



WORLD BANK
ECONOMICS OF TOBACCO TOOLKIT

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Tool 4: Design and Administration

Design and Administer Tobacco Taxes

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DRAFT

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I. Introduction

Purpose of this Tool

The purpose of this Tool is to help the reader understand the structure, design, and administration of tobacco taxes. There is no doubt about the adverse health impacts of tobacco use. In both developed and developing countries, the Ministries of Health, tobacco interest groups, academia, and advocates against tobacco strongly believe that tobacco consumption should be reduced, and that tobacco taxes are the single most cost-effective policy tool to achieve this goal. The challenge is how to engage in a dialogue with policy makers, most especially those in charge of tobacco taxes. An effective dialogue requires a good understanding of tobacco tax structure, design, and administration so that the impact of a tobacco tax increase on various economic issues can be better evaluated.

Although there is no doubt tobacco consumption adversely impacts health, policies to address this problem create conflicts of interest among policy makers to the point that policy can be ineffective. More specifically, tobacco taxes and their consequences on the interests of policy makers create a conflict on why and how to levy taxes on tobacco products.

This Tool discusses some of the issues surrounding tobacco taxes from the perspectives of consumers, public health advocates, politicians, and government administrators. Guidance is provided in how to satisfy the goals of these players without compromising their interests. In particular, consider the following concerns when reading this Tool.

- Consumers already pay sales or value added taxes (consumption tax) when they purchase tobacco products. Why should they pay another tax for tobacco products?
- Policy makers are the final decision makers on tobacco tax policies. When a tax increase on tobacco products is suggested, how can the tax be made efficient and equitable?

- Tax administrators often provide guidance in how to achieve projected revenues from tobacco taxes. How can they best forecast government revenue based on tax changes?
- Public health advocates are involved in various tobacco control policies, and they need to know why tobacco taxes are cost-effective and how they should be designed to effectively reduce tobacco use, and how advocates can communicate with policy makers when a tax increase is requested.

Who Should Use this Tool

This Tool is intended primarily for public health advocates, policy makers, tax administration staff, and government officials. Public health advocates will gain information on the various types of tobacco taxes and which type can best reduce cigarette consumption. The tool also discusses whether and how increased tobacco taxes create a financial burden on consumers, especially the poor.

Since tobacco taxes are often justified from the public health perspective, this Tool includes another point of view—that of the policy maker and the tax administrator. That is, there is discussion on the pros and cons of administering different tobacco excises and their impact on government revenue streams and administration efforts.

For the economist and analyst, this Tool does present models and formulas for possible inclusion in any effort to estimate the benefit or impact of tobacco excise taxes on a government and its consumers. Economists and analysts can get a better understanding on tobacco tax structure and design for policy recommendations for tobacco control using tobacco taxes.

How to Use this Tool

Designing and administering tobacco taxes is a process unique to every government. There are too many variables—from tobacco and tobacco product usage to the objective and purpose of taxation to the viable and most effective method of imposing and administering a tax—to allow for a general rule of thumb regarding tobacco excise taxes. Therefore, this Tool cannot present universally applicable methods to apply, mathematical models or formulas to fulfill, or step-by-step instructions to follow.

However, this Tool does present useful discussions, advice, and evidence on a number of the “better” processes to follow when deciding whether and how best to implement and administer tobacco taxes.

All readers should refer to the **Key Information** chapter, as it provides basic information on the fundamentals and assumptions presented in this Tool.

Tobacco control advocates seeking to gain general information will benefit from **The Rational for Tobacco Excise Taxes, What is the “Right” Tax Rate?**, and the **Consider the Appropriate Type of Tobacco Taxes** chapters.

Academicians who do economic analysis of tobacco taxes and study government revenues from different sources should read **The Rational for Tobacco Excise Taxes, What is the “Right” Tax Rate?**, and the **Generate Higher Excise Revenues** chapters. Here they can learn the difference in types of tobacco taxes and how these taxes serve the objectives of different interest groups, such as consumers, governments, administrators, producers, and so on.

Policy makers, tax administrators, and researchers will benefit from all chapters of this Tool, as this group is the most informed and works daily to tackle issues of how to reach a government’s objective to increase revenues from tobacco taxes. In particular, tax administrators need to know which tobacco taxes are most appropriate to maintain a government’s revenue stream, given current economic conditions and the structure of tax administration. This toolkit mainly serves the needs of these tax administrators.

II. Key Information

Definitions

Excise Tax

An excise tax is a tax on selected goods produced for sale within a country, or imported and sold in that country. The tax is usually collected from the producer/manufacturer/wholesaler or at the point of final sale to the consumer. It can be either:

- specific: a set amount per pack, per 1,000 sticks, or per ton (e.g., \$1.50 per pack regardless of price)¹
- *ad valorem*: a percentage of the value of the product, as measured by the manufacturer/producer price at which the product is sold to the retailer/distributor (e.g., 45 percent of the manufacturer's price)

Excisable Good

An excise tax can be imposed on products and services if they have one or more of the following characteristics (McCarten and Stotsky, 1995):

- Production, distribution, and sales can be closely supervised by the government. This ensures little chance of tax avoidance during these processes.
- Demand is price-inelastic (i.e., as price rises, consumption falls by less than the percentage rise in the price). Revenue is therefore increased regardless of the rate of consumption.

¹ An example of a specific tax: If the pretax price of cigarettes is US \$1 per packet and the specific tax is US \$0.33, then the retail price would be US \$1 + US \$0.33 = US \$1.33 per pack (ignoring VAT) (Oxford Economic Forecasting and International Tax and Investment Center, 2001).

- The product or service is considered a luxury rather than a basic necessity. Not only does consumption of luxury goods and services rise as income rises, but it rises even faster than the rise in income. Here the income elasticity of demand is greater than one, meaning the greater the consumption, the even greater the revenue.
- Consumption lacks “merit” (i.e., a person’s lack of control over him/herself is increased) or causes negative externalities. This provides a populist reason (economic rationale) to institute a tax.

Sales Tax

There are two general types of sales taxes: single-stage and multi-stage.² Though this tool does not explore the policies behind sales taxes or assess their relative merits, a general description is given to provide background information to the reader.

- Single stage sales taxes apply only at one stage of the production/distribution chain. For example, it may apply only to sales at the manufacturing, wholesale, or retail stage. In the United States, sales taxes apply for most products at the retail stage.
- Multi-stage sales taxes apply at several stages of the production/distribution chain for a product or service. This type of tax includes the value-added tax (see below).

Value-Added Tax

The value-added tax (VAT) is a general indirect tax on consumption.³ In principal, it is a general tax on consumption of goods and services applied proportionally to their price. On each transaction, the VAT—calculated on the price of the goods or services at an appropriate rate—is chargeable after deduction of the amount of VAT born directly by the various cost components.

Most countries that impose VATs impose them on a base that includes any excise tax and customs duty. A VAT of 10 percent raises the cost of the good by 10 percent, even when the good is subject to an excise tax (or a customs duty).

Assumptions and Requirements

Readers of this tool should have some background information on issues surrounding tobacco products and policies. Readers should also have knowledge about the tax types and structure in their

² For more information, please see McMorrان (1996).

³ For more information, please see Williams (1996) and Zee (1995).

country. Some countries apply taxes on tobacco but not necessarily specifically as excise taxes. China, for example, does not have excise taxes, but does levy the equivalent in other taxes on tobacco.

Though this tool discusses the design and administration of taxes on tobacco products *as a whole*, in many instances the language used in the following arguments focuses on smokers and smoking. This is *not* meant to indicate that the issue at hand is only applicable to smokers and not to other tobacco users. Rather, it is simply easier to present and read about such arguments when referring to smoking as a universal example of tobacco use. The reader, therefore, is urged to consider all tobacco products and tobacco use throughout this document.

If the reader is using this tool for forecasting or estimation purposes, then the reader should read **Tool 3. Demand Analysis** and **Tool 6. Poverty** to be familiar with the demand models and interpretation of estimated price, tax, and income variables.

III. The Rational for Tobacco Excise Taxes

Why Tax Tobacco?

Before deciding to impose a tax, it is first necessary to define the objective of a tax. A number of political, social, and economic issues provide substance from which to develop and define an objective for a tobacco tax. There are also additional issues, not discussed here, unique to each governing body or tax administrator to consider. Policymakers should carefully and comprehensively review their situation and develop a tobacco tax policy that best addresses their own needs and requirements.

Once the objective is defined, it is then necessary to determine the purpose(s) of a tax. There are at least three purposes or reasons for imposing a tax on tobacco products (McCarten and Stotsky, 1995; Warner *et.al*, 1995).

- Raise revenue. Tobacco taxes are *very* efficient at raising revenue. Typically there is a large, captured consumer market paying taxes because they cannot either quit smoking due to addiction, or they are not price sensitive due to lower taxes. Further, the enforcement and collection of these taxes is easier than for other taxes, such as those based on income.
- Correct for externalities. A tobacco tax helps defray the external costs of tobacco consumption, such as diseases contracted by non-smokers and the costs to treat such diseases. This argument is called “negative externalities.”
- Discourage use of the product. Tobacco is considered a product without merit; it is addictive and destructive, and therefore is arguably not productive for the greater economy. Tobacco taxes discourage consumption, most particularly among the poor, the young, and new tobacco

users, and provide opportunity for more productive spending and investment elsewhere.

Each of these purposes is interrelated to the other two, as the discussion in this chapter makes clear. Less clear are the numerous possibilities with respect to the type of tax, the rate of tax, the administration and collection of the tax, and the use of revenue from the tax. These issues are discussed in further chapters of this Tool. Once they are understood, one can then implement, administer, and defend the tax, and define the system in which to measure the success or failure of a tax.

...for Fiscal Reasons

In strictly fiscal fashion, taxes on tobacco products provide and/or increase revenue for a government. Revenue is a good thing, as it means a government can pay down debt, lower other taxes, increase spending, or even cover the external costs attributed to the taxed product or service.

In addition, a tobacco tax encourages consumers to reduce spending on tobacco products and either invest the money in savings, or consume other goods and services considered more productive to the economy.

Increase Revenue

When revenue generation is a goal, governments should favor excise taxes on goods with large sales volumes, few producers, inelastic demand, easy definability, and a lack of close substitutes. Such goods provide for a relatively consistent, stable, and profitable revenue stream.

Tobacco products fit most or all of these characteristics. Like other excise taxes, taxes on tobacco products are relatively easy to collect, with low administrative effort, and provide limited opportunities for tax evasion.

Ease Revenue Collection

In most developed countries, tobacco taxes (excise + VAT) from cigarettes contribute a substantial share (70–80 percent) of the price of a pack of cigarettes, whereas in most middle-income and low-income countries tobacco taxes vary between 20–50 percent of the price of a pack of cigarettes. Given the revenue generating characteristics of tobacco taxes, in countries where it is difficult to collect income taxes, such tobacco taxes are an important part of total revenues. Table 4.1 shows the share of cigarette taxes (excise + VAT) as a percentage of the retail price of a pack of cigarettes, and the share of cigarette tax revenues in total tax revenues by income groups. Although the share of cigarette excises compared to total tax

Table 4.1
Cigarette Tax Revenues as Percentage of Retail Price and Total Tax Revenues for Countries
by Income Group, 1999

	Cigarette Tax ¹ as Percentage of			Cigarette Tax ¹ as Percentage of			
	Price/Pack Retail Price (US\$)	Total Tax Revenues		Price/Pack Retail Price (US\$)	Total Tax Revenues		
High Income				Lower-Middle Income			
Austria	2.49	74	2	Algeria	1.86	33	4
Belgium	3.47	74	2	Belarus	0.33	36	3
Cyprus	1.38	64	3	Belize	0.62	68	2
Denmark	4.37	81	3	Bulgaria	0.57	55	9
Finland	3.84	76	2	Colombia	0.54	65	4
France	3.16	76	2	Costa Rica	0.64	83	2
Germany	2.76	69	2	Egypt	0.45	61	5
Greece	2.17	73	9	Estonia	0.99	55	4
Ireland	4.13	77	5	Indonesia	0.63	30	9
Italy	2.09	75	2	Jamaica	2.02	57	4
Japan	2.3	60	4	Kazakhstan	0.45	29	9
Korea, Rep.	1.68	60	6	Latvia	0.48	49	3
Kuwait	1.11	41	6	Lebanon	0.33	19	1
Netherlands	3.15	72	2	Lithuania	0.29	39	1
Portugal	1.81	80	4	Morocco	1.45	30	5
Spain	1.25	73	3	Philippines	0.63	63	11
Sweden	4.09	71	1	Romania	1.04	54	10
UAE	1.5	65	6	Russia	0.60	21	5
UK	5.73	79	4	Syria	0.58	22	1
				Thailand	0.73	62	5
				Turkey	0.99	77	11
				Ukraine	0.55	46	11
				Venezuela	1.28	83	2
Upper-Middle Income				Low Income			
Argentina	1.35	70	5	Bangladesh	0.85	30	6
Barbados	3.12	38	2	Cambodia	0.41	20	7
Brazil	0.95	75	2	Cameroon	1.36	22	7
Chile	1.62	70	6	Cote d'Ivoire	0.81	50	4
Croatia	1.38	67	5	Guyana	0.61	56	6
Czech	1.86	60	6	Malawi	0.41	35	3
Hungary	1.15	61	4	Nigeria	1.04	45	4
Malaysia	0.76	33	1	Senegal	0.8	52	10
Mexico	0.91	60	3	Vietnam	0.56	36	8
Poland	1.14	61	7				
Slovenia	1.41	63	2				
Trinidad & Tobago	1.12	43	3				
Uruguay	1.71	60	4				

¹ Excise + VAT.

Source: Unpublished data, IMF, WHO, and the World Bank Tobacco Survey.

revenues seem low, given the size of total revenues in developed countries, this share is an indication of the significance of cigarette excise tax revenue.

Further, a similar study from the same source uses data from 1994–1995 and shows that cigarette tax revenue contributes significantly to total excise tax revenue. For instance, this percentage is 75.68 for Nepal, 73.61 for Switzerland, 68.57 for Indonesia, and 66.23 for Brazil, to name a few. This suggests that, regardless of the income level, cigarette excise taxes are a significant share of the total excise tax revenues.

When the price elasticity of the demand for cigarettes is less than a value of -1 , the increase in taxes will result in a net gain in total tax revenues.⁴

The contribution of cigarette excise taxes to total tax revenues depends on:

- the tax rate, or proportion of the cigarette pack price that is due to excise tax
- the amount of cigarette expenditures
- other taxes paid for goods and services as a proportion of GDP

Express this contribution in the formula:

$$\text{TER/TTR} = (\text{TER/CSC}) \times (\text{CSC/GDP}) \times (\text{GDP/TTR})$$

where: TER = cigarette excise revenue = number of packs of cigarettes consumed \times tax rate

TTR = total tax revenue = tax revenues from excise taxes (including cigarette excises) and other goods and services

CSC = consumer spending on cigarettes = number of packs of cigarettes consumed \times cigarette price

GDP = gross domestic product

Similarly, express the percentage share of cigarette excise tax revenue to total excise tax revenue as:

$$\text{TER/ER} = (\text{TER/CSC}) \times (\text{CSC/GDP}) \times (\text{GDP/TTR}) \times (\text{TTR/ER})$$

where: ER = excise revenue.

Excise taxes on cigarettes are good sources for generating revenue. Although the share of cigarette tax revenues in total tax revenues are low in all countries, given the level of total tax revenues in developed countries, that share indicates the significance of generating revenues from cigarette taxes.

⁴ The less elastic the demand, the less effective the tax in reducing cigarette consumption, but the greater the gain in tax revenues.

...for Public Health Reasons

Public health, or more accurately improving public health, provides a popular and reasonable objective for a tobacco tax. Consider this: it is estimated that tobacco will be responsible for 10 million deaths annually by 2030. Two-thirds of these deaths will occur in developing countries. The costs of mortality and morbidity due to tobacco related diseases will be tremendous. In most instances the government will be the major health insurance provider, though such insurance will only cover a small percentage of the population. For the rest, when medical help is needed, the individual must pay the expenses him/herself. These costs will be an especially huge burden on the poor.

Impose taxes on tobacco consumption to improve public health; with the subsequent reduction in tobacco consumption comes reduced mortality and morbidity. Further, use the revenue generated from these taxes to better provide insurance coverage for those affected by tobacco use. This argument is discussed in further detail below.

Directly Reduce Tobacco Use

Taxes raise the price consumers must pay for tobacco products. The higher the price, the less people buy. So institute high tobacco taxes to:

- Encourage smokers to quit or reduce their smoking.
- Discourage ex-smokers from starting again.
- Deter non-smokers from starting.

(Note: this applies equally to all tobacco products—cigarettes, *bidis*, chewing tobacco, pipe tobacco, snuff, cigars, etc. Otherwise, increasing tax on one tobacco product encourages smokers to switch to a cheaper product, and undermines the impact of increasing taxes to reduce overall consumption.) A fall in tobacco use reduces the number of cases of disease and death caused by such use. Large increases in tobacco taxes can avert millions of premature deaths attributed to tobacco.

Protect Children and Young Adults

Young people appear especially sensitive to price in deciding whether and how much to consume tobacco—most notably by smoking. This is because they have less money to spend. However, peer pressure also plays a major role in their decision of whether to smoke. So direct efforts to reduce smoking among young people to this sub-population as a whole, rather than the individual smoker.

Because young people deciding whether to begin smoking are not yet addicted to nicotine, their desire to smoke is not as intense and, perhaps, can be more easily manipulated than that of an addicted

smoker. Impose a very high tax on tobacco (seen as a high initiation cost to the young person) to persuade the potential smoker not to start. More importantly, sustaining a high tax on tobacco over a long period reduces use by successive cohorts of teenagers and has a lasting impact on aggregate consumption. Protecting children from smoking and its associated health risks is the most compelling argument for increasing tobacco taxation (Warner *et al*, 1995). That is, implement a cycle in which:

1. increased tobacco taxes raise cigarette prices which, given the limited income of the youth, makes cigarettes more expensive to purchase, leading to
2. an increase in the mean age at which an individual does start to smoke, which leads to
3. a lower total consumption of tobacco, which leads to
4. lower future health care costs, deaths and diseases.

Correct for Negative Externalities

The use of cigarettes and other tobacco products has unintended health care costs that arise from the disease and deaths of tobacco users, particularly smokers and others who inhale their smoke (e.g., smokers' health care costs due to smoking, and the costs of the disease and deaths non-smokers suffer from second hand smoke). Economists use the term "negative externalities" when referring to these costs imposed on people other than the immediate consumers of the goods and services. Generally, these costs are *not* reflected in the price of cigarettes and other tobacco products, and smokers are unlikely to take them into consideration in deciding whether and how much to smoke.

Impose a tax on the smoker that incorporates the negative external costs of that smoker's actions on non-smokers. Because the smoker pays for the higher, societal cost, he/she is forced to make a more economically efficient decision on whether and how much tobacco to purchase. If the external cost—and incorporated tax level—is high enough, the smoker consumes less and the external costs of smoking are ultimately lowered.

IV. What is the “Right” Tax Rate?

Determine the Best Tax Rate

Decisions about the “right” tax rate for tobacco products are complex, since there may be a need to balance several different objectives with economic realities. The likelihood of smuggling and tax evasion, the tax system’s administrative capacity, income levels, and taxes in neighboring countries can affect policy decisions. Politics also play a role in decisions to increase tobacco taxes. (See **Tool 1. Introduction** for more on the political implications of tobacco taxes.)

Governments may want to maximize revenue in the short- and/or long-term, and may also want to use the tax to improve public health. Raising revenue through excise taxes in the manner least disruptive to the efficiency of the economy is a challenge.

Since taxing of a good raises its relative price and induces consumers to shift toward substitute goods and away from complementary goods, excise taxes have distortionary effects beyond the market for the taxed good. Under most circumstances, the consequence of imposing a tax is to create an efficiency loss, which refers to the excess reduction in a consumer’s welfare due to the income lost to payment of the tax. Try to design tobacco tax rates that raise the required revenue while minimizing the overall distortionary “deadweight loss” from taxation. Note, however, that setting up the right level of tobacco taxes often involves debate on the issues of equity and efficiency, as almost every member of the populace can be effected by tobacco excise taxes.

Evaluate Tax Efficiency and Equity

Taxes are evaluated on two basic criteria:

- efficiency

- equity

A fundamental principle in the efficiency of taxation is to prefer taxes that generate substantial revenue with relatively little loss of welfare arising from higher prices caused by such taxes (Chaloupka *et al*, 2000). In other words, taxation efficiency means that tax revenue should be maximized with a minimum change in consumers' choices of various goods or services. Generally, taxes create efficiency losses because the income the consumer must devote to paying the tax reduces the consumer's welfare. This *efficiency loss* is also called the "excess burden of tax" or "deadweight loss" (Zee, 1995).

Equity in taxation means that there should be an equal tax treatment of equal individuals (horizontal equity), or unequal tax treatment of unequal individuals (vertical equity). These two equity concepts are of limited practical value unless and until the following are achieved:⁵

1. Define the basis for measuring equality (in inequality) among individuals.
2. Specify the meaning of equal (and unequal) tax treatment.
3. Derive the tax principals that can be realistically implemented to guide policy.

This concept of tax equity is complicated, and further definition is beyond the scope of this Tool. Readers are referred to **Tool 6. Poverty**, which deals extensively with tax equity, for further details and clarification on this issue.⁶

Tax efficiency and equity are often intertwined. Depending on the purposes and goals of policy and policy makers, respectively, there is often a burdensome trade-off between tax efficiency and equity. With respect to efficiency, the focus has been on both the use of tobacco taxes to cover the net social costs of cigarette smoking and other tobacco use, and the imposition of higher taxes on goods with inelastic demand. With respect to equity, the focus has been on issues related to vertical equity—specifically on the apparent regressivity of cigarettes and other tobacco taxes.

Make Tax Efficient

It can be difficult to design tax rates that raise the required revenue while minimizing the deadweight loss from taxes. Frank Ramsey (1927), an early economist, proposed a solution. The "Ramsey Rule" states that tax rates should vary inversely with the elasticity of demand for products (holding the elasticity of supply constant). So,

⁵ Hu *et al* (1998) and Howell H. Zee "Taxation and Equity" in Tax Policy Handbook. (1995) ed. by Shome.

⁶ For more information, please see Krellove (1995).

tax goods with relatively inelastic demands more heavily, and tax those with relatively elastic demands less.

The Ramsey Rule argues for relatively high taxes on cigarettes and other tobacco products. In the short-run, at least, the demand for tobacco products is relatively inelastic in most countries. Thus, increases in taxes on tobacco products, even though they lead to significant reductions in cigarette smoking and other tobacco use, will at the same time lead to significant increases in tax revenues.⁷

It is desirable that taxes affect a consumer's decisions so as to reduce consumption of the product and, hence, the negative externalities. So, impose an even *heavier tax* than indicated by the Ramsey Rule on products that create negative externalities, such as tobacco.

Make Tax Equitable

It is a fair assumption that individuals with varying degrees of wealth consume products of the same type but with different quality and price characteristics. Imposing different taxes on a product depending on such characteristics addresses the vertical equity concern. For instance, impose higher tax rates on cigars and other products used by wealthier consumers who can absorb the extra cost, or reduce or abolish any tax on products used by poor consumers.

The differential tax treatment in India and Indonesia are good examples of such a system. The poor in India primarily smoke *bidis*, which do not have an excise tax. Similarly in Indonesia, hand-made *kreteks* have a lower tax rate compared to machine-made and white cigarettes, and are smoked primarily by the poor.

Many countries have opted to “customize” their tobacco tax rates based on a number of factors:

- size of producer (Indonesia)
- prestige of the brand, quality of tobacco leaves used, marketing characteristics, better packaging, smooth taste, etc. (China)
- type of tobacco product, such as *bidis*, *kreteks*, chewing, snuff, tobacco for hand-rolled cigarettes, and white sticks (India, Norway, Indonesia, Nepal, and Malaysia)

It is recommended that all tobacco products be taxed and, as a simple first step, at a consistent and equal rate. They all harm health and cause disease, and so warrant a tax.

Varying tax rates can encourage consumers to substitute cheaper products

A difference in tax rates on tobacco products does cause consumers to change consumption from high tax (and priced) products to low tax (and priced) products. For instance, when Egypt increased its tax

⁷ The elasticity of cigarette excise tax revenue with respect to the cigarette excise tax rate is equal to one plus the own-price elasticity of cigarettes times the share of tax in the tax inclusive price. $DRT/dtR = 1 + (\eta/P)$ where η is the own-price elasticity.

for more expensive ones.

on manufactured cigarettes but not on *shisha* tobacco (a type of pipe tobacco), *shisha* smoking increased while cigarette smoking declined (Townsend, 1998). Similarly, when Indonesia increased taxes on white cigarettes but not on *kreteks*, sales of *kreteks* rose while white cigarette sales declined (de Beyer and Yurkli, 2000). And in Norway, when the tax on cigarettes increased, cigarette consumption declined but consumption of hand-rolled cigarettes increased (Townsend, 1998). So, when using different tax rates—or different changes in tax rates—for different tobacco products, take into account the likely substitution effects.

Evaluate the Impact of Tobacco Excise Taxes

Higher Tobacco Taxes and the Poor

The primary concern over tax equity is whether cigarette and other tobacco taxes are regressive—that is, whether the tax accounts for a higher percentage of the income of poor versus wealthy individuals.⁸

A basic principle of tax policy suggests that individuals with the greatest ability to pay should be taxed more heavily (called “vertical equity”). Cigarette and other tobacco taxes can appear to violate this principle. If everyone uses the same amount of tobacco products, then:

1. All groups pay the same *absolute* amount of tobacco taxes.
2. Taxes account for a higher *proportion* of the income of poor people.
3. Taxes are *regressive* with respect to income.

If poor people use *more* tobacco products than wealthy people, then the tax is more regressive on the group of poor individuals.

However, even if cigarette taxes fall most heavily on poor smokers, *increases in tobacco taxes can be progressive* provided lower income smokers significantly reduce their smoking. The implication is that the poor are more sensitive to price increases than the wealthy, and will therefore reduce consumption based on the degree of the overall price due to a tax increase. A beneficial result is an increase in the quality of their health and economic welfare. Therefore, in the short run, the poor face a heavy burden, but in the long run the benefits far offset the costs. This implication is proving true, as there is growing evidence in a number of countries (notably Poland and South Africa) that people with lower incomes reduce tobacco consumption more than higher income groups when overall prices rise.

⁸ For more information, please see Chaloupka *et al* (2000) and **Tool 3. Demand Analysis**.

Consider this example. There are two smokers consuming the same number of cigarettes (x), one with low income (y) and the other with high income ($3y$). Estimates of the price elasticity of demand suggest the low-income smoker is more price sensitive (elasticity of -0.80), while the high-income smoker is less price sensitive (elasticity of -0.20). The cigarette tax is 50 percent ($1/2$) of price and the tax is fully passed on to the smokers. Given this, both smokers are paying $x/2$ in cigarette taxes. For the low-income person this is $x/2y$ of income, compared to $x/6y$ for the high-income person. This tax is clearly regressive. However, a *tax increase* is not regressive. Assuming the price elasticity of demand is the same, doubling the cigarette tax reduces both smokers' consumption, with a relatively larger reduction for the low-income smoker. In addition, the total tax paid by both smokers rises (to $0.6x/y$ for the low-income smoker and $0.3x/y$ for the high-income smoker). However, the increase in the tax paid by the low-income smoker is less (at $0.1x/y$) compared to the increase (at $0.133x/y$) for the high-income smoker. So although the starting tax is regressive, *the tobacco tax increase is progressive* and the overall regressiveness of the tobacco tax is reduced (Chaloupka *et al*, 2000).

Smokers and the Cost of Their Habit

The primary concern over tax efficiency focuses on the use of tobacco taxes to cover the net social costs of cigarette smoking and other tobacco use (Chaloupka *et al*, 2000). Two notions are important to keep in mind when discussing the appropriate level of tobacco taxes.

Due to the inelastic demand for tobacco products, tobacco taxes reflect efficient taxation over the short term.

The first notion is reflected in the Ramsey Rule. That is, given that governments need to generate revenue and use excise taxes to do so, taxes applied to goods and services with relatively inelastic demands are more efficient than taxes applied to those with more elastic demands (holding the elasticity of supply constant). The more inelastic demand is, the less consumers change their purchasing decisions in response to tax/price changes. Hence there is less distortion caused by the taxes.

Because of the high external costs of smoking imposed on society, tobacco taxes can help "internalize" such costs on the smokers themselves.

The second notion relates to externalities.⁹ Taxes can be used to improve economic efficiency where there are externalities (such taxes are referred to as "Pigouvian taxes") (Pigou, 1962). If tobacco excise taxes are viewed as a way to "internalize" the social costs of smoking—that is, to add an element of the social implications of smoking to the price that smokers must pay—one could measure this social cost and set the tax rates accordingly. Thus, set the amount of tax on cigarettes so that total tax revenue paid for by smokers equals

⁹ In general, these externalities fall into two categories: the financial externalities associated with the impact of tobacco use on the costs of healthcare, group health and life insurance, pensions, and other collectively financed programs; and the costs associated with the health and other consequences of exposure to environmental tobacco smoke (Chaloupka *et al*, 2000).

the total social cost generated by smokers.¹⁰

Although estimates of the net social costs of tobacco use are critical in determining the appropriate level of tobacco taxes, estimating the costs of the negative externalities resulting from cigarette smoking and other tobacco use is a highly controversial subject (Chaloupka *et al*, 2000).

Both the Ramsey and Pigouvian tax rules recommend tobacco products carry relatively high taxes for tax efficiency reasons.

Smuggling

The potential for smuggling tobacco can limit increases in tobacco tax rates. When setting tax rates, consider the risk of smuggling, the purchasing power of local consumers, tax rates in neighboring markets, and the ability and effectiveness of the tax authority to enforce compliance.

However, those who oppose tobacco tax increases often exaggerate the amount and risks of smuggling. For example, in South Africa the tobacco industry predicted massive smuggling when the government announced a series of large increases in tobacco taxes. Although smuggling did increase, it did not occur on the massive scale suggested by the tobacco industry—smuggling is estimated to have risen from one percent to six percent of all cigarettes smoked.

See **Tool 7. Smuggling** for a thorough discussion of tobacco smuggling and its implications on tax policies, administration, and revenue.

¹⁰ There is an abundance of evidence on the health consequences of tobacco use that clearly implies that the direct medical care costs of preventing, diagnosing, and treating tobacco related diseases are substantial. For more information please see Lightwood *et al* (2000) “Estimating the costs of tobacco use” Tobacco Control in Developing Countries, ed. by Jha and Chaloupka, WB Publication 2000.

V. Generate Higher Excise Revenues

Forecast Excise Revenue from Tobacco Taxes

As discussed above, a primary purpose of implementing or increasing excise taxes is to generate more revenue. Since tobacco is the best candidate to achieve required revenue from excise taxes, tax administrators must often identify and recommend the necessary tax increase to achieve the required revenue. Tax administrators often forecast excise revenues as a result of excise rate changes. There are different ways to forecast these excise revenues, ranging from the use of simple estimation techniques to sophisticated econometric models (Sunley and Weiss, 1992).

Why Forecast

Forecasting tax revenue is important for administrators and policy makers. It is necessary to know the full amount of a government's revenue before adequately adjusting its expenditures. Moreover, and particularly in developing countries, governments are often in need of more revenue, so tobacco taxes are perfect candidates in fulfilling this need.

When a tobacco tax increase is in question, it is important to forecast the revenue based on proposed tax rates for two reasons. First, policy makers and governments have a vested interest in knowing how much additional revenue will be gained from the increase. Second, and especially when a tax increase is considered as a method to reduce consumption, public health advocates must present evidence that an increased tax does not reduce government revenues. Otherwise, policy makers will be less likely to consider a tobacco tax increase.

Economists who analyze the impact of tobacco taxes on consumption should also consider the consequences of an increase on government revenues for a stronger policy recommendation.

To achieve a target increase in tax revenue, know the price elasticity of demand. In most low- and middle-income countries, the price elasticity of demand for cigarettes is about -0.8 .

Tobacco products are subject to sales taxes and also import duties. By the time consumers purchase products, tobacco products have, excise taxes, VATs, and import duty rates on them. The following section discusses only excise revenue.

How to Forecast

Estimate excise revenue due to a rate change by multiplying the tax base by the increase in the tax rate and adjust for changes in the tax base. For example, there is a specific excise tax of 10 rupees per pack of cigarettes, which retail for 20 rupees per pack. This tax is equal to 50 percent of the retail price. If 10 million packs are sold each year, excise revenue is 100 million rupees (10 rupees multiplied by 10 million). When the excise rate is increased 10 percent to 11 rupees per pack, the retail price of a pack of cigarettes is raised 5 percent to 21 rupees. If the demand elasticity for cigarettes is -0.8 (which means, a 10 percent increase in price will reduce the consumption by 8 percent), the 5 percent increase in the retail price of cigarettes reduces the demand for cigarettes by 4 percent.¹¹ Sales become 9.6 million packs per year, and tax revenue increases by 5.6 million rupees ((11 rupees \times 9.6 million packs) – (10 rupees \times 10 million packs)), or 5.6 percent.

The expected change in government excise revenue from a change in the excise tax can be shown mathematically (van Walbeek, 2000):

$$\text{GER} = \text{consumption (Q)} \times \text{excise tax (CET}_x)$$

by taking the log value

$$\text{Ln(GER)} = \text{Ln(Q)} + \text{Ln(CET}_x)$$

and taking the derivative with respect to time:

$$d(\text{GER})/\text{GER} = d(\text{Q})/\text{Q} + d(\text{CET}_x)/\text{CET}_x \quad [1]$$

since the derivative of

$$\text{Ln}(fx) = df(x)/f(x)$$

where GER = government excise tax revenue from cigarettes

CET_x = cigarette excise tax per pack

Q = per capita consumption/pack

$$\text{Percent change in consumption } d(\text{Q})/\text{Q} = \text{price elasticity} \times \text{percent change in price } d(\text{P})/\text{P} \quad [2]$$

$$\text{Percent change in price } (d(\text{P})/\text{P}) = \text{percent change in cigarette excise tax } d(\text{CET}_x)/\text{CET}_x \times \text{ratio of tax over price (CET}_x/\text{P)} \quad [3]$$

Replace [3] into [2] to get:

¹¹ If the price is increased by 10 percent, an 8 percent reduction in consumption is expected. Since the price increases only 5 percent (half of 10 percent), consumption is reduced 4 percent (half of 8 percent).

$$(d(Q)/Q = (\eta_p) \times ((d(CET_x)/CET_x) \times (CET_x/P)) \quad [4]$$

Replace [4] into [1] to get:

$$d(GER)/GER = d(CET_x)/CET_x \times (1 + (\eta_p \times (CET_x/P)))$$

where $d(GER)/GER$ = percent change in GER

$d(CET_x)/CET_x$ = percent change in CET_x

η_p = price elasticity of cigarettes

CET_x/P = cigarette excise tax ratio in price per pack of cigarettes ((10/20) = 0.50)

Apply the values from the scenario above into this formula:

$$d(GER)/GER = 10 \times (1 + (-0.8 \times (0.50)))$$

$$d(GER)/GER = 6 \text{ percent}$$

When forecasting excise revenue, it is very important to consider whether the excises are *ad valorem* or specific and, if specific, whether they are indexed for inflation. Refer to the “Select the Type of Tax” section in the **Consider the Appropriate Type of Tobacco Tax** chapter for more detailed information on specific versus *ad valorem* taxes.

Econometric Model for Forecasting

There are several methods one can use to forecast excise tax revenue as a result of excise rate changes for a given time period. One approach is to develop an econometric model, estimate its parameters from the available data, and then use it to predict future values of the variables of interest.

In **Tool 3. Demand Analysis**, several models are presented that estimate demand and price elasticity of cigarette consumption by using aggregate time-series data. One of these models—the myopic demand model—can be used to forecast excise tax revenue when the price increases.¹² This forecast is expressed as:

$$Q_t = b_0 + b_1P_t + b_2Y_t + b_3Q_{t-1} + \varepsilon_t$$

where Q_{t-1} = per capita consumption of cigarettes per adult in year $t-1$

Y_t = real income per adult

P_t = real price per pack of cigarette

Assume the estimation provides the following coefficients:

¹² Only three independent variables are used in this illustration to maintain simplicity. Further, in this example an increase in price is used instead of a tax because the model is designed for this purpose. Readers seeking to use this and other models for estimating and forecasting price elasticity and tax revenue should become familiar with the econometric models presented in **Tool 3. Demand Analysis**.

$$\text{Predicted } Q_t = 142.5 - 0.464P_t + 0.003Y_t + 0.158 Q_{t-1} + \varepsilon_t$$

Note: The price elasticity for this equation for the time period (1970–1999 data) is estimated at -0.8 . This is derived by multiplying the price coefficient (-0.464) by the proportion of sample means of price and consumption (price/consumption). Using another approach, multiply the price coefficient by the proportion of price and consumption value for the year 1999 to estimate the price elasticity for 1999.

Assume the latest year observation is 1999 ($t = 99$), and the values are 1999 data.

$$\text{Predicted } Q_{99} = 142.5 - 0.464(420 \text{ rupees}) + 0.003(4,500) + 0.158(43) + \varepsilon_{99}$$

Also assume

Real $P_{99} = 420$ rupees (1999 nominal price 2,300 rupees per pack divided by 1999 Consumer Price Index (CPI))

Y_{99} (real income) = 4,500 rupees per adult (nominal income divided by CPI for the corresponding year)

Q_{99-1} = last year's per adult consumption is 43 packs

Then estimate predicted per capita consumption for 1999 by multiplying the estimated coefficients by the actual values of the variables in that year, as follows:

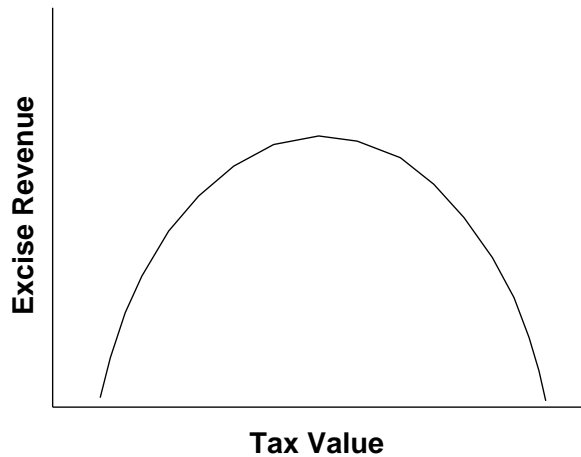
1. Assume nominal price for cigarettes increased by 10 percent in 1999.
2. Multiply the nominal price value for 1999 by 10 percent and add it to the value (the price is 2,300 rupees and a 10 percent increase is 230 rupees, so the new price is $2,300 + 230 = 2,530$ rupees).
3. Divide the nominal value by the consumer price index in 1999 to find the new real value of the 1999 price per pack.
4. Replace the new real price value into the price value for the 1999 equation. Other variables are assumed constant.
5. Multiply each value with the corresponding coefficient to find the hypothetical consumption for 1999 when the price is increased by 10 percent. The difference between predicted and hypothetical per capita consumption gives the per capita gain or loss of cigarettes in packs.
6. Multiply the per capita gain or loss of cigarette pack by the adult population for 1999, since the dependent variable is adult per capita consumption. This indicates the total packs of cigarettes gained or lost in 1999.
7. Multiply this number with the tax rate (in the example, it is assumed the 10 percent price increase came from a tax

increase, so 230 rupees are added to the 1999 tax value per pack and the sum is divided by the CPI to find the real value of tax).

8. If the VAT per pack is known, multiply the total consumption with the real VAT value to estimate the real cigarette revenue from VAT tax.
9. Sum both revenues (excise revenue + VAT revenue) to find total real cigarette tax revenue.

The next challenge is to determine the rate of tobacco excise tax where revenue is maximized. Hypothetically, the price can be methodically increased 5, 10, 50 percent, and so on, with a subsequent estimation of the corresponding tax value. However, typically when a tax increase is reflected in price, producers pass the tax increase completely on to the consumer so that the consumer bears the tax burden. When the relationship between tax and revenue is graphed, a Laffer curve is revealed, and the point of maximum revenue is identified. Figure 4.1 shows a Laffer curve.

Figure 4.1
Laffer Curve



VI. Consider the Appropriate Type of Tobacco Tax

Impose an Excise Tax on Traded Tobacco Products

Tobacco and tobacco products are often produced in one country and then shipped to another for consumption or for further production. When tobacco products are traded, specify where the excise taxes should be levied. There are two distinct types of excise taxes:

- A manufacturer's excise tax is imposed on the producer or importer of a taxable good and is included in the price paid for that good by the ultimate purchaser.
- A retail excise tax, in contrast, is imposed at the point of sale to the ultimate purchaser.

Given the weak tax administrations, in most developing and transition countries, excise taxes are levied at the manufacturing level for administrative purposes.

Excise taxes on imports/exports can be levied in the country of origin or at the destination country (Terra, 1996).¹³ The best international practice is to impose excise taxes at the destination, so that each country taxes its imports but not its exports. This standard avoids the potential problems of either double taxation or the absence of taxation (Sunley *et al*, 2000).

Many countries impose both a customs duty and an excise tax on imports. However, *do not* specify the base for *ad valorem* taxes as the cost plus the customs duty. Otherwise this results in a tax on a

¹³ The territorial scope of excise taxes can be based on the origin principle and the destination principle. Most governments adopt the destination principle for excise taxes. This principle can require a border tax adjustment (BTA), which is a surcharge on imports and must not exceed the internal taxes or other charges levied on similar domestic products. BTA refers to the treatment of taxes under the rules of the GATT, now embedded in the WTO (Terra, 1996).

tax, because the customs duty is included in the base of the excise tax (Sunley *et al*, 1999).¹⁴

Under the General Agreement of Tariff and Trade (GATT) which is now embedded in the World Trade Organization (WTO):

- Countries may impose compensatory taxes on imports and may exempt, or remit, taxes on exports, though they are not required to do so.
- Countries may not discriminate between domestically produced and imported products. Imported products shall “not be subject, directly or indirectly, to internal taxes or internal charges of any kind in excess of those applied directly or indirectly to like domestic products” (Terra, 1996).¹⁵
- Internal taxes shall not be applied to protect domestic production (GATT, article III(2); Terra, 1996).

Select the Type of Tax

Specific and *ad valorem* taxes are the two main types of excise tax.

- Specific taxes are levied on the *quantity* of the product produced or consumed—a fixed amount per pack, per 1,000 cigarettes, per 1,000 grams of tobacco, etc.
- *Ad valorem* taxes are a percentage of the *value* of tobacco products based on price or cost to manufacturers or importers.

Determine Tax Preferences

Specific and *ad valorem* taxes have different effects on prices, profits, tax revenues, product quality, product variety, administration, and the distribution of income (Keen, 1998; Delipalla *et al*, 1992). The relative merits of each tax depend in part on whose perspective is being used to evaluate their effect.

- Consumers care about price, quality, and variety of the tobacco products they use.
- Tobacco producers care about profit and market share.
- Governments care about tax revenues, ease of administration, effective tax collection, and the welfare of consumers.

¹⁴ To illustrate, if the customs value is 100, a 10 percent customs duty increases the cost to 110, and a 20 percent excise tax on the customs value is 20. So the total cost with duty and tax is $100 + 10 + 20 = 130$. If the customs duty is *included* in the base of the excise tax, the 20 percent excise tax is 22, increasing the total cost to $100 + 10 + 22 = 132$.

¹⁵ In general, the principle of nondiscrimination requires that a country levy an identical excise on domestic products and the same or similar products imported from other member countries.

Choose between Specific and *Ad Valorem* Taxes

There are many extenuating factors that can affect or influence the choice of one type of tax over another.¹⁶ The important scenarios to consider pertain to the overall objective(s) of the tax on the consumer, government, and producer perspectives.

- If inflation is high and expected to remain high, *ad valorem* taxes are preferred. Since they are value-based, they automatically keep pace with inflation.
- If the primary purpose of the tax is to discourage consumption of cigarettes, a strong case can be made for specific excises. As they are based on the quantity of the good purchased, the tax burden is the same per cigarette. There are exceptions, however, since the tobacco industry is likely to seek ways to minimize the impact of these taxes on consumption.¹⁷
- If tax administration is weak, specific excises are preferred, since it is easier to determine the physical quantity than the value of the taxed product.
- If imports have a higher quality/price than domestic products, *ad valorem* taxes are preferred. *Ad valorem* rates result in higher absolute amounts of tax being paid per unit for high value/quality cigarettes, and if passed on to consumers, will raise the prices of imports more than the prices of lower cost/quality domestically produced cigarettes. This provides protection for domestic manufacturers.
- If imports are of a higher quality than domestic products and there are large differences in quality between the two, custom duties imposed on the imported product offset the inherent effect that a specific tax is “bad” for low-priced domestic production. That is, the price of a lower-priced domestic product is raised a greater proportion, and the price differential is reduced.
- If custom duties are imposed to protect local producers, specific taxes can be imposed on both domestic production and imports. Such taxes can include *ad*

¹⁶ For more information, please see Johnson (1978), London Economics (1995), Oxford Economic Forecasting (2001), and Myles (1988).

¹⁷ For example, Townsend (1998) describes how, in the United Kingdom, the switch from a system where taxes were based on the weight of tobacco to a system in which they were imposed per cigarette led tobacco companies to market “king-sized” and “super king-sized” cigarettes. This action lowered the total tax per amount of tobacco smoked. Similarly, Evans and Farrelly (1998) find that increases in cigarette excise taxes, while significantly reducing smoking prevalence, led some continuing smokers to switch to longer cigarettes or brands with a higher yield of nicotine and tar. This is interpreted by some as an increase in the quality of the average cigarette consumed (Barzel, 1976; British American Tobacco, 1994; Sobel and Garrett, 1997).

valorem taxes, which may create a problem for importers. Import duties are already imposed on high-priced imported products, and their price reflects this cost. As a result, the price difference between domestic and imported brands is high. When an *ad valorem* tax is levied, the price of an imported brand increases more than that of a domestic brand, and the price differential is even greater. Thus it can be very difficult for the imported brand to gain market share.

- With an *ad valorem* tax, part of any increase in the price of cigarettes goes to the government as tax revenue (called a tax multiplier effect) (Keen, 1998). So *ad valorem* rates discourage producers from upgrading cigarette quality if this implies higher prices, and hence higher amounts of tax paid. Consider a manufacturer who wishes to improve quality by significantly reducing tar level in its tobacco products. The cost of doing so must be passed on to the consumer. Due to the multiplier effect, if the manufacturer increases its net price (producer price) by \$1, then the manufacturer must increase the price charged to the consumer by more than \$1. Specifically, increasing producer price by \$1 requires consumer price to be increased by $\$1/(1-v)$ or \$2.50 where v is the *ad valorem* rate of 60 percent.¹⁸ In this scenario, it is highly unlikely the quality improvement will occur.
- Specific taxes should be automatically adjusted by reference to the consumer price index (CPI) to keep pace with inflation. It is critical that the adjustment be automatic—by administrative order—and not require a decision of an executive agency or approval of a legislative body. Countries may suspend automatic adjustments in periods of high inflation.
- If domestic currency is prone to depreciate or appreciate greatly, specify a specific tax in a “hard currency.” This ensures the specific tax is more consistent and reliable as a source of revenue.
- If tax rates change, producers react differently under different tax systems. When specific tax rates rise or fall, producers tend to increase or decrease the consumer price by more or less than the amount of the tax, respectively. Thus the consumer assumes the burden of the tax change. But with *ad valorem* taxes, where the amount of tax paid is automatically built into the price of the product, there is less incentive for the producer to

¹⁸ Assume v is *ad valorem* tax rate and δ is the specific tax rate. The producer price (P_n , which is the price net of taxes) is simply the consumer price P , less the specific tax δ and *ad valorem* taxation vP : $P_n = (1-v) P - \delta$.

raise the consumer price. So an increase or decrease in the rate of an *ad valorem* tax tends to lead to a consumer price rise or decline of less than the tax rise. In short, increases in specific tax rates are more likely to raise consumer prices than do increases in *ad valorem* tax rates.

A comparison of these two types of taxes and their effects on the consumer, government, and industry is summarized in Table 4.2.

Consider the Best of Both

It is possible to have “the best of both” by combining a specific tax with an *ad valorem* tax on tobacco products.

For instance, for each member country of the European Union (EU), the excise duty on cigarettes consists of two parts: one specific and one *ad valorem*. The specific element must represent 5–55 percent of the total tax burden (excise duty plus VAT) of the most popular price category sold in that country (usually, king-size filter brands). This combination of tax types reflects a political compromise that “blessed” the then-current tax regime for cigarettes in most EU countries.¹⁹ The minimum rates for other manufactured tobacco—cigars and cigarillos, hand-rolling tobacco, and other smoking tobacco—are expressed in *ad valorem* terms.

¹⁹ That is, the hybrid tax was a compromise solution to a political challenge between the EU member countries.

Table 4.2
Comparison of Specific and *Ad Valorem* Taxes on Tobacco Industry Participants

Participant/Concern	Specific Tax	<i>Ad Valorem</i> Tax
Consumer: Quality and Variety		
Provide an incentive for higher quality and greater variety of products.	Yes (upgrading effect). ¹	No. ²
Effect of tax increase on price.	Higher prices (overshifting). ³	Lower prices (undershifting).
Government: Revenue and Administration		
Maintain revenue value under high inflation.	No (should be adjusted by CPI).	Yes.
Minimize evasion/avoidance and realize expected revenues.	Manufacturer can manipulate cigarette length or pack size to reduce tax payment.	May need to set minimum price to counter abusive transfer pricing. ⁴
Administration and Enforcement.	Easy. ⁵	Must define the base for <i>ad valorem</i> in a way that minimizes the industry's ability to avoid taxes. ⁶
Domestic Producer: Profits and Marketshare		
Protect domestic brands against international brands.	No	Yes (the higher the price, the higher the absolute amount of tax paid per unit since tax is a percentage of price). ⁷

¹ Per unit taxes are the same for all cigarettes, with no variation by quality/value/price. This reduces the price differential between high and low quality/price cigarettes, and may lead consumers to switch to higher quality/price cigarettes (assuming that more expensive cigarettes are considered to be of higher quality).

² *Ad valorem* tax adds the same percentage to the prices of high- and low-quality versions of the product, and so keeps relative prices the same.

³ Faced with a tax rate increase, an oligopolist or a monopolist producer tends to increase the consumer price by more than the amount of a specific tax increase, but will increase the price less than the full amount of an *ad valorem* tax increase (Harris, 1987; Townsend, 1998).

⁴ If the *ad valorem* tax is a percentage of the manufacturer's price, the manufacturer may sell cigarettes to a related marketing company at an artificially low price in order to reduce its excise liability.

⁵ Specific taxation is easier to administer, particularly in countries where tax administration is weak. Tax administrators can easily determine and verify liability by counting goods and/or marking or affixing stamps to taxed units.

⁶ In developing countries, a tax based on value (*ad valorem*) can be difficult to administer if market prices of the excise goods are not established or are undervalued due to the nonexistence of formal markets. This can cause a substantial loss of tax revenue.

⁷ With *ad valorem* taxation, part of any increase in the consumer price goes to the government as tax revenue.

VII. Administer Tobacco Taxation and Revenues

The administration of excise taxes requires an integrated strategy for taxpayer registration, filing and payment, collection of overdue taxes, audits, appeals, and taxpayer services. In high-income countries, excise taxes can be administered by relying on the taxpayer to submit tax returns and then auditing the taxpayer's account books. In countries with less-established taxation collection systems, effective enforcement of excise taxes on tobacco products can require much greater physical control over the products.²⁰

Collect Tax

Compliance

The high degree of compliance with excise taxes, as experienced in many high-income countries, is based in part on the maintenance of a professional relationship between the taxing authority and the taxpayer.

Develop such professional relationships as part of the overall strategy to strengthen tax administration and tax compliance.

Registration and Licensing

Effective enforcement begins with a licensing system covering all importers, producers, and wholesalers of tobacco products. Retailers can be required to purchase products only from licensed importers, wholesalers, or producers.

Before issuing a license, conduct a background check if there is suspicion of a criminal background or involvement with smuggling.

²⁰ For more information, please see Sunley *et al*, 2000.

Relatively severe penalties for not obtaining a license facilitate the administration of the tax.

Timing of Tax Payment

Excises on tobacco products are usually levied on the production or imports of a good, not on the final sale of the good. With appropriate physical controls (discussed below), it is much easier to determine when goods are produced or shipped than when they are sold or paid for.

Although the tax liability is fixed when the goods are imported or produced, permit deferment of the payment of the tax, so long as there are suitable guarantees that the tax will be paid. A deferment can allow the timing of the tax payment to coincide roughly with the time that the consumer buys the product.

Bonding

Producers can have cash flow problems if they are required to maintain inventories of excisable goods on a tax-paid basis. This problem can be alleviated if producers purchase a bond or similar security to ensure that all tax liabilities are paid.

When production facilities are bonded, impose the tax liability when the excisable goods are removed from the bonded facility (that is, released for consumption) and not when they are produced. A cigarette producer, therefore, can manufacture cigarettes and place them in a bonded warehouse. Tax is due when the product is removed from the bonded warehouse (unless it is withdrawn under a transfer bond for transfer to another bonded production center for further processing or it is withdrawn under an export bond for export).

Physical Controls

Governments with effective tax administration systems ensure that shipments into and out of tobacco production facilities are controlled. The producer makes records available for inspection by the tax authority on a regular basis, usually either weekly or monthly.

Periodically take stock of the products at hand and checks against the taxpayer's production and shipment records. Control can also include checking inventory by counting cigarette packs. An employee of the company may perform the actual measuring under the supervision of a tax official. To help ensure integrity, frequently rotate the control official among different locations, and have the supervisor make surprise visits.

High-income countries have, in the past, adopted intensive physical controls on excisable goods. For example, whisky distilleries in Scotland once had official locks on their entrances, exits, and key areas of the production process that were vulnerable to unlawful

extraction. Each distillery had a resident excise officer who lived in a provided house next door to the distillery, and no activity could take place without the officer being present to unlock the locks. Similarly, in the United Kingdom, each bonded warehouse used to have a resident officer who had to unlock and lock the warehouse. Now, the United Kingdom relies on the warehouse keeper to exercise day-to-day control, with official control based on spot checks and systems of audit. Some developing countries should consider similarly intensive controls on tobacco products. As in all such systems, however, the potential for fraud by the excise officer must be considered.

Stamps

Excise stamps are another method of ensuring payment of excise tax and ensuring that goods for which the tax appropriate for one jurisdiction has been paid do not get shipped to another.

Either sell these stamps to the taxpayer to collect money in advance, or provide stamps to bonded producers with payment delayed until the excise is otherwise payable.

Paying Specific Taxes with Stamps

Stamps representing full payment of a tax are particularly effective for the payment of specific excise taxes. If the price of the stamp does not represent the *full* payment of a tax, as in the Russian Federation, the stamp can still be used to represent payment of other taxes.

Ensure that the full excise tax is paid on products bearing stamps by requiring excise taxpayers to account accurately for the storage and use of stamps. In this situation, stamps serve to complement other administrative programs to help determine the tax liabilities of producers.

Paying Ad Valorem Taxes with Stamps

When stamps are used to reflect payment of *ad valorem* taxes, different stamps are needed for each value of the excised good. In the case of cigarettes, manufacturers apply the excise stamp directly to the pack as part of the manufacturing process. For instance, stamps are often affixed to cigarette packs before the final cellophane packaging is applied.

Administering Stamps

A government must maintain total control over both the excisable good and the stamps. In many countries, the excise stamps are re-used and/or are easy to counterfeit. To limit such activity, require stamps that are of high quality, difficult to duplicate, serially numbered, and adhere to the package so that they break when the package is opened. Stamps serve little purpose in control unless their

use is monitored at the retail level and retailers believe that the stamp program is being strictly enforced.

Impose strong penalties or criminal sanctions for producing or possessing counterfeit stamps and for persons who deal in illicit products. Similarly, make it an offence for a retailer or wholesaler to possess tobacco products that do not bear authentic stamps. Governments need to have the authority to revoke the operating licenses of retailers and wholesalers who are repeat offenders.

Cost of Stamps

The introduction of stamps involves some costs for the producers of the excised goods, both in terms of the labor and equipment needed to apply the stamps, and the slower production lines that result from the application of the stamps. For example, stamping machines can cost around US\$40,000 each, and some of the larger taxpayers may require as many as 100 machines. Producers also bear the additional cost of lost flexibility: once stamped for one national market the product cannot be shipped to another.

Floor-Stock Tax

To limit opportunities for evasion and to ease administration, levy tobacco excises at the manufacturing stage. However, whenever excise rates are increased, impose a tax on the “floor stock,” or the stock of product held by distributors and retailers on the date of the tax increase. This floor-stock tax limits the downstream windfalls that result when tax increases raise prices immediately, even when distributors and retailers are holding inventory taxed at the previous lower rate.

A floor-stock tax is not necessary every time an excise rate is increased, only when the rate increase is significant. Further, any floor-stock tax should exempt a minimum, “necessary” level of inventory.

Earmarked Tax

An earmarked tax designates some or all of its revenue for spending on specific government or public services (Teh-wei Hu, 1988). Earmarked taxes are not new, and are quite common. For example, in the United States at least one-third of all federal, state, and local government expenditures are funded from earmarked taxes (McMahon and Sprenkle, 1970). However, earmarking part of tobacco tax revenue for particular expenditures is relatively new. Since the late 1980s some countries have applied the “benefit principle”²¹ to the use of revenue from tobacco excises by earmarking this revenue for tobacco control activities and for health-

²¹ The benefit principle of taxation states that individuals should pay for their use of government-provided services in proportion to the benefits they derive from consuming these services.

related expenditures, including health promotion and health insurance.

Uses of Earmarked Tobacco Taxes

Several U.S. states (most notably California, Massachusetts, Arizona, and Oregon), and governments in several countries (Canada, Ecuador, Finland, French Polynesia, Guam, Iceland, Indonesia, Korea, Malaysia, Nepal, Peru, Poland, Portugal, and Romania) earmark a part of tobacco taxes for:

- tobacco-related education and counter-advertising
- funding health care for under-insured populations
- cancer control research
- funding sporting and artistic events previously funded by the tobacco industry

An often debated but not yet adopted use of earmarked tobacco taxes is to help tobacco farmers and those employed in manufacturing tobacco products move into other crops and industries.

Justification for Earmarking Tax Revenues

Many public finance economists oppose earmarked taxes because they introduce rigidities that make it more difficult to allocate general revenues among competing uses. On the other hand, there are good reasons to consider earmarking:

- Earmarked tobacco taxes can be used to fund health promotion and disease prevention. This is consistent with the “benefit principal” of taxation and can reduce the loss of producer and/or consumer surplus resulting from higher taxes (Hu *et al*, 1998). The health benefits resulting from tax-induced reductions in smoking are disproportionately larger in the lowest income populations. Particularly appropriate is the earmarking of new tobacco tax revenues to subsidize the provision of nicotine replacement products and other smoking cessation services for the poor, further reducing the perceived regressivity of a tax increase and increasing the progressivity of the health benefits from a tax increase.
- Earmarked tobacco taxes can promote equity. For instance, many publicly provided health insurance programs target lower-income populations. Earmarking tobacco taxes for the health insurance programs of the poor is consistent with an overall system of taxes and transfers that promotes vertical equity.
- Tobacco farmers and those employed in tobacco manufacturing bear part of the burden of adjustments resulting from higher tobacco taxes. In the short run,

earmarking part of the new revenues from a tobacco tax for crop-substitution and retraining programs can significantly reduce any impact on tobacco growers and producers.

- Tobacco tax increases earmarked for anti-tobacco media campaigns, prevention programs, subsidization of tobacco cessation products and programs, and other activities to reduce tobacco use generate even *larger* reductions in tobacco use and improvements in health than the tax increase alone.

Provide Refunds and Credits

Institute an excise law that provides for a refund or credit of excise tax previously paid on a product that is destroyed prior to being marketed, or that is returned to the manufacturer. In addition, if excise stamps are used, fully credit the manufacturer for any stamps destroyed or damaged in transit or in the manufacturing process. In these instances, there is no excisable sale or use of the product.

Make Taxation Easy to Administer

It is easier to administer specific taxation than *ad valorem* taxation, particularly in developing countries where the tax administration is weak. *Ad valorem* rates require more training and sophistication to enforce than *specific* rates, in which tax administrators can easily determine and verify liability by physically counting goods and/or marking or affixing stamps to taxed units. It may not be easy to administer an *ad valorem* tax in developing countries if market prices of the excise goods are established or undervalued due to the nonexistence of formal markets. In such instances there is potential for a substantial loss of tax revenue.

Under *ad valorem* taxation, determining value is particularly difficult when taxpayers use abusive transfer prices to reduce their tax liabilities. For example, if the *ad valorem* cigarette excise is a percentage of the manufacturer's price, the manufacturer may sell cigarettes to a related marketing company at an artificially low price, thus reducing its excise liability. This problem led the Philippine government to abandon *ad valorem* taxes on cigarettes in favor of specific excises in 1996. Similarly, as part of its 1996 tax reforms, the Russian Federation unified the excises on imported and domestic products and adopted specific excises for cigarettes. Until then, specific excises were imposed on the domestic production of cigarettes but imports were subject to *ad valorem* excises.

Case Studies

Many countries, including those in the European Union, impose specific rates on certain excisable goods and *ad valorem* rates on other excisable goods, particularly those varying widely in quality (such as jewelry or fur coats) that would be difficult to assess under specific rates. In the United States, the excise taxes on cigarettes and small cigars are specific, but taxes on large cigars are *ad valorem*. Still other countries impose specific minimum rates with *ad valorem* supplements on some excisable goods.

Solve the Valuation Problem

The valuation problem of *ad valorem* taxation can be solved with different alternatives.

- Give the tax administration the authority to make price adjustments in situations where under-pricing of excisable goods reduces the excise tax base.
- Collect *ad valorem* cigarette excises from the manufacturer or importer, based on the maximum retail price that is specified by the manufacturer and printed on the package. Impose penalties on any sales of cigarettes at prices in excess of the maximum retail price. However, this approach is cumbersome or unworkable if prices change rapidly and there is a large inventory of packaging materials pre-printed with the retail price.
- Collect the *ad valorem* tax at the retail stage, where most sales are to the final consumer. However, this solution can be problematic for the tax administrator, as there are many more retailers than manufacturers and importers.

Account for Inflation on Excise Taxes

Under specific taxation, the real value of the tax and excise revenue falls over time, unless tax rates are regularly increased to account for inflation.²² This can create problem of hoarding or stockpiling as consumer and producers anticipate discrete tax changes. Under a system of *ad valorem* taxation, the real value of the tax and the real price of tobacco products should be stable over time as nominal prices rise with the prices of other goods and services.

Automatically adjust specific taxes by reference to the consumer price index (CPI) to keep pace with inflation. The CPI is the preferred index because once issued it is not revised, unlike some other price indicators such as the GDP deflator. Moreover, it is

²² For example, in the United States the relative stability of federal and state cigarette excise taxes contributed to a drop of nearly 40 percent in real cigarette prices between 1971 and 1981. This was later reversed by a series of federal and state tax increases in the 1980s and 1990s.

commonly assumed the public understands the concept of the CPI adjustment.

Establish and adjust specific taxes to changes in the dollar, Euro, or an internationally stable currency. This is particularly applicable for most developing countries, where the domestic currency may depreciate relative to such stable currencies. For instance, when Kyrgyz Republic changed its excise tax base from the U.S. dollar to domestic currency in 1995, the tax rate and tobacco tax revenues were reduced in terms of the U.S. dollar.

Taxes levied according to *ad valorem* rates maintain their real value under inflation, but *ad valorem* taxes include no guarantee that tax revenues will keep pace with inflation. Adjust *ad valorem* rates to out-pace or lag inflation.

Avoid Inflation Problems with a “Hybrid” Tax

Tax officials can avoid tax erosion of specific tax rates and revenues due to inflation and the undervaluation of an *ad valorem* system. Implement a hybrid form of excise tax enforcement and collection to realize the features of both *ad valorem* and specific taxation.

This hybrid tax is often referred to as the “administered-price *ad valorem* rate” excise tax. The excise rate is defined in *ad valorem* terms as a fixed percentage of the taxable price per unit. Tax authorities periodically issue a list of the official price²³ by which the tax is assessed. Compute the tax per unit by multiplying the *ad valorem* rate with the official administered price.

Advantages of the Hybrid Tax

- Production and inventories are monitored and accounted for and are marked or stamped.
- The same administrative procedures and personnel are used without any further changes.
- Tax revenue loss due to the undervaluation problem of an *ad valorem* system is avoided, since the government determines the value of the tax base.
- Constant real revenue and rates are maintained by revising the official price list frequently. This reduces the incentive to pile or hoard taxable goods.
- Revisions of the official price list are made without involving legislative procedures, as is required with a specific rate.

²³ It is difficult to determine the official taxable price when there are several producers for the same type of product. It is important to survey current prices so that the product’s taxable price is not unrelated to its market price. This avoids over- and under-valued tax bases.

- The tax administration of the hybrid system is a more effective method of excise collection than the *ad valorem* system. Further, the erosion of tax revenues, which occurs when using specific rates, are avoided.

Disadvantages of the Hybrid Tax

- Tax administrators must be aware of the current prices of excise taxed commodities so that the official taxable price is closely related to the current market prices. Otherwise, the tax base is either over- or under-valued.
- The revision, publishing, and distributing of new data and the price list—all dependent on the rate of inflation and the frequency of revision—can be costly.
- If the revisions of the price list or the changes in the official taxable price are made discontinuously and in discrete amounts, then the incentive for stockpiling will remain both for consumers and producers to reduce their tax liability.

Despite these problems, using the hybrid system of tax administration can be an effective way to collect taxes. This holds true especially in developing countries, as the system avoids the inflation-caused erosion of rates and revenues that occurs when specific rates are used.²⁴ Further, implementation is easier than for *ad valorem* taxation.

Negative Externality

When external costs, the externalities, are traced to some particular characteristic(s) of a product in question, it is more appropriate to impose specific taxes on that characteristic—and thus that product. Thus, tax harmful products based on their undesirable features.

Since negative externality is highly related to total amount of consumption, use different specific rates to assure that uniformity of levy on the undesirable features of a commodity is maintained (Mark Ferron, 1984). Further, empirical evidence shows that when an externality is large enough to effect policy, the optimal tax structure should be specific taxation (Prittilla, 1997).

Levels of Revenue

The level of revenue from a tax differs according to the market structure. For instance, in a competitive market, imposing either specific or *ad valorem* taxes makes no difference on the level of revenue, as both are equally affected by any change in the market. However, in an imperfect competitive scenario, like a monopoly or oligopoly, the level of revenue derived from both taxes varies.

If an objective is to either maximize revenue or maximize welfare subject to a revenue requirement, the optimal levels of specific and ad valorem

²⁴ The price list must be adjusted frequently to avoid erosion caused by inflation.

taxes differ.

For example, under a monopoly where there is a single producer, tax revenue increases under *ad valorem* taxation:

Consider a specific tax, s_0 .

Equating marginal revenue (MR) net of the tax to marginal cost (MC), the profit maximizing monopolist produces output at $MR - s_0 = MC$.

When the tax is changed to an *ad valorem*, v_0 , the total tax does not change if the consumer price, P_0 , and total demand do not change. In other words, $v_0 P_0 = s_0$, and the marginal revenue is $(1 - v_0) MR = MR - s_0$.

Since $P > MR$, then $(1 - v_0) MR > MR - s_0$. This implies that the profit-maximizing firm increases its output level since the net marginal revenue exceeds marginal cost at the initial output level. The expansion of output increases the tax revenue from the *ad valorem* tax, v_0 . Further, since the monopolist increases output, the consumer price consequently falls. Since the monopolist only produces at a point where the elasticity of demand exceeds one, reduced prices lead to increased consumer expenditure and hence to increased tax revenue.²⁵

Under oligopoly conditions (particularly, under the Cournot model), there are a fixed number of producers²⁶ selling a homogeneous product. So in this case, *ad valorem* taxes lower the price and increase the tax revenue.²⁷

The certainty of tax revenue provides macroeconomic and political stability, and is as important as the level of revenues. This is especially true for many transition economies, such as those in Ukraine and Georgia, where excise taxes are a central part of the overall revenue. In these countries, choosing between specific or *ad valorem* taxation is a major concern of yielding certainty and stability of tax revenue.

The price elasticity of demand has a significant role in balancing *ad valorem* and specific taxes to minimize revenue variation. If the price is inelastic ($E = 0$), then sales (X) are not affected by price levels and the variation in revenue can be removed by using only specific taxes. If, on the other hand, the product is very elastic ($E = 1$), then consumer expenditure (PX) is independent of price (P), so all variation in revenues can be eliminated using only *ad valorem* taxation.²⁸

²⁵ Assume there is a single good of fixed quality.

²⁶ Assume the product itself is of a single fixed quality.

²⁷ Assume the specific tax is s_0 , and the specific tax is replaced by an *ad valorem* tax $v_0 = s_0/MR$, which does not change the output and the consumer price (since $(1 - v_0) MR = MR - s_0$ (where MR is the marginal revenue perceived by the typical firm)), but does increase tax revenue because $v_0 P - s_0 = s_0 ((P/MR) - 1) > 0$.

²⁸ Assume the demand curve is linear, and the impact of changes in the good's price has no effect on expenditure of other taxed goods.

In other words, revenue from cigarettes is unaffected by changes in the consumer price, if and only if the share of *ad valorem* in total taxation is equal to the price elasticity of demand.²⁹ However, a change in the price of cigarettes more likely affects the consumption of other goods, such as alcoholic drinks. If total expenditure is fixed, then an increase in consumer price on cigarettes (where the price elasticity of cigarettes is less than unity—inelastic) reduces the expenditure of the alcoholic drink (depending on the magnitude and sign of cross-price effects between cigarettes and the alcoholic drink). In this case, it is important to extract revenue from the increased expenditure on cigarettes through relatively high *ad valorem* taxation.³⁰

Distribution of Income

Though the consequences of the distribution of tobacco taxes is discussed in great depth in **Tool 6. Poverty**, it is necessary to briefly discuss the effect the balance between specific and *ad valorem* taxes has on distribution of economic welfare (tax incidence).

Progressivity or regressivity is the main concern when choosing the balance between specific and *ad valorem* taxes. The distributional effects of the two taxes can differ by the expenditure and the unit of cigarettes consumed by the wealthy and the poor. When both consume the same amount of cigarettes, but the wealthy spend more on the quality attributes, then an *ad valorem* tax bear differentially on the wealthy and the poor. In the same situation, a specific tax is akin to a regressive poll tax.

Kay and Keen (1987) examine the distributional effects of these two taxes in a model. They show that as long as the wealthy consume no fewer physical units than the poor, the optimal policy involves a positive *ad valorem* tax used in part to finance a specific subsidy. In effect, the wealthy are taxed in order to make a distributionally attractive poll subsidy.

Alternatively, in order to avoid the adverse distributional consequences in unalloyed specific taxes, governments in some developing countries, such as India, have adopted tiered specific taxes wherein the rate increases as the price increases (similar to *ad valorem* taxation).

²⁹ This is reflected as: $vP/vP + s = E$. This condition does not restrict the overall level of taxation, only its composition.

³⁰ For example if price elasticity is 0.5, the rate of tax applied to alcoholic drink is 15 percent, and the tax on cigarettes is 75 percent of their consumer price, then overall tax revenue required of *ad valorem* to total tax is 60 percent, not 50 percent as $vP/vP + s = E$ requires. In other words, when the total expenditure is fixed (assuming τ is the tax rate on an alcoholic drink), then total revenue is unaffected by a small change in price—if and only if $vP/vP + s = E + (P/vP + s) \tau (1 - E)$.

VIII. Conclusion

Tobacco Taxes Can Control Tobacco Use

Tobacco control is very challenging. Since the first evidence appeared on the adverse health impacts of tobacco use, there have been various studies examining which factors increase tobacco consumption and policies to reduce tobacco use by age, gender, race, and ethnicity. When economists start analyzing the impacts of tobacco taxes on consumption, tobacco control activities gain a different but stronger dimension. Unlike other policies, tobacco taxes have a very strong impact on smokers' behavior and are very cost effective to implement. But tobacco taxes also have a different impact on several stakeholders' interests. As a result, tobacco is a politically hot commodity because it increases concerns and worries among various stakeholders. For effective tobacco control, it is essential to open communication channels with various decision makers—especially those in Ministries of Health, Tax and Custom Administrations, and the Treasury who are responsible for tobacco tax structure, design, rate, and application. For effective communication, tobacco advocates must have a good understanding on the structure, design and administration of tobacco taxes and be able to address these specific worries and concerns. In particular, it is necessary to understand the arguments made by the tobacco industry on the types of tobacco taxes, and use them or be aware of changes in design, structure, and rate that can affect the cigarette consumption. This Tool is designed to provide a good understanding of tobacco taxes for successful tobacco control.

Tobacco Taxes Can Raise Revenue

Although excises on tobacco products are not new taxes, they are named, structured, designed, applied, and implemented differently by countries depending on various factors such as the structure of the industry (state owned, private), production (net importer, net exporter), administration (weak, strong), and the political structure. Governments in developed or developing countries always need to

increase their revenues to achieve economic and social development goals. Tobacco is often used for generating revenues, and tobacco tax revenue can have a significant share in total excise tax revenues and total tax revenues. A Tobacco administration unit is often responsible for establishing tobacco tax rates to achieve the estimated revenue increase. Administrators must be aware of the design of tobacco taxes and understand how well the current structure and design fits into a country's need to increase revenues. Administrators must also be able to suggest appropriate changes. This tool is designed to provide information to tax administrators on the pros and cons of tobacco tax structure and design, administration techniques, and different ways of estimating (forecasting) tobacco tax revenues and establishing tobacco taxes. For sophisticated estimation techniques, administrators should be aware of econometric estimation methods before estimating or forecasting tax revenues and tax rates.

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