup>27</sup>

Unfortunately, only a few studies distinguish between the rates on equity and debt. One such study, by Martin Feldstein, suggests that interest rates on debt would nearly double in the near term and remain higher than prereform interest rates over longer horizons.<sup>28</sup> His predictions are based on the assumption that reform would not alter the premium between equity and debt and thus would create significant upward pressure on interest rates, as discussed above. He also assumed that the marginal product of capital would not decline by a large amount and that the prereform tax rate on interest income would be much lower than that on equity income.

In the previously cited paper, Auerbach comes to opposite conclusions about the interest rate, noting that current tax rates on equity (including housing) are much lower than those on interest income—and thus interest

24. Eric M. Engen and William G. Gale, "The Effects of Fundamental Tax Reform on Saving," in Aaron and Gale, eds., *Economic Effects of Fundamental Tax Reform*, pp. 83-112.

25. Auerbach, "Tax Reform, Capital Allocation, Efficiency, and Growth."

26. Robert E. Hall and Alvin Rabushka, *The Flat Tax*, 2nd ed. (Stanford, Calif.: Hoover Institution Press, 1995).

27. Auerbach, "Tax Reform, Capital Allocation, Efficiency, and Growth."

28. Martin Feldstein, *The Effect of a Consumption Tax on the Rate of Interest*, Working Paper No. 5397 (Cambridge, Mass.: National Bureau of Economic Research, December 1995).

**Box 3.**  
**The Effect of Tax Reform on Rates of Return**

Theory cannot predict the net effect that switching to a consumption-based tax will have on market rates of return. That uncertainty would remain even if the market rates of interest on debt and return from equity always rose or fell together. Moving to a consumption base at the personal level raises the after-tax rate of return from saving, increases the supply of capital, and acts to reduce market rates. But allowing firms to expense (write off) their investment (or, equivalently, eliminating the tax on business income) in effect lets firms deduct the returns from equity paid to owners. Firms can already deduct the cost of interest paid to lenders. Therefore, expensing eliminates the discrepancy in the tax treatment of debt and equity, increases the demand for equity-financed capital, and acts to raise market rates.

Moreover, opposing forces will act simultaneously on interest and equity rates as investors seek to get the highest after-tax returns consistent with risk. The first force acts to push down the market interest rate relative

to the market equity rate because interest income is currently taxed at a higher average rate than equity income from ownership of homes, stocks, and businesses. (A large fraction of equity is in the form of owner-occupied housing, whose imputed income is not subject to tax.) Because of the initial difference in tax rates, the interest rate could fall by a greater proportion than the equity rate under reform and yet each could yield the same after-tax return as before.

However, equity will remain riskier than debt, and investors will continue to require a higher expected rate of return on equity than on debt—a risk premium. If investors try to maintain the same risk premium as before, a second force will come into play. Investors will bid up the interest rate in relation to the equity rate. Of course, the risk premium could fall because bidding up the interest rate in relation to the equity rate involves reducing the ratio of debt to equity in the financial structures of firms, thereby reducing their risk.

rates should fall by more than equity rates.<sup>29</sup> But he also assumes that debt and equity are perfect substitutes and therefore ignores the risk premium that plays such an important role in Feldstein's analysis. In summary, those two studies illustrate the tremendous uncertainty that plagues predictions about the effects of reform on rates of return. The results critically depend on the underlying assumptions.

## International Considerations

The flows of capital across national borders will also influence how tax reform affects interest rates. In some open-economy models, interest rates (adjusted for exchange-rate expectations) are assumed to be fixed by world capital markets. Thus, tax reform would not affect interest rates. Those models, however, apply only to small economies in which capital is highly mobile.

In reality, the U.S. economy is quite large compared with the rest of the world. In 1992, gross domestic sav-

ing by the United States represented 17 percent of the world total; gross domestic investment totaled 18 percent. Such magnitudes suggest that the much larger world capital market is likely to absorb much, but not all, of the pressure on interest rates in the United States.

The MSG2 model provides channels for the United States to influence the rest of the world. In that model, tax reform would cause an increase in demand for investment that would outweigh the increasing supply of saving for almost 20 years. Hence, the real rate of interest would rise above the baseline level during that period. In the long run, however, the real rate would fall below the baseline.

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## Conclusion

The effects of fundamental tax reform on the economy are highly uncertain. Results depend on the type of models used and the assumptions built into those models. However, some broad conclusions stand out about capital accumulation, labor supply, and economic output.

29. Auerbach, "Tax Reform, Capital Allocation, Efficiency, and Growth."

## Capital Accumulation

Results from economic simulation models indicate that consumption-based tax proposals are likely to increase national saving. The empirical evidence on the intertemporal response, the hybrid nature of the current tax system, and uncertainty about saving behavior suggest that the effects of tax reform on capital accumulation are less likely to be at the higher end of the range of estimates presented in this study. Transition relief would reduce the effects still further. The reductions in overall costs of capital under a consumption tax should lead to an increase in investment and capital intensity, but might reduce risk taking. The switch to a consumption-based tax is likely to affect international capital flows as well, although the short-term patterns will differ from those in the longer term.

## Labor Supply

A switch to a comprehensive consumption-based tax could cause the supply of labor to increase or decrease,

depending on the significance of reductions in marginal tax rates and a lower price of future consumption in relation to present consumption. The effects of tax reform on human-capital accumulation depend largely on whether human capital is more of a substitute for or a complement to new physical capital.

## Output

The probable increases in the capital stock, coupled with smaller changes in labor supply (in either direction), indicate that the level of national output would be likely to increase in the long run. As with the saving response, the magnitude of the change in output is uncertain. Simulation models suggest increases ranging from 1 percent to 10 percent, and other factors suggest that the upper end of that range is less likely. Nonetheless, even with significant changes in the level of output, tax reform is unlikely to raise the growth rate of the economy permanently.



# Effects on the Allocation of Resources

In addition to its effects on saving, investment, and total domestic production, comprehensive tax reform is likely to change the mix of what is produced in the economy and how it is produced. Industries differ in how they employ capital and labor in their production processes; the types of capital they use; the share of production that stems from corporate and non-corporate business; and the extent to which they rely on loans, stock sales, or retained earnings to fund new investments. Current proposals for fundamental tax reform are likely to affect all aspects of how firms do business.

A general movement away from an income-based tax to a consumption-based tax would encourage the use of capital over labor in production processes as well as greater growth in capital-intensive industries over labor-intensive ones. Better coordination of personal- and business-level taxes would affect the relative costs of different types of capital assets and the returns from different forms of investment and business organizations. By broadening the base, many proposals would remove certain tax preferences that favor particular types of investments, such as owner-occupied housing, and reallocate resources away from those previously tax-preferred uses. Finally, the switch to a consumption-based tax might pose new measurement difficulties, cause different tax treatment of some economic activities, and introduce new preferences. Such changes could also have significant effects on how resources are allocated.

What ultimately happens to the allocation of resources in the economy and to relative prices will reflect changes in both supply and demand in the various markets for inputs and for goods. For example,

changes in household incomes typically imply changes in the mix of goods purchased. Consequently, changes in the distribution of payments to labor and capital would affect not only what is produced (the supply of goods), but also what consumers wish to purchase (the demand for goods). Immediate changes to the supply or demand in one market often have a ripple effect as price changes affect demand or supply in other markets. Therefore, using general-equilibrium models, which account for interactions among markets, can help quantify the effects of tax changes on the allocation of resources.

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## The Effect of Tax Reform on Incorporation, Asset Mix, and the Cost of Capital

The current income tax system has a major impact on the organizational structure of firms and the types of capital investments made in the economy. The existence of a business-level income tax applied only to corporations and not other types of businesses leads to heavier tax liabilities for corporate incomes than non-corporate ones. The current system of allowances for depreciation tends to favor some types of capital investment over others. Those two features combined imply that the after-tax costs of capital facing firms differ greatly depending on both incorporation and the mix of assets. Most of the current proposals to replace the income tax would result in firms' facing similar costs of capital regardless of their organizational form or mix of capital.

**Table 3.**  
**Allocation of Types of Capital by Industry and Sector (As a percentage of capital stock)**

Industry Number and Name	Sector	Share of the Sector's Capital Stock in the Form of					The Sector's Share of Total Capital Stock
		Equipment	Structures	Inventories	Land	Intangibles	
1. Agriculture, Forestry, Fisheries	Corporate	21.6	5.1	8.9	63.7	0.7	0.6
	Noncorporate	5.1	4.7	9.4	80.1	0.7	15.5
2. Mining	Corporate	48.0	38.8	11.3	1.6	0.3	0.4
	Noncorporate	16.7	73.6	7.2	2.2	0.3	0.1
3. Crude Petroleum and Gas	Corporate	4.7	89.0	3.4	2.7	0.3	1.3
	Noncorporate	1.3	89.0	4.6	5.0	0.3	0.6
4. Contract Construction	Corporate	26.5	1.8	49.9	20.3	1.5	1.1
	Noncorporate	21.1	5.4	40.1	31.9	1.5	0.6
5. Food and Tobacco	Corporate	22.4	16.6	35.6	8.9	16.5	1.5
	Noncorporate	10.3	28.7	18.5	26.1	16.5	0
6. Textiles, Apparel, and Leather	Corporate	28.9	15.8	40.8	9.0	5.6	0.5
	Noncorporate	5.1	11.3	67.0	11.0	5.6	0
7. Paper and Printing	Corporate	40.3	18.9	22.4	11.4	7.0	1.0
	Noncorporate	15.8	52.9	8.5	15.9	7.0	0.1
8. Petroleum Refining	Corporate	20.2	34.5	23.4	15.9	5.9	0.9
	Noncorporate	n.a.	n.a.	n.a.	n.a.	n.a.	0
9. Chemicals, Rubber, and Plastics	Corporate	36.3	12.0	23.7	6.3	21.7	2.1
	Noncorporate	24.1	29.8	4.2	20.1	21.7	0
10. Lumber, Furniture, Stone, Clay, and Glass	Corporate	32.0	19.6	31.7	10.2	6.5	0.7
	Noncorporate	21.7	49.7	14.8	7.3	6.5	0.1

(Continued)

## Organizational Form: Corporate or Noncorporate?

Most proposals for comprehensive reform of the tax system would subject all businesses—corporate and noncorporate—to the same business-level tax. That provision would be likely to have significant effects on the mix of corporate and noncorporate production. Under the current federal income tax, marginal tax rates on corporate income average a little over 40 percent,

whereas rates on noncorporate income are only around 20 percent.<sup>1</sup> Even if the replacement tax system involved no tax on businesses, eliminating the current corporate-level tax would represent a change in the tax treatments of corporate and noncorporate income.

1. Jane Gravelle, *The Economic Effects of Taxing Capital Income* (Cambridge, Mass.: MIT Press, 1994), p. 56, Table 3.3.

**Table 3.**  
**Continued**

Industry Number and Name	Sector	Share of the Sector's Capital Stock in the Form of					The Sector's Share of Total Capital Stock
		Equipment	Structures	Inventories	Land	Intangibles	
11. Machinery, Instruments, and Miscellaneous Manufacturing	Corporate	23.2	13.3	39.7	6.1	17.7	7.0
	Noncorporate	11.1	22.5	28.1	20.6	17.7	0.2
12. Transportation Equipment and Ordnance	Corporate	8.8	9.5	29.8	4.5	47.5	1.3
	Noncorporate	5.6	22.6	6.9	17.4	47.5	0
13. Motor Vehicles	Corporate	29.5	10.1	27.5	4.7	28.2	1.0
	Noncorporate	n.a.	n.a.	n.a.	n.a.	n.a.	0
14. Transportation, Communications, and Utilities	Corporate	42.4	49.3	3.8	3.8	0.7	9.0
	Noncorporate	23.8	18.9	0	56.5	0.7	1.2
15. Trade	Corporate	12.3	8.3	62.9	12.3	4.2	10.1
	Noncorporate	5.0	15.1	44.6	31.1	4.2	4.9
16. Finance and Insurance	Corporate	1.4	15.3	0.6	54.3	28.4	0.4
	Noncorporate	1.4	55.8	0	14.4	28.4	2.1
17. Real Estate	Owner-occupied	0	74.7	0	25.3	0	22.8
	Rental	0	74.7	0	25.3	0	9.6
18. Services	Corporate	52.9	29.4	4.1	5.7	7.8	1.4
	Noncorporate	24.4	50.5	1.0	16.2	7.8	1.8
Total Capital Stock	n.a.	12.6	38.2	16.8	27.4	4.9	100.0

SOURCE: Congressional Budget Office based on Don Fullerton and Diane Lim Rogers, *Who Bears the Lifetime Tax Burden?* (Washington, D.C.: Brookings Institution, 1993), pp. 88-89.

NOTE: n.a. = not applicable.

The immediate effect of treating corporate and noncorporate firms identically would be that corporate firms would enjoy a relative reduction in their cost of capital. Therefore, resources would be shifted from industries dominated by noncorporate firms (such as agriculture) to those dominated by corporate firms (such as motor vehicles). Without the separate corporate tax, however, the mix of corporate and noncorporate production would ultimately change, with more firms in all industries choosing to incorporate.

### Allocating Capital by Type

The cost of using capital services differs not only according to whether firms are incorporated (and thus subject to corporate-level taxation) but also according to the type of capital used. The difference arises because capital of one type, such as equipment, can differ greatly from capital of another type, such as inventories, according to factors that include rates of economic depreciation, tax depreciation allowances, investment

**Table 4.**  
**Impact of a Consumption Tax on Effective Tax Rates and Allocation of Capital,**  
**by Sector and Type of Capital**

	Equipment	Structures	Inventories	Land	Intangibles	Percentage of Capital
<b>Benchmark Law</b>						
Corporate ETRC	0.482	0.590	0.555	0.572	0.195	63.2
Noncorporate ETRC	0.285	0.371	0.320	0.359	0.079	36.8
Percentage of capital	12.6	38.2	16.8	27.4	4.9	100.0
<b>Consumption Tax (Long run)</b>						
Corporate ETRC	0.139	0.191	0.139	0.191	0	65.4
Noncorporate ETRC	0.139	0.191	0.139	0.191	0	34.6
Percentage of capital	12.8	37.5	20.5	25.7	3.5	100.0

SOURCE: Congressional Budget Office based on simulations from the Fullerton-Rogers model, using 1993 benchmark.

NOTES: The model probably underpredicts the extent to which unincorporated firms will be encouraged to incorporate after the tax change.

ETRC = effective tax rate on capital.

tax credits, and property taxes. All of those factors affect the gross cost of capital and imply that the effective tax rate on a given type of capital does not simply equal the statutory marginal tax rate.<sup>2</sup> With intangible capital—such as "know how," trademarks, and advertising—many purchases are expensed or receive tax credits. As a result, the effective tax rate on that type of capital, even for corporations, is close to zero or even negative under current law.

The mix of capital by type differs significantly by industry and between corporate and noncorporate sectors (see Table 3 on page 38). The transportation-equipment industry, being a high-tech industry that engages in much research and development, relies more on intangible capital than do other industries, whereas the corporate sectors of the services and mining industries depend the most on equipment.

Switching to a consumption-based tax could increase tax neutrality among different types of capital assets: a consumption tax treats all kinds of expected, normal returns uniformly, subjecting them all to a zero rate. In replacing the income tax only, however, some nonneutralities from other types of taxes (such as local property taxes) might remain.

## Effective Tax Rates on Capital

The Fullerton-Rogers general-equilibrium model described in Appendix C illustrates possible changes in effective tax rates on capital as well as changes in the mix of capital types, distinguishing between corporate and noncorporate sectors and different types of capital (see Table 4). The switch to a consumption-based tax that better integrates personal- and business-level taxation would eliminate the tax advantage of noncorporate production relative to corporate production. It would also reduce the tax advantage of some forms of capital (such as intangibles and equipment) over others. Moreover, effective tax rates on capital would fall quite substantially. Note, however, that even with the switch to a consumption tax, effective tax rates on most forms of capital would still be positive and would not be perfectly identical because of the continued presence of property and other taxes.

2. More specifically, the effective tax rate on capital is the difference between the gross cost (which reflects all the factors mentioned above) and the rate of return after all taxes (a weighted-average net discount rate), divided by either net or gross cost. For analytic representations of the cost of capital, see Don Fullerton and Diane Lim Rogers, *Who Bears the Lifetime Tax Burden?* (Washington, D.C.: Brookings Institution, 1993), pp. 59-61; and the original exposition of cost-of-capital formulas in Robert E. Hall and Dale W. Jorgenson, "Tax Policy and Investment Behavior," *American Economic Review*, vol. 57 (June 1967), pp. 391-414.

The changes in the costs of capital among sectors (corporate and noncorporate) and asset types would induce changes in both the degree of incorporation within each industry and the mix of capital types used by firms. Simulation results from the Fullerton-Rogers model indicate that the increases in capital intensity would be more pronounced for corporate firms because the decreases in their costs of capital would be more significant. At the same time, following the switch to a better-integrated tax system, some noncorporate firms would have an incentive to incorporate. Thus, corporate production would increase more than noncorporate production in all industries. The increase in corporate production is likely to be especially pronounced for industries with a low initial share of corporate production and industries with larger proportions of those types of capital that are taxed heavily under current tax law (inventories, in particular). The Fullerton-Rogers model may underpredict changes in incorporation, however, for reasons described in Box 4.

In all industries, a switch to a more neutral consumption-based tax would also result in a shift in

the mix of capital. Simulations from the general-equilibrium model suggest that firms would reduce their share of intangible capital and increase their share of inventories. The continued presence of property taxes would prevent an increase in the shares of capital stock made up of land and structures. Equipment as a share of total capital would also remain virtually unchanged. Given that substitution among capital types is limited, however, the costs of capital would change more for some industries than others. Moreover, the effects on long-run levels of output would differ according to the amount and mix of capital employed.

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## The Effect of Tax Reform on the Use of Capital and Labor

A switch to a consumption-based tax would reduce the cost of using capital, making it attractive for firms to use more capital-intensive methods. With more capital per worker, productivity and income would rise. Pre-

### Box 4.

#### Using the Fullerton-Rogers Model to Predict Changes in the Allocation of Resources

Throughout this chapter, a computable general-equilibrium model developed by Don Fullerton and Diane Lim Rogers is used to simulate some of the potential effects on different industries caused by replacing the current federal corporate and individual income tax system with a generic, broad-based consumption tax.<sup>1</sup> The results illustrate only the general effects of the proposals described in Chapter 2, in that the simulated replacement tax represents a fully comprehensive version of a consumption-based tax, with no deductions or exemptions and no relief for owners of existing assets during the transition. It also simplifies the specification of the rate structure by using a single marginal and average tax rate—that is, it is a "proportional" tax.

The Fullerton-Rogers model captures the shifts in resources from eliminating capital-income taxation, integrating personal and corporate taxes, and achieving greater neutrality among types of capital. It also includes the effects from redistributing income among different types of households (young and old, rich and poor). The model does not, however, account for the changes in a firm's financial decisions, nor does it acknowledge the costs of adjusting the capital stock. The model uses only one net rate of return from capital because it assumes that capital is perfectly (costlessly) mobile across sectors and industries and is also perfectly convertible into any form of asset. In addition, the model may underpredict changes in incorporation because it assumes consumers view corporate and noncorporate products as imperfect substitutes and does not account for the advantage corporations have in their limited liability. Because one general-equilibrium model cannot answer all questions, results from other general-equilibrium models are discussed in this chapter as well.

1. The model used is based on the life-cycle general-equilibrium model described in Don Fullerton and Diane Lim Rogers, *Who Bears the Lifetime Tax Burden?* (Washington, D.C.: Brookings Institution, 1993). An abbreviated description of the model can be found in Appendix C of this study. Note that the representation of a progressive income tax in the model does not capture all the features of the current income tax. In addition, the simulations remove all U.S. corporate and personal income taxes, not just those at the federal level.

dictably, some industries would expand proportionately more than others. For example, the real estate industry would expand the least, assuming that housing lost its current tax-favored status.

## What Effects Will Lower Capital Costs Have?

Many factors of supply and demand determine the results of switching to a consumption-based tax. One factor usually dominates: the switch reduces the cost of using capital in all sectors other than owner-occupied

housing, but does not reduce it uniformly. The cost of capital falls proportionately more for corporations because their effective tax rates were originally higher. Also, total costs fall proportionately more for capital-intensive firms because capital costs represent a bigger share of their total costs. Consequently, although firms in all industries other than real estate expand capital and output, corporate and capital-intensive firms tend to expand proportionately more (see Table 5).

However, capital costs are not the entire story: in the long run, other factors take on increased importance. For instance, the technology of some industries

**Table 5.**  
**Changes in Industries' Output Levels and Capital Intensity from a Switch to a Proportional Consumption Tax**

Industry Number and Name	Benchmark Capital-to-Labor Ratio	Percentage Change in Long-Run Output	Percentage Change in Long-Run Capital-to-Labor Ratio
1. Agriculture, Forestry, Fisheries	1.39	4.2	4.7
2. Mining	0.16	4.5	29.0
3. Crude Petroleum and Gas	0.74	5.2	33.0
4. Contract Construction	0.04	2.5	28.0
5. Food and Tobacco	0.12	4.6	29.7
6. Textiles, Apparel, and Leather	0.06	5.8	43.3
7. Paper and Printing	0.06	3.5	40.6
8. Petroleum Refining	0.34	4.8	39.9
9. Chemicals, Rubber, and Plastics	0.11	3.9	37.8
10. Lumber, Furniture, Stone, Clay, and Glass	0.09	3.8	41.2
11. Machinery, Instruments, and Miscellaneous Manufacturing	0.12	4.3	30.6
12. Transportation Equipment and Ordnance	0.13	1.6	23.2
13. Motor Vehicles	0.12	5.0	34.5
14. Transportation, Communications, and Utilities	0.18	5.0	35.8
15. Trade	0.12	4.5	30.5
16. Finance and Insurance	0.04	1.8	6.3
17. Real Estate	4.64	0.8	-7.5
18. Services	0.02	3.7	17.2
Average <sup>a</sup>	0.49	3.8	25.6

SOURCE: Congressional Budget Office based on simulations from the Fullerton-Rogers model, using 1993 benchmark.

NOTE: Capital-to-labor ratios were derived from the Bureau of Labor Statistics' Survey of Current Business, as described in Don Fullerton and Diane Lim Rogers, *Who Bears the Lifetime Tax Burden?* (Washington, D.C.: Brookings Institution, 1993), pp. 76-87. The measure of output includes intermediate products. Hence, the reported changes in industry and average output depend on the level and detail of disaggregation. Moreover, for given changes in labor supply and the capital-to-labor ratio, the percentage change in output including intermediate products will be smaller than the corresponding change in value-added output.

a. Weighted by initial levels of output.

will enable them to substitute capital for labor more readily than the average industry can. That shift will give them a relative cost advantage over other industries whose technology is not so flexible. Furthermore, consumers in the model buy proportionately more of certain goods—such as clothing—as their discretionary income grows, and they buy more from any industry whose price of output falls. Thus, even though textile production is labor intensive, its output and capital intensity rise proportionately more than any other industry. The textile industry can substitute capital for labor more readily than most industries, and consumers tend to spend a larger share of income on clothing as their income rises.

Nevertheless, shares of output and rankings of capital intensity change little in the model—to cite just one instance, textiles remain a small, labor-intensive industry. Moreover, the results could be quite different in an open-economy model. Historically, for instance, as increased capital intensity has driven up the economy-wide wage, the domestic share of textiles has shrunk as producers seeking lower labor costs have moved their factories abroad.

Although capital costs fall in most industries, they rise in relative terms in real estate because the switch eliminates the tax advantage of owner-occupied housing. Thus, even though real estate is the most capital-intensive industry, its capital intensity falls and its output rises the least.

In the model used for this study, firms can adjust their stock of capital without cost in response to the tax change. Hence, firms with high initial investment have absolutely no advantage over firms with low initial investment. In general, however, the costs of adjustment may be a factor. If so, firms that were already investing a lot under the current tax system would be better able to increase their capital investment and output in response to the reduced costs of capital under new law.

## Capital Intensity and International Trade

The effects of reduced capital-income taxation among industries are likely to change the composition of international trade in the long run. The United States will

be more likely to import labor-intensive products (such as clothing) and export capital-intensive products (such as petroleum). Thus, the composition of domestic consumption need not change as much as the composition of domestic production. By the same token, however, the increased supply of capital-intensive products would reduce their world price, shifting the terms of trade against the United States and decreasing the gains accrued from switching the tax base. Such a shift would decrease—but not eliminate—the United States' gains from trade.

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## The Effect of Tax Reform on Financial Decisions

Replacing the current income tax system with a better-integrated, consumption-based tax would also remove the present incentives that favor financing investment with debt rather than equity and that favor retaining earnings rather than paying dividends.

### Debt Versus Equity

Most of the major proposals for comprehensive tax reform integrate corporate and personal taxes. They are structured so that the returns from all types of capital investments are taxed at most only once. Because most proposals use a consumption base, however, those marginal investments are taxed only once at a zero rate on the expected normal return. In moving from the current system to an integrated consumption-based tax, the shift is from the corporate- and personal-level taxation of equity income and the personal-level taxation of debt (interest) income to no taxation of the (expected normal) return from investments financed with either equity or debt. However, a level playing field between debt and equity is likely to raise relative costs for firms with high debt-to-equity ratios.

Debt as a share of capital stock differs widely by industry (see Table 6). Holding other factors constant, those industries with high shares of debt are the most likely to experience relative increases in the cost of capital from a switch to a better-integrated, more neutral tax system. Given the more neutral treatment of debt

**Table 6.**  
**Debt as a Percentage of Capital Stock**

Industry Number and Name	Debt Share
1. Agriculture, Forestry, Fisheries	15.9
2. Mining	25.8
3. Crude Petroleum and Gas	17.3
4. Contract Construction	8.0
5. Food and Tobacco	25.3
6. Textiles, Apparel, and Leather	43.5
7. Paper and Printing	26.8
8. Petroleum Refining	19.4
9. Chemicals, Rubber, and Plastics	16.9
10. Lumber, Furniture, Stone, Clay, and Glass	27.3
11. Machinery, Instruments, and Miscellaneous Manufacturing	16.0
12. Transportation Equipment and Ordnance	43.3
13. Motor Vehicles	25.5
14. Transportation, Communications, and Utilities	49.7
15. Trade	31.3
16. Finance and Insurance	60.5
17. Real Estate (Rental housing)	78.7
18. Services	50.3

SOURCE: Yolanda Kodrzycki Henderson, "A General Equilibrium Evaluation of Corporate Income Tax Reform," *Economic Inquiry*, vol. 25 (October 1987), p. 576. Debt shares are based on balance-sheet data from Standard & Poor's COMPUSTAT tape, described in Don Fullerton and Roger H. Gordon, "A Reexamination of Tax Distortions in General Equilibrium Models," in Martin Feldstein, ed., *Behavioral Simulation Methods in Tax Policy Analysis* (Chicago: University of Chicago Press, 1983), p. 381.

versus equity, firms would have an incentive to increase their reliance on equity.

## Retained Earnings Versus Dividends

Although the current system favors retaining corporate profits over paying dividends, a consumption-based tax would no longer favor such retention. Under a consumption-based system, people pay tax when they consume income, regardless of whether a firm retains it or pays it. The general-equilibrium model used for the earlier simulations described in this chapter, however, does not allow one to consider the effects of changes in

corporate finance, since it assumes that the mix of financing (debt versus equity, and retentions versus payouts) is fixed.

Other versions of general-equilibrium models, however, have explored the effects of more neutral taxation on the financing decisions of businesses.<sup>3</sup> They reveal a variety of potential changes in financial structure depending on how the financial decisions of firms are assumed to be made and the specific nature of the policy change. Part of the problem in predicting the effects of tax reform on financial decisions is that no consensus exists on the appropriate economic model of how firms make such decisions.

The improved coordination of business- and personal-level taxes will lead directly to changes in the costs of capital and supplies of output for all industries. How resources are allocated among industries will also depend—to perhaps a lesser extent—on any effects from the redistribution of income. Greater neutrality in business taxation involves relative gains to some types of individuals over others, and that change may affect the demand for some goods over others. Unfortunately, one would find little consensus in the economics profession on who bears the burden of corporate taxes.<sup>4</sup>

## The Effect of Tax Reform on Other Sectors of the Economy

Most of the current proposals for comprehensive tax reform would not only replace the current income tax with a consumption-based tax but also add to the size of the tax base by eliminating many existing preferences. Such broadening of the base would permit lower overall tax rates, countering the higher rates that would

3. See, for example, Don Fullerton and Roger H. Gordon, "A Reexamination of Tax Distortions in General Equilibrium Models," in Martin Feldstein, ed., *Behavioral Simulation Methods in Tax Policy Analysis* (Chicago: University of Chicago Press, 1983), pp. 369-426; and in the same volume, Joel Slemrod, "A General Equilibrium Model of Taxation with Endogenous Financial Behavior," pp. 427-458.

4. Although the general-equilibrium model used in this chapter incorporates effects on consumer demand, the incidence of the corporate income tax is effectively imposed based on the assumed forms of utility and production functions and does not reflect any empirical consensus. The literature on the distributional effects of the corporate tax is summarized in Congressional Budget Office, *The Incidence of the Corporate Income Tax*, CBO Paper (March 1996).

otherwise be required for revenue neutrality in the shift from an income base to a consumption base. Thus, many of the proposed consumption-based taxes could collect the same amount of revenue as the current system, while imposing marginal and average tax rates that were in many cases lower than those under current law.

Because existing tax preferences are targeted toward specific sources or uses of income, any removal or reduction of those preferences would cause resources to be reallocated within the economy. As with aspects of the proposals discussed earlier, removing preferences could redistribute income among households. If people in various income groups have significant differences in how they use their income, any redistribution of income could have secondary effects on how resources are allocated to industries.

## Owner-Occupied Housing

Many of the tax proposals eliminate all or nearly all itemized deductions. One of the most visible of those is, of course, the home mortgage interest deduction. But under an income tax, the mortgage interest deduction on its own does not constitute an overall tax preference toward owner-occupied housing. Current law departs from a comprehensive income tax treatment of such housing. One need only consider that the implicit rental services from owner-occupied housing, and nearly all of the capital gains from it, go untaxed; in contrast, the rental sector must pay tax on rental income and capital gains. Instead of the current system, a comprehensive income tax would allow mortgage interest expenses to be deductible only if the flow of income resulting from such investment was taxed when earned.

Most of the proposals for fundamental tax reform eliminate some of those preferences for owner-occupied housing to varying degrees. For example, the Unlimited Savings Allowance tax eliminates the property tax deduction but retains a deduction for mortgage interest similar to that under current law. Borrowing to purchase a home is not counted against net saving and yet capital gains are included. Consequently, the USA tax retains preferential treatment for owner-occupied housing that is debt financed, but it simultaneously removes the preference for equity-financed housing.

In contrast, the Arney-Shelby flat tax removes both the mortgage interest deduction and the property tax deduction. At the same time, it gives no special treatment to purchasing and consuming owner-occupied housing services relative to other forms of consumption. Removing the various preferences for owner-occupancy is likely to reduce the demand for such housing over rental housing, other forms of investment, and other forms of consumption, as long as housing demand responds to changes in price.

Simulation results from the Fullerton-Rogers model indicate that the owner-occupied housing sector benefits greatly from the current income tax system. A move to a proportional consumption-based tax would substantially raise the cost of capital for owner-occupied housing compared with rental housing. Although the cost of capital rises by about 2 percent for the owner-occupied housing sector in the long run, it falls by nearly 50 percent for rental housing. In the short run, that relative change causes some owner-occupied housing to be converted to rental housing. Moreover, depreciated owner-occupied housing is not replaced, and the total supply of housing falls as investment is diverted to other industries. In the long run, however, the simulations suggest that improved incentives for rental housing and greater demand arising from higher incomes lead to an increase in the overall quantity of housing.

Removing tax preferences for owner-occupied housing is apt to result in some drop in the market value of such housing. For example, Richard K. Green, Patric H. Hendershott, and Dennis R. Capozza assume a fixed supply of owner-occupied housing and predict that in areas with high property taxes, removing all tax preferences toward such housing would bring about a 25 percent drop in housing value, even after incorporating a drop in the market interest rate.<sup>5</sup>

A study by economists at DRI/McGraw-Hill emphasizes the short-run effects of simultaneously eliminating the deduction for mortgage interest and enacting a consumption tax. Also assuming a fixed supply of housing, that study predicts that housing prices would fall substantially in the short term (perhaps more than

5. Richard K. Green, Patric H. Hendershott, and Dennis R. Capozza, "Taxes, Mortgage Borrowing, and Residential Land Prices," in Henry J. Aaron and William G. Gale, eds., *Economic Effects of Fundamental Tax Reform* (Washington, D.C.: Brookings Institution, 1996).

20 percent), even with a drop in mortgage interest rates.<sup>6</sup>

Those predictions of 20 percent to 25 percent declines in housing value, however, are probably overstatements. First, even in the very short run, the supply of housing is not completely fixed. Even a small drop in supply could significantly mitigate the fall in price. Second, the business sector cannot absorb new investments that otherwise would have gone into housing as rapidly as theory assumes. Most of the theoretically calculated drop in housing prices occurs because the switch in tax base raises the demand for business assets and diverts capital from housing. But adjustment costs would retard the pace at which business investment could expand, thereby helping to stem the flow of capital from housing and prop up its price. For such reasons, housing prices do not historically exhibit swings nearly as wide as their theoretically calculated values, which have varied considerably with changes in tax law and other factors.

## Nonprofit Institutions

The preferences in current law that most affect nonprofit institutions are deductibility of contributions from individuals and corporations, exemption from taxation, and eligibility to use the proceeds from tax-exempt bonds to finance capital investments. Current proposals for tax reform would affect all three of those preferences.

Removing deductions for charitable contributions could hurt charitable giving by raising the price of giving for taxpayers who currently itemize. The USA tax would retain the deduction for charitable contributions, but the Arme-y-Shelby flat tax and most sales or value-added taxes would eliminate it. Economists Charles T. Clotfelter and Richard L. Schmalbeck estimate that proposals that eliminate the charitable deduction would lower annual contributions on the order of 10 percent to 20 percent.<sup>7</sup>

6. Roger Brinner, Mark Lasky, and David Wyss, "Market Impacts of Flat Tax Legislation," in DRI/McGraw-Hill, *Review of the U.S. Economy* (Lexington, Mass.: DRI/McGraw-Hill, June 1995), pp. 29-37.

7. Charles T. Clotfelter and Richard L. Schmalbeck, "The Impact of Fundamental Tax Reform on Nonprofit Organizations," in Aaron and Gale, eds., *Economic Effects of Fundamental Tax Reform*, pp. 211-246.

Nonprofit and charitable institutions might also be hard hit if their incomes were made taxable under the new tax system—or if they were to lose the ability to finance their investments with tax-exempt bonds. For example, the Gibbons value-added tax would apply to the sales of goods and services of all nonprofit institutions. The Arme-y-Shelby flat tax and the USA tax would impose business taxes on those nonprofit institutions that do not qualify as charitable institutions.<sup>8</sup>

A pure, neutral consumption base would include the consumption of government- and nonprofit-provided goods and services. Nonetheless, because governments and nonprofit organizations usually provide goods or services on a free-of-charge or subsidized basis, measurement problems would occur. The same measurement problems arise in taxing implicit income that the government provides to citizens under the current system. But the bias would be magnified under indirect consumption taxes if the price that governments pay for goods does not fully reflect the tax. Many of the tax proposals, including the USA tax, exempt at least some types of activities of governments and nonprofits, favoring that type of consumption over other forms of consumption.<sup>9</sup>

The proposals for tax restructuring differ in how they treat tax-exempt bonds. By eliminating the taxation of interest and other capital income, proposals for a consumption-based tax would wipe out the distinction between taxable and tax-exempt bonds, thus raising the cost of financing for nonprofits and state and local governments. A possible drop in overall interest rates would to some degree soften that effect. In addition, the Gibbons VAT proposal would include interest earnings from tax-exempt bonds in net income to determine assessments on taxpayers with income above \$75,000.

8. "Charitable" institutions, as described under section 501(c)(3) of the Internal Revenue Code, are those that are organized for the benefit of public rather than private interests. Exempt status under current tax law is enjoyed by many organizations that do not, however, meet the criteria of section 501(c)(3). Under the less stringent section 501(c)(4), exempt status is granted to organizations that "promote social welfare," even if the net earnings of the organization might benefit a private shareholder or individual. See Congressional Budget Office, *The Potential Effects of Tax Restructuring on Tax-Exempt and Other Nonprofit Institutions*, CBO Paper (February 1997).

9. However, recall that many proposals also eliminate the state and local tax deduction, which would increase the relative price of government-provided goods and services.

Certain proposals would retain some preferences for financing that is now tax-exempt. To mention one example, the USA tax would retain a preference for tax-exempt bonds by excluding the interest from such bonds from the cash income of individuals, while permitting the purchase of bonds to qualify as tax-exempt saving.

## The Underground Economy

Some proponents of consumption-based taxation like to claim that the new tax base would include some of the economy that now escapes taxation. Yet the switch in fact would probably not do much to reduce the size of the underground economy or increase the revenue yield. True, a direct consumption tax, such as the flat tax, could shave the incentives for many upper-income households to avoid taxes by broadening the base and flattening the rates. Yet adopting a broader and flatter income-based tax could deliver the same result.

Incentives to avoid taxes would not substantially change for business activities. For example, under a retail sales tax, a plumber working in the underground economy would have to pay tax on any unreported income when he or she used it to purchase legal goods (quite unlike under the current income tax, in which the unreported income completely escapes taxation). However, the plumber's customers would still avoid paying taxes by hiring the underground plumber instead of a legal plumber. An imbalance would continue to exist in the way taxes treat unreported and reported economic activities. Similarly, the incentive to hide income or consumption would remain.

Thus, the consumption base would probably do nothing to shrink the size of the underground economy. In fact, ironically, under a national retail sales tax, the incentive to sell and purchase in the underground economy could well rise, if only because the tax rate would be high and would be collected only once, at the point of sale.

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## Conclusion

Moving to a comprehensive consumption tax would in the short run encourage investment and expand output for firms with capital-intensive technologies. Also in the short run, improving the integration of personal- and business-level taxes would benefit firms that rely on equity financing over those that issue debt. In the long run, the entire economy's resources would be re-allocated more toward capital-intensive production. In addition, they would shift toward previously less-favored types of capital assets. More production would come from firms organized as corporations. Industries that would probably experience the largest increases in output in the long run are those that currently have, or can adopt, capital-intensive production technologies. Industries that currently receive tax preferences, such as the owner-occupied housing industry, would suffer reductions in their output. As a result, even if the total of national income did not significantly increase, the allocation of resources within the economy would change substantially.



# Effects on Economic Efficiency

Changes in saving and investment, output, and the allocation of resources are not ends in themselves, but rather avenues by which society as a whole may become better off. What then do the overall effects of comprehensive tax reform imply for overall social well-being? Specifically, will such a change increase economic efficiency—that is, economic well-being or "utility" over all generations?

In the current tax debate, some economists have argued that replacing the existing income tax system with a consumption-based tax would improve efficiency, even if attempts were made to keep the same distribution of tax burdens that exists under the current system. Other policymakers propose consumption-based taxes that clearly redistribute the tax burden. They maintain that the larger improvements in efficiency and other economic variables make such redistribution worthwhile.

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## Economic Efficiency and Tax Policy

Social well-being is not necessarily positively correlated with macroeconomic effects. Even though national income may rise, some households will inevitably suffer losses in their lifetime income. Moreover, well-being is not simply a function of income. Increased labor supply allows individuals to earn more income but leaves them with less time for leisure, which reduces economic well-being.

Tax reform can also affect economic well-being by changing the degree to which taxes influence decisions. When taxes change the way people make decisions, the losses in economic well-being do not simply reflect the tax dollars collected. Taxes affect economic choices by changing the prices of inputs and goods. Households and firms respond to changes in prices by purchasing less of the more heavily taxed goods and inputs. That change in behavior can result in a less desirable allocation of society's economic resources, thereby reducing economic well-being. The additional loss in well-being, over and above the tax revenues collected, is called the "excess burden" of the tax.

Excess burden is a measure of the inefficiency of the tax and means that it costs more than \$1.00 of private output to finance \$1.00 of public goods and services. That is why some economists refer to the tax-and-transfer system as a "leaky bucket," with leakage that represents the excess burden of the various programs.

Taxes that do not alter economic choices—and hence have no excess burden—are feasible, but they are also typically considered undesirable for reasons of equity. For example, a "head tax" (in which each individual pays the same dollar amount) is an example of a lump-sum tax; people cannot avoid it by changing their behavior. Relative prices do not change, and therefore no new incentive develops for people to substitute lightly taxed activities for those that are heavily taxed. Because the burden of the head tax would be precisely equal to the tax dollars collected, the tax carries no excess burden.

Another example of a lump-sum tax is a "retroactive tax," or one on past economic activity. Because people cannot change their past actions, such a tax cannot be avoided. But both a head tax and a tax on past economic activity are typically considered unfair—the head tax because it is not related to the ability to pay taxes, and the retroactive tax because past economic decisions were made under the belief that the activities either would not be taxed or would be taxed at a lower rate.

Taxes that meet the standard of reflecting people's abilities to pay must link tax burdens to some form of measurable (and current) economic capacity, such as income, wealth, or consumption. But once that observable economic behavior is taxed, people can avoid the tax by choosing to reduce such behavior, and the burden of the tax will end up exceeding the tax revenue collected. Hence, some inefficiency is necessary in order to collect taxes that are related to the ability to pay. That effect is true for both income and consumption taxes. All that policymakers can hope for is to find tax structures that minimize inefficiency.

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## Would a Switch to a Consumption-Based Tax Enhance Economic Efficiency?

Because it would tax consumption instead of income, a broad consumption-based tax might be more efficient than the current income tax system. As discussed in Chapter 1, an income tax affects two major types of household decisions. First, by taxing income from labor, it reduces the price of current leisure relative to current consumption. It thereby induces households to cut back labor supply (and consumption) and increase leisure. Second, by taxing capital income, it reduces the price of current consumption compared with future consumption, thus encouraging households to consume more now and save less.

Although an income tax affects both of those decisions, a consumption-based tax only affects the first. A consumption tax does not influence the decision to save because the expected normal return to capital is effectively untaxed. Theoretically, however, a consumption-based tax is not necessarily more efficient than an in-

come tax. Indeed, the remaining effects on decisions about whether and how much to work could be larger than under an income tax.

However, most of the current proposals to replace the existing income tax do not just change the basis of taxation to consumption; they also make the tax a broader and more neutral one. They propose lower marginal tax rates and fewer activities subject to preferential tax treatment. As a result, they remove some or all of the excess burden of other economic choices, such as the way businesses are organized, what types of investments are made, and what kinds of goods are consumed.

Thus, by promoting greater neutrality, comprehensive tax reform is more likely to increase efficiency. From a policy perspective, that effect raises a number of issues. For example, to evaluate alternative reforms, such as a flatter, more comprehensive income tax or a more progressive consumption tax, one needs to know how much the change from an income base to a consumption base contributes to any economic gains, as opposed to the contribution from more neutral taxes.

## Moving Toward a Consumption Base

Because a consumption-based tax does not include the expected returns from additional investment, a single-rate consumption-based tax does not affect the choice between present and future consumption.<sup>1</sup> A consumption tax is clearly more neutral as to the timing of consumption than is an income tax. However, both taxes affect the choice of whether to work within any period of time. Both types of taxes reduce the returns from work: an income tax taxes earnings directly, whereas a consumption tax does so indirectly by reducing the purchasing power of those earnings.

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1. If the consumption-based tax has graduated marginal tax rates, however, there may still be an intertemporal distortion. See Robert A. Androkovich, Michael J. Daly, and Fadle M. Naqib, "The Impact of a Hybrid Personal Tax System on Capital Accumulation and Economic Welfare," *European Economic Review*, vol. 36 (1992), pp. 801-813. The switch to a consumption-based tax may or may not increase saving. But even if the total effect on saving is zero, the switch to a consumption base will still reduce (or eliminate) the effect of the tax system on the price of present relative to future consumption (the substitution effect), and it is this effect that causes excess burden.

In fact, unless the tax reform includes efforts to broaden the base, the influence of a consumption tax on decisions about work might be larger than under the income tax because of a higher effective tax rate on earnings. Whether consumption-based taxes are more efficient than income-based taxes thus depends on how sensitive consumers are in their choice between present and future consumption, when compared with their choice between work and leisure.

Consider another reason why the consumption base might be a relatively efficient one—namely, because the transition from an income tax to a consumption tax could impose a one-time tax on existing wealth. If the United States switched "cold turkey" from the current income tax to something like a national retail sales tax, people who had accumulated savings under the income tax would face an unanticipated increase in their tax burden that would be difficult to avoid. That one-time tax on wealth would be efficient because it would not alter economic choices.<sup>2</sup>

Collecting some revenue from a lump-sum source means that less revenue needs to come from other sources of taxation (such as taxes on income from labor) that can influence economic behavior. The issue is significant: if proposals for comprehensive tax reform attempt to relieve the burden on holders of existing wealth, then a switch to a consumption-based tax really becomes more like a switch to a tax based on wages. As will be shown later, switching to a tax based on wages is less efficient than switching to a consumption tax. A wage tax lacks the lump-sum component. As a result, it requires a greater tax rate on income earned from labor and so has a greater effect on the labor-or-leisure choice.

## Reduced Tax Rates and Greater Neutrality

Current proposals to replace the existing income tax typically "flatten" the tax system in several ways.

2. Alternatively, if people did not believe that the tax was just a one-time tax (that is, if they believed that existing capital would be taxed again in the future), then the tax on existing wealth could affect current saving and investment, even if it indeed turned out to be a one-time tax.

First, they broaden the tax base by removing many tax preferences, thereby allowing overall tax rates to be reduced. Lower marginal tax rates across the board imply smaller differences in relative prices between taxed and untaxed activities.

Second, the proposals reduce differences in effective tax rates. They level the playing field among types of assets and across sectors and industries. Equally important, they also integrate business-level and personal-level taxes. With fewer distinctions among the ways that various sources or uses of income are taxed, individuals and businesses will have less incentive to change their behavior on the basis of tax consequences alone, and the excess burden of the tax system will fall.

Finally, many of the proposals flatten the tax rate schedule—that is, they reduce the graduation in marginal rates so that rates for different income levels are more similar. That flattening of the schedule permits a reduction in the top marginal tax rate and enhanced efficiency, but it does so at the cost of less redistribution of income.

Thus, the gains in efficiency from switching to a flatter consumption-based tax are not just the result of the consumption base. If it turns out that the "flatness" of a proposal for comprehensive tax reform would do a lot to enhance efficiency, then a switch to a flatter version of an income-based tax could have similar potential. Such potential would be especially likely if the advantage that the consumption base holds in improving efficiency is relatively small.

## How Market Failures Affect the Efficiency of Taxes

Greater neutrality in tax rates, however, does not always enhance efficiency. Some of the tax preferences within the current tax system were put in place to encourage activities that have spillover benefits (or "positive externalities") to the rest of society. For example, charitable contributions may benefit people other than those who contribute or receive such donations. The research and experimentation that certain businesses undertake can benefit all of society by advancing tech-

nology in ways that all firms, not just those who did the work, can exploit.

With such positive spillover effects, tax preferences help reduce private net costs so that individuals and firms will consume or produce at levels that increase social welfare. Without tax preferences for such activities, the market left on its own would fail to produce efficient levels of those activities. Thus, the base-broadening aspects of proposals to replace the income tax could lead to less efficient levels of those activities that produce social benefits in excess of private benefits.

Education, or the accumulation of human capital, may also generate positive spillover benefits to all of society. If so, then increasing the taxes on income from labor under a consumption tax might reduce the tax system's efficiency—even beyond the negative effects on labor participation and hours worked—and make consumption taxes relatively less efficient than income taxes.

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## Estimating the Gains in Efficiency from a Proportional Consumption-Based Tax

This study uses the Fullerton-Rogers general-equilibrium model (discussed in greater detail in Appendix C) to estimate the effects of tax reform on economic efficiency.

The model's consumption side is well-suited for analyzing the effects of consumption taxes on efficiency because it specifies two parameters that describe the sensitivity of the timing of consumption and labor supply to changes in relative prices. The "intertemporal elasticity of substitution" measures the individual's response to changes in the price of present consumption compared with future consumption, all else held constant. The "leisure-consumption elasticity of substitution" measures the individual's response to a change in the price of leisure relative to consumption (that is, the

after-tax wage rate), all else held constant.<sup>3</sup> A switch from income-based taxation to consumption-based taxation removes the effect that taxing capital income has on the timing of consumption. Yet, for the same total revenues, the switch to a consumption base exacerbates the effect on labor supply because the smaller tax base requires a higher tax rate. The gains in efficiency from the base change alone are therefore positively related to the sensitivity of the timing of consumption (as measured by the intertemporal elasticity). Yet the gains are inversely related to the sensitivity of the choice between leisure and consumption (as measured by the leisure-consumption elasticity). As a result, a relatively low intertemporal elasticity could actually mean a loss in efficiency in switching from an income-based tax to a consumption-based tax.

Gains in efficiency are more likely to be positive, however, when the switch is from a progressive income tax to a broader and proportional consumption-based tax—in which the new tax base is more comprehensive and tax rates are lower.<sup>4</sup> In a move to a flatter consumption-based tax, the relationship between the size of the gain in efficiency and the two types of substitution elasticities differs. The gains in efficiency from a single lower tax rate—that is, from the greater neutrality in taxation—are positively related to both of the substitution elasticities. (The larger those sensitivities, the larger the gain from moving to a more neutral tax system.) But the gains in efficiency from the shift from an income base to a consumption base are positively related to the intertemporal elasticity and negatively related to the leisure-consumption elasticity.

One could therefore predict that the gains in efficiency that stem from combining base change with flatness will be more positively correlated with the intertemporal elasticity than with the leisure-consumption elasticity. The relationship between the leisure-consumption elasticity and the sign of the gain in efficiency

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3. More specifically, these elasticities are defined as the percentage changes in quantity ratios divided by percentage changes in price ratios, with utility held constant.

4. The proportional consumption tax is a very flat version of a consumption-based tax, with a single marginal tax rate and no exemption level. Such a tax is less progressive than proposals such as the Armey-Shelby flat tax, which has exemption levels, or the USA tax, which has both exemption levels and graduated rates. This proportional version does, however, have an advantage in terms of economic efficiency because the revenue-neutral marginal tax rate is lower—in short, it is an example of the common trade-off between efficiency and equity.

is in fact theoretically ambiguous. The higher that elasticity, the less efficient is a switch to a consumption base. At the same time, a switch to a more neutral, or flatter, tax system becomes more efficient.

Hence, although most economists believe that a movement to a comprehensive, proportional consumption-based tax would lead to an increase in efficiency, the size of the gain remains in dispute. The magnitude of the estimated gain in efficiency hinges crucially on what economists assume, either explicitly or implicitly, about the magnitudes of the two critical elasticities.

Simulating the replacement of all current personal and corporate income taxes with an equal-yield single-rate consumption tax (in this case modeled as a value-added tax) can be viewed as a "best-case" scenario for potential gains in economic efficiency, especially if a relatively high intertemporal elasticity is assumed. The first set of simulation results assumes values of 0.30 for both the intertemporal and leisure-consumption elasticities.<sup>5</sup> Under such assumptions, the replacement tax rate on consumption needed to maintain equal revenues starts out at about 16 percent, but then declines in the long run (or "steady state") to 14 percent as a result of the growth in output (see Table 7). Effective tax rates on corporate and noncorporate capital decline sharply, and the corporate/noncorporate difference is reduced. Remaining differences in effective tax rates by sector reflect the continued existence of property taxes, which place higher tax rates on structures and land than on other types of capital.<sup>6</sup>

One measure of the gain in efficiency is the change in economic well-being over all generations compared with lifetime income over all generations (see Box 5). The switch to the proportional consumption tax redistributes income among generations; not everyone is better off. A gain in economic efficiency only indicates

5. The intertemporal elasticity applies to discretionary (above-necessity) consumption only. See Appendix C for more detail. The implied elasticity for total consumption is about 0.26.

6. The steady state refers to a long-run period of equilibrium during which relative prices have stabilized. Results from the initial period refer to the first period of equilibrium following the tax change (within the first year of the tax change).

**Table 7.**  
**Tax Rates Associated with a Switch to a Proportional Consumption Tax (In percent)**

Economic Variable	Income Tax (1993 Benchmark)	Proportional Consumption Tax (Steady state) <sup>a</sup>
Replacement Tax Rate	n.a.	0.138
Effective Tax Rates		
Corporate	0.529	0.152
Noncorporate	0.349	0.180
Owner-occupied housing	0.273	0.278

SOURCE: Congressional Budget Office.

NOTE: n.a. = not applicable.

a. The Fullerton-Rogers model is used to simulate the replacement of all corporate and personal income taxes with a flat-rate value-added tax. The numbers shown here are based on elasticities of 0.30 for the substitution of consumption across periods ("intertemporal") and with leisure ("leisure-consumption").

that the gains to the winners outweigh the losses to the losers. As a result, the winners could compensate losers and make everyone better off.

The switch to a proportional consumption-based tax produces fairly significant increases in saving, capital-to-labor ratios, and labor productivity. But the effect on economic efficiency is actually rather modest (0.45 percent of lifetime income and 3.1 percent of revenue).<sup>7</sup> Moreover, that modest gain comes under generous assumptions about how responsive economic behavior is.

7. To translate that gain in efficiency into dollars, for example, a person in the middle (50th percentile) of the lifetime income distribution has a present value of lifetime income of around \$800,000. Consequently, a 1 percent gain in efficiency equals a once-in-a-lifetime payment of \$8,000 to such a person. See Don Fullerton and Diane Lim Rogers, *Who Bears the Lifetime Tax Burden?* (Washington, D.C.: Brookings Institution, 1993), p. 114.

**Box 5.**  
**Calculating Gains in Efficiency**

Gains in efficiency are approximated in the following manner. The lifetime "equivalent variation"—a dollar measure of the change in economic well-being, or utility—is computed for each generation. Then, to calculate the overall gains in efficiency as a percentage of lifetime income, the present value of equivalent variation over all generations is divided by the present value of lifetime income over all generations.

The concept of present value allows one to compare and add dollar flows that occur at different points in time. It is based on the notion that a dollar received now is worth more than a dollar in the future because of market interest rates, the subjective valuation of time, or the social weighting of different generations. Dollars in the future are therefore "discounted" before being compared with present dollars. Other things being equal, calculating the present value gives less absolute weight

to a future dollar if either the discount rate is higher or the payment of the dollar is later.

Calculating the present value, however, yields only an approximation of the compensation principle. Other models explicitly calculate the compensation from winners to losers in determining gains in efficiency.<sup>1</sup> Moreover, the gains in efficiency calculated in this chapter are sensitive to the choice of 4 percent as the discount rate (chosen to reflect a real market interest rate net of all taxes). A lower rate would cause utility gains to younger generations to receive greater weight, leading to a larger calculation of the gains in efficiency.

1. See, for example, the discussion about the "Lump Sum Redistribution Authority" in Alan J. Auerbach and Laurence J. Kotlikoff, *Dynamic Fiscal Policy* (Cambridge, England: Cambridge University Press, 1987), pp. 62-64.

When lower values of the intertemporal and leisure-consumption elasticities are used, the size of the gain in efficiency drops substantially. In fact, when the intertemporal and leisure-consumption elasticities are reduced to 0.15, efficiency actually falls slightly (by 0.05 percent of lifetime income). Even with very high elasticities of 0.50, the gain in efficiency is less than 1 percent of lifetime income. Considering the econometric evidence on intertemporal and labor-supply responses, William C. Randolph and Diane Lim Rogers conclude that the likelihood of any gain larger than 1 percent of lifetime income is less than 10 percent.<sup>8</sup>

Moreover, the size of the gain in efficiency is less sensitive to the value of the leisure-consumption elasticity than to the value of the intertemporal elasticity. Simulations are performed using various combinations of high (0.50) and low (0.15) values for the intertempo-

ral and leisure-consumption elasticities. A high value of the intertemporal elasticity implies larger gains in efficiency, even when the elasticity between leisure and consumption is low. But a high value of the leisure-consumption elasticity does little to generate sizable gains in efficiency as long as the intertemporal elasticity is low.<sup>9</sup>

The range of elasticities considered in this chapter (0.15 to 0.50) is chosen to emphasize the qualitative relationship between gains in efficiency and the two critical elasticities of substitution. Quantitatively, that range of values might be high, as opposed to the evidence cited in Chapter 3. Yet it is more consistent with the specification of the general-equilibrium model used here. Because the model includes minimum required levels of consumption, elasticities of substitution apply only to discretionary consumption. That result implies that a specified elasticity for discretionary consumption

8. Randolph and Rogers, "The Implications for Tax Policy of Uncertainty About Labor-Supply and Savings Responses," *National Tax Journal*, vol. 48, no. 3 (September 1995), pp. 429-446. Table 2 in that paper does show, however, that there is a greater likelihood of positive gains (between 70 percent and 80 percent) than of losses. Alan J. Auerbach and Laurence J. Kotlikoff find gains of similar magnitude; see Auerbach and Kotlikoff, *Dynamic Fiscal Policy* (Cambridge, England: Cambridge University Press, 1987). But Dale Jorgenson predicts much larger gains; see Jorgenson, "The Economic Impact of Fundamental Tax Reform" (draft, Harvard University, 1995).

9. With an intertemporal elasticity of 0.50 and a leisure-consumption elasticity of 0.15, the gain in efficiency is 0.82 percent of lifetime income, compared with 0.97 percent when both elasticities equal 0.50. In contrast, setting the intertemporal elasticity to 0.15 and the leisure-consumption elasticity to 0.50 results in an efficiency gain of only 0.07 percent of lifetime income.

would be equivalent to a lower effective elasticity for total consumption.<sup>10</sup>

As discussed previously, according to economic theory, the gains in efficiency from a switch to a proportional consumption tax could either be positively or negatively related to the elasticity of substitution between leisure and consumption. The reason is that reform involves both a change from income-based to consumption-based taxation (suggesting a negative relationship with the leisure-consumption elasticity) as well as a change to a more neutral tax system (suggesting a positive relationship). The simulations from the general-equilibrium model show a positive relationship. Hence, they indicate that the gains from more neutral taxation may be more significant than the gains from the change in the basis of taxation.

The shift to a consumption base results in some redistribution of income, both among and within generations. Both of those effects help to promote economic efficiency but may adversely affect equity.<sup>11</sup> Because a consumption base includes existing wealth as well as income from wages, the change in the tax base redistributes income among generations. The elderly (specifically, retired people) are taxed more heavily than they would be under the income tax. Under a consumption tax, the principal and interest from accumulated savings would be effectively taxed when consumed. But under an income tax, only the interest would be taxed.

The higher burden on the elderly allows a lower lifetime tax burden on the young, given revenue constraints. Such a tax on existing wealth also helps to promote economic efficiency because it is a form of lump-sum taxation. Moreover, including existing wealth in the base permits a lower overall tax rate and thus a smaller effect on decisions about labor supply. Consequently, any relief provided during the transition period that would reduce or eliminate taxes on existing wealth would lower gains in efficiency.

10. In the case of a proportional consumption tax, the 0.15 to 0.50 range for discretionary consumption implies a range of effective elasticities for total consumption of 0.13 to 0.41.

11. A more detailed presentation of the distributional effects of a shift to consumption taxes is beyond the scope of the present study. The redistribution is discussed here only in the context of how it contributes to the gains in efficiency, and how such gains might be reduced if the extent of redistribution was reduced.

The tax change also redistributes income within generations by flattening the rate structure and broadening the tax base. A shift from an income base to a consumption base should narrow the base because the consumption base excludes savings. However, most proposed consumption-based taxes actually broaden the tax base by removing many tax preferences. A broader base promotes efficiency by allowing lower overall marginal tax rates. However, the switch to a flat-rate consumption tax is also "lifetime regressive"—that is, it redistributes the tax burden from the lifetime rich to the lifetime poor.

Although the proportional consumption-based tax could produce some gains in efficiency, one must wonder what would be left if either the comprehensive nature of the consumption base or the flatness (the lower and less diverse tax rates) were compromised somewhat. For example, what would happen to those gains in efficiency if the lump-sum tax on existing wealth was eliminated? What if the consumption tax was made more progressive? Finally, how important is the consumption base—or more specifically, how would the gains in efficiency from a more neutral, lower-rate income tax compare with those from a consumption tax?

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## What Accounts for the Gains in Efficiency from a Proportional Consumption-Based Tax?

Simulations using the Fullerton-Rogers model cast light on a number of key issues similar to those just discussed:

- o What is the relative importance of taxing existing wealth, providing a flatter rate schedule, allowing more neutral treatment of investment, and shifting to a consumption base?
- o To what extent do the contributions of those features to the gains in efficiency depend on assumptions about how people will respond in terms of saving and labor supply?

- o And finally, how have the expected gains in efficiency shifted since the major changes in the Tax Reform Act of 1986, and how does that outcome depend on assumptions about how individuals respond?

To determine the importance of various features of consumption taxes, four alternatives to the current income tax are compared with the proportional consumption tax examined in the previous section. Those alternatives are a proportional wage-income tax; a proportional income tax; a value-added consumption tax with some goods exempt ("zero-rated"); and an exemption-level VAT, which taxes consumption at a single marginal tax rate above an annual exemption level of \$10,000 per person.

### Gains in Efficiency from the Tax on Existing Wealth

As explained earlier, part of the gain in efficiency from consumption taxes comes from the lump-sum tax on existing wealth. But how important is that factor? For the answer, one can compare gains in efficiency under the tax on wages with those under the value-added consumption tax.

Although similar in its neutral treatment of present versus future consumption, the wage tax does not tax existing wealth. It therefore places less of a burden on people with savings at the time the switch occurs. As a result, to be revenue neutral, the replacement tax rate for a wage tax must be higher than the tax rate for the broad-based consumption tax.<sup>12</sup> Without the lump-sum tax on wealth, the wage tax is always less efficient than the single-rate proportional VAT. Assuming high values for both elasticities (0.50), the gain in efficiency as a result of a move from the current income tax to the wage tax is 0.86 percent of lifetime income versus a gain of 0.97 percent from the broad-based VAT (see Table 8).

Gains in efficiency are smaller under the tax on wages, even though increases in the saving rates are

12. Assuming elasticities of 0.50, the tax rates under a wage-tax replacement are over 20 percent initially and about 18 percent in the steady state, in contrast to rates of 18 percent and 14 percent under the consumption tax.

**Table 8.**  
**Comparing Gains in Efficiency from a Broad-Based Proportional Consumption Tax and a Wage-Based Income Tax (As a percentage of lifetime income)**

Replacement Tax	Intertemporal and Leisure-Consumption Elasticities of Substitution <sup>a</sup>			
	0.5/0.5	0.5/0.15	0.15/0.5	0.15/0.15
Proportional Value-Added Tax	0.97	0.82	0.07	-0.05
Proportional Wage-Income Tax	0.86	0.66	-0.31	-0.20

SOURCE: Congressional Budget Office based on simulations from the Fullerton-Rogers model, using 1993 benchmark.

a. These elasticities measure the substitutability of consumption across periods and with leisure, respectively.

sometimes larger. The Fullerton-Rogers model predicts that under low enough elasticities, the larger decrease in the real income of workers (caused by the wage tax's higher taxation rate on labor income) induces bigger increases in labor supply and savings compared with the consumption-based tax.<sup>13</sup>

The wage tax is not only less efficient but also more regressive than the VAT. A consumption base differs from a wage base even over a lifetime as a result of bequests. Inheritances are larger for households with high lifetime income and allow the present value of their

13. Don Fullerton and Diane Lim Rogers, "Lifetime Effects of Fundamental Tax Reform," in Henry J. Aaron and William G. Gale, eds., *Economic Effects of Fundamental Tax Reform* (Washington, D.C.: Brookings Institution, 1996). Fullerton and Rogers show that although the consumption tax produces larger increases in the saving rate than the wage tax under higher elasticities, when both the intertemporal and leisure-consumption elasticities are 0.15, the steady-state saving rate increases by 6.5 percent under the wage tax but only about 3 percent under the consumption tax. Thus, the wealth-tax component of the consumption tax helps efficiency but not necessarily saving.

consumption to exceed the present value of their income from labor.<sup>14</sup>

### Gains in Efficiency from Less Progressive Taxes

Some of the gain in efficiency from the proportional consumption tax is bought at the price of redistribution between high- and low-income families, which may make the proportional version of the tax undesirable. Exempting goods and services on which low-income families spend a greater proportion of their income, or exempting a certain level of total expenditures for everyone, would make the consumption tax more progressive, though not as progressive as the current income tax. Proposals for national sales taxes often exempt certain goods that are considered necessities. In addition, all of the proposed versions of flat taxes (including the Arme-y-Shelby flat tax) and personal cash flow taxes (including the USA tax) specify exemption levels that depend on family size.

Exempting certain goods and services makes the consumption tax less neutral for consumer purchases. At the same time, exempting either goods and services or a certain level of expenditures would require higher tax rates to maintain the same amount of revenue. Either exemption might be expected to reduce the gains in efficiency, but that is not necessarily the outcome (see Table 9).

The zero-rated VAT exempts food, shelter, utilities, autos, and fuel. Those goods have the highest minimum required purchases in the Fullerton-Rogers model, as based on estimates from the Bureau of Labor Statistics' Consumer Expenditure Survey.<sup>15</sup> The distributional results indicate that zero-rating particular goods reduces, but does not eliminate, the regressivity of

**Table 9.**  
**Comparing Gains in Efficiency**  
**Under Various Consumption Tax Bases**  
**(As a percentage of lifetime income)**

Replacement Tax	Intertemporal and Leisure-Consumption Elasticities of Substitution <sup>a</sup>			
	0.5/0.5	0.5/0.15	0.15/0.5	0.15/0.15
Proportional Value-Added Tax	0.97	0.82	0.07	-0.05
Value-Added Tax with Zero-Rated Goods	0.79	0.65	-0.17	-0.25
Value-Added Tax with Exemption Level	0.96	0.85	0.05	-0.04

SOURCE: Congressional Budget Office based on simulations from the Fullerton-Rogers model, using 1993 benchmark.

a. These elasticities measure the substitutability of consumption across periods and with leisure, respectively.

the switch to the VAT.<sup>16</sup> The reduction in regressivity comes at the price of reduced efficiency (gains as a percentage of lifetime income drop to about 0.79 percent from 0.97 percent for the highest-elasticity case). The drop in efficiency stems from the nonneutral tax treatment of different goods and the much higher tax rate required for revenue neutrality. Revenue-neutral tax rates for the zero-rated VAT reach nearly 50 percent initially and fall to 34 percent in the steady state for the highest-elasticity case.

In contrast, the VAT with an exemption level, which taxes only expenditures above \$10,000 per person per year (in 1993 dollars), is more successful in reducing regressivity while maintaining efficiency. The exemption-level VAT eliminates virtually all of the regressivity measured on a lifetime basis. At the same time,

14. Ibid. The study includes this distributional comparison. Another difference between a wage tax and a consumption tax is in the treatment of supernormal or above-expected returns to capital. Although both taxes exempt the expected or normal return to capital, the consumption tax continues to tax returns above that level and subsidize returns below. If supernormal returns are correlated with income level, the correlation can also make the consumption tax look more progressive (or less regressive) than a wage tax.

15. Fullerton and Rogers, *Who Bears the Lifetime Tax Burden?* Chapter 5. The authors provide estimates of the parameters describing the demands for particular consumer goods.

16. Distributional results from the model are not shown. But a similar conclusion is drawn from a separate analysis discussed in Congressional Budget Office, *Effects of Adopting a Value-Added Tax* (February 1992).

gains in efficiency under the exemption-level VAT are very close to those under the proportional VAT, despite the higher replacement tax rate that is required because of the exemption (over 20 percent in the steady state with elasticities of 0.50 compared with 14 percent for the proportional VAT).<sup>17</sup>

Compared with the proportional and zero-rated VATs, the exemption-level VAT causes greater redistribution of income from the old to the young. In the model employed, labor-intensive goods (such as health care and financial services) are a larger proportion of the total consumption of the old. The higher marginal tax rate under the VAT with the exemption than under the proportional VAT leads to larger increases in the relative prices of labor-intensive goods. Thus, because it places a greater (lump-sum) tax on wealth for the elderly, the exemption-level VAT is able to achieve gains in efficiency comparable to those from a proportional VAT despite a higher tax rate.<sup>18</sup>

Note that the importance of the gain in efficiency from redistributing income compared with the loss in efficiency from the higher tax rate depends on the magnitude of the effects on the labor supply. When labor supply is very sensitive to prices, the higher tax rate under the exemption-level VAT leads to a slightly smaller gain in efficiency when compared with the proportional VAT. But when labor supply is less sensitive to prices, the exemption-level VAT leads to slightly larger gains in efficiency. Redistributing income between old and young increases efficiency and overcomes the decrease in efficiency that stems from a higher tax rate on labor income.

## Gains in Efficiency from a Consumption Base

Because the gain in efficiency from a proportional consumption tax can disappear as the tax becomes less

17. Note, however, that the replacement tax rates under the exemption-level VAT are much lower than those under the zero-rated VAT.

18. If annual income instead of lifetime income was used as the classifier, the exemption-level value-added tax would not look nearly so equitable because many of the elderly would be classified as having lower income in the current year.

**Table 10.**  
**Comparing Gains in Efficiency Under Consumption and Income Tax Bases (As a percentage of lifetime income)**

Replacement Tax	Intertemporal and Leisure-Consumption Elasticities of Substitution <sup>a</sup>			
	0.5/0.5	0.5/0.15	0.15/0.5	0.15/0.15
Proportional Value-Added Tax	0.97	0.82	0.07	-0.05
Proportional Income Tax	0.70	0.57	0.07	-0.05

SOURCE: Congressional Budget Office based on simulations from the Fullerton-Rogers model, using 1993 benchmark.

a. These elasticities measure the substitutability of consumption across periods and with leisure, respectively.

neutral or more progressive, one is left wondering whether the consumption base is indeed a crucial feature. In particular, might the gains in efficiency be similar if a more neutral and less progressive income tax replaced the current tax system? The new income tax would continue to affect decisions about the timing of consumption (unlike the consumption tax). But as a result of a lower initial replacement tax rate, the effects of the income tax on labor supply might be smaller than those of a consumption tax.

Simulations indicate that the initial replacement tax rate, assuming elasticities of 0.50, would be less than 16 percent under a single-rate, proportional income tax, instead of 18 percent under the single-rate, proportional VAT. As for gains in efficiency, the simulations indicate that if the intertemporal elasticity is high, the consumption base is important in contributing to those gains (see Table 10). In other words, if the sensitivity of the timing of consumption to a tax on capital income is large, eliminating that tax will result in a more efficient system. Alternatively, if the intertemporal elasticity is low, the increase in efficiency from the flat income tax is very similar to that under the consumption tax, indicating that the switch to a consumption base on its own has no effect on efficiency.

Moreover, the relative gains in efficiency stemming from a shift from an income to a consumption base are more sensitive to the intertemporal elasticity than to the leisure-consumption elasticity. For example, starting with intertemporal and leisure-consumption elasticities of 0.50, the gain in efficiency from a proportional income tax is 72 percent of the gain from a proportional consumption tax (0.70/0.97). With a leisure-consumption elasticity of 0.15 and the same intertemporal elasticity, the relative gains in efficiency do not change much (0.57/0.82 = 70 percent). However, with an intertemporal elasticity of 0.15 (and no matter what the value of the leisure-consumption elasticity), the gains in efficiency from the income tax are the same as under the consumption tax.

The replacement income tax is, however, a perfectly neutral income tax. In practice, neutrality may be more difficult to achieve under an income base because of the inherent problems in measuring capital income. Also, a lower discount rate may make the proportional consumption tax look relatively more efficient, since the larger gains to young and future generations would be weighted more heavily.

Many opponents of a consumption-based tax argue that a consumption base is inherently regressive and that an income base, which includes both labor and capital income, is preferred on the grounds of greater equity. However, although a proportional income tax might be almost as efficient as a proportional consumption tax, it is also likely to be similar to the proportional consumption tax in its lifetime regressivity, in contrast to current law.

### Are the Gains Small Because of Past Reform?

Finally, have the expected gains changed since the Tax Reform Act of 1986? By reducing marginal tax rates and leveling the playing field among capital assets, the act may have decreased any potential gains in efficiency to be had from further tax reform. Recall that a switch to a proportional consumption tax involves both reducing marginal rates and removing any taxes on new capital. Simulations can compare the gains in efficiency from a switch to a proportional VAT based on a 1993 income tax with the gains that would have taken place in switching from an income tax before the 1986 Tax

Reform Act. Statutory marginal tax rates fell with the 1986 act, suggesting that gains in efficiency from greater neutrality would be smaller now. At the same time, effective tax rates on capital rose with the TRA, indicating that gains in efficiency from abolishing a tax on capital would be greater.

When the intertemporal elasticity of substitution is high, gains in efficiency from a switch to a proportional consumption tax are about the same in 1993 as they would have been before the 1986 act (see Table 11). The decrease in the size of the gains that stems from reducing marginal rates offsets the increase in the size of gains from greater neutrality in the timing of consumption. With a low intertemporal elasticity, however, the gains in efficiency are smaller in 1993 than before the TRA because the gains from neutrality in the timing of consumption are reduced.<sup>19</sup>

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## Evidence from Other Studies

Estimates of the gains in efficiency from comprehensive tax reform depend on the assumptions of a particular general-equilibrium model. Evidence from other simulation studies can provide some indication of how strongly those assumptions may affect the predicted gains in efficiency.

Another version of a life-cycle model has generated gains in efficiency from comprehensive tax reform that range from zero to about 6 percent of lifetime income—which are for the most part higher than the gains presented in this chapter.<sup>20</sup> The higher numbers may result partly from higher assumed values for some of the elasticities (a leisure-consumption elasticity of 0.80, for example) and partly from differences in other characterizations of household preferences (such as no minimum required levels of consumption). Despite predicting more dramatic effects on capital accumulation than the

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19. The saving response, however, is actually bigger now compared with pre-1986, under either value of intertemporal elasticity. Steady-state saving increases by 3.0 percent (low elasticity) and 17.2 percent (high elasticity) in 1984, versus 4.8 percent and 19.9 percent in 1993.

20. Alan J. Auerbach, "Tax Reform, Capital Allocation, Efficiency and Growth," in Aaron and Gale, eds., *Economic Effects of Fundamental Tax Reform*.

**Table 11.**  
**Comparing Gains in Efficiency from a Proportional Value-Added Tax Under Current Law**  
**and Gains Before the Tax Reform Act of 1986**

	Based on 1984 Benchmark	Based on 1993 Benchmark
Benchmark Marginal Tax Rate on Personal Income	0.30	0.25
Benchmark Statutory Marginal Tax Rate on Corporate Income <sup>a</sup>	0.495	0.395
Benchmark Effective Tax Rates		
Corporate capital	0.466	0.529
Noncorporate capital	0.328	0.349
Owner-occupied housing	0.232	0.273
Efficiency Gains from a Proportional Value-Added Tax (As a percentage of lifetime income) <sup>b</sup>		
Intertemporal elasticity of substitution of 0.50	0.97	0.97
Intertemporal elasticity of substitution of 0.15	0.17	0.07

SOURCE: Congressional Budget Office based on simulations from the Fullerton-Rogers model, comparing results based on 1984 data and tax parameters with those corresponding to 1993 data and tax parameters.

- a. Corporate statutory rates include corporate taxes at both the federal and state level.  
b. Assumes a leisure-consumption elasticity of substitution of 0.50.

life-cycle models, infinite-horizon models produce gains in efficiency that are quite similar.<sup>21</sup>

The Fullerton-Rogers model does not account for the mobility of international capital, although capital flows can affect the results in a number of ways. One model that accounts for international capital mobility suggests that with agents who have perfect foresight over an infinite horizon, the income tax causes a smaller distortion in an open economy than in a closed economy. In that case, switching to a consumption tax would yield smaller gains in efficiency in an open, rather than closed, economy.<sup>22</sup> Other models, however,

will not yield that result, and the issue remains open to question.

The calculations of efficiency shown in this chapter also assume that firms and consumers are myopic in their expectations about prices, behaving as if future prices will be equal to current prices. Those expectations may be highly important in determining how responsive consumers are to the removal of taxes on capital income.

Some researchers suggest that infinite foresight would increase the potential gains in efficiency from a switch to consumption-based taxes, since consumers would respond more to changes in the price of present relative to future consumption.<sup>23</sup> Other researchers, however, have indicated that those studies assume the availability of lump-sum taxes. They point out that in a more realistic model acknowledging that taxation is distortionary, perfect foresight over a finite horizon

21. Robert E. Lucas, Jr., "Supply-Side Economics: An Analytical Review," *Oxford Economic Papers*, vol. 42, no. 1 (1990), pp. 293-316. Lucas emphasizes that welfare effects are less dramatic for two reasons. First, diminishing returns from capital indicate that long-run consumption increases by only a fraction of the long-run increase in capital. Second, there is a long period of reduced consumption before the long-run gains are enjoyed.

22. Enrique G. Mendoza and Linda L. Tesar, *Supply-Side Economics in a Global Economy*, Working Paper No. 5086 (Cambridge, Mass.: National Bureau of Economic Research, April 1995).

23. See, for example, Christophe Chamley, "The Welfare Cost of Capital Income Taxation in a Growing Economy," *Journal of Political Economy*, vol. 89 (June 1981), pp. 468-496.

leads to smaller increases in efficiency. People anticipate future reductions in the net rate of return, which will occur as capital accumulates. Thus, compared with myopic consumers, they save less—not more—as a result.<sup>24</sup>

At the same time, the Fullerton-Rogers model assumes that individuals possess perfect knowledge of their own labor productivity and lifespan. By introducing uncertainty about wages or lifespan into a model with human capital, some researchers have found that the case for consumption-based taxes weakens.

Given uncertainty about remaining lifetime wages, a wage- or income-based tax may be superior to a consumption-based tax because taxing wages provides better "social insurance" (reduced taxes) against low wages.<sup>25</sup> In addition, given the uncertainty about their future income and lifespan, people are likely to have a precautionary motive for saving. Precautionary savings respond less to changes in the net rate of return from capital. That factor further weakens the case for a switch to consumption-based taxation in terms of both lower efficiency and lower economic output.<sup>26</sup>

The Fullerton-Rogers model also ignores any possible role for constraints on liquidity and the effects on the accumulation of human capital. The calculations for efficiency are based on a model in which individuals are assumed to be able to borrow or lend against future income at the same interest rate. Several researchers have found that if borrowing constraints or differences in borrowing and lending rates exist, the gains in efficiency from removing taxes on capital decrease. Those gains increase with at least some taxes on capital income. Moreover, when human-capital accumulation is added to the story, researchers find that without taxes on physical capital, individuals may choose too little

education.<sup>27</sup> The Fullerton-Rogers model also fails to account for other types of market failure that may imply that neutrality in taxation is not necessarily the most efficient approach.

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## Conclusion

Replacing the current income tax system with a comprehensive consumption-based tax might be expected to increase economic efficiency for a number of reasons. First, the switch to a consumption base would eliminate the influence of taxes on the timing of consumption. Second, the new system might treat different sources or uses of income more uniformly by including more of them in the tax base and subjecting all of them to similar tax rates. Third, a broader base would allow lower overall marginal tax rates, thereby reducing the amount by which taxes affect relative prices and hence all kinds of economic decisions. Society must put up with taxes if it desires government-provided goods and services. But the less the tax system influences the choices that consumers and businesses make, the more efficient that system will be, and the better off society will be.

However, the calculations of efficiency from the Fullerton-Rogers model, along with the evidence from other research, suggest that the gains from even a very broad-based and proportional version of a consumption-based tax are rather modest—probably no more than a small percentage of lifetime income. If the timing of consumption is insensitive to changes in the relative prices of present and future consumption (as some evidence suggests), then the gains in efficiency are likely to be around zero.<sup>28</sup> Society as a whole might not gain because any large gains to younger generations are

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24. Charles L. Ballard and Lawrence H. Goulder, "Consumption Taxes, Foresight, and Welfare: A Computable General Equilibrium Analysis," in John Piggott and John Whalley, eds., *New Developments in Applied General Equilibrium Analysis* (Cambridge, England: Cambridge University Press, 1985), pp. 253-282.

25. See Jonathan H. Hamilton, "Optimal Wage and Income Taxation with Wage Uncertainty," *International Economic Review*, vol. 28 (June 1987), pp. 373-388.

26. Eric Engen and William Gale, "The Effects of Fundamental Tax Reform on Saving," in Aaron and Gale, eds., *Economic Effects of Fundamental Tax Reform*.

27. R. Glenn Hubbard and Kenneth L. Judd demonstrate that substituting capital income taxes for consumption taxes given constraints on liquidity can raise welfare; Hubbard and Judd, "Liquidity Constraints, Fiscal Policy, and Consumption," *Brookings Papers on Economic Activity*, no. 1 (1986), pp. 1-50. Martin Browning and John Burbidge add the human-capital dimension and produce results complementary to Hubbard and Judd; Browning and Burbidge, "Consumption and Income Taxation," *Oxford Economic Papers*, vol. 42, no. 1 (1990), pp. 281-292.

28. Or perhaps even negative. For a survey of the econometric evidence on the intertemporal elasticity of substitution, see Randolph and Rogers, "The Implications for Tax Policy of Uncertainty About Labor-Supply and Savings Responses."

offset by losses to older generations. Relief for holders of existing assets during a transition period would reduce still further the size of the gains in efficiency. Moreover, depending on the form, attempts to enhance progressivity could also have a negative effect. The superiority of the consumption base over an income base also depends critically on the sensitivity of the timing of consumption to changes in capital taxation—that is, a small response implies that a tax on income is as efficient as one on consumption.

Efficiency is, however, not the only criterion to use in judging the desirability of tax reform. Administra-

tive and compliance costs are other important factors. If a consumption tax offered substantial gains from reduced complexity, then even a minimal gain in economic efficiency would be an added bonus. Finally, one should keep in mind that the proportional consumption-based tax examined in this study results in a considerable redistribution of the tax burden—a factor that must be considered in evaluating the desirability of the policy.<sup>29</sup>

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29. The distributional effects of a switch to consumption-based taxation will be the focus of a future CBO study.

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# Appendixes



# What Will a Consumption-Based Tax Do to the Price Level and the Value of Existing Assets?

**M**oving to a consumption-based tax may affect the price level and will certainly affect the value of existing assets. The precise effects, however, depend on the details of the proposal.

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## The Price Level

Switching to an indirect tax such as a valued-added tax (VAT) or national sales tax will probably cause a one-time jump in the price level, with no permanent change in the inflation rate. By contrast, any consumption-based tax that levies taxes directly on households will probably have little or no effect on the price level.

A VAT or sales tax is likely to boost the price level because each one collects the tax on labor income from the firm or retailer. That treatment represents a change from the current income tax system, which collects tax on labor income directly from the worker. Because the cost of labor to the firm would include the new tax, real compensation paid to workers would initially have to fall to match the value of their so-called "marginal product" and keep them fully employed.

Real compensation can fall in two ways: nominal compensation can drop or the price level can rise. What happens will ultimately depend on the Federal Reserve. If it fixes the price level, nominal compensation will have to fall—an event that workers might accept because they would no longer have to pay income tax and hence would take home about the same pay as

now. Most analysts note, however, that workers have resisted cuts in nominal compensation in the past. Those analysts expect that firms fearing morale problems or facing union contracts will hesitate to make such cuts. In that case, nominal compensation may fall slowly to its new level, leading to higher unemployment rates in the interim. To prevent that outcome, the Federal Reserve is expected to allow the price level to rise. For example, a VAT or sales tax of 10 percent would lead to a one-time jump of 10 percent in the price of consumer products.<sup>1</sup>

Further price increases may ensue if compensation is indexed to inflation. In that case, the price rise will cause a corresponding rise in compensation, and real compensation will not drop enough to maintain full employment, requiring a further price rise—that is, a wage-price spiral. That problem occurred in the United Kingdom when it adopted a VAT in 1979, although the extent of indexing there was greater than it is in the United States.

In contrast, the flat tax probably has little effect on the price level. Although the total tax base of the flat tax is essentially the same as that of a VAT, compensation under the flat tax is taxed at the household level. In that case, firms do not face a new tax on labor, and thus their payroll is the same as before the reform. The flat tax may, however, lead firms to raise prices by about 2 percent to recoup their loss of deductions for

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1. A value-added tax would also lead to a jump in the price of producer products, but their effective price would remain as before because the VAT is rebated to producers.

payroll taxes and fringe benefits other than pension contributions.

The Unlimited Saving Allowance (USA) tax combines a subtraction-method VAT (an indirect consumption tax) with a personal cash flow tax (a direct consumption tax). The VAT is collected at the business level at a rate of 11 percent, but firms are given a credit for their payroll taxes—about 6 percent of compensation. Thus, if nominal compensation did not fall, a switch to the USA tax would raise the price of business output by about 5 percent. The personal portion of the USA tax, however, would fall directly on household consumption and would not affect the price level.

Although pure forms of comprehensive, single-rate, consumption-based taxes differ from each other in their effects on the cost of labor to firms, they have identical effects on the real after-tax compensation received by workers. Given pure forms, an indirect tax resulting in higher consumer prices leaves workers with the same purchasing power as a direct tax on consumption. But the various plans are not pure forms and impose taxes at different rates. Therefore, the plans will have similar, but not identical, results. Moreover, without legislation, the form of the tax will affect the purchasing power of recipients of government transfers (such as welfare payments) that are not indexed to the price level.

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## The Value of Existing Assets

Switching from a pure tax with an income base to one with a consumption base would by itself impose a new burden on current owners of existing assets. Owners in effect would pay a one-time levy on their assets at the new tax rate. But the net effect on asset prices is uncertain because neither the existing income tax nor all proposed substitutes are pure forms and because other factors would by themselves act to raise asset prices.

### Switching Between Pure Forms Exacts a Levy on Existing Assets

A levy would apply under pure forms because existing assets would lose their tax basis. For instance, if a plan

allowed expensing and imposed a business-tax rate of 20 percent, a firm would reduce its tax liability by \$20 when it spent \$100 on new capital and expensed it. But old capital that is otherwise identical would lose its basis because it would receive no deductions and yet would face a 20 percent tax rate. In effect, buying \$100 of new capital would cost the firm only \$80. Consequently, the value of otherwise equivalent old capital (or shares in the firm that owns it) would also fall to \$80—a 20 percent drop. A sales tax would have the same effect in that the firm would lose its deductions for old capital, whose return would face the new tax when it was consumed.

The decline in the value of assets would be shared proportionately by owners and lenders if the price level rose to include the new tax. Such a price rise would reduce the real value of nominal claims, constituting a loss to the lender and a gain to the borrower. Except for the loss to holders of government debt, however, such gains and losses would cancel each other in the economy as a whole.

In addition to imposing a levy on real assets, the various plans would change the tax treatment of existing financial securities, such as bonds and mortgages. All consumption-based plans would eliminate deductions for interest paid, increasing the tax liabilities of borrowers and reducing their net worth. (The USA tax, however, would continue to allow deductions for mortgage interest.) The flat tax would eliminate any tax on interest income, reducing the tax liabilities of lenders and raising the value of their loans. Under the other plans, the tax would apply to interest income not when it was earned but rather when it was consumed. Other things being equal, the value to the holder would rise if the rate of the consumption tax fell below the rate of the income tax it replaced.

### Departures from Pure Forms Counteract the Levy

Because the current income tax and some proposed consumption-based taxes are not pure forms, the levy on existing assets would fall short of its theoretical value under pure forms. First, owners of household assets—owner-occupied housing and consumer durable goods—would escape such a levy because the imputed yields of those assets are already taxed on a consump-

tion basis under the current system. Thus, the levy would strictly apply only to existing business assets.

Second, much existing capital has been depreciated faster than it would have been under a pure income tax. Accelerated depreciation under current law in essence grants partial expensing and places old capital at a tax disadvantage in relation to new capital. Moreover, most past investment that firms made in their intangible property—such as buying advertising, conducting research and experimentation, or developing software—was fully expensed. Eliminating the income tax would abolish the tax disadvantage of such capital and intangibles, partly offsetting the levy.

Third, capital gains are now taxed when they are realized, even if the proceeds are reinvested. The switch in the tax base would free those gains from tax and directly benefit people who intended to realize them. In other words, the switch would eliminate the lock-in effect on capital gains.

Finally, granting relief to holders of existing assets during the transition would reduce the levy by allowing firms to retain a basis in their assets. For instance, the USA tax would allow firms to amortize existing assets.

## **Other Factors That Counteract the Levy**

Several other factors might also work to counteract the levy. First, existing firms have a market advantage if investment incurs costs beyond the purchase of new capital. Such adjustment costs of investing may include retraining workers or disrupting other work. In that case, new firms would find it too costly to amass capital

immediately and compete at the scale of existing firms. That situation temporarily allows existing firms to earn supernormal returns on their existing capital and previously planned investment, thereby raising their share value.

Second, a theory of dividends (the "new view") predicts that the new treatment of dividends and capital gains in isolation would raise the value of stocks. According to the new view, the value of corporations would rise because the effective tax rate on dividends currently exceeds that on capital gains, and a new tax treatment would equate the effective rate on each. Even though both are taxed at the same statutory rate, capital gains are currently taxed at a lower effective rate because taxes are deferred until realization. Switching to a consumption base would equate the two rates—at zero, for normal expected returns—and, according to the new view, raise stock values. The new view is controversial, however, and the traditional view holds that equating the effective tax rates on dividends and gains would not by itself affect the stock market.

Finally, reform would affect the demand for all assets. Total demand would rise if reform boosted private saving. Furthermore, the demand for business assets would rise in relation to that for household assets because reform would reduce or eliminate the tax bias against business assets. In addition, other things being equal, the value of most assets would increase if the market interest rate fell under reform. (Holders of municipal securities, however, would suffer a capital loss as the after-tax interest rate rose because interest on those securities is already tax-free.) Moreover, owners of existing assets would benefit from higher after-tax returns, although that benefit would mean more to the young than the old because the young would receive the higher net returns for a longer period of time.



# Simulation Models and the Saving Response

Simulation models try to reflect the major interactions among various markets in the economy and can provide some quantitative predictions about the effects of fundamental tax reform on economic variables, including saving. Such models make assumptions about how readily people trade future for present consumption or sacrifice consumption for leisure. They also take into account the production side of the economy and make assumptions about how firms decide on the number of people to employ, the amount of investment to undertake, and the amount of output to produce. Most of the models that the Congressional Budget Office uses focus on the long run and thus assume that the prices of goods, capital, and labor will adjust until all markets are in equilibrium.

The intertemporal elasticity of substitution is a critical factor in determining how saving responds in those models (see Box B-1). That elasticity measures the extent to which consumers substitute future for current consumption when the net return from saving rises and thus the relative price of future consumption falls. Evidence suggests that the value of the intertemporal elasticity of substitution is likely to be at the low end of the range of values used in those simulation models. Thus, the effects on saving are more likely to be at the low end of the estimates presented in this study.

By necessity, the models are highly simplified representations of the economy and the tax system. Because people save for a variety of reasons and the U.S. tax system is extremely complicated, no single model can capture all of those motivations. As a result, the designers of those models must decide which aspects of saving behavior and the tax code to emphasize. In the

end, those decisions have significant effects on the quantitative predictions of the models.

Some models may overstate the effects of switching to a consumption-based tax. That overstatement is particularly apt to occur if the models fail to recognize that the hybrid nature of the current tax system already incorporates many of the saving incentives of a consumption tax. About half of personal saving is already treated as it would be under a consumption tax.<sup>1</sup> For example, funds placed in pensions, Keoghs, 401(k) plans, and most individual retirement accounts are not taxed until they are withdrawn, and the net return from those investments is already equal to the before-tax rate of return. If introducing a consumption tax reduces the before-tax interest rate, as is likely in the long term, the rate of return from those forms of saving would fall.

Saving for retirement is the focus of so-called "life-cycle" models. Those models assume that people save in order to meet their financial needs during retirement. People borrow when young, save when middle-aged, and spend their savings ("dissave") when retired to smooth out their consumption over the life cycle. In the most simplistic versions of those life-cycle models, consumers are assumed to see the future with perfect clarity. Thus, in making their plans, workers are assumed to know exactly how much they will earn over their lives, when they will retire, and when they will die.

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1. Based on William G. Gale, "Reinventing the Federal Tax System," *The Brookings Review* (Fall 1995), and personal communication with Gale.

**Box B-1.**  
**A Key Factor in the Simulation Models:**  
**The Intertemporal Elasticity of Substitution**

The intertemporal elasticity of substitution (IES) is a central factor in the simulation models, particularly in determining how much people will change their saving in response to a change in the real after-tax rate of return, all other things being equal. A larger value of the IES implies a larger substitution effect in response to a change in the after-tax rate of return. In other words, a given increase in the after-tax rate of return from saving would cause a person with a high IES to increase saving (substitute future for present consumption) more than a person with a low IES. An elasticity of zero indicates no substitution effect, although other influences—such as changes in income or wealth—could still affect saving.

Empirical evidence on the size of the intertemporal elasticity of substitution is not precise. A study by Robert Hall found that the IES is unlikely to be much above 0.1 and may well be zero.<sup>1</sup> Earlier studies found values

1. Robert E. Hall, "Intertemporal Substitution in Consumption," *Journal of Political Economy*, vol. 96, no. 2 (1988), pp. 339-357.

closer to 1.0 and possibly higher than 1.0, but those values were obtained using techniques that have been shown to be flawed.<sup>2</sup> Moreover, some new evidence suggests that the IES may not even be constant, but may increase with the level of consumption.<sup>3</sup>

Most of the simulation models assume values for this critical parameter that significantly exceed Hall's findings. Auerbach and Kotlikoff assume that the IES is 0.25. Engen and Gale assume an IES of 0.33, but in the context of a model with uncertainty and precautionary savings. The Fullerton-Rogers model assumes a range of 0.15 to 0.50, but that is with respect to discretionary, not total, consumption.

2. Lawrence Summers, *Tax Policy, the Rate of Return, and Savings*, Working Paper No. 995 (Cambridge, Mass.: National Bureau of Economic Research, September 1982).

3. Orazio P. Attanasio and Martin Browning "Consumption over the Life Cycle and over the Business Cycle," *American Economic Review*, vol. 85, no. 5 (December 1995), pp. 1118-1137.

Without relief for owners of existing capital, tax reform can produce substantial effects on saving in a life-cycle model, although the results vary significantly among models and depend on the assumptions about the intertemporal elasticity of substitution. Don Fullerton and Diane Lim Rogers found that a switch to a comprehensive consumption-based tax could produce long-run increases in the net saving rate of as little as 3 percent and as much as 20 percent depending on the intertemporal elasticity. Using a different life-cycle model, Alan Auerbach found that the net saving rate could increase by almost 25 percent in the long run. The effect is dampened, however, if owners of existing capital get relief or if investment involves adjustment costs in addition to the purchase cost of new capital.<sup>2</sup>

2. Don Fullerton and Diane Lim Rogers, "Lifetime Effects of Fundamental Tax Reform," and Alan J. Auerbach, "Tax Reform, Capital Allocation, Efficiency, and Growth," in Henry J. Aaron and William G. Gale, eds., *Economic Effects of Fundamental Tax Reform* (Washington, D.C.: Brookings Institution, 1996).

Although the simplest life-cycle models provide useful insights, some of their predictions are inconsistent with actual economic behavior. For example, actual consumption depends more on current income than the models predict. Those findings suggest that other factors besides retirement influence people's decisions about saving.

Adding uncertainty to the life-cycle framework generates "precautionary saving" in addition to life-cycle saving. Precautionary saving is another way to describe the old maxim of "saving for a rainy day." In models with precautionary saving, households are forward looking, but they face an uncertain future. They do not know how long they will live or how their earnings will vary over time. As a result, they are prompted to accumulate wealth not only to finance their retirement but also to guard against future downturns.

Compared with life-cycle saving, precautionary saving is less sensitive to changes in rates of return.

Thus, models with precautionary saving predict that tax reform would have a somewhat smaller effect on the accumulation of capital than do other life-cycle models. For example, Eric Engen and William Gale find that switching to a consumption tax (again, without relief for transition) would increase the saving rate by about 13 percent in the long run.<sup>3</sup> Interestingly, if relief for transition was provided, the saving rate would increase by just 7 percent.

Saving to provide bequests is another reason why people save. But how the motive to leave bequests should be modeled is highly uncertain—and different approaches lead to very different answers. One approach is to assume that people are altruistic toward their children, meaning that all generations are effectively linked over time. Under that assumption, decisions about saving reflect trade-offs between consuming now and consuming over an infinitely long horizon. Moreover, a reduction in capital-income taxes typically has a larger positive effect on saving in the long run than the life-cycle models predict. Another approach is to assume that people leave bequests for the satisfaction it gives them, in which case they would be only slightly more sensitive to lower capital-income taxes than life-cycle savers would be.

Saving by "rules of thumb" may also explain some people's saving behavior. Many people may have difficulty forming rational expectations about the future (as the previous models assumed) and may instead choose simple rules of thumb when determining how much to save. For example, they may simply decide to save a constant fraction of their annual income. Those decisions may well be rational if the cost of obtaining and processing information about the future is high. In any case, those people would not increase their saving as the after-tax rates of return rose. Of course, a change in the tax code as dramatic as switching to consumption-based taxes could cause those people to alter their rules of thumb, but predicting the direction and magnitude of that change is difficult.

In addition, some households may not view all forms of saving as identical, as the previous models

assumed. Instead, they may keep track of the different types of saving instruments in distinct mental accounts.<sup>4</sup> Under that view, the effect of tax reform on saving is not simply a function of what happens to the net return from saving; it also depends on what happens to the current institutional structures that enable people to save. For example, under the current income tax, pensions are a tax-preferred form of saving. In contrast, a consumption-based tax would treat all saving the same. Moreover, under a value-added tax, cash wages and pensions are treated equally as components of total compensation, and hence pension contributions would be taxed.<sup>5</sup>

Such treatment may mean that workers would prefer cash wages to pension benefits. Under the life-cycle view, a higher overall net rate of return from capital implies that workers should increase their own saving by more than enough to compensate for reduced pension saving. But under the mental accounts view, the pension system encourages saving because the institutional structure makes it easier for individuals to think about saving. Left on their own under a consumption-based tax, workers might not save all of their reduced pension contributions. As a result, total private saving would not rise as much.

Taxpayers who distinguish among saving instruments may also react to the various proposals in different ways. Consider two proposals: an immediate-deduction form of a consumption tax that allows taxpayers to deduct any net saving from taxable income but requires them to include both the return of principal and interest in the tax base, and a yield-exemption form of a consumption tax that neither allows an explicit deduction for saving nor includes interest in the tax base. Taxpayers who distinguish among different saving instruments may respond more to immediate tax saving from a tax deduction than to tax saving from an exclusion of interest, which is spread out over a longer period.

3. Eric M. Engen and William G. Gale, "Effects of Fundamental Tax Reform on Saving," in Aaron and Gale, eds., *Economic Effects of Fundamental Tax Reform*.

4. Richard Thaler, "Anomalies, Saving, Fungibility, and Mental Accounts," *Journal of Economic Perspectives* (Winter 1990), pp. 193-205.

5. See Dallas L. Salisbury, "Employee Benefits in a Flat Tax of Consumption Tax World," *Employee Benefits Research Institute, EBRI Notes*, vol. 16, no. 9 (September 1995), pp. 1-11.



# The Fullerton-Rogers General-Equilibrium Model

The Fullerton-Rogers model uses measures of lifetime income based on longitudinal data and classifies households according to lifetime-income categories.<sup>1</sup> By specifying functions that describe consumer utility and industrial production, the model is able to calculate the general-equilibrium effects of tax changes on the prices and quantities of goods and factors of production (labor and capital). It also measures the subsequent effects on economic efficiency and the welfare of each income category.

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## Lifetime Incomes

The Fullerton-Rogers model incorporates data on lifetime incomes, requiring longitudinal data for many individuals over many years. Although no data set spans the entire lifetimes of individuals, the University of Michigan's Panel Study of Income Dynamics has been asking the same questions of the same people for over 20 years. From that study, Fullerton and Rogers drew a sample of 500 households that included 858 adults, with information on wages, taxes, transfers, and various demographic variables for the years from 1970 through 1987. They included single heads of households as well as husbands and wives in the sample, and for simplicity in defining the lifetime of a "household," they excluded households whose marital status varied over the sample period. They estimated the wage rate as a

nonlinear function of age for men and women separately. As a result, for each individual in the sample Fullerton and Rogers were able to predict the wage rate for the years that come after as well as before the sample period; multiply the actual or estimated wage rate by a total number of hours per year (such as 4,000) to get the value of the individual's potential earnings; and calculate the present value of those earnings over the individual's lifetime.

Thus, the level of well-being in the Fullerton-Rogers model is defined by potential earnings, including the value of leisure. Those levels were used to classify individuals into 12 groups according to lifetime ability to pay, in which an individual's lifetime income is defined as the average lifetime income of the head of household and the spouse (if any). The groups were constructed by starting with the 10 deciles, but the poorest 2 percent were separated from the next poorest 8 percent, and the richest 2 percent from the next richest 8 percent.

For a given level of lifetime income, the timing of income matters: the shape of an individual's profile for lifetime income determines savings and therefore the composition of any year's annual income. Therefore, Fullerton and Rogers reestimated the profiles of wages by age separately for each of the 12 groups. In addition, they estimated the time paths of personal income taxes paid and transfers received. In that way, they set up a consistent benchmark data set with a path of consumer spending out of total available after-tax income.

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1. Don Fullerton and Diane Lim Rogers, *Who Bears the Lifetime Tax Burden?* (Washington, D.C.: Brookings Institution, 1993).

## Model Structure and Numerical Specification of Parameters

The general-equilibrium approach to tax analysis accounts for behavioral effects and excess burdens caused by taxes. It can capture the important influences of taxes on diverse household choices about labor supply, savings, and the consumption of different commodities. Consumers supply labor and capital and purchase goods and services in such a way that well-being is maximized. The assumption that producers will maximize profits determines the demands for labor and capital and the effects of taxes on those demands. As the model solves for the prices establishing general equilibrium, it captures the net impact of taxes when those consumer and producer behaviors are considered simultaneously.

In the Fullerton-Rogers model, consumer decisions maximize the lifetime economic well-being of individuals. To begin, the individual calculates the present value of potential lifetime earnings. That endowment is then supplemented by government transfers, reduced by taxes, discounted at the after-tax interest rate, and augmented by a fixed initial inheritance. For computational simplicity, the model assumes "myopic" expectations about future prices—in other words, the consumer expects the current interest rate to prevail in all future periods.

One part of the lifetime endowment must be saved for a bequest upon death. The model avoids the many possible motivations for individual bequests, or the many ways in which taxes might affect the size of those bequests. Instead, it simply acknowledges that life-cycle saving by itself can only explain about half of the observed capital stock. In the model, part of the capital stock is attributable to individuals receiving a fixed level of inheritances and then being required to leave comparable bequests at the end of life. The incidence of capital taxes thus depends on the differences in those inheritances among groups. To achieve balanced growth, the members of each group must add some additional savings to their inheritance before they make their bequest.

The rest of the present value of income is available for spending. Decisions are made in stages. In the context of fundamental tax reform, the first two stages are the most important because they define the saving and labor-supply responses.

At the first stage, the consumer chooses how much to spend each period. That choice depends on assumptions about the form of lifetime utility and the values of certain key parameters. Lifetime utility is specified as a "constant-elasticity-of-substitution" (CES) function:

$$U = \left[ \sum_{t=1}^T a_t \frac{1}{\epsilon_1} x_t^{(\epsilon_1-1)/\epsilon_1} \right]^{\epsilon_1/(\epsilon_1-1)}$$

where  $T=60$  (chronological age 79) is the individual's certain date of death,  $\epsilon_1$  is the intertemporal elasticity of substitution, and  $x_t$  is the amount of "composite commodity" (a combination of a composite consumption good and leisure) at economic age  $t$ . The weighting parameter,  $a_t$ , reflects the consumer's subjective rate of time preference, which is set at 0.005.

Although in their 1993 book Fullerton and Rogers used a central-case intertemporal elasticity equal to 0.50, that elasticity is varied from a low of 0.15 to a high of 0.50 in this study's examination of efficiency gains. The consumer's choice about how much to spend each period is also affected by changes in the net rate of return (which is set at 0.04 in the central case).<sup>2</sup>

At the second stage, the consumer allocates one period's "spending" between leisure and other consumption goods, according to the CES function:

$$x_t = \left[ \alpha_t^{1/\epsilon_2} \bar{c}_t^{-(\epsilon_2-1)/\epsilon_2} + (1 - \alpha_t)^{1/\epsilon_2} l_t^{(\epsilon_2-1)/\epsilon_2} \right]^{\epsilon_2/(\epsilon_2-1)}$$

where  $\bar{c}_t$  is the amount of composite consumption good consumed at  $t$ ,  $l_t$  is the amount of leisure taken at  $t$ , and  $\epsilon_2$  is the elasticity of substitution between

2. Ibid., Chapter 8. The book discusses the sensitivity of calculations of incidence to those parameter values. The current study emphasizes the importance of the intertemporal elasticity in determining the efficiency gains from a switch to consumption-based taxation.

consumption and leisure. The decision about how much labor to supply depends on what is assumed about the value of this leisure-consumption elasticity of substitution. Fullerton and Rogers set that elasticity at 0.5 in their central case, but for the purposes of this study that elasticity is varied from 0.15 to 0.5 (just as the intertemporal elasticity is varied). In the general-equilibrium model, individuals can "buy" more leisure at a price equal to the forgone after-tax wage instead of buying other goods. Both taxes and age affect that choice. Individuals in that model never fully retire. The weight on leisure increases with age after they reach 60 in a way that reflects actual choices.

In the third stage, individuals decide how to allocate current consumption spending among 17 particular goods (such as food, alcohol, tobacco, utilities, housing, and so forth), according to the function:

$$\bar{c}_t = \prod_{i=1}^N (c_{it} - b_{it})^{\beta_{it}}$$

where  $N$  is the number of consumer goods (=17), and  $c_{it}$  is the amount of consumer good  $i$  consumed at age  $t$ . That function is of the "Stone-Geary" form, which means that a consumer at a given age has to buy a set of "minimum required purchases" ( $b$ ) and then allocates remaining spending according to a set of "marginal expenditure shares" ( $\beta$ ). In this model, those 34 ( $17 \times 2$ ) parameters are estimated for each of 12 age categories using data from the Consumer Expenditure Survey, as described thoroughly in the Fullerton and Rogers book.

The Stone-Geary framework has several important implications. By making a portion of spending non-discretionary, it reduces the sensitivity of total consumption and saving to the net rate of return. In addition, because discretionary income may be spent in proportions different from minimum requirements, the proportion of total income spent on any particular good will vary with total income. Required spending is relatively high for housing and gasoline, while discretionary spending is relatively high for clothing, services, and recreation. Thus, the rich and the poor buy different

mixes of goods and bear different tax burdens because of those differences in how they spend their income.<sup>3</sup>

In the fourth stage of the consumer's allocation process, the expenditure on each consumer good is divided by fixed coefficients among components drawn from a list of 19 industries. No real "decision" is made here, but that step allows the matching up of consumption data using one definition of commodities with production data using a different definition. For example, expenditures on the consumer good "appliances" are composed of portions from metals and machinery, transportation, and the trade industry.

Then, in the fifth and final stage of the decision process, the consumer takes the spending on the output of each industry and allocates it between the corporate sector and the noncorporate sector, according to the CES function:

$$\bar{Q}_j = \left[ \gamma_j^{1/e_3} (Q_j^c)^{(e_3-1)/e_3} + (1-\gamma_j)^{1/e_3} (Q_j^{nc})^{(e_3-1)/e_3} \right]^{e_3/(e_3-1)}$$

where  $Q_j^c$  is the amount of corporate production of producer good  $j$ ,  $Q_j^{nc}$  is the amount of noncorporate production of producer good  $j$ , and  $e_3$  is the elasticity of substitution between corporate and noncorporate outputs in consumption. Corporate output is assumed to be slightly different from noncorporate output in the same industry. (Hand-carved furniture, for example, is not the same as manufactured furniture.) The consumer chooses the amount of each, using a weighting parameter  $\gamma$  based on initial corporate and noncorporate shares of production within each industry (as observed in the data) and using another elasticity of substitution ( $e_3$ , which is set to 5.0 in the central case). That specification is consistent with the observed coexistence of both sectors within an industry, despite different tax

3. This framework also allows Fullerton and Rogers to use the same utility function for everyone in the model. In previous efforts, rich and poor individuals spend in different proportions because they have different preferences. But the rich and the poor differ in fundamental characteristics and not just by the amount of income they receive. With differences in utility functions, if the poor were to receive additional income, they would still spend it as if they were poor, according to their unchanged proportions. Fullerton and Rogers argue that it seems more natural that a poor person with more money would begin to behave like a rich person. That is, the primary distinction between rich and poor is the amount of income they receive. Therefore, in their model, everyone has the same preference parameters. The poor spend more on goods with high minimum required expenditures, because they are poor, and the rich spend more on goods with relatively high marginal expenditure shares.

treatments. If the outputs were identical, then a higher tax rate would drive one sector out of production. The elasticity of substitution reflects the degree of similarity. The other purpose of that specification is to capture ways in which changes in corporate taxes affect relative product prices and quantities demanded for the outputs of each sector.

A similar process characterizes the behavior of producers in each sector of each industry. Many competitive firms produce each output according to multistage production functions with constant returns to scale. Also, to keep the computation simple, the model assumes no externalities, no adjustment costs, and no uncertainty.

In the first stage of production, output is composed of a fixed-coefficient combination of value added and intermediate inputs. Each of the 19 industries uses the outputs of all other industries in fixed proportions. Thus, changes in the price of one product affect many other product prices. In the second stage, value added is a function of labor and composite capital, according to the function:

$$VA = \phi \left[ \zeta^{1/\sigma_1} L^{(\sigma_1-1)/\sigma_1} + (1-\zeta)^{1/\sigma_1} \bar{K}^{(\sigma_1-1)/\sigma_1} \right]^{\sigma_1/(\sigma_1-1)}$$

The weighting parameters ( $\zeta$ ) are based on observed labor  $L$  and capital  $\bar{K}$  in each industry, and the elasticity of substitution ( $\sigma_1$ ) varies by industry (between 0.68 and 0.96 in the central case). Thus, a tax on labor can induce the firm to use more capital, and vice versa. It also raises the cost of production, and thus the price of output, in any industry that uses a high proportion of the taxed factor.

In the third and final stage of production, composite capital is a CES function of five asset types ( $K_k$ )—equipment, structures, land, inventories, and intangibles:

$$\bar{K} = \left[ \sum_{k=1}^{N_k} (\psi_k)^{1/\sigma_2} (K_k)^{(\sigma_2-1)/\sigma_2} \right]^{\sigma_2/(\sigma_2-1)}$$

Those types are defined by important tax differences such as the investment credit for equipment and the

expensing of new intangible assets created through advertising or research and development. The weighting shares ( $\psi_k$ ) are again based on observed use of assets in each industry, and the response to tax differences is again specified by an elasticity of substitution ( $\sigma_2 = 1.5$  in the central case).

Government in the model conducts several functions. It pays transfers to individuals according to the estimated lifetime transfer profiles discussed above. It produces an output for sale through an industry called "government enterprises," and it also produces a free public good by combining its use of labor, capital, and purchases of each private industry's output. The weights in that combination are based on observed government purchases, and the elasticity of substitution is 1.0. The level of that public good is held fixed in all simulations, as any tax change involves an adjustment that ensures a constant yield of real revenues. A final government function, of course, is to collect taxes. Simplifying assumptions of the model are that the government balances its budget in each period and that only one level of government exists (that is, no distinctions are made among federal, state, and local levels).

Each tax instrument enters the model as a wedge between the producer's price and the consumer's price. The payroll tax, for example, applies at an ad valorem rate to each producer's use of labor. Consequently, the gross wage paid by the producer is higher than the net wage received by the worker. Similarly, sales and excise taxes appear as an ad valorem rate on each consumer good. Therefore, the gross price paid by the consumer exceeds the net price received by the seller.

The modeling of the personal income tax is a bit more complicated when used to capture that tax's progressive structure of burdens. The actual U.S. personal income tax system imposes higher effective tax rates on higher incomes through a graduated rate structure with a changing marginal tax rate.

Ideally, one would calculate the effects of individual choices at each different possible marginal tax rate to determine the behavior that would maximize utility. For ease of computation, however, the Fullerton-Rogers model uses a set of linear tax functions that approximate the U.S. system with a negative intercept for each group and a single marginal tax rate (0.25 in the 1993 benchmark). Although all individuals face the same

marginal tax rate, average tax rates still increase with income because of the negative intercepts. The model does not include the myriad exemptions and deductions in the tax code. Those simpler, linear tax functions can replicate the observed data on personal taxes actually paid by each group.

Property taxes and income taxes at all levels of government raise the producer's gross cost of capital for each type of asset compared with the investor's net rate of return. The cost of capital corresponding to each type of asset depends on the statutory corporate tax rate (set at 0.395 to reflect federal and state taxes in the 1993 benchmark), depreciation allowances at historical cost, how the real value of those allowances is eroded by the rate of inflation (set at 4 percent), the rate of investment tax credit (set at zero after the Tax Reform Act of 1986), and the required net rate of return for the firm. That required rate of return depends, in turn, on the going market rate and the personal taxation of interest (at rate 0.246), dividends (0.292), and capital gains (0.13).

The simulations described in this study assume the "old view" of taxing dividends, in which the personal-level taxation of dividends affects the cost of capital for marginal investments.<sup>4</sup> A similar cost-of-capital formula applies to the noncorporate sector. That treatment allows the producer's choice among assets to depend on relative tax rules, and the price of output in each industry to depend on the relative use of assets with different tax treatments.

Other assumptions help to complete the model in a way that accounts for all flows and that helps facilitate computation. The model ignores international mobility of labor or capital, but allows for the trade of industrial outputs. Also, the value of imports must match the value of exports; the government's expenditures and transfer payments must match tax revenue; and the value of personal savings must match the value of expenditures for investment. Producer investment is not the result of a firm's decisions about the timing of investment, but instead results from the levels of personal saving that consumers choose. The amount of personal saving is growing over time because consumers' earn-

ings from labor are growing as a result of population and technical change. On the steady-state growth path, the capital stock grows at exactly the same rate as the effective labor supply.

The data used in the Fullerton-Rogers model come from many sources, adjusted to represent 1993 as the base year.<sup>5</sup> In addition to the survey data used to estimate wage profiles and preference parameters, the model uses the national income and product accounts for an input-output matrix, labor compensation by industry, government purchases, and international trade. Those published data are combined with other unpublished data on capital allocations and inheritances.

For some parameters, such as the elasticities of substitution, particular values are assumed. For other parameters, such as the Stone-Geary preferences, econometric estimates are used. Finally, some remaining parameters are "calibrated" from data on actual allocations. Demand functions and all initial prices and observed quantities are used to solve backward for the value of the parameter that would make that quantity the desired one. That procedure establishes a "benchmark" equilibrium, with existing tax rules and prices. As a result, all consumers are buying the desired quantities and supplying the desired amounts of each factor, while producers are using their desired amounts of factors to produce the desired output.

Thus, using all of those parameters together, one can solve for an equilibrium with unchanged tax rules that replicates the benchmark's consistent data. That ability provides an important check on the procedure for solution. Then, starting from that verified benchmark, any particular tax rule can be altered, and one can determine how much more or less of each good consumers want to buy. The model's algorithm then raises the price of any good in excess demand and lowers the price of any good in excess supply, until it finds a set of prices at which the quantity supplied equals the quantity demanded for every good and factor. It simulates the effect of the tax change to calculate all new prices, quantities, and levels of consumer utility. The measure of the change in tax burden is the "equivalent variation," the dollar value of the change in utility measured in terms of benchmark prices. Gains in efficiency from

4. See Fullerton and Rogers, *Who Bears the Lifetime Tax Burden?* pp. 210-213, for discussion of how adopting the alternative "new view" affects the efficiency and distributional effects of the various U.S. taxes.

5. The benchmark specified in the Fullerton-Rogers book is based on earlier (1984) data.

a tax change are calculated as the present value of equivalent variations added over all income groups and all generations relative to the present value of lifetime incomes.

Results characterized as "short run" or "initial" correspond to an equilibrium immediately after the simu-

lated policy change. Results characterized as "long run" or "steady state" reflect allocations and prices after 30 equilibria are achieved, calculated five years apart from each other. Although the 30th equilibrium is 145 years after the time of the tax change, that equilibrium is virtually identical (in terms of allocation of resources and relative prices) to one that is 35 to 50 years out, at least in terms of the simulations discussed in this study.