

# Example 19.1

## The Value Added Tax

U.S. readers may be surprised at the popularity of the value added tax (VAT). Some form of VAT is levied by 135 nations (2005)<sup>1</sup>, including every industrialized market economy except the U.S. The VAT is particularly identified with Europe because it has long been used there and is a requirement for membership into the EU. Therefore, we will use the EU version of the VAT in this example when discussing some of the main economic issues associated with the VAT.

### Value Added: The Tax Base

Nations that levy a tax on value added have three natural variations to choose from, a product VAT, an income VAT, and a consumption VAT. To understand these choices for the tax base, we need to review some fundamental principles of national income accounting.

Value added measures the contribution of each producer to the circular flow of economic activity. It views producers as beginning with the intermediate goods or material inputs that they purchase from other producers and then adding the primary factors of production – labor, land, and capital – to produce a good or service of greater value than they started with. The value of their end product is their sales, and the difference between their sales and their purchases of intermediate goods is their value added to the circular flow.

$$\text{Value added} = \text{Sales} - \text{Purchases of Intermediate Goods}$$

From an economy-wide perspective, total sales in the economy by all producers less their total purchases of intermediate goods is total sales of final goods and services or sales to final demanders, which is a nation's gross domestic product (GDP). Therefore

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<sup>1</sup> Source: *International Tax Dialogue Conference Press Release: Value Added Tax*, March 15, 2005. <[www.itdweb.org/VATConference/Pages/PressRelease.aspx](http://www.itdweb.org/VATConference/Pages/PressRelease.aspx)>

the sum of value added by all producers equals the nation's GDP. Recall, also, that there are only two kinds of final goods and services, consumer goods and services and capital goods. The former are purchased by households and government agencies, and the latter are purchased by private firms or government producers as investments that add to their stock of capital.

Note, finally, that a producer's sales must equal its cost of goods sold, which is the sum of its purchases of intermediate goods plus its payments to the primary factors of production. The payments to the primary factors are the compensation of employees (payments to labor), rents (payments to land), and net interest payments and profits (payments to capital). Profits is the residual item that takes on whatever value is required – positive, negative, or zero – so that the cost of goods sold equals sales.

With these concepts in hand, the three natural choices nations have in defining the tax base for a VAT are as follows:

- *Product VAT*: If they levy the tax on the entire value added, a producer's sales minus purchases of intermediate goods, the tax is referred to as a product VAT because it is equivalent to a tax on GDP in the aggregate.
- *Income VAT*: A variation is to allow firms to deduct from sales the depreciation on their capital as well as their purchases of intermediate goods in determining their tax base. All firms are allowed to enter an estimate of the depreciation of their stock of capital to their cost of goods sold, which reduces their profits dollar-for-dollar. Firms are interested in recording a charge for depreciation because their profits are often subject to a separate tax, such as a corporation income tax. Since the profits are reduced, these depreciation charges create a discrepancy in the aggregate between GDP, the difference between aggregate sales and purchases of intermediate goods, and national income, the sum of the payments to the primary factors of production.<sup>2</sup> Therefore, if firms are permitted to deduct depreciation from value added in computing their taxable value added, the tax is referred to as an income VAT because it is equivalent to a tax on national income in the aggregate.
- *Consumption VAT*: A final option is to allow firms to deduct the entire amount of their investment in plant and equipment from value added in computing their taxable value added. Since final products (the GDP) can be only consumption goods or investment goods, allowing firms to deduct investment from value added in computing their taxable value added is referred to as a consumption VAT because it is equivalent to a tax on consumption in the aggregate.

## VAT in the EU

The EU has chosen the consumption VAT, as have the majority of the 136 nations that use the VAT. The EU has also issued a number of directives on the allowable tax rates.

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<sup>2</sup> In constructing the national income accounts for the United States, the Department of Commerce makes a separate estimate of the depreciation of the aggregate stock of capital, which it calls the consumption of fixed capital. Therefore, GDP equals national income plus the consumption of fixed capital.

The standard rates that apply to most goods and services must be between 15% and 25%. Cyprus and Luxembourg have set the rate at the minimum of 15%, and Denmark and Sweden have set the rate at the maximum of 25%, with most of the other 23 nations choosing rates between 18% and 22%. Nations are also permitted to set lower rates on one or two classes of goods and services, but these special rates must be at least 5%. They may also set lower rates, including exemption from tax, for labor intensive services. Nations have most often used this provision to set lower rates on, or exempt, common domestic services such as home building and personal and medical care. Finally, the tax on exports is set at zero but imports are taxed at the rates applying in the nation of destination.<sup>3</sup>

The EU has also chosen the credit invoice method to administer the tax. Each firm pays a tax equal to the VAT rate times its entire sales, but receives a credit for any VAT paid by the sellers from whom the firm purchased its intermediate goods or material inputs. Therefore, each firm selling intermediate goods has to provide an invoice to the purchasing firm that shows its VAT tax liability on these goods. This method of administering the tax is considered desirable because each firm has an incentive to insist on accurate invoices from its suppliers in order to receive the full credit for the suppliers' VAT liabilities. The only point in the production hierarchy at which there is no cross-checking of previous taxes paid is on the sale of a good or service to a final consumer, since the VAT is not levied on consumers.

To see how the credit invoice method works, along with some of its implications, imagine a simple economy in which labor is the only primary factor of production and three goods are produced, wheat, flour, and bread. Wheat seeds are manna from heaven and free to the farmers. All wheat grown by the farmers is sold as an intermediate good to the millers, who grind it into flour, and all the flour is sold to the bakers, who bake the bread. The bakers sell the bread to consumers as a final product. The values of intermediate goods, labor input, sales, and value added at each stage of the production hierarchy without any value added tax are assumed to be as follows:

	Intermediate Goods	Labor	Sales (= Intermediate Goods + Labor)	Value Added (= Sales - Intermediate Goods)
Wheat	0	10	10	10
Flour	10	20	30	20
Bread	30	50	80	50
<b>Totals</b>	40	80	120	80

In this example, the GDP = 80, the amount of the bread sold to consumers, the only final good. The national income is also 80, the sum of the wages paid to labor at each stage

<sup>3</sup> A more complete description of the EU VAT tax rates, along with other features of the tax described in this example, can be found on the EU website at [http://ec.europa.eu/taxation\\_customs/taxation/vat/how\\_vat\\_works/rates/index\\_en.htm](http://ec.europa.eu/taxation_customs/taxation/vat/how_vat_works/rates/index_en.htm).

in the production hierarchy, and the value added is also 80. In this simple example without capital, the product, income, and consumption VAT tax bases are all the same.

Suppose the government institutes a VAT at a rate of 20%, and assume for simplicity that the tax is fully passed on to the purchasers in the next stage of the production hierarchy. Under the credit invoice method of paying the tax, the farmers pay a tax of \$2 on their sales of wheat, and therefore charge the millers \$12 for their wheat. Since the millers receive a credit of \$2 for the tax paid by the farmers, the net cost of the wheat to them remains \$10. Adding \$20 of labor raises their costs to \$30, which would be the value of their sales without the tax. At a 20% tax rate, they owe a tax of \$6, and therefore charge the bakers \$36 for their flour. Their tax payment net of the \$2 credit is \$4. Since the bakers receive a credit of \$6 for the tax paid by the millers, the net cost of the flour to them remains \$30. Adding \$50 of labor raises their costs to \$80, which would be the value of their sales without the tax. At a 20% tax rate, they owe a tax of \$16 and therefore charge the consumers \$96 for the bread. Their tax payment net of the \$6 credit is \$10. The total VAT collected is \$2 (farmers) + \$4 (millers) + \$10 (bakers) = \$16. The incentive for the millers and bakers to receive accurate invoices from their suppliers is evident from the example. Producers at each stage in the hierarchy pay higher taxes if their suppliers understate their own tax liabilities.

Suppose, instead, that the government levied a retail sales tax of 20% on final consumption. The farmers and millers have no tax liability since they produce only intermediate products. Therefore, the sales prices of wheat to the millers and flour to the bakers are the same as in the table. The baker pays a tax of 20% on the \$80 sales of bread, or \$16, and charges the consumers \$96 to cover the tax liability. The 20% retail sales tax is therefore equivalent to the 20% VAT: Each collects \$16 of tax revenue and raises the sales price of the bread to the consumers by \$16, from \$80 to \$96. In a more complex example with capital, it can be shown that a 20% retail sales tax is equivalent to a 20% consumption VAT.

## Some Economic Issues with a Consumption VAT

The simple example points to some economic issues associated with the EU-style consumption VAT that have caught people's attention. They are of relevance to the U.S. since some people in the administration and Congress want to replace the federal personal income tax with either a consumption VAT or a national retail sales tax. They are:

1. *Administrative costs* – Although a consumption VAT and a retail sales tax are equivalent in principle, the two are not quite equivalent in practice. A consumption VAT has higher administrative costs because it collects taxes at every stage in the production hierarchy. At the same time, however, it is less susceptible to fraud because of the incentive of each producer to receive accurate invoices from their suppliers. The trail of invoices in turn provides a means for Departments of Revenue to check on the tax payments of the producers. Under a retail sales tax, consumers

have no incentive to check on the accuracy of the tax liabilities of firms – indeed, they are happy to pay lower prices if the sellers can evade taxes. That same possibility for fraudulent tax reporting exists at the point of final sales under a consumption VAT, but any uncollected tax revenues at the final stage represent only a fraction of the total VAT collected, not the entirety of the revenues as with a retail sales tax.

A consumption VAT would also be much more costly to introduce in the U.S. than a national retail sales tax because the sales tax could be collected by the state governments, 45 of which already levy sales taxes. A whole new administrative framework would have to be established to collect a consumption VAT. Once the consumption VAT is up and running, however, its administrative costs would be quite low. The EU consumption VAT has administrative costs of 1% or less of tax revenues collected.<sup>4</sup>

A final point is that the administrative costs of a consumption VAT rise when special rates are allowed on certain goods and services, as in the EU. The cheapest tax to administer is one that taxes all sales at the same rate under the credit invoice method. Some EU nations tax a fairly large number of goods and services at different rates, even zero, because the EU grandfathered in some provisions of these nations' tax laws that existed when the original EU members went to a common market.

2. *Consumption vs. Income Taxes* – Because a consumption VAT is equivalent to a tax on consumption, it shares all the economic implications discussed in the textbook when comparing broad-based consumption and income taxes.

For instance, it is commonly assumed that the burden of consumption taxes is passed on entirely to consumers because supply curves are considered to be essentially perfectly elastic in the long run. Some people, adopting the sources and uses view of tax incidence discussed in Chapter 19, interpret this to mean that a consumption VAT is highly regressive because the ratio of households' consumption to income falls dramatically in any one year as household income rises. The textbook notes, however, that this impression must be tempered by two considerations. One is that the incidence of any broad-based consumption tax is more nearly proportional from a sources and uses perspective when viewed over a taxpayer's lifetime because lifetime consumption is very close to lifetime income for most people. The second is that a general equilibrium analysis of tax incidence brings up a host of issues in thinking about the incidence of broad-based consumption vs. income taxes:

- i) In the static, one-period baseline model of Chapter 18, with identical consumers, constant returns to scale production, and perfectly competitive markets, consumption and income taxes can be designed to have identical incidence. Since it does not matter which side of a market is taxed, a VAT (the three kinds are the same in a static model without investment, as in the above example), a personal

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<sup>4</sup> This estimate is reported in Hyman, D. (2008) *Public Finance: A Contemporary Application of Theory to Policy*, 9th edn (Mason, OH: Thomson South-Western,), p. 650.

- income tax, a personal consumption tax (expenditures tax), and a sales tax are all identical.
- ii) The side of the market taxed does matter because it is easier to take account of the personal characteristics of taxpayers through a personal income or consumption (expenditures) tax than through any kind of tax on business. Personal exemptions or graduated tax rates that make, say, a personal income tax progressive would not be practicable under a VAT or sales tax levied on businesses. An additional transfer program has to be established to protect low-income taxpayers under any business tax. The best a consumption VAT can do to generate some progressivity is to levy lower tax rates on necessities and higher tax rates on luxuries. But the ability to generate much progressivity in this way is quite limited as a practical matter, and varying tax rates adds considerable complexity and administrative costs to a consumption VAT.
  - iii) The overlapping generations (OLG) model introduced in Chapter 12, with its young working generation and old retired generation and the possibility of saving, generates dramatically different implications for consumption and income taxes from the static model of Chapter 18. Replacing the U.S. federal personal income tax with a revenue-equivalent consumption VAT would generate an increase in saving and investment because they would no longer be taxed. This leads eventually to a much larger capital stock, a more productive economy, and large increases in output per person over the long run. But these dynamic efficiency gains come at the cost of large losses to the current elderly when the change occurs, because they are effectively taxed a third time by the consumption VAT.
3. *Revenue* – A consumption VAT is an effective way to raise revenue. Gale and Steuerle estimate that every percentage point of tax rate under a consumption VAT would raise revenue equal to .4% of GDP in the U.S., or about \$56 billion (in 2008).<sup>5</sup> Since the federal personal income tax raises just over \$1 trillion of revenue, replacing it with a consumption VAT would require a VAT tax rate of approximately 18%.
  4. *Tax fraud* – Europeans are increasingly worried about fraud under the consumption VAT, even though the VAT seems to do reasonably well on this score. Recent estimates of uncollected EU VAT tax revenues resulting from tax evasion are about 10% of tax revenues, vs. about 14% for the U.S. personal income tax. Nonetheless, there is growing concern about a type of fraud called “carousel fraud,” mostly associated with exports and imports. Exports are zero-rated, meaning the exporters pay no VAT but can take a credit for the VAT paid by their suppliers. Imports, in contrast, are subject to the full VAT rate in the country of destination, to put them on an equal footing with other goods and services produced in that country. A commonly noted advantage of this practice is that it helps keep the EU members more

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<sup>5</sup> The Gale and Steuerle estimate is reported in Bickley, J. (2006) A Value-Added Tax Contrasted with a National Sales Tax, *CRS Report for Congress*, 25 May, Congressional Research Service, Library of Congress, p. CRS-2. The website on which the estimate appeared is no longer available.

competitive in international trade. Since exporters receive credit for their suppliers' VAT liabilities, they do not have to raise their prices to cover the taxes paid by their suppliers, as our simple wheat–flour–bread example above demonstrates. In contrast, import prices rise by some or all of the VAT liability (depending on the tax incidence).

But this method of taxing imports and exports generates a form of carousel fraud, as follows. Firm A in country #1 sells a good to firm B in country #2 and has no VAT liability. Firm B, the importer, owes a VAT on the good at the VAT rate in country #2 when it sells the good. Assume it sells the good to firm C in country #2. Finally, firm C exports the good back to some firm in country #1, perhaps even firm A, paying no tax on the export but claiming a refund credit on the tax liability incurred by firm B. But the tax owed by firm B as the importer is typically not collected at the border by country #2, but later on in the next round of tax collections under the VAT. Therefore, some time passes before the tax is paid by importers. The fraud occurs because firm B disappears before paying the tax and the tax is never paid. Yet firm C has a (falsified) invoice from firm B claiming that the tax was paid, and therefore applies for a tax refund. If the refund is given, the game can start all over again by exporting the good to a firm in another EU member country, going round and round as if on a carousel. This type of fraud is prevalent on high-value items that are cheap to transport such as cell phones and computer chips. The EU is trying to reduce carousel fraud (and other types of fraud) but, as noted, overall fraudulent behavior under the EC consumption VAT does not appear to be unduly large for a broad-based tax.<sup>6</sup>

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<sup>6</sup> See Keen, M., and Smith, S. (2007) VAT Fraud and Evasion: What Do We Know and What Can Be Done?, *IMF Working Paper, WP07/31*, February, for further discussion of carousel fraud and other types of fraud under the EU consumption VAT. The 10% estimated revenue loss to fraud is on p. 3 and the 14% estimate for the U.S. personal income tax (precisely, 13.7%) is on p. 22.