



**Tax Policy Center**

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**EFFECTS OF IMPOSING A VALUE-ADDED TAX  
TO REPLACE PAYROLL TAXES OR CORPORATE TAXES**

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## **Introduction**

This report examines the effects of imposing a new value added tax (VAT) in the United States and using the revenue raised to lower payroll tax and corporate income tax rates. We summarize how different forms of VAT operate and compare how a VAT, payroll tax, and corporate income treat different sources of income and the different ways each tax distort economic decision-making.

We then present estimates of the revenue effects from a VAT and the reduction in payroll and corporate income taxes that a VAT could potentially finance. We examine several prototype VAT bases, including a broad tax base on just under 80 percent of consumption and a narrower tax base on about 50 percent of consumption that reduces adverse impacts on low-income households by exempting housing, food consumed at home, and medical expenses, other than those already financed by government. We also examine an alternative in which a broad VAT base is combined with a per-capita refundable tax credit instead of exemptions of necessities as a method of relieving the burden on low-income taxpayers.

The estimates in this report are “static” estimates, meaning they assume no behavioral response. We discuss, but do not estimate, potential behavioral responses to a VAT and how they might affect revenue raised and economic performance. We also briefly discuss the effects of adding a new VAT on administrative and compliance costs.

A major concern with a VAT is that it could be regressive, raising tax burdens proportionately more on lower income than on higher income taxpayers. The report provides estimates of the distributional effects by income group of substituting a VAT for cuts in employer contributions to Social Security taxes, the corporate income tax, and a combination of the two taxes.

## **Differences between the Tax Bases**

### *Description of Tax Bases*

*How a Value-Added Tax Works.* A value added tax is a tax on sales to consumers that is collected at different stages of the production process. It has the same base as a retail sales tax (RST) that is collected only on sales to final consumers. Under the *credit-invoice* type of tax used in the Europe, Australia, New Zealand, Canada, and elsewhere (sometimes referred to as general sales tax, GST), all sales by businesses are taxable, but sellers pass on invoices to the GST-registered business taxpayers who purchase goods and services from them. These purchasers, in turn, claim a credit for taxes paid on their purchases, but then pay GST on the full value of their sales. The result is that there are no net taxes on sales between registered VAT businesses, while the full value of the final sale to the consumer bears tax.

Under a *subtraction method* value added tax, sometimes called a business transfer tax (BTT) in the United States, all businesses pay VAT on the difference between the

value of their sales and the value of their purchases from other businesses. The sum of all amounts subject to tax under a BTT, if there are no exemptions, also equals the value of sales to final consumers. A subtraction-method VAT has been discussed in the United States and has been enacted in Japan<sup>1</sup>, but most countries use the credit-invoice method.

The mechanics of a retail sales tax (RST), subtraction method value added tax (BTT) and credit-invoice value added tax (GST) are often illustrated using the example of the production of bread (Table 1). In this example, in the absence of taxes, the farmer grows wheat and sells \$300 of it to the miller. The miller produces flour from the wheat, which he sells to the baker for \$700. The baker then bakes the bread and sells it to consumers for \$1,000.

Now suppose the government imposes a 10 percent sales tax. With an RST, business to business sales are exempt and the full \$100 (10 percent of sales) tax is collected from the baker. With the BTT, the farmer pays \$30 of tax on his \$300 of wheat and charges the miller \$330. The miller, in turn, pays \$40 of tax on his \$400 of value added and adds that tax to his price, charging \$770 to the baker. The baker charges the final consumers \$1070 plus a \$30 tax on the \$300 difference between his sales and purchases. The total tax is \$100, the same as in the RST example.

Table 1  
Example - Prices with 10 percent Sales Tax  
(taxes paid in parentheses)

Production Stage	No Tax	RST	BTT	GST
Farmer	\$300	\$300 (\$0)	\$330 (\$30)	\$330 (\$30)
Miller	\$700	\$700 (\$0)	\$770 (\$40)	\$770 (\$70-\$30)
Baker	\$1,000	\$1,100 (\$100)	\$1,100 (\$30)	\$1,100 (\$100-\$70)
Total Tax	\$0	\$100	\$100	\$100

RST = Retail Sales Tax, BTT = Subtraction Method VAT, GST = Credit-invoice Method VAT

The GST also produces the same result, but is calculated differently. The farmer pays \$30 of tax on \$300 of output, charges the miller \$330, and passes on a tax invoice of \$30. The miller pays \$70 of tax on \$770 of gross sales, but then cashes in this invoice for a \$30 tax credit, thus paying a net tax of \$40. The baker pays \$100 of tax on his gross sales, but then claims a \$70 credit, for a net payment of \$30. Again, total tax paid is \$100 and consumers spend \$1,100 for the bread, which would cost \$1,000 without any tax.

<sup>1</sup> Although Japan has a so-called subtraction method VAT, it contains all the invoice requirements and rules of a credit method VAT, so in effect it is not that different from VATs in effect in other countries.

While BTT and GST look the same, the mechanics work differently when either businesses or final consumers are exempt from tax. For example, to exempt bread consumption from an RST, all that is needed is to exempt the sales of the baker, because the farmer and miller already pay no tax (Table 2). Under a BTT, the farmer, miller, and baker would all need to be made tax-exempt; simply exempting the retailer would still leave in place the tax paid at earlier stages and only relieve the consumer of \$30 of the \$100 increase in price. In contrast, under a credit-invoice VAT, the farmer and miller continue to remit tax; eliminating tax on the final good is accomplished by making sales by the baker *zero-rated*, meaning the baker not only pays no tax, but also still claims \$70 of credit for taxes at earlier stages of production.

Table 2  
Example - Removing the Bread Tax

Production Stage	RST	BTT	GST
Farmer	No change	Exempt Sales	No change
Miller	No change	Exempt Sales	No change
Baker	Exempt Sales	Exempt Sales	Zero-rating

The three collection methods also have very different implications if one seller is left out of the sales tax system, either through a legislated exemption or by failing to report transactions (Table 3). Exempting the baker reduces tax by the full \$100 under an RST, but by only \$30 under both a subtraction method and credit invoice VAT. Under the subtraction method, the baker's purchase price continues to reflect taxes paid by the farmer and miller. In the credit invoice method, the baker's entire \$100 of sales are exempt, but if she is not in the system the baker cannot claim credit on the \$70 of tax previously paid, so again the tax saving is only \$30.

Exempting the farmer has no effect either under the retail sales tax or credit-invoice VAT. Under the retail sales tax, the farmer is already exempt. Under the credit-invoice tax, the farmer no longer pays \$30 in tax, but the miller then no longer receives a \$30 tax invoice and pays \$70 instead of \$40 to the government. The miller, in turn, passes on the \$70 tax invoice to the baker to claim against his \$100 tax, so the total tax paid remains \$100, although now the miller sends \$70 to the government and the farmer zero. Under the subtraction method VAT, in contrast, the \$30 tax cut to the farmer is passed forward as a lower price to the final consumer.

Exempting the miller has no effect under the retail sales tax, but very different effects under the subtraction method and credit-invoice versions of the VAT. Under the subtraction method, the \$40 tax saving to the miller is passed on as a lower price to the

final consumer. Under the credit-invoice tax, however, exempting the miller *raises* total tax paid by the consumer. The miller saves \$40 in tax as before, but now no longer passes on any tax invoice to the baker, who must pay \$1000 of tax on the full value of the sale, for a total combined tax of \$130 remitted by the farmer and baker. In effect, exempting the intermediate seller causes a break in the chain of credits, wasting the tax invoice that the farmer would otherwise pass forward to registered purchasers.

Table 3  
Example - Effect of Exemptions

Production Stage	RST	BTT	GST
Farmer exempt	No effect	\$30 tax cut	No effect
Miller exempt	No effect	\$40 tax cut	\$30 tax increase
Baker exempt	\$100 tax cut	\$30 tax cut	\$30 tax cut

These examples illustrate why many believe a credit-invoice VAT is superior to both a subtraction-method VAT and a retail sales tax as a way of administering a consumption tax. Compared with a retail sales tax, both versions of the VAT have a lower compliance risk, because evasion by the retailer removes only a portion of the tax on the final sale. Retail sales taxes in the U.S. states also produce significant cascading of multiple levels of tax because it is often administratively difficult to separate out sales of a good or service to businesses and sales to final consumers. The result is that, although theoretically exempt, business-to-business sales are often taxed. With a VAT, all sales are taxable, but purchasing firms that are VAT taxpayers can offset the tax on business to business sales either through a deduction of the value of goods purchased (subtraction-method) or claiming a refund of tax paid (credit-invoice method).

The credit-invoice VAT has two advantages over the subtraction-method VAT. First, the trail of tax invoices makes it easier to exempt the value of sales of selected consumer goods and services by zero-rating final sales; in contrast, it is more difficult to recover tax paid at earlier stages under a subtraction method VAT because there is no record of taxes paid at earlier stages of production. This makes it easier to exempt certain goods and services viewed as necessities from tax and to exempt exports. Second, under the credit-invoice VAT, it is harder to provide tax breaks to selected producers; as Table 3 shows, exemption of an intermediate producer could raise the total tax burden. In contrast, intermediate producers typically benefit from exemptions under a subtraction-method tax, unless there are (complex) mechanisms in place to deny deductions for purchases of intermediate goods that did not pay VAT.

A retail sales tax automatically taxes imports and exempts exports because it is collected only on sales to final consumers within a country's borders. Credit-invoice

value added taxes throughout the world also tax imports and exempt exports because importers do not pass forward tax invoices for their import purchases, while sales of exports are zero-rated. These taxes are said to be destination-based, as opposed to an origin-based tax that includes all domestic production in the tax base (whether for domestic use or export) and exempts imports. Destination-based taxes are neutral with respect to trade because they impose the same U.S. tax on domestic consumption of goods and services manufactured in the United States and overseas, while not taxing any consumption outside the United States. A subtraction-method VAT could also be made destination-based, but as noted above, exempting (while not subsidizing) exports requires tracing of taxes paid on intermediate goods in order to calculate the appropriate rebate.

*How the U.S. Payroll Tax Works.* The federal government imposes a 15.3 percent tax on employees' wages, collected half from employers and half from employees. Thus, for every \$107.65 of pretax compensation paid by employers, the employee receives \$92.35 of after-tax compensation, after her employee pays \$7.65 in payroll tax and withholds and remits an additional \$7.65 to cover the employee's share of the tax. The employer contribution is excluded from taxable income because it is deductible to the employer and exempt from the employee's taxable wages. (In this example, the employee reports \$100 of wages on her income tax return.) But the employee share of the tax is not deductible from the employee's taxable income, so the employee portion is effectively taxed more heavily than the employer share.

Self-employed persons pay both halves of the payroll tax. To make the self-employer person's tax (the SECA tax) equivalent to the combined tax on employers and employees as a share of pretax compensation (\$107.65 in this example), the sum of the employer and employee rates is applied to 92.35 percent of self-employment income. One half of the SECA tax is deductible from taxable income. Individuals who receive business income, partnership income, and farm income (reported on Schedules C, E, and F) must pay SECA tax on these sources of income.

Payroll taxes revenues are used to finance the Old Age, Survivors and Disability Trust funds (OASDI) of the Social Security program and the Hospital Insurance Trust Fund (HI) of the Medicare program. The tax rates are, respectively 12.6 percent for OASDI and 2.9 percent for HI. The OASDI rate is imposed only on wages and self-employment income up to the Social Security wage base (\$106,800 in 2009 and indexed to the growth in the average wage). The HI rate is imposed on all wages.

*How the Corporate Income Tax Works.* The corporate income tax is imposed on a corporation's profits; that is, its receipts less costs, at rates up to 35 percent. Most corporate profits are reported by the largest corporations and taxed at the 35 percent rate.<sup>2</sup> (Many states also tax corporate profits; after accounting for deductibility of the state corporate income taxes, these taxes add slightly over 4 percentage points on average, making the combined federal-state maximum corporate tax rate in the United States

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<sup>2</sup> Corporations may deduct 9 percent of profits from domestic manufacturing beginning in 2010 (the deduction was 6 percent in 2007-09); this effectively reduces the top corporate rate on those profits to 31.9 percent.

slightly over 39 percent.) Deductible costs include compensation paid to employees, costs of goods sold, and capital recovery allowances. Unlike under a typical corporate income tax, corporations cannot generally deduct the costs of purchases from other firms in the year of purchase. Instead, purchases of inventory and materials are deductible only when they or the outputs that include them are resold, under accounting rules that specify which purchases are associated with which sales. Purchases of capital goods used in production also (with some exceptions) cannot be deducted immediately, but instead may be deducted over time in accordance with depreciation schedules in the income tax.

The U.S. corporate income tax is imposed on the worldwide profits of U.S. corporations and on U.S.-source income of foreign corporations with permanent business establishments in the United States. Subject to some limits, U.S. corporations may claim a tax credit for foreign income taxes paid on their foreign-source income (up to the applicable U.S. tax rate on that income), so that income earned overseas is not taxed twice. In addition, with some exceptions, U.S. corporations may defer tax on profits of their foreign subsidiaries until these profits are repatriated as dividends to the United States. As a result of deferral and the ability of companies to time repatriation and use excess credits in high-tax countries to offset US tax on profits in low-tax countries, U.S. corporations pay very little residual U.S. tax on their profits earned overseas. Thus, with some exceptions, the U.S. corporate income tax operates as a tax on corporate profits from investments located in the United States.<sup>3</sup>

Simply eliminating taxation of corporate profits is not consistent with a system of income taxation. If there were no corporate income tax, individuals could accumulate income tax-free within corporations and escape individual income tax. Instead, the “neutral” treatment of corporate income within an income tax system is to allocate all corporate profits to corporate shareholders and tax the profits once at the individual level, as is done currently with partnerships and subchapter-S corporations. While neutral with respect to corporate form, debt-equity choices, and the decision to retain or distribute profits, however, partnership treatment (also called full integration) of large publicly traded corporations is cumbersome and costly because frequent changes in share ownership make it difficult to allocate corporate profits among individual shareholders. An alternative approach is to continue to tax retained earnings at the corporate level, but remove the double taxation of corporate dividends, either by allowing corporations to deduct dividend payments, allowing shareholders to claim a credit for taxes associated with dividends (the shareholder imputation method), or exempting dividends from individual-level taxation. The U.S. Treasury has at different times recommended all three of these approaches and also advanced a proposal that would tax both interest and dividends at the corporate level by eliminating corporate deductibility of interest and

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<sup>3</sup> A slightly more detailed description of the corporate income tax and the taxation of multinational corporations can be found in the Tax Policy Center’s “Tax Policy Briefing Book” at <http://www.taxpolicycenter.org/briefing-book/key-elements/international/consequences.cfm>

dividends, while also eliminating taxation of corporate interest and dividends received by individual taxpayers.<sup>4</sup>

### *Economic Distortions*

Taxes drive a wedge between prices paid by sellers and prices received by buyers, causing buyers to face higher prices or sellers to receive lower returns or both. To the extent taxes affect returns more to some than to other activities, they distort economic behavior, causing less output and consumption of heavily taxed activities and more of lightly taxed activities.

The three taxes examined in this paper impose different economic distortions (Table 4). All taxes distort the choice between market work and non-market production. For example, if I shovel snow from my driveway, the work I perform generates no income tax, but if I hire someone to clear away the snow and work an extra hour to get the money to pay him, I must pay tax on my additional earnings. This extra tax penalty applies equally to a payroll tax and a consumption tax; with the payroll tax, a portion of my market earnings is withheld from my paycheck, while with the consumption tax my additional market earnings buy less services, but again my labor shoveling snow escapes tax.

The corporate tax exempts labor services used to purchase goods this year, so it does not encourage me to shovel my own driveway instead of paying someone to do it. But if I choose to save my earnings, the corporate tax lowers my return on investment and therefore distorts my choice between non-market work and *future* consumption.

Both a consumption tax and a payroll tax are neutral between present and future consumption because they do not tax the rate of return on saving, which determines how much I can buy in the future if I sacrifice consumption today. In contrast, both the individual and corporate income taxes, by taxing returns to saving, encourage people to consume more today and save less for the future.<sup>5</sup>

Payroll taxes are in general neutral among choices of consumer goods, while consumption taxes may be distorting or neutral, depending on their design. The corporate income tax affects relative consumer prices through its effects on returns to capital investment, but does not directly distort consumer choices beyond those caused by the factor price distortions except to the extent it includes specific subsidies for some goods and services. (For example, the U.S. corporate income tax now includes a separate deduction for domestic manufacturing.) Both payroll and consumption taxes are neutral with respect to decisions about how businesses should be organized and financed and

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<sup>4</sup> See U.S. Department of the Treasury (1977), U.S. Department of the Treasury (1984), and U.S. Department of the Treasury (1992).

<sup>5</sup> Income taxes, by reducing people's wealth, may also lead them to consume less both today and in the future; this "income effect" could offset the "substitution" effect from lower returns, leading to no increase or even a fall in current consumption. But if a payroll or consumption tax replaces an income tax, so that on balance most people are paying roughly the same total taxes, this "income effect" approximately nets out and the reduced adverse "substitution" effect should raise saving.

what investments firms should undertake, while the U.S. corporate income tax favors selected tax-preferred investments, encourages firms to organize as flow-through enterprises (limited partnerships or subchapter S corporations) instead of taxable corporations, and encourages the use of debt over equity finance and retained earnings over dividends.<sup>6</sup>

Table 4  
Economic Distortions of Tax Bases

Choices Distorted	Consumption Tax	Payroll Tax	Corporate Income Tax
Market work vs non-market production	Yes	Yes	No for current goods; yes for future goods
Present vs future consumption	No	No	Yes
Choices among consumer goods	Yes, if some goods and services exempt	No	Yes, if some outputs tax-favored
Relative returns among capital investments	No	No	Yes, if some investments tax-favored
Form of business organization	No	No	Yes
Form of business finance	No	No	Yes

*Distributional Effects: Who Pays Taxes by Sources and Uses of Income*

All taxes, whether collected from individual or business taxpayers, are ultimately paid by people in the form of lower after-tax income.<sup>7</sup> Different tax bases, however, have varying effects on which people bear the burden of the tax. People differ in how they earn their income (sources of income) and how they spend their income (uses of income), and different tax instruments treat different sources of income (earnings, investment income, transfer payments) and different uses of income (for example, spending on

<sup>6</sup> The Jobs and Growth Tax Relief Reconciliation Act of 2003 (JGTRRA) equalized the tax rates on dividends and capital gains, but retained earnings still have some tax advantage over distributions because taxes on capital gains are delayed until gains are realized by sale or exchange and capital gains escape tax entirely if assets are transferred at death.

<sup>7</sup> Thus, it is meaningless to speak of a tax burden on corporations; the issue is which people bear the burden of taxes that corporations are required to pay on their profits.

housing, gasoline, cigarettes, food, etc.) differently. Behavioral responses by workers, investors, and consumers, could shift the initial burden of any tax to others.

Consumption taxes, corporate income taxes, and payroll taxes all tax selectively either certain sources of income, certain uses of income or both (Table 5).

*Sources Side.* Consumption taxes can be viewed as taxes on the gross sales of businesses to final consumers. As such, they lower both wages and profits in relation to prices charged to consumers. (Even if imposing a consumption tax causes nominal prices to rise instead of nominal wages and profits to fall, there is still a decline in *real* wages and profits.) But because a consumption tax allows firms to deduct instead of capitalize purchases of inventory, structures and capital equipment, it does not impose a tax on the return to new investment and saving.<sup>8</sup> So the only differences between consumption and income taxes are that the former exclude from the tax base the normal return to new saving and do not allow taxpayers to deduct interest on new borrowing. Compared with income taxes, consumption taxes impose lower burdens on individuals who are accumulating wealth and heavier burdens on those who are increasing their indebtedness or spending down wealth.<sup>9</sup>

Payroll taxes generally only include wages in the base and exempt returns from capital income. (All self-employment income, partnership income, and farm income are subject to the payroll tax, even though some of this income may represent a return to assets invested in the business.) Payroll taxes also exempt the components of reported capital income that represent entrepreneurial returns instead of normal returns to capital.<sup>10</sup>

The corporate income tax is imposed only on a portion of capital income: the returns (both normal returns and economic rents) to equity investors. Recipients of labor income and interest income do not pay corporate income tax because labor compensation costs and interest payments are deductible from corporate income.

*Uses Side.* Everyone is a consumer, so in one sense it is meaningless to say a tax falls on “consumers.” But all of us consume different mixtures of goods and services. A consumption tax that taxed all goods and services at the same rate would have no “uses” side effect, but in practice both state retail sales in the United States and value added taxes overseas have numerous exemptions and special rates. The effect is that a consumption tax favors those who consume a larger share of untaxed goods and services over those who consume relatively more taxable goods and services.

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<sup>8</sup> The equivalence between exemption of new saving and exemption of normal returns to new capital has been explained in many articles and textbooks. See, for example, Bradford *et al* (1984).

<sup>9</sup> The current federal individual income tax has many “consumption-tax” features; it allows individuals to accrue income tax-free within qualified retirement saving accounts and it does not allow deductions for most interest paid by individuals, with the notable exception of home mortgage interest.

<sup>10</sup> For example, limited partners in private equity firms receive a large share of their compensation in the form of “carried interest” that is taxed as capital gain; these gains are not subject to payroll tax even though they arguably represent a return to the partner’s labor sources.

A payroll tax includes all wages in the base. If, as most economists assume, it falls on wage-earners in the form of lower after-tax wages and does not change pre-tax wages, it has no effect on relative cost of different goods and services and therefore is neutral on the uses side.<sup>11</sup>

The corporate income tax does affect the relative prices of goods and services because it is a “partial tax” on only some factors of production and some firms. It raises the prices of goods in corporate-intensive industries relative to those characterized by non-corporate firms (real estate and agriculture) and raises relative prices in capital-intensive industries. The current U.S. corporate income tax also favors some industries over others due to preferential treatment of selected forms of investment, such as expensing of oil and gas drilling and research expenses and more favorable depreciation rules for machinery and equipment than for structures.

Table 5  
Tax Bases for Consumption, Corporate Income, and Payroll Taxes:  
Sources and Uses

	Sources	Uses
Consumption Taxes	Wages, economic profits, and returns to old capital included; income from new saving and indexed transfer payments exempt	Taxable goods and services; typically some goods and services exempt
Payroll Taxes	Wages and self-employment income included; returns to capital and economic profits exempt	No distinction among uses
Corporate Income Tax	Returns to equity capital, including economic profits and normal returns included; wages and interest income exempt	Goods and services produced in the corporate sector; capital-intensive goods taxed more heavily

*Treatment of Indexed Transfer Payments.* All three taxes exempt indexed transfer payments, such as Social Security retirement benefits. Consumption taxes exempt indexed transfers, without regard to whether the Federal Reserve System allows prices to rise to accommodate the tax or holds prices fixed, forcing factor incomes to decline. If prices rise, recipients of indexed transfers are compensated by an increase in their

<sup>11</sup> If employers of minimum-wage workers cannot pass through the employer share of the tax in the form of lower wages and must therefore instead pass through the cost in higher prices to their consumers, then the payroll tax imposes a relatively higher burden on consumers of goods and services employing minimum-wage workers than on other consumers.

benefits. If prices do not rise, recipients of indexed transfer payments are unaffected because the real (and in this case also the nominal) value of their benefits is unchanged.

## **Estimates of Revenue Effects**

### *Simulations Performed*

We estimate the effect on federal tax liability and the distribution of the tax burden of imposing a 5 percent VAT on both a broad and a narrow tax base in 2012. We also estimate the effects of combining a 5 percent VAT on a broad base with per-capita refundable tax credits that lose the same revenue as the additional exemptions in the narrow base. We simulate the effects of using the revenues from the broad and narrow base VAT options to reduce the employer contribution to the OASDI payroll tax and the corporate income tax.

The broad base VAT includes all domestic consumption, except for education, government-financed health care (Medicare and Medicaid), services of charitable organizations, and services performed by sub-national governments. Under a credit-invoice VAT, these expenditures would be zero-rated; that is sellers to charitable organizations would be able to exempt their sales, but claim invoice credits, just as with exports. State and local sales taxes are also exempt from the VAT base. The imputed value of financial services (charged for implicitly through reduced interest rates to deposit holders) would be exempt due to the difficulty of measuring it. Interest paid on vehicles and other consumer debt is also exempt. The broad base includes just under 80 percent of total consumption.

The narrow base VAT has the same exemptions as the broad base, but in addition exempts housing consumption, food consumed at home, and private medical expenses (out of pocket expenses and insurance premiums). The narrow base includes just over 50 percent of total consumption. The appendix provides more detail on the composition of the broad and narrow bases.

### *Revenue Estimates.*

*Impose a Broad-Based VAT.* Imposing a 5 percent VAT on a broad base in 2012 would increase tax liability by \$259 billion, about 1.7 percent of projected GDP<sup>12</sup> (Table 6). The VAT itself would raise about \$355 billion (2.3 percent of projected GDP), but would be partially offset by \$56 billion in reduced individual income tax liability, \$30 billion in reduced payroll tax liability and \$11 in billion reduced corporate income tax liability.<sup>13</sup> (The reduction in income and payroll tax liability that we estimate is about 27

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<sup>12</sup> The Congressional Budget Office (2009) projects GDP at \$15,574 billion in 2012.

<sup>13</sup> We follow the estimating convention used by the Treasury Department and the Joint Committee on Taxation (JCT) that assumes that GDP is invariant to changes in tax policy. With nominal GDP (and prices) fixed, a consumption tax must lower factor incomes. Effectively, the sales tax paid by the business is deductible from profits that the business reports and reduces the taxable wages it pays. Treasury and JCT

percent of VAT receipts, comparable to the 25 percent offset that JCT uses for excise taxes.)

*Impose a Narrow-Based VAT.* The narrow base 5 percent VAT would increase tax liability by about \$161 billion in 2012 or 1.0 percent of projected GDP (Table 6). The VAT would raise about \$221 billion (1.4 percent of projected GDP), partially offset by \$34 billion in reduced individual income tax liability, \$19 billion in reduced payroll tax liability and \$7 billion in reduced corporate income tax liability.

If, instead of including additional exemptions of “necessities” to relieve the tax burden on low-income individuals, the broad-based VAT were combined with a refundable credit equal to \$436.88 per adult (\$218.44 or half as much per dependent child), the net increase in tax liability would remain at \$161 billion. The rebate itself would cost about \$98 billion and income and payroll tax offsets would increase to \$97 billion, the same as under the broad-based VAT, but, as shown below, the distributional effects of a rebate differ substantially from the distributional effects of additional VAT exemptions.

Table 6  
Revenue Effect of a 5 percent VAT in 2012  
(in billions of dollars)

VAT Option	VAT	Individual Income Tax	Payroll Tax	Corporate Income Tax	Refundable Credit	Net Tax Increase
Broad base	\$355.5	-\$55.8	-\$29.8	-\$11.4	\$0.0	\$258.6
Narrow base	\$221.4	-\$34.0	-\$18.6	-\$7.1	\$0.0	\$160.9
Broad base with rebate <sup>1</sup>	\$355.5	-\$55.8	-\$29.8	-\$11.4	-\$97.7	\$160.9

Source: Urban-Brookings Tax Policy Center Microsimulation Model (version 0509-4).

(1) A rebate in the form of a refundable tax credit equal to \$436.88 per adult and \$218.44 per dependent child, combined with the broad base, raises the same net revenue as the narrow base.

*Use VAT Revenues to Reduce Payroll Taxes.* If the receipts from a broad-based VAT were used to finance a reduction in employer contributions to OASDI, the employer contribution as a share of wages could decline from 6.2 percent under current law to 0.3

thus apply an offset in reduced individual income, corporate income, and payroll tax revenues when sales taxes are imposed or increased. In addition, a cut in the employer contribution to payroll taxes also has an offset. The reduced employer tax raises wages and therefore raises individual income tax receipts. Our revenue and distributional estimates include the effects of these offsetting changes in other taxes. (See the appendix for a fuller discussion.)

percent (net of all offsets); that is, net receipts from a 5 percent broad-based VAT would be sufficient to eliminate almost all of the employer contribution to Social Security (Table 7). (Employers would still pay their 1.45 percent share of the Medicare tax and employee contributions to OASDI and HI would be unchanged.) The narrow-based VAT would not permit as big a payroll tax cut, but the employer contribution could still drop by 3.7 percent of wages, from 6.2 percent to 2.5 percent.

*Use VAT Revenues to Reduce Corporate Income Taxes.* Alternatively, the VAT revenues could be used to finance a drop in the corporate tax rate. Assuming no behavioral responses, the broad-based 5 percent VAT would raise enough to drop the top corporate rate to 7.4 percent; the narrow-based VAT would finance a cut to 18 percent. As discussed in the next section, behavioral responses go in different directions and could enable either a larger or smaller corporate rate cut.

*Use VAT Revenues to Reduce Corporate and Payroll Taxes.* If the broad-based VAT were used to finance equal cuts in employer contributions to OASDI and the corporate income tax, the employer OASDI contribution rate could drop to 3.5 percent and the corporate tax rate to 19.7 percent. Alternatively, the narrow base could be used to finance cuts in the employer OASDI contribution rate and corporate rate to 4.5 percent and 25.6 percent, respectively.

Table 7  
Required Payroll and Corporate Tax Rates under VAT Options

VAT Option	Reduce Corporate Rate	Reduce Employer OASDI Payroll Rate	Reduce Both Rates	
			Corporate	Payroll
No VAT	35.0%	6.2%	35.0%	6.2%
Broad Base	7.4%	0.3%	19.7%	3.5%
Narrow Base <sup>1</sup>	18.0%	2.5%	25.6%	4.5%

Source: Urban-Brookings Tax Policy Center Microsimulation Model (version 0509-4).

(1) Required rates are the same for the broad base with rebate option.

## Economic Effects and Behavioral Responses

These revenue estimates assumed no behavioral responses. We have estimated the effects of behavioral responses on receipts or the effects of the various policy options on economic efficiency and output, but provide below some qualitative discussion.

### *Benefits of a VAT Relative to a Payroll Tax*

A value-added tax is neutral between present and future consumption, so it does not adversely affect the incentive to save. It does, however, reduce the return from working in the same manner as an individual income tax or payroll tax, although the mechanism for remitting the VAT is very different than the collection mechanism for direct taxes. The result is that the net effect of substituting a VAT for payroll tax on the incentive to work is not large.

The substitution of a broad-based VAT for a portion of the employer payroll tax that we simulate would raise the after-tax wage (lower the total tax rate on the employee's work product) for workers in the 15 and 25 percent brackets, but lower the after-tax wage (increase the total tax rate on work) for high-wage employees who earn more than the maximum wage subject to OASDI tax (Table 8).

In the examples shown, all workers contribute an additional \$107.65 to the value of an employer's sales. The worker's marginal product is assumed to be invariant under different tax regimes. Under current law, there is no VAT, but employers withhold from wages \$7.65 in employer payroll taxes, leaving \$100 of taxable money wages. They also withhold the employee's \$7.65 payroll tax contribution and the employee in the 15 (25) percent bracket pays an additional \$15 (\$25) of income taxes.

The employee in the 35 percent bracket is assumed to have earnings above the Social Security wage threshold, so she and her employer both pay only the 1.45 percent (\$1.54) Medicare payroll tax on a money wage that is now \$106.11 for every \$107.65 of worker product. The 35 percent income tax rate raises \$37.14 on the higher money wage base. The total tax rate (as a share of marginal product) paid by the workers in the 35 percent bracket is about the same as the tax rate in the 25 percent bracket, as the reduced marginal payroll tax rate (from crossing the OASDI threshold) almost exactly offsets the higher marginal income tax rate.

Introducing a 5 percent VAT on a base that includes just 78.6 percent of consumption (see appendix) is equivalent (in terms of its effect on after-tax income) to introducing a VAT of 3.93 percent on all consumption. Because VAT is expressed in tax-exclusive terms (on sales excluding the tax), the tax on rate on sales including the tax is somewhat lower (3.78 percent). The VAT reduces the gross compensation that can be paid to employees, therefore, by 3.78 percent of the worker's contribution to sales (including tax). In the example, this comes out to a VAT of \$4.07. The VAT revenues are used to reduce the employer payroll tax rate by 5.9 percentage points to 1.75 percent. For workers in the 15 and 25 percent marginal income tax bracket, the employer payroll tax collected equals \$1.81 on the \$103.58 of gross compensation net of VAT.

The remaining \$101.77 of money wages is then subject to employee payroll tax on \$7.79 (7.65 percent) and income tax of \$15.27 (in the 15 percent bracket) and \$25.44 (in the 25 percent bracket). Note that the net increase in money wages from substituting a VAT for employer payroll tax contributions raises income tax revenues slightly. The bottom lines, combining all the taxes, are fairly modest declines in the total marginal tax rates on the worker's product. For the worker in the 15 percent income rate bracket,

substituting VAT for payroll taxes reduces the total marginal tax rate from 28.1 percent to 26.8 percent. For the worker in the 25 percent income tax bracket, the total marginal rate falls from 37.4 percent to 36.3 percent.

Thus, for the workers in lower marginal tax brackets, substituting a VAT for the employer payroll tax slightly increases the after-tax return from working more. Both the VAT and payroll tax adversely affect work effort, but because part of the VAT also falls on consumption from old wealth, the net return to work from the payroll tax substitution is slightly higher.

Table 8

Example: Taxation of Sample Employees, Partial Substitution of a VAT for a Payroll Tax

	15% Bracket		25% Bracket		35% Bracket	
	Current Law	with VAT	Current Law	with VAT	Current Law	with VAT
Marginal Product	\$107.65	\$107.65	\$107.65	\$107.65	\$107.65	\$107.65
VAT	\$0.00	\$4.07	\$0.00	\$4.07	\$0.00	\$4.07
Gross Compensation	\$107.65	\$103.58	\$107.65	\$103.58	\$107.65	\$103.58
Employer Payroll Tax	\$7.65	\$1.81	\$7.65	\$1.81	\$1.54	\$1.50
Cash Wage	\$100.00	\$101.77	\$100.00	\$101.77	\$106.11	\$102.08
Employee Payroll Tax	\$7.65	\$7.79	\$7.65	\$7.79	\$1.54	\$1.50
Income Tax	\$15.00	\$15.27	\$25.00	\$25.44	\$37.14	\$35.73
Net Wage	\$77.35	\$78.71	\$67.35	\$68.54	\$67.43	\$64.85
Total Tax Rate	28.1%	26.9%	37.4%	36.3%	37.4%	39.8%

Notes: VAT is the 5 percent broad-based VAT. It includes 77 percent of consumption, so the VAT rate on all sales is 3.93%. This is a tax exclusive rate; the tax inclusive rate equals  $(3.93/1.0393) = 3.78\%$ .

The payroll tax rates under current law are 7.65% for both the employer and employee.

The VAT revenues are used to reduce the employer payroll tax rate by 5.9 percentage points to 1.75%.

For taxpayers in the 35 percent income tax rate bracket, it is assumed that their wages are above the Social Security thresholds, so only the Medicare tax (1.45 percent of the money wage for both the employer and employee) applies at the margin. In the VAT simulations we perform, only the OASDI tax is reduced.

These calculations assume the workers views the payroll tax as a "tax," and do not take into account any increase in future Social Security benefits from higher payroll tax contributions.

The story is different for the worker in the 35 percent bracket, however. She gets no incentive to work more from the reduction in the OASDI payroll tax rate because she is already over the wage threshold for OASDI taxes. The employer payroll tax collected from her declines slightly only because the VAT reduces her gross compensation. The resulting decline in her money wages also lowers her income tax payment. But, after

these offsets, the VAT raises the total marginal tax rate she faces on an additional dollar of earnings from 37.4 percent to 39.8 percent.

### *Benefits and Costs of Corporate Rate Reductions*

The effects of substituting a VAT for part of the corporate income tax are very different than the effects of substituting it for part of the payroll tax. The corporate income tax does not distort the choice between working for current consumption and leisure, but it does either reduce the after-tax return on capital or increase the return investors must receive from a corporate investment. Thus, substituting VAT for a portion of the corporate income tax should increase incentives to save and invest.

In an open economy with international capital flows, different ways of taxing capital income may affect incentives to save and invest differently. Most corporate income tax is paid by large multinational corporations. For those companies, the tax is largely a *source-based* tax on their profits from investments in the United States. Both U.S. and foreign-owned multinational corporations are taxable on their U.S.-source income, but U.S. multinational corporations pay little additional tax on profits from overseas investments because of provisions such as deferral and foreign tax credits (Grubert and Altshuler, 2006). This means that the corporate level tax may raise the cost of corporate capital in the United States by raising required pretax returns on investments in the United States by internationally mobile investors, by much more than it lowers after-tax returns to U.S. savers, who can escape the U.S. corporate tax by investing in foreign assets. Beyond this, even if the after-tax return to U.S. savers falls, some research shows this may not reduce their saving much because savers respond little to changes in after-tax returns (Bernheim, 2002).

This analysis suggests that the main benefit of lowering the corporate income tax would be to attract more investment to the United States. In addition, because corporations can use transfer pricing and other techniques to shift the source of reported income among countries, a lower corporate tax rate could lead to more reported profits in the United States. A shift of reported corporate profits to the United States would raise revenue collected from U.S. corporations, partially or fully offsetting the direct loss in revenue from a lower corporate rate, even if domestic investment does not increase.

*Increased Domestic Investment.* Many studies find that the location of investment of multinational corporations is sensitive to the local effective tax rate on corporate income (de Mooij and Ederveen, 2003). This means that reducing the U.S. corporate income tax would encourage U.S. companies to substitute domestic for foreign investment and foreign-owned companies to invest more in the United States. The increased investment would also raise the corporate income tax base, therefore offsetting some of the revenue loss from the lower corporate tax rate. More investment would raise real wages in the United States and lower pretax returns to capital, shifting some of the benefits of the tax reduction from capital owners to workers.

*Reduction in tax-motivated Income Shifting.* A lower U.S. corporate tax rate would also reduce income-shifting within multinational corporations from U.S. to foreign affiliates (Clausing, 2007). With a higher corporate rate in the United States than in other countries, companies have an incentive to manipulate transfer prices between their affiliates, overstating the value of goods and services purchased from foreign affiliates and understating the value of goods and services sold or licensed to them (especially unique intangibles, for which it is difficult to establish a comparable “arms-length” price). Companies may also engage in other transactions, such as debt-equity swaps, that shift reported income among their affiliates.

*Responses of Other Advanced Countries.* Since enactment of the 1986 tax reform act, the U.S. federal statutory corporate rate has remained virtually unchanged, rising from 34 to 35 percent in 1993. (The deduction for domestic production activities enacted in 2004 reduced the tax rate to 31.85 percent for certain domestic investments.) Most other countries in the OECD reduced their corporate tax rates substantially over the same period. Currently the U.S. federal-state average top corporate rate of 39.3 percent (excluding the domestic production deduction) is substantially above the average statutory rates for the rest of the G7 (32.2 percent) and the rest of the OECD (26.2 percent) (Altshuler, Harris, and Toder, 2009).

Reducing the U.S. corporate tax rate would help correct this imbalance. But if other countries react to a lower U.S. corporate tax rate by reducing their tax rates further, the benefit to the United States of lower rates would be substantially reduced. Instead of a lower rate shifting investment to the United States, its net effect could instead be a loss in revenue to all OECD treasuries.

*Potential Erosion of Individual Income Tax Base.* In an income tax system, a corporate income tax is necessary to prevent individuals from accruing tax-free profits within corporations. A neutral rule for taxing investment income under an income tax would tax corporations the same ways as partnerships. There would be no separate corporate income tax, but corporate profits would be allocated to shareholders in proportion to share ownership and taxed as accrued under the individual income tax. The partnership method of taxing corporate income, however, is administratively impractical for large corporations with many shareholders and frequent changes of share ownership.

Lowering the corporate rate below the top individual income tax rate would provide an incentive for many small closely held businesses that are currently taxed as flow-through enterprises (limited partnerships or subchapter S corporations) to choose to be taxed as corporations. With an additional individual income tax of 15 percent on dividend income and a top individual tax rate of 35 percent, the combined corporate-individual rates on dividends would be lower than the tax rate on partnership income for corporate rates below 23.6 percent. And if individuals wanted to accrue and reinvest profits or could find ways to convert labor income to corporate income, the lower corporate rate would make corporations an attractive tax shelter that would erode the individual income tax base. Special rules would need to be devised to limit the ability of

small or closely-held businesses to be taxed as corporations and to prevent shifting of reported income from labor compensation to profits (Halperin, 2009).

### **Effects on Compliance Burdens and Tax Administration**

Value-added taxes around the world may impose lower average compliance burdens on taxpayers and administrative costs on tax enforcement agencies than income taxes. For example, the U.S. Government Accountability Office (2008) cites evidence from the United Kingdom and New Zealand that administrative costs are lower for a VAT than for an income tax. VAT costs less than an income tax because it is collected only for business taxpayers, so that most individual taxpayers are outside the system. In addition, many countries exempt small businesses which, as we note above, could have very minor adverse revenue consequences in an invoice-credit system because businesses outside the system do not receive credit for VAT collected at earlier stages of production.

But administering a VAT is not cost-free and countries with a VAT experience significant problems of tax avoidance. Adding a VAT on top of the existing income tax system would add to total costs of administration for the entire tax system because businesses would face additional reporting requirements and the IRS would have to administer an entire new tax, without shedding responsibility for other taxes. The credit-invoice system does introduce an element of self-enforcement compared with a retail sales tax because in the latter system non-reporting by the retailer avoids tax on the entire value of the good, while under the VAT retailers outside the system do not get to claim credits for tax invoices from their purchases. But VAT is far from fraud-proof. The Government Accountability Office (2008) cites a number of tax avoidance issues, including false invoices, underreporting of cash transactions, and use of fictitious businesses to claim invoice credits. Compliance problems are significantly worse if there are multiple rates.

HM Revenue and Customs (2009) estimates a tax gap for the United Kingdom VAT of 12 percent of total tax liability, compared to a tax gap for all direct taxes (income tax, social insurance payments, capital gains, and corporation income tax) of 8 percent. But the UK VAT has many exemptions and special rates, while the UK income tax is simpler than the US tax system. In comparison, the latest IRS estimates of the tax gap for the entire U.S. tax system (almost entirely reflecting direct taxes) is about 16 percent of total tax liability (Toder, 2007).

In short, a VAT stacks up reasonably well relative to other tax instruments in terms of its compliance burdens, costs of administration, and potential for evasion. But adding a VAT on top of the existing system would raise costs of compliance and administration. Given the fixed costs of adding a new tax system, a VAT would impose large costs per dollar of additional revenue if the rate were too low. This argues for enacting either a fairly substantial VAT or none at all.

## **Distributional Effects**

Introducing a new value added tax to replace revenues from either the payroll tax or the corporation income tax will alter the distribution of tax burdens among income groups. In this section of the report, we review briefly how the Tax Policy Center (TPC) does distributional analyses, outline our methods for assigning burdens to corporate income taxes, payroll taxes, and consumption taxes, and discuss the assumptions we make. We then present results of how the policies we simulate will affect the distribution of tax burdens among income groups.

### *The Tax Policy Center Micro-Simulation Model*

The Urban-Brookings Tax Policy Center Microsimulation Model (TPC model) calculates tax liability for a representative sample of households under current law and alternative tax rules. The sample includes over 130,000 individual income tax returns filed in 2004 from the Public Use File (PUF) produced by the Statistics of Income Division (SOI) of the Internal Revenue Service (IRS). The data source is similar to data used by the Congressional Budget Office (CBO), the Joint Committee on Taxation (JCT) and the Treasury's Office of Tax Analysis (OTA) for their revenue and distributional estimates, except for some changes in the sample and elimination of certain data fields performed by SOI to mask the identity of individual taxpayers. TPC augments the tax return sample with data on non-filers, based on a statistical match between the SOI and the Current Population Survey (CPS). The TPC model includes a detailed tax calculator incorporating parameters of current, past, and future tax laws, which can compute individual income taxes paid by all tax units. Documentation of the model is supplied in Rohaly, Carasso, and Saleem (2005).

The data in the TPC model are projected to tax years 2009-2019, based on CBO economic forecasts and on the most recent published data on the distribution of individual income and income sources by income group from the SOI. TPC has also statistically matched to the tax returns data on consumption of different goods and services by income group from the Consumer Expenditure Survey (CEX), data on consumption of medical services from the National Medical Expenditure Survey (NMES) and data on wealth holdings by income group from the Survey of Consumer Finances (SCF). TPC also uses the match with CPS records to impute the division of wages between spouses for purposes of computing payroll tax liability because the tax return data from the PUF only show total wages of the tax unit.

The TPC model does not simulate corporate income taxes paid. It does, however, distribute the burden of a given level of corporate income taxes based on data reported on individual income tax returns and data imputed to the model, as discussed below.

### *Assumptions about Distributional Incidence*

*Corporate Tax Falls on Capital Income.* Following the method used by the U.S. Treasury Department and the Congressional Budget Office, TPC currently allocates the burden of corporate taxes in proportion to capital income of individuals. This method is based on models of the incidence of corporate taxation by Harberger (1962) and subsequent authors, which assume a fixed supply of total saving and a closed economy. In the Harberger model, the corporate tax causes capital to flow from the corporate to the non-corporate sector, raising prices and pretax returns to capital in the corporate sector and driving down returns in the non-corporate sector, thereby shifting the burden of the tax from owners of corporate equity to all capital owners. Harberger finds under these assumptions and using reasonable estimates of behavioral responses that capital owners bear between 90 and 120 percent of the burden of the tax, with the exact amounts depending on relative shares of labor and capital in production in the two sectors and the amount of substitutability between labor and capital in production.

More recent research has considered the effects of corporate taxation in a global economy, where some of the corporate tax burden may be shifted to labor through an outflow of corporate capital overseas, which would reduce the capital/labor ratio and real wages in the United States (Gravelle and Smetters, 2006; Randolph, 2006; Harberger, 1995; and Harberger, 2006). Authors disagree on how much of the tax is shifted to labor, with the amount depending on the degree of substitutability in consumption between U.S. and foreign-manufactured products and the degree of portfolio substitution between investments in equities issued by U.S. and foreign-based multinational corporations. In addition, some of the corporate income tax may stick with corporate equity owners in the short run and, to the extent the tax captures economic rents instead of normal returns to equity, in the long run as well. Good summaries of this research can be found in Auerbach (2007) and Harris (2009).

*Payroll Tax Falls on Labor Income.* TPC assumes that both the employee and employer components of the payroll tax are paid by workers (including self-employed individuals and recipients of farm and partnership income) in proportion to their taxable earnings. Since research finds labor supply generally fairly unresponsive to changes in the after-tax wage, labor is unlikely to escape much of the tax by working less, thereby raising the pretax market wage.

*Consumption Taxes Have Both Source and Use Effects.* In this paper, we model consumption taxes in two pieces. On the sources side, the total amount of the tax is allocated among taxpayers in proportion to their sum of labor income (including both earnings subject to income tax and tax-free fringe benefits) and economic profits. For the whole economy, economic profits are calculated as the difference between total consumption (e.g., sales of businesses) and labor income, as reported in the National Income and Product Accounts. Once the total amount of economic profits is calculated, it is allocated among taxpayers in proportion to their wealth holdings. What that means in practice is that the consumption tax is modeled as a tax on labor income plus a partial tax on income from capital.

The amount of tax allocated on the sources side adds up to the total revenue from the consumption tax. But the consumption tax also affects relative prices, benefitting (relative to a uniform tax) those who spend relatively more of their consumption on tax-free goods and services and hurting those who spend relatively more on taxable goods. We impute consumption of different goods and services to taxpayers in different income groups, based on relative ratios of consumption to income reported in the CEX. We then compute the additional taxes (relative to a uniform tax raising the same revenue) paid by those with high ratios of taxable to total consumption and the tax saving of those with lower ratios of taxable to total consumption. The sum of the sources and uses side burdens for each income group is their total burden from the tax.

The method we use to allocate the burden of the consumption tax as a tax on income from labor and economic profits plus a reallocation of tax burdens by consumption patterns is similar to the methodology used by the Treasury Department for allocating the burden of general consumption taxes and specific excise taxes (Cronin, 1999). But our method does not take account of differences among income groups in the ratio of current to future consumption; that is, differences in the rate at which tax units in different income groups will either add to or spend down from their existing wealth in future years. In effect, the estimates assume that the ratio of saving to wealth is the same for all income groups. TPC is currently reviewing how best to impute differences among tax units by income and age in their additions to (through saving) or subtractions from (through consumption) existing wealth.

#### *Problems with Alternative Methods for Distributing the Burden of Consumption Taxes*

The method used in this paper is one way of modeling the distributional burden of consumption taxes. An alternative method is to allocate the burden of a uniform consumption tax in proportion to the ratio of current consumption to current income by income group, as reported in the CEX. This “consumption ratio” method of allocating the burden of a uniform consumption tax results in a much more regressive distribution of the tax burden than the “income sources” method we use (Burman, Gravelle, and Rohaly, 2005). Although both methods have flaws, we believe the “sources” method better represents the distributional burden of a consumption tax.

*Distributing by Observed Difference in Ratio of Current Consumption to Current Income.* In the CEX data, the ratio of consumption to income falls dramatically as income rises. Individuals in the bottom quintile, for example, consume more than 200 percent of their income in the CEX data. There are several problems with using this as the basis for determining the effect of consumption taxes by income group. First, some observers believe the ratio of consumption to income may be significantly overstated because the CEX underreports income at the low end of the distribution. Reported contributions to savings accounts, also in the CEX, suggest much less variation in the ratio of saving to income by income group than the consumption/income ratios suggest (Sabelhaus, 1998). Second, the data do not record private transfers that some people may receive from relatives. If other people are footing the bill for someone’s consumption, it

is inconsistent to assign the income to the donor and the consumption tax burden to the recipient of the transfer. Finally, one year's snapshot of data is not representative of how much people consume relative to their income over a longer period. Individuals cannot sustain consumption levels of more than double their income over an extended period, but may react to a temporary drop in income (from, for example, a temporary spell of unemployment) by spending down wealth or borrowing and may save a large part of a temporary windfall. Both of these behaviors make the ratio of transitory consumption to transitory income by income group decline much more sharply with income than the ratio of permanent income to permanent consumption. In a widely cited study using data from the Panel Study on Income and Dynamics, Fullerton and Rogers (1993) find that people with higher lifetime incomes do consume a somewhat smaller share of their income than people with lower lifetime incomes, but the ratio of permanent consumption to permanent income declines only modestly as permanent income increases.

For all these reasons, we believe that using the CEX data to represent how a consumption tax would affect people in different income groups would make a consumption tax appear much more regressive than it really is. We do, however, use the CEX as a reasonably accurate (and the best available) measure of the *relative* amounts people spend on different goods and services.

*Assuming Saving is Proportional to Wealth.* People accrue wealth through saving so distributing the benefit from exempting new saving to wealth holders (by assuming only a portion of the return to wealth is taxable) is a reasonable first approximation if wealth/income ratios are a reasonable proxy for variations in the long-term saving/income ratios across individuals. This estimate of the benefit of exempting new saving from tax is also flawed, however, to the extent that the distribution of *net future wealth accruals* differs systematically across income groups from the distribution of current wealth. If, for example, low-income individuals have a lower (higher) ratio of future wealth accruals to current wealth than high-income individuals, then our measure will have made a consumption tax look more progressive (regressive) than it is because a consumption tax adds an extra burden on those who are spending down their old wealth, but exempts accruals of new wealth. TPC plans to investigate this relationship further, using simulation models based on estimates of age-wealth profiles for different income groups.

### *Distributional Estimates*

We estimate the distributional effects of imposing a broad-based VAT, a narrow-based VAT, and a broad-based VAT with per-capita refundable credits and of using these three VAT options to finance reductions in the employer contribution to the OASDI payroll tax, the corporate tax rate, and both payroll and corporate rates. This section summarizes the distributional results. More complete TPC tables are presented in an Appendix.

*With Broad-Based VAT.* The burden of a broad-based VAT is roughly proportional throughout the income distribution, except at the very top (Table 9). The tax

reduces after-tax incomes by 2.9 percent from the middle of the income distribution through the 95<sup>th</sup> percentile. The reduction in after-tax income is slightly less in the bottom two quintiles, largely because many taxpayers in these income groups are older taxpayers who rely on indexed Social Security benefits, which are not burdened by a VAT, for a substantial share of their income. The percentage reduction in after-tax income declines more sharply at the top of the income distribution, where most income from capital (partially exempt from VAT under our assumptions) is concentrated.

Table 9  
Effects of a Broad-based 5 percent VAT with Alternative Offsets  
on After-tax Income, 2012

Income Group	No Offset	Reduce Payroll Tax <sup>1</sup>	Reduce Corporate Tax <sup>2</sup>	Reduce Both Taxes <sup>3</sup>
Bottom Quintile	-2.8%	+0.4%	-2.1%	-1.0%
Second Quintile	-2.6%	+0.5%	-1.9%	-0.8%
Middle Quintile	-2.9%	+0.6%	-2.1%	-0.9%
Fourth Quintile	-2.9%	+0.7%	-1.9%	-0.8%
80-90th percent	-2.9%	+0.5%	-1.5%	-0.6%
90-95th percent	-2.9%	+0.2%	-0.9%	-0.4%
95-99th percent	-2.7%	-0.8%	+1.0%	+0.2%
Top 1 percent	-2.1%	-1.8%	+6.9%	+3.0%
<b>All Tax Units</b>	<b>-2.7%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>

Source: Urban-Brookings Tax Policy Center Microsimulation Model (version 0509-4).

(1) Reduce employer contribution rate to OASDI to 0.3%

(2) Reduce corporate revenues by 78.9 percent relative to CBO baseline; maximum corporate tax rate drops to 7.4%

(3) Reduce employer contribution rate to OASDI to 3.5% and reduce corporate revenues by 43.7 percent relative to CBO baseline; maximum corporate tax rate drops to 19.7%

Using VAT revenues to replace part of the payroll tax raises after-tax income for the bottom 95 percent of the population and lowers after-tax income for the top 5 percent. This result reflects the fact that the VAT is less regressive than the payroll tax. Net gains from the tax substitution rise throughout the first four quintiles of the income distribution as the share of wages in income rises; recipients of indexed transfer payments experience less net gains from the substitution because they pay neither payroll tax nor VAT on this income source. Taxpayers at the top of the income distribution, however, gain relatively little from the payroll tax cut as a share of income because a large share of their earnings is above the tax ceiling and because a substantial share of their total income comes from returns to capital instead of earnings. In contrast, taxpayers at the very top, although less

burdened by VAT as a share of income than others, still pay some VAT on their income from capital, while they pay no payroll tax on that income source.

Using the VAT to replace part of the corporate income tax, in contrast, reduces after-tax income from the bottom 95 percent of the population and raises after tax income from the top 5 percent, and especially the top 1 percent, whose after-tax income increases almost 7 percent. This reflects the fact that the corporate income tax, as a tax on income from capital, is much more progressive than the value-added tax, which falls largely on wages. Taxpayers in the bottom four quintiles would experience about a 2 percent reduction in after-tax income from this tax substitution because they gain little from the corporate income tax. Taxpayers in the top 1 percent lose the least from the VAT in relation to their income and gain the most from the lower corporate income tax.

Replacing the VAT with equal cuts in corporate and payroll taxes is also regressive, though less so than reducing the corporate tax alone, because the distributional shift is much greater from the corporate tax for VAT substitution than from the payroll tax for VAT substitution. (Both payroll taxes and a VAT directly reduce real after-tax wages.) With both alternative tax sources reduced, the tax substitution still reduces after-tax income for all groups in the bottom 95 percent of the income distribution and raises after-tax income for the top 5 percent, with the largest gains occurring among the top 1 percent.

*With Narrow-Based VAT.* A narrow-based VAT is moderately progressive through most of the income distribution and regressive only at the very top (Table 10). The exemptions in going from a broad to a narrow-based VAT (food, housing, medical care) provide relatively larger tax cuts (as a share of income) for those with lower income than for those with higher incomes (compare Tables 9 and 10). Narrowing the VAT base raises after-tax income by 1.6 percent in the bottom quintile, for example, but by only 0.8 percent for taxpayers in the 95<sup>th</sup>-99<sup>th</sup> percentiles and 0.6 percent for taxpayers in the top 1 percent.

Although the narrow-based VAT is more progressive than the broad-based VAT, substituting the narrow VAT for payroll and corporate taxes has similar results to substituting a broad VAT. Substituting a narrow VAT for a payroll tax is generally progressive; the bottom 90 percent of the distribution benefits, while the top 5 percent pay more. Unlike with a broad VAT, however, the largest increases in after-tax income from substituting a narrow VAT for a payroll tax go to taxpayers at the bottom of the income distribution, with net gains decreasing monotonically as income rises. Substituting a VAT for the corporate tax continues to be regressive, with the bottom 95 percent paying more tax and the top 5 percent less tax, although with a narrow VAT the largest losses are now borne by those in the middle, not the bottom, of the distribution. Reducing both corporate and payroll taxes equally to offset VAT revenues now reduces after-tax income for all groups below the 99<sup>th</sup> percentile. The only income group that gains is the top 1 percent of the distribution.

Table 10  
Effects of a Narrow-based 5 percent VAT with Alternative Offsets  
on After-tax Income, 2012

Income Group	No Offset	Reduce Payroll Tax <sup>1</sup>	Reduce Corporate Tax <sup>2</sup>	Reduce Both Taxes <sup>3</sup>
Bottom Quintile	-1.2%	+0.8%	-0.7%	0.0%
Second Quintile	-1.4%	+0.6%	-0.9%	-0.2%
Middle Quintile	-1.6%	+0.5%	-1.2%	-0.4%
Fourth Quintile	-1.8%	+0.4%	-1.2%	-0.5%
80-90th percent	-1.9%	+0.2%	-1.0%	-0.5%
90-95th percent	-2.0%	0.0%	-0.7%	-0.4%
95-99th percent	-1.9%	-0.7%	+0.4%	-0.1%
Top 1 percent	-1.5%	-1.2%	+4.1%	+1.7%
<b>All Tax Units</b>	<b>-1.7%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>

Source: Urban-Brookings Tax Policy Center Microsimulation Model (version 0509-4).

(1) Reduce employer contribution rate to OASDI to 2.5%

(2) Reduce corporate revenues by 48.6 percent relative to CBO baseline; maximum corporate tax rate drops to 18.0%

(3) Reduce employer contribution rate to OASDI to 4.5% and reduce corporate revenues by 26.9 percent relative to CBO baseline; maximum corporate tax rate drops to 25.6%

*With VAT and Refundable Credit.* A VAT with a refundable credit is very progressive throughout the income distribution, except at the very top (Table 11). Taxpayers in the bottom quintile see their after-tax income increase by 1.7 percent, as the benefit of a fixed grant (refundable credit) as a share of their (low) after-tax incomes exceeds the burden of the new tax. But taxpayers in the fourth quintile and above fare better with VAT exemptions than with a refundable credit. Taxpayers in the top 1 percent still experience a relatively lower percentage cut in after-tax income than those in upper-middle groups (1.9 compared with over 2 percent for other sub-groups in the top income quintile), but, unlike in the cases of a broad-based VAT with no rebate or a narrow-based VAT, now face a larger increased tax burden as a share of after-tax income than the population as a whole (1.9 percent compared with 1.7 percent).

Using the VAT with a refundable credit to replace part of the payroll tax substantially raises after-tax income for taxpayers in the bottom four quintiles of the income distribution, with the bottom income group gaining the most (3.8 percent), but lowers after-tax income throughout the top quintile. Taxpayers in the top 1 percent of the income distribution experience the largest losses (1.8 percent of after-tax income). Combining the VAT with a refundable credit also substantially changes the distribution of the VAT for corporate tax substitution, compared with the distribution of the other

VAT options. The combination of a broad-based VAT, fixed dollar refundable credit, and corporate tax cut raises the after-tax income of the bottom quintile and the top 1 percent of the distribution and reduces after-tax income from taxpayers in the middle and upper-middle (80<sup>th</sup>-95<sup>th</sup> percentiles) portions of the distribution. At the bottom, taxpayers gain more than they pay in VAT from the refundable credit; at the very top, they gain more from the corporate income tax cut. Groups in the middle experience a net tax increase because they gain relatively little from either a fixed refundable tax credit or a cut in the corporate income tax rate.

Reducing both corporate and payroll taxes equally has similar effects, raising after-tax incomes at the bottom and top of the income distribution and lowering after-tax incomes in the middle. But compared with cutting the corporate tax rate alone, the combined corporate/payroll tax cuts leads to relatively larger gains at the bottom and relatively smaller gains at the very top.

Table 11  
Effects of a Broad-based 5 percent VAT with a Refundable Credit  
and Alternative Offsets on After-tax Income, 2012

Income Group	No Offset <sup>1</sup>	Reduce Payroll Tax <sup>2</sup>	Reduce Corporate Tax <sup>3</sup>	Reduce Both Taxes <sup>4</sup>
Bottom Quintile	+1.7%	+3.8%	+2.3%	+2.9%
Second Quintile	-0.5%	+1.5%	0.0%	+0.7%
Middle Quintile	-1.5%	+0.7%	-1.0%	0.2%
Fourth Quintile	-1.9%	+0.3%	-1.2%	0.6%
80-90th percent	-2.1%	-0.1%	-1.3%	0.7%
90-95th percent	-2.3%	-0.4%	-1.1%	0.8%
95-99th percent	-2.4%	-1.2%	+1.0%	+0.6%
Top 1 percent	-1.9%	-1.8%	+3.4%	+1.1%
<b>All Tax Units</b>	<b>-1.7%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>

Source: Urban-Brookings Tax Policy Center Microsimulation Model (version 0509-4).

(1) Refundable credit equals \$436.88 per adult and \$218.33 per dependent child.

(2) Reduce employer contribution rate to OASDI to 2.5%. Refundable credit equals \$444.88 per adult and \$222.44 per dependent child

(3) Reduce corporate revenues by 48.6 percent relative to CBO baseline; maximum corporate tax rate drops to 18.0%. Refundable credit equals \$446.18 per adult and \$223.09 per dependent child.

(4) Reduce employer contribution rate to OASDI to 4.5% and reduce corporate revenues by 26.9 percent relative to CBO baseline; maximum corporate tax rate drops to 25.6%. Refundable credit equals \$445.30 per adult and \$222.65 per dependent child.

*Effects of Narrowing the VAT Base.* The preceding tables showed how much payroll tax and corporate tax reduction could be achieved with either a broad-based or a narrow-based 5 percent VAT and the net distributional effects of substituting equal-

revenue payroll or corporate tax cuts for both the narrow and broad VAT. An alternative way of looking at the effects of narrowing the VAT base is to compare two different VAT bases that raise the same amount of revenue. Given the definition of the two tax bases used in this paper, an 8 percent rate on a narrow base would be required to raise the same revenue as a 5 percent rate on a broad base.

Given the additional exemptions used to get from the broad to the narrow base (food, privately-paid medical expenses), a narrow base VAT with an 8 percent rate would be more progressive than a broad-base VAT with a 5 percent rate (Table 12). Substituting the narrow for the broad base raises after-tax incomes in the bottom three quintiles, has no net change in the fourth quintile, and lowers after-tax incomes in the top quintile of the income distribution. The lowest income taxpayers gain the most from the substitution and all sub-groups within the top quintile lose approximately the same as a percentage of their after-tax income.

Table 12  
Comparison of Effects on After-tax Income of a Broad-based 5 percent VAT  
and an 8 percent Narrow-based VAT

Income Group	Broad-Based 5-percent VAT	Narrow-Based 8-percent VAT	Effects of Narrowing the Base and Raising the Rate
Bottom Quintile	-2.8%	-1.9%	+1.0%
Second Quintile	-2.6%	-2.2%	+0.4%
Middle Quintile	-2.9%	-2.6%	+0.2%
Fourth Quintile	-2.9%	-2.9%	0.0%
80-90th percent	-2.9%	-3.0%	-0.2%
90-95th percent	-2.9%	-3.1%	-0.3%
95-99th percent	-2.7%	-3.0%	-0.3%
Top 1 percent	-2.1%	-2.4%	-0.2%
<b>All Tax Units</b>	<b>-2.7%</b>	<b>-2.7%</b>	<b>0.0%</b>

Source: Urban-Brookings Tax Policy Center Microsimulation Model (version 0509-4).

Note: Difference in the last column may differ due to rounding.

*Summary – Comparison of Effects of Different Proposals on After-Tax Income.* These estimates show that the distributional effects of a VAT depend on both the design of the VAT and the way VAT revenues are returned to the population. By itself, a broad-based VAT is proportional through most of the income distribution and moderately regressive at the top. A narrow-based VAT is progressive instead of proportional in the bottom four quintiles, because taxpayers in those groups benefit proportionately more than others from exemptions of food, privately-funded medical care, and housing from the VAT base. But the narrow-based VAT is also regressive at the very top. A broad-based VAT with a refundable credit that produces the same revenue loss as narrowing the

base raises after-tax incomes in the bottom quintile of the distribution, but is slightly regressive at the very top.

In general, substituting a VAT for payroll taxes makes the tax system more progressive, while substituting a VAT for the corporate income tax makes it less progressive. If the VAT combined with a refundable credit substitutes for corporate revenue, however, the distributional effect is bi-modal – taxpayers at the very bottom and top of the income distribution benefit and taxpayers in the middle pay more.

## **Conclusions**

The United States is the only country in the developed world that does not impose a broad-based consumption tax. The typical form of broad-based consumption tax used worldwide is a credit-invoice value-added tax (VAT). A credit-invoice VAT, a subtraction-method VAT or business transfer tax (BTT), and a retail sales tax (RST) are all intended to tax final consumption once at the retail level, but the collection mechanisms differ among the three taxes. VAT is a tax on final consumption that the government collects in pieces at each stage of the production process, while under an RST government collects the full tax on sales to final consumers. VAT has administrative advantages over both a BTT and an RST. Both VAT and BTT are easier to enforce than an RST because under a tax collected at different stages of production evasion by the final seller still leaves much of the tax in place. Compared with a BTT, a VAT makes it easier to exempt sales of categories of consumption goods, including export sales, but more difficult to grant preferences to selected industries.

The distributional burden of a VAT is roughly proportional at the bottom of the income distribution but regressive at the top, largely because a VAT effectively exempts income from new saving from tax. Exempting housing, food consumed at home, and medical services from a VAT makes it slightly progressive at the bottom of the income distribution. A refundable tax credit, however, would be much more effective than selective exemptions in relieving low-income taxpayers of the burden of a VAT.

Substituting a VAT for a portion of payroll taxes would make the tax system slightly more progressive because a payroll tax is slightly more regressive than a VAT. But substituting a VAT for a portion of corporate income taxes would make the tax system less progressive. Substituting a VAT for equal reductions in payroll taxes and corporate taxes would also make the tax system on balance less progressive because a VAT is only slightly more progressive than a payroll tax, but much less progressive than the corporate income tax.

VAT, payroll taxes, and corporate income taxes impose taxes on very different bases and distort economic decision-making in different ways. Both a VAT and a payroll tax are neutral between current and future consumption and do not discourage saving and investment, while a corporate profits tax raises the cost of investing in the United States. Both a VAT and a payroll distort the choice between home production and market work by reducing after-tax wages in relation to the prices of goods and services. But for an

equal amount of revenue raised, the distortion is slightly less under a VAT than a payroll tax because a VAT reduces the real value of assets in addition to real wages.

As other countries have reduced their corporate tax rates, the U.S. corporate rate has become one of the highest in the OECD. A relatively high corporate tax rate causes investment to shift out of the United States and also encourages firms, through transfer pricing and other methods, to shift reported income to lower-tax jurisdictions. The corporate income tax also introduces a number of additional distortions of economic behavior that would not be present in a VAT. It favors non-corporate enterprises over taxable corporations, encourages the use of debt over equity finance, and encourages companies to retain profits instead of distributing them. The current U.S. corporate tax also contains special rules that favor some investments over others. Reducing corporate tax rates below the top individual rate, however, would enable high-income individuals to avoid income tax by accumulating profits inside corporations and would require additional regulations to prevent individuals from reclassifying earnings as corporate profits.

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## **Appendix: Methodology for Modeling and Distributing a Value-Added-Tax (VAT)**

### **Defining the VAT base**

#### *Consumption base*

The TPC microsimulation model disaggregates consumption into twenty-two different categories. Seventeen core non-health categories are derived from the Bureau of Labor Statistics' Consumer Expenditure Survey (CEX) and calibrated to NIPA aggregates.<sup>14</sup> Four categories of health expenditure are based on data from the National Health Expenditure Accounts (NHEA). In addition, data on new housing purchases are imputed from the American Housing Survey.

The starting point for our consumption base is all domestic consumption. We do not include consumption of religious and charitable organizations or the imputed value of financial services provided without payment. In order to account for the treatment of housing purchases under a VAT, we subtract out the imputed rental equivalence of owner occupied housing and add in the value of new housing purchases.

*Broad base.* Under the broad-based VAT, we further exclude all education spending (primary, higher, and other), vehicle and other consumer interest, and government-financed health expenditures.

*Narrow base.* In addition to items excluded from the broad base, the narrow-based VAT excludes housing (rent and new home purchases), food consumed at home, and all other private health expenditures.

Table A1 details the composition of the broad and narrow bases used in the simulations.

#### *Adjustments to the base*

*Adjustment for indirect taxes.* The NIPA consumption aggregates TPC targets include federal excise and state/local sales taxes, which we assume are excluded from the VAT base. We use disaggregated tax revenue data from NIPA to remove these indirect taxes from our measures of consumption. We assume that federal gasoline, alcohol, tobacco, air transport, and telephone excise taxes, as well as state/local general, gasoline, alcohol, tobacco, utility, and other sales taxes are all paid at the consumer level.<sup>15</sup>

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<sup>14</sup> The mapping from CEX UCC codes to NIPA PCE categories is based on Harris and Sabelhaus (2000).

<sup>15</sup> Our procedure is similar to the one used in Feenberg, Mitrusi, and Poterba (1997). The taxes we remove correspond to lines 4, 5, 6, 8, 10, 16, 17, 18, 19, 20, 22, 24, 25, and 26 of NIPA Table 3.5.

Table A1  
Composition of the VAT base, 2012

	Level (\$billions)	%GDP <sup>1</sup>
<b>All Domestic Consumption</b>	<b>11,209.3</b>	<b>70.2%</b>
Non-Health	8,197.5	51.3%
Health	3,011.7	18.9%
<i>less</i> housing adjustment <sup>2</sup>	- 743.8	4.7%
<i>less</i> education spending, consumer interest, and government health expenditures	- 1,603.0	10.0%
<b>Broad Base</b>	<b>8,862.5</b>	<b>55.5%</b>
<i>less</i> housing, food consumed at home, and private health expenditures	- 3,192.1	20.0%
<b>Narrow Base</b>	<b>5,670.4</b>	<b>35.5%</b>

Source: Urban-Brookings Tax Policy Center Microsimulation Model (version 0509-4).

(1) The forecast of GDP comes from the CBO's *Budget and Economic Outlook: An Update* (August, 2009).

(2) Imputed rental value of owner-occupied housing minus new housing purchases.

*Compliance adjustment.* We assume a 15 percent noncompliance rate for the VAT. This figure is consistent with estimates of income tax evasion in the U.S. and with estimates of noncompliance in existing VAT systems worldwide. It is the same rate used by the U.S. Treasury for the 2005 President's Advisory Panel on Federal Tax Reform.

*Projected growth rates.* TPC projects health expenditures to grow according to estimates from the NHEA at rates that exceed the growth of GDP. Consistent with observed trends, we project that all non-health consumption expenditures grow at a rate consistent with a stable consumption to GDP ratio over time.

## Revenue impacts

### Gross revenue

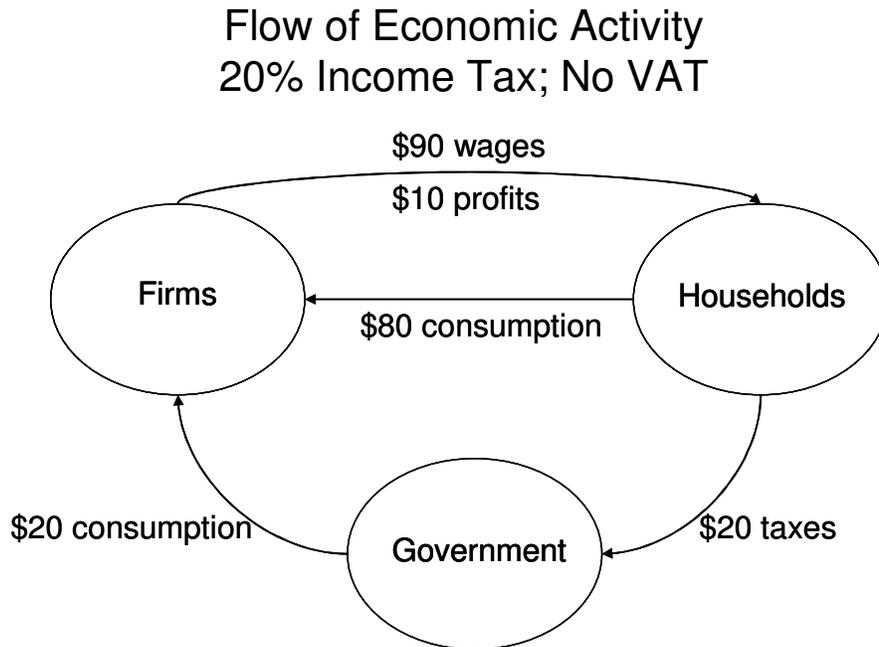
The gross revenue raised by the VAT is simply the uniform VAT rate multiplied by aggregate taxable consumption (after the adjustments detailed above),

$$GROSSREV^{VAT} = t^{VAT} \cdot \sum_i C_i^{TAX}$$

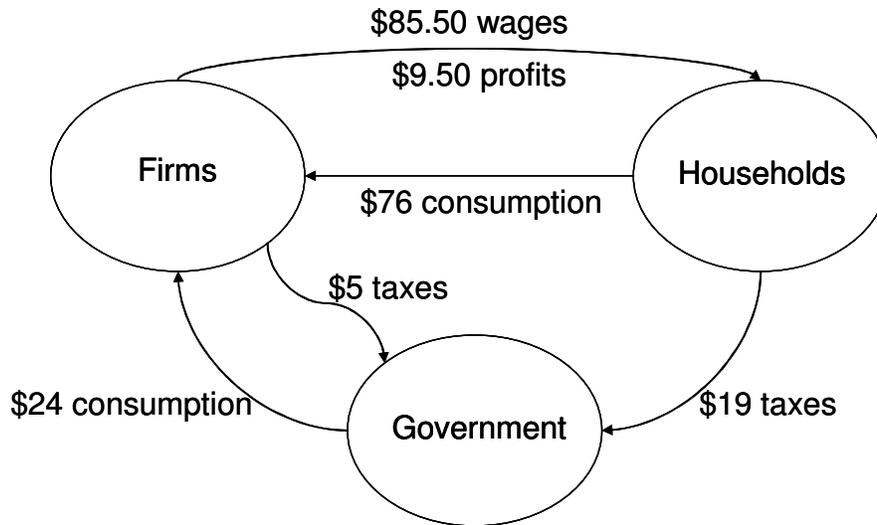
*Revenue offsets*

*VAT Offset.* Following standard revenue estimating assumptions, in our simulations we assume prices and nominal output remain fixed. As a result, implementation of a VAT lowers factor incomes and it is necessary to account for the lost tax revenue from existing direct taxes (see diagram below). The CBO and JCT typically assume a 25% revenue offset for changes in excise and other indirect taxes in their revenue estimates.

The chart below illustrates the flow of economic activity and tax assuming \$100 of pretax income, divided between \$90 of wages and \$10 of business profits, and a 20 percent flat rate tax on all income. (Households are assumed to consume all their after-tax income.) Households earns \$100 and pay \$20 in tax to government. Firms sell \$100 of goods and services (\$80 to households and \$20 to government). They pay out their receipts as wages and profits.



## Flow of Economic Activity 20% Income Tax; 5% VAT



The second chart shows what happens to these flows if a 5 percent VAT is added on top of the 20 percent income tax. (The VAT here is expressed as a “tax-inclusive” rate; the comparable tax exclusive rate would be 5.26 percent.) The VAT would reduce both wages and profits payable from \$100 of business revenues by 5 percent, so that wages would fall to \$85.50 and profits to \$9.50. Households would use their after-tax income to buy \$76 worth of goods and services and government would buy \$24 from firms, using their revenue of \$19 from income taxes and \$5 from VAT remitted by firms. The \$5 tax paid by firms would reduce wages and profits available to their employees and owners.

We calculate the revenue offset from lower individual income, individual and employer paid payroll, and corporate income taxes directly using the TPC microsimulation model. Consistent with our distributional assumptions (see below), we assume labor’s share of the burden is equal to the aggregate ratio of labor income to consumption as reported in NIPA. The remaining fall in aggregate income is assumed to reduce corporate profits. To calculate the resulting decrease in corporate tax revenue, we use the effective tax rate implied from CBO projections as the marginal tax rate. For the simulations reported above, we calculated a combined revenue offset of 27% (see Table A2).

Table A2  
Gross and Net Revenue Impacts of a 5% VAT (\$billions), 2012

	Gross Revenue	Revenue Offsets				Net Revenue
		Income	Payroll	Corporate	Total	
<i>Broad Base</i>						
Level	355.5	-55.8	-29.8	-11.4	-96.9	258.6
% of Gross		15.7%	8.4%	3.2%	<b>27.3%</b>	
<i>Narrow Base</i>						
Level	221.4	-34.9	-18.6	-7.1	-60.5	160.9
% of Gross		15.8%	8.4%	3.2%	<b>27.3%</b>	

Source: Urban-Brookings Tax Policy Center Microsimulation Model (version 0509-4).

*Payroll Offset.* TPC assumes that the incidence of the employer portion of the payroll tax falls on workers in the form of lower cash wages. As a result, a reduction in the employer portion of the OASDI payroll tax increases taxable wages, producing an offsetting increase in tax revenues from the associated direct taxes (income and payroll).

Formally, holding pretax compensation constant,

$$\frac{1}{\theta}W_1 + \min(W_1, \bar{W}) \cdot \tau_1 = \frac{1}{\theta}W_2 + \min(W_2, \bar{W}) \cdot \tau_2,$$

where  $\bar{W}$  is the OASDI earnings cap. The new cash wage after a reduction in the OASDI rate ( $\tau_2 < \tau_1$ ) is then given by,

$$W_2 = \begin{cases} \left( \frac{1 + \theta\tau_1}{1 + \theta\tau_2} \right) W_1 & \text{if } W_1 \leq W_1^* \\ [W_1 + \theta\tau_1 \cdot \min(W_1, \bar{W})] - \theta\tau_2 \cdot \bar{W} & \text{if } W_1 > W_1^* \end{cases} \text{ where } W_1^* = \left( \frac{1 + \theta\tau_2}{1 + \theta\tau_1} \right) \bar{W}.$$

The magnitude of the offset is then calculated using marginal tax rates implied from the TPC microsimulation model. An example of the effects of a reduction in the employer portion of the OASDI tax rate is shown in Table A3.

Table A3  
Reduce the Employer-paid OASDI Tax from 6.2% to 3.1%  
Impact on Revenue (\$ billions), 2012

	Gross Revenue	Revenue Offsets				Net Revenue
		Income	Payroll	Corporate	Total	
Level	-189.6	35.5	18.1	0.0	53.6	-136.0
% of Gross		18.7%	9.6%	0.0%	<b>28.3%</b>	

Source: Urban-Brookings Tax Policy Center Microsimulation Model (version 0509-4).

## Distributing the burden of the VAT

### *Sources side.*

On the sources side, the burden of the VAT is allocated to labor and economic profits based on each individual's share of labor income and capital asset ownership. Labor income is defined as the sum of cash wages, non-taxed fringe benefits, and 80% of reported self-employment and business income.

Formally, the sources-based VAT burden for individual  $i$  is equal to,

$$SOURCES_i = GROSSREV^{VAT} \left[ \alpha \cdot \left( \frac{Y_i^{labor}}{\sum Y^{labor}} \right) + (1 - \alpha) \left( \frac{Wealth_i}{\sum Wealth} \right) \right],$$

where  $\alpha$  is equal to ratio of aggregate labor income to aggregate personal consumption expenditures as reported in NIPA<sup>16</sup>.

### *Uses side.*

On the uses side, the burden of the VAT falls more heavily on individuals that consume a higher proportion of taxable goods. The uses-based burden has the property that it is equal to zero for individuals whose ratio of taxable to total consumption is equal to the aggregate ratio, positive for higher ratios, and negative for lower ratios. The uses-based burden sums to zero across the entire population, but not necessarily by income group.

Formally, the uses-based VAT burden for individual  $i$  is equal to,

$$USES_i = GROSSREV^{VAT} \left[ \left( \frac{C_i^{TAX}}{\sum C^{TAX}} \right) - \left( \frac{C_i^{TOTAL}}{\sum C^{TOTAL}} \right) \right].$$

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<sup>16</sup> For our simulations we use  $\alpha = 0.88$ , which is calculated from NIPA Table 2.1 using data from 2008.