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28 March 2011

Subcommittee on Public Revenue Revenue Protection (Dutiable Commodities) Order 2011. 9-11 am on 2 April 2011.

To: Chair and Members

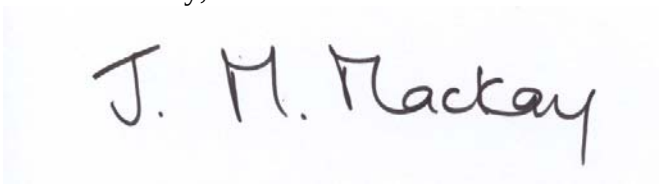
Re: 2011 Budget: Tobacco tax

As a Hong Kong resident since 1967, and for public health reasons, I strongly support the increase of tobacco tax in 2011 Budget. The reasons are simple, science based, backed by health economists including the World Bank, and apply globally:

SUMMARY

1. Price measures have been shown around the world to be the one, single, most effective measure in reducing tobacco use, especially among the young.
2. Tobacco tax increases are therefore the core of governmental tobacco control policy, designed to both prevent youth smoking and also encourage smokers to quit.
3. Hong Kong is now party, via China, to the World Health Organisation's Framework Convention on Tobacco Control (FCTC) and thus under international obligation on this issue.
4. 60 countries already have tobacco tax levels of 65% and above of retail price. 40 countries have tax levels above 70%. Thus the recent budget measures are neither extreme nor extraordinary, but are consistent with global trends (in fact, a bit behind).
5. Evidence shows that even if tobacco tax increases lead to increased smuggling (and in general they do not), smoking rates, especially among the young, still fall.
6. The tobacco industry and its allies will inevitably argue that increasing tax will increase smuggling. Smuggling seriously harms public health, helps finance criminal groups, and reduces government revenue. But cigarettes are smuggled across all borders, often multi-directionally. The solution to this, as with all crimes, is for governments to fight crime, and not reduce commitment to public health.

Yours sincerely,



Dr Judith Mackay, SBS, OBE, JP, FRCP (Edin), FRCP(Lon)

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Senior Advisor, Chinese Association on Smoking and Health
Visiting Professor, Chinese Academy of Preventive Medicine
Honorary Professor, Dept of Community Medicine, University of HK
How can cigarette smuggling be reduced?
Luk Joossens, Martin Raw

Attached documents:

BMJ 2000;321:947-950 doi:10.1136/bmj.321.7266.947 (Published 14 October 2000)
http://www.bmj.com/content/321/7266/947.full

Tob Control 2010;19:31-36 doi:10.1136/tc.2008.028779
Research paper
A simulation model to predict the fiscal and public health impact of a change in cigarette excise taxes
Corné van Walbeek
http://tobaccocontrol.bmj.com/content/19/1/31.abstract

WHO Technical Manual on Tobacco Tax Administration
http://whqlibdoc.who.int/publications/2010/9789241563994_eng.pdf

World Bank: The taxation of tobacco products
Chaloupka, Frank, Tei-Wei Hu, Kenneth E. Warner, Rowena van der Merwe, and Ayda Yurekli. Taxation of Tobacco Products. Paper for Curbing the Epidemic, World Bank

World Bank Smuggling Toolkit: Understand, measure and combat tobacco smuggling, by David Merriman. http://siteresources.worldbank.org/INTETC/Resources/375990-1113490055569/Smuggling.pdf

Appendices

WORLD HEALTH ORGANIZATION FRAMEWORK CONVENTION ON TOBACCO CONTROL

PART III: MEASURES RELATING TO THE REDUCTION OF DEMAND FOR TOBACCO

Article 6

Price and tax measures to reduce the demand for tobacco

1. The Parties recognize that price and tax measures are an effective and important means of reducing tobacco consumption by various segments of the population, in particular young persons.

2. Without prejudice to the sovereign right of the Parties to determine and establish their taxation policies, each Party should take account of its national health objectives concerning tobacco control and adopt or maintain, as appropriate, measures which may include:

(a) implementing tax policies and, where appropriate, price policies, on tobacco products so as to contribute to the health objectives aimed at reducing tobacco consumption; and

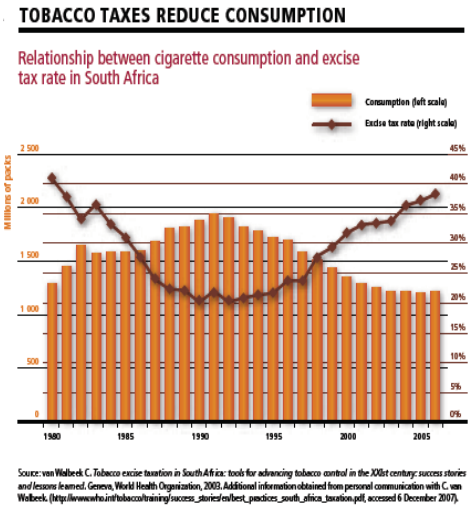
(b) prohibiting or restricting, as appropriate, sales to and/or importations by international travellers of tax- and duty-free tobacco products.

3. The Parties shall provide rates of taxation for tobacco products and trends in tobacco consumption in their periodic reports to the Conference of the Parties, in accordance with Article 21.

The FCTC essentially calls upon all governments to adopt tax and price policies that reduce tobacco consumption. The World Bank proposes that taxes should account for two-thirds to four-fifths of the retail price of cigarettes.

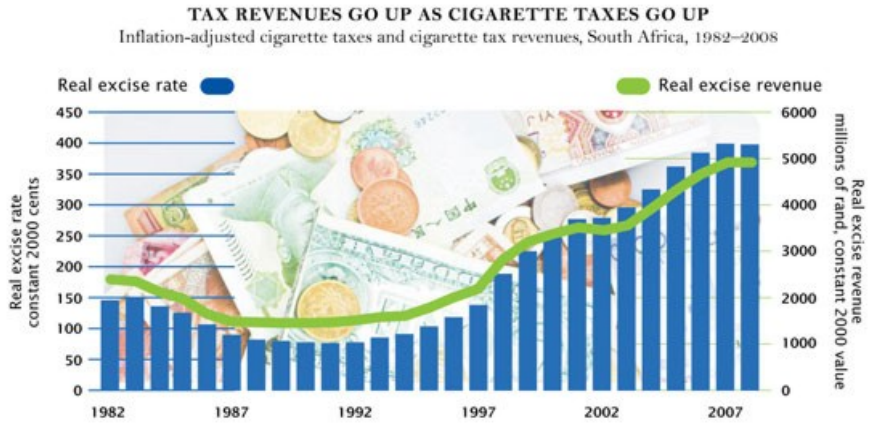
It is no accident that the first protocol being negotiated within the WHO FCTC is on smuggling. And, even in spite of smuggling problems, the evidence shows that tax increases significantly reduce cigarette consumption.

Developing country example



Developed country example

Governments do not lose revenue with increased tobacco tax



How can cigarette smuggling be reduced?

Luk Joossens, Martin Raw

Summary points

Cigarette smuggling occurs in all parts of the world, even in regions where taxes and prices are low

The solution to combat smuggling is not to decrease taxes, as this will increase consumption and decrease revenue

Spain has been successful in combating smuggling by reducing the supply of illegal cigarettes

Only action to control cigarette transit at international level will solve the smuggling problem

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BMJ 2000;321:947–50

The tobacco industry has argued that tobacco smuggling is caused by market forces—by the price differences between countries, which create an incentive to smuggle cigarettes from "cheaper" countries to "more expensive" ones. The industry has urged governments to solve the problem by reducing taxes, which will also, it says, restore revenue. The facts contradict all these assertions. Smuggling is more prevalent in "cheaper" countries, and where taxes have been reduced, such as in Canada, consumption has risen and revenue fallen. There are, however, countries that have solved the problem by better control, Spain being the most impressive example to date, and the new World Health Organization framework convention may at last promote control of tobacco smuggling at the level at which it must be tackled—globally.

Tobacco smuggling has become a critical public health issue because it brings tobacco on to markets cheaply, making cigarettes more affordable and thus stimulating consumption, consequently increasing the burden of ill health caused by its use. Smuggling is not a small phenomenon: we have estimated that, globally, a third of legal cigarette exports disappear into the contraband market.[1] This extraordinary proportion results in a second key effect of smuggling—the loss of thousands of millions of dollars of revenue to government treasuries. We also showed in our earlier studies that tobacco smuggling defies apparent economic logic. Common sense might suggest that cigarettes would be smuggled from countries where they are cheap (southern Europe, for example) to expensive countries (such as northern Europe) and that this is due simply to price differences between these countries, as the tobacco industry claims. Although this does happen, it is not the largest type of smuggling, and in Europe there is far more smuggling from north to south rather than the reverse.[2]

In fact, smuggling occurs in all parts of the world, even in regions where taxes are low. One internal document of BAT (British American Tobacco), the largest European international tobacco company, estimated that 318 billion (nearly 6%) of world cigarette sales of 5300 billion were DNP (duty not paid) cigarettes, an industry term for contraband.[3] Eastern Europe and the Asia-Pacific region accounted for most of this, at about 85 billion each, although Western Europe was also important at about 50 billion. In relation to total market sales, volumes of DNP cigarettes are largest in Eastern Europe (about 13%) and in Africa and the Middle East (about 12%) but are also substantial in Latin America (about 9%) and Western Europe (about 7%). Western Europe has the highest prices in the world—in 1996 they were four to five times higher than in Africa, the Middle East, and Eastern Europe[4]—yet, despite these high prices, smuggling is on average lower than in other regions of the world. In other words, cigarette smuggling is not caused principally by "market forces." It is supply driven, caused mainly by fraud through the illegal evasion of taxes.

Yet the tobacco industry has lobbied governments to reduce tobacco tax, arguing that this will solve the smuggling problem and increase government revenues. This is not true: when the Canadian government reduced cigarette tax in response to industry pressure the results were disastrous. Tobacco smuggling not only makes tobacco available cheaply but also sabotages national tobacco taxation and tobacco control strategies. Its key characteristic is not cross border shopping and bootlegging but large scale fraud in which millions of cigarettes evade duty and appear on the contraband market. The true beneficiaries are the tobacco companies.[2] In this article we suggest solutions to combat smuggling which follow logically from a true understanding of its cause.

Methods

Smuggling is illegal trade, which means that statistics are often not reliable. Customs and excise authorities in various countries do make estimates but often don't

publish them. Apart from figures quoted from published articles, our sources for estimates of smuggled cigarettes have been customs authorities, and for tax revenue tax and health authorities. Often these are based on conversations, exchanges at conferences, or documents unofficially handed to us, but they are rarely "published" or otherwise in the public domain.

Countries' responses to smuggling

Canada and Sweden

Canada and Sweden reduced their taxes on tobacco products because of concern about increased smuggling. In Canada the negative consequences for public health and tax revenue are now well documented. After the Canadian tax reductions in 1994 the real price of cigarettes fell by a third. The prevalence of smoking increased in teenagers from 16% to 20% and also increased in the population as a whole.[5] Federal tax revenues fell by $C1200m, more than twice as much as predicted.[6]

In Sweden the data needed to evaluate the impact of the tax reduction are yet not available. Two substantial tax increases, in December 1996 and August 1997, raised cigarette prices by about 43% to roughly $6 a pack. They increased tax revenue and reduced cigarette smoking in Sweden.[7] However, in response to the perception that smuggling was becoming a problem (and to lack of public support for the tax increases) the 1997 tax rise was repealed in August 1998.[7] Data on smoking prevalence for 1999 are not yet available, but, as table 1 shows, tax revenue was lower than in the previous two years (Paul Nordgren, National Institute of Public Health, Stockholm, personal communication).

Canada is important for another reason. The key to the story was the export by Canadian manufacturers of Canadian cigarettes to New York State (where there is no market for them as US smokers mainly smoke US brands), from where they were smuggled back into Canada. At the very least, the tobacco industry could be said to have facilitated the smuggling by supplying the cigarettes. In fact, in 1998, for the first time, a tobacco company was convicted for assisting in a smuggling operation. An affiliate of RJR Nabisco pleaded guilty to charges of helping smugglers illegally re-route export cigarettes into Canada. The affiliate, Northern Brands, agreed to pay US$15m in criminal fines and forfeitures for its involvement in these illegal activities. In 1999 the Canadian federal government launched a US$1bn lawsuit in Syracuse, New York, against R J Reynolds companies and the Canadian Tobacco Manufacturers' Council, alleging that the cigarette makers ran a vast illegal smuggling operation. An employee of Northern Brands, to which the cigarettes were exported, pleaded guilty of being in charge of selling eight billion contraband cigarettes into Canada, but RJ Reynolds denies that it played a role in encouraging this.[8 9]

It is clear that more and more governments now feel that the tobacco industry has a case to answer in relation to tobacco smuggling. In recent months Canada, Columbia, and Ecuador have filed lawsuits against US tobacco companies for smuggling. Although the Canadian suit was dismissed in July 2000 on jurisdictional grounds, Canada has now appealed.[10] The European Commission announced in July 2000 that it plans a civil suit against US cigarette makers for alleged involvement in smuggling,[11] and in Britain the Parliamentary Health Select Committee has called for an investigation by the Department of Trade and Industry into the alleged involvement of BAT in smuggling.[12]

Table 1 Swedish tobacco tax revenue (data from National Institute of Public Health, Stockholm)

Year	Revenue (million Kr)
1996	7084
1997	7694
1998	7507
1999	7385

Table 2 Excise revenue from tobacco sales in Spain (data from Spanish Customs and Excise)

Year	Revenue (billion pesetas)
1996	447
1997	522
1998	653
1999	676

Spain and Andorra

Spain is one of the few countries in the world to have tackled smuggling successfully. It did not do so by reducing tobacco tax. Despite Spanish cigarettes being among the cheapest in the European Union, smuggled cigarettes had a market share of 15% in 1995.[2] One of the sources of smuggled cigarettes in Spain and the European Union was Andorra. In 1997 there was concerted action at national and European levels to reduce the supply of contraband cigarettes. Close collaboration between the authorities in Spain, France, Britain, Ireland, and Andorra and the European Anti Fraud Office (OLAF) reduced the supply of smuggled cigarettes from Andorra. Actions included sealing the Andorran border, civil guard brigades patrolling valleys and hills to make smuggling more difficult, and political pressure on the Andorran government by the European Union and its member states that forced it to create new legislation making it illegal to smuggle tobacco into neighbouring countries.[13]

As a result contraband cigarettes, which had accounted for 12% of the Spanish market in early 1997, held only 5% by mid-1999 (Ignacio Garcia, Customs and Excise, Madrid, personal communication). Sales of legal cigarettes increased from 78 billion in 1997 to 89 billion in 1998, and tax revenue increased by 25% in the same year (Jesus Lauzurica, Customs and Excise, Madrid, personal communication) (see table 2). According to the Spanish customs authorities, their success was not due to controlling distribution at street level, which is almost impossible, but to reducing the supply into the country at "container level" through intelligence, customs activity and cooperation, and technology (Ignacio Garcia, Customs and Excise, Madrid, personal communication).

Andorra is important because it illustrates the role of the tobacco industry. Andorra was not only supplying illegal cigarettes to the Spanish market but also to Britain. Exports from Britain to Andorra (which has a population of only 63 000) increased from 13 million

cigarettes in 1993 to 1520 million in 1997. Since few of these cigarettes were legally re-exported and Andorran smokers do not generally smoke British brands, then either each Andorran (including children and non-smokers) was smoking 60 British cigarettes a day in 1997 or these cigarettes were being smuggled out of Andorra. It seems obvious that the companies would know what was happening to their cigarettes. In a television interview on the BBC's *Money Programme* of 8 November 1998, a spokesperson for the tobacco company Gallaher said: "We will sell cigarettes legally to our distributors in various countries. If people, if those distributors subsequently sell those products on to other people who are going to illegally bring them back into this country, that is something outside of our control." In response to the interviewer's comment, "I suggest it is within your control, because you could stop supplying them," the spokesperson said: "That would do nothing to influence the degree of smuggling because the smugglers would just bring back somebody else's product."

United Kingdom

Tobacco smuggling has become a problem in Britain relatively recently and has been driven by the increased price of cigarettes in Britain compared with the rest of Europe (over £4 or $6 a packet) and the high value of sterling. As with Canada, smuggling became a problem as mainly domestic brands became available to smuggling networks outside Britain which brought them illegally back into the country. British customs and excise authorities have estimated that the contraband market increased from 3% in 1996-7 to 18% in 1999-2000 and that lost revenue increased from £680m in 1996 to £2500m in 1999.[14]

Again the tobacco industry has argued that this is due to market forces. Again, however, the real problem is not "tourist" cross border shopping and bootlegging but container fraud—that is, the disappearance into the contraband market of container loads of cigarettes exported by the tobacco industry, as illustrated by Andorra. Customs and excise estimate that in 1999 £50m of revenue was lost from smuggling by air passengers, £340m from cross channel bootlegging, but £1400m from container smuggling.[14] This is essentially because a container holds 5-10 million cigarettes, rather than a few thousand, and has a higher profit margin because the cigarettes are exported duty unpaid (rather than duty paid but from a cheaper country). Thus a container of 10 million transit cigarettes (duty not paid) can be bought for $200 000 and sold for about $2m, a very attractive profit margin.

The UK government has responded by announcing measures that include a network of scanners for detecting containers, prominent fiscal marks on cigarette packs, increased punishment, more customs officers, and a campaign to increase public awareness. By its own admission, the government hopes to contain rather than eliminate the problem.[14] Given the clear incentive of the tobacco industry to make cigarettes available to smugglers, a real crackdown on smuggling will require controls on cigarette transport, something that will require concerted action at international level.

GERARD JULIEN/AFP

Customs officers checking a container of contraband cigarettes at the port of Marseille

Conclusions

Andorra shows that tobacco companies view contraband markets as simply one area of market competition. In an extraordinary admission, the deputy chairman of BAT (a former minister for health) recently said: "Where any government is unwilling to act or their efforts are unsuccessful, we act, completely within the law, on the basis that our brands will be available alongside those of our competitors in the smuggled as well as the legitimate market."[15] An editorial in the *Guardian* the following day said that this was an incredible admission: "He has openly admitted that the company supplies cigarettes knowing that they are likely to end up on the black market."[16]

A generous conclusion would be that the tobacco industry transports containers of a product worth $1-3m with astonishing recklessness. In fact, as we have shown, the real problem is fraud, and the real solution must therefore be to control, through international treaty, the transport of this valuable and dangerous product. One of the problems has been that the manufacturers have been technically within the law, arguing that what dealers do with their (legally sold and bought) cigarettes is not their business. Similar arguments have proved socially and politically unacceptable when the product is arms, and so we recommend that tobacco export and transit should be controlled by mechanisms similar to those for arms control. In October 2000 the World Health Organisation will start negotiations for a framework convention on tobacco control. A specific protocol could deal with tobacco smuggling. It could, for instance, require "chain of custody" markings on all packages of tobacco products, placing the onus on the manufacturers to show that cigarettes arrive legally in their end user markets. Manufacturers might also apply for export licences for cigarettes. Only such action at international level will resolve the problem, but it has now been shown to be soluble.

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Competing interests: None declared.

A simulation model to predict the fiscal and public health impact of a change in cigarette excise taxes

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A simulation model to predict the fiscal and public health impact of a change in cigarette excise taxes

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ABSTRACT

Objectives (1) To present a model that predicts changes in cigarette consumption and excise revenue in response to excise tax changes, and (2) to demonstrate that, if the industry has market power, increases in specific taxes have better tobacco control consequences than increases in ad valorem taxes.

Design All model parameters are user-determined. The model calculates likely changes in cigarette consumption, smoking prevalence and excise tax revenues due to an excise tax change. The model is applicable to countries that levy excise tax as specific or ad valorem taxes.

Results For a representative low-income or middle-income country a 20% excise tax increase decreases cigarette consumption and industry revenue by 5% and increases excise tax revenues by 14%, if there is no change in the net-of-tax price. If the excise tax is levied as a specific tax, the industry has an incentive to raise the net-of-tax price, enhancing the consumption-reducing impact of the tax increase. If the excise tax is levied as an ad valorem tax, the industry has no such incentive. The industry has an incentive to reduce the net-of-tax price in response to an ad valorem excise tax increase, undermining the public health and fiscal benefits of the tax increase.

Conclusions This paper presents a simple web-based tool that allows policy makers and tobacco control advocates to estimate the likely consumption, fiscal and mortality impacts of a change in the cigarette excise tax. If a country wishes to reduce cigarette consumption by increasing the excise tax, a specific tax structure is better than an ad valorem tax structure.

Over the past decades many countries have reduced tobacco consumption and increased excise tax revenues by increasing the excise tax on tobacco products. Despite nicotine's addictiveness, numerous studies have shown that people reduce their tobacco consumption when faced with higher prices.[1 2] Consumption decreases as a result of decreases in smoking prevalence (ie, people quitting or not starting smoking) and smoking intensity (ie, remaining smokers reducing their average consumption).[2]

Increasing the excise tax on tobacco acts as a double-edged sword; not only does it reduce tobacco consumption but, because tobacco is relatively price inelastic, it also increases government revenue. For a given percentage increase in the excise tax per cigarette, the percentage decrease in cigarette consumption is smaller, resulting in an overall increase in government revenue.

Whereas the rationale for increasing the excise tax in high-income countries is typically to reduce tobacco use, in low-income and middle-income countries the fiscal aspects often take priority. In low-income and middle-income countries governments typically raise insufficient revenue through direct taxes (eg, income and corporate tax) and are often more dependent on indirect taxation, of which excise tax is an important component.[3]

This paper presents an online model to help policy makers predict the likely fiscal and public health outcomes of a change in the tobacco excise tax. The model is a tool for policy makers, primarily in low-income and middle-income countries, where a paucity of data prevents them performing a comprehensive analysis of tobacco demand. The model requires few inputs, yet is programmed to provide a fairly comprehensive analysis of the aggregate impact of an excise tax change. For instance, the model predicts by what percentage cigarette consumption, smoking prevalence and excise tax revenue would change in response to a given percentage change in the excise tax. The online model has default values for all relevant parameters, but the user can calibrate these parameters to his/her country. All the outputs are presented as percentage changes, which imply that the user does not have to know the absolute values of the variables of interest at the outset (eg, cigarette consumption and the price level) for the model to function.

The model is available at http://www.commerce.uct.ac.za/TETSiM.

THE BASIC MODEL

The model estimates the quantitative impact of an excise tax change on a number of variables: cigarette prices, cigarette consumption, smoking prevalence, smoking intensity, excise tax revenue, industry revenue and smoking-related mortality.

The model requires, at the minimum, the following inputs from the user (unless the user accepts the model's default values shown in the next section): (1) excise tax burden at the outset (ie, the excise tax amount as a percentage of the retail price); (2) the general sales tax (or VAT) rate; (3) an estimate of the price elasticity of demand; (4) the percentage increase in the excise tax; and (5) the percentage increase in the net-of-tax price. To estimate the public health impact in more detail (eg, changes in smoking prevalence and smoking intensity, and the number of lives saved because of the intervention) the model is set up to require some additional inputs, not listed here.

The model is based on a number of assumptions:

- The price elasticity of demand is assumed to be constant
- General sales tax (eg, value-added tax) is levied on the sum of the excise tax and the net-of-tax price

(ie, the amount of the retail price that is distributed between the cigarette manufacturers and the rest of the supply chain)
- The cigarette market is assumed to be fairly homogeneous, with limited variation in the price around the average. The model is not appropriate for countries where premium cigarettes sell at significantly higher prices than discount cigarettes, and where smokers are likely to move to the discount brands when faced with price increases
- While cigarette smuggling may exist at the outset, it is assumed that the increase in the excise tax does not increase cigarette smuggling
- The excise tax is levied either as a specific tax (ie, as a certain amount per unit) or as an ad valorem tax (ie, as a percentage of value). The model does not consider more complex taxation structures—for example, combinations of specific or ad valorem taxes, or taxes subject to weight, length or price thresholds
- The model does not assume that the government or the tobacco industry aims to optimise some quantity—for example, excise tax revenues or industry profits, respectively. Given an initial situation, it simply considers what will happen if the government changes the excise tax (and if the industry possibly changes the net-of-tax price in response). The model does not suggest that the outcome is optimal, in that it is the result of some maximisation or minimisation exercise.

The starting point of the model is that one can subdivide the retail price of cigarettes (P) into three components: the excise tax (ET), a general sales tax (typically value-added tax, denoted τ) and the remainder, called the net-of-tax price (NTP). The user enters the excise tax burden (ie, ET/P) and τ. On the assumption that τ is levied on the sum of the net-of-tax price and the excise tax—that is, $P=(NTP+ET)\times(1+\tau)$, and if P at the outset is set at an arbitrary value of 100, the net-of-tax price is calculated as follows:

$$\mathrm{NTP} = 100/(1 + \tau - ET) \quad (1)$$

Since all model outputs (eg, price, consumption, government revenue and industry revenue) are in percentage changes, the model does not require information about the absolute magnitudes of these values at the outset. Using an arbitrary base value for cigarette consumption (say 1000), the model calculates initial excise tax revenue (ie, $ET\times1000$) and industry revenue (ie, $NTP\times1000$). In the second step the user indicates by what percentage the government raises the excise tax, and by what percentage the industry changes the net-of-tax price (if they do). The model calculates the new retail price as follows:

$$P = [NTP(1 + \psi) + ET(1 + \lambda)](1 + \tau) \quad (2)$$

where ψ is the proportional change in the net-of-tax price and λ is the proportional change in the excise tax.

Cigarette consumption changes as a result of the price change, the magnitude depending on the price elasticity of demand. Since the price change is a discrete amount (rather than an infinitesimally small amount), it is appropriate to use the midpoint formula, rather than the point formula,[4] to calculate the new point of consumption. For minor changes in the price, the midpoint and the point formulas provide similar answers. However, for large price increases the point formula is inappropriate since it yields implausible answers. For example, if the price elasticity is −0.6 and the price increases by 200%, consumption would decrease by 120%, which is mathematically impossible. The midpoint formula would predict a more plausible decrease of 41.2%.

Once the new level of consumption has been calculated, the model calculates new levels of excise tax revenue and industry revenue, based on the new consumption figures. The model subsequently calculates percentage changes in the retail price, cigarette consumption, excise revenues and industry revenues. For most policy makers, these are likely to be the most important outputs of the model.

A decrease in total cigarette consumption can come about in two ways: a decreased number of smokers (ie, a decrease in smoking prevalence) or a decreased number of cigarettes smoked by smokers (ie, a decrease in smoking intensity). The model calculates the percentage change in smoking prevalence and smoking intensity if the magnitudes of the respective proportions are specified by the user. Furthermore, if the user enters the initial smoking prevalence percentage and the size of the adult population, the model calculates the absolute numbers of people who are expected to quit smoking and the number that will be saved from a premature tobacco-related death.

A comprehensive appendix of the mathematical structure of the model is available as part of the online model.

SOME SIMULATIONS FOR A TYPICAL LOW-INCOME OR MIDDLE-INCOME COUNTRY

Initially a set of outcomes is presented, based on default parameters. Subsequently the sensitivity of the outputs to different input parameters is investigated, by changing one parameter at a time, while holding the others constant. First a specific excise tax is considered and then the analysis is repeated for an ad valorem excise tax.

Excise tax levied as a specific tax

The default assumptions are shown in the top half of column (1) in table 1. The initial excise tax burden (ie, ET/P) of 40% is informed by the median burden of 36% in low-income and middle-income countries and a global median of 45% (author's calculations, based on a recent WHO publication[5]). The price elasticity (ϵ_P) value of −0.6 is based the World Bank's estimate that ϵ_P in low-income and middle-income countries lies between −0.4 to −0.8.[6] The VAT rate of 15% is based on a recent KPMG study, which found the average VAT rate to be 19.5% in the EU, 17.7% in OECD countries, 14.2% in Latin America and 10.8% in the Asia Pacific region.[7] The assumption that 40% of the decrease in cigarette consumption is attributed to a decrease in smoking prevalence is informed by findings from South Africa[1] and some youth studies in the USA.[8 9 i] A change in the excise tax is assumed to be fully passed onto smokers. Initially the industry is assumed not to change the net-of-tax price in reaction to the tax change.

Using an arbitrary value of P of 100 at the outset, an initial excise tax burden (ET/P) of 40% and a VAT rate (τ) of 15%, the net-of-tax price (NTP) is 46.96, using equation (1). The total tax burden (ie, the excise tax and the VAT amount expressed as a percentage of the retail price) is 53.04%. A 20% increase in the

[i] There is currently no consensus in the literature (eg, the HNP Working Paper series published by the World Bank) on the relative magnitudes of the "participation elasticity" (which determines how smoking *prevalence* is affected by changes in the retail price) and the "conditional demand elasticity" (which determines how smoking *intensity* is affected by changes in the retail price). While the relative magnitudes of these two sub-elasticities influence the mortality impact of a change in cigarette taxes or prices, they have no fiscal or aggregate consumption impact.

Table 1 Inputs and output of the simulation model, given a 20% excise tax increase

	Specific tax								Ad valorem tax		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Inputs											
Initial excise tax burden*	*40*	20	65	40	40	40	40	40	*40*	40	40
Price elasticity of demand	*−0.6*	−0.6	−0.6	−0.3	−1.2	−0.6	−0.6	−0.6	*−0.6*	−0.6	−0.6
Percentage change in net-of-tax price	*0*	0	0	0	0	0	10	−5	*0*	10	−5
Percentage of decrease in consumption attributed to decrease in smoking prevalence	*40*	40	40	40	40	70	40	40	*40*	40	40
Outputs											
Initial total tax burden†	*53.04*	33.04	78.04	53.04	53.04	53.04	53.04	53.04	*53.04*	53.04	53.04
New total tax burden	*57.00*	35.99	80.90	57.00	57.00	57.00	54.93	58.11	*57.00*	57.00	57.00
Percentage change in											
Retail price	*9.20*	4.60	14.95	9.20	9.20	9.20	14.60	6.50	*9.20*	20.12	3.74
Cigarette consumption	*−5.14*	−2.66	−8.01	−2.60	−10.03	−5.14	−7.84	−3.71	*−5.14*	−10.14	−2.18
Smoking prevalence	*−2.11*	−1.08	−3.34	−1.06	−4.22	−3.69	−3.27	−1.51	*−2.11*	−4.39	−0.88
Smoking intensity	*−3.10*	−1.60	−4.83	−1.57	−6.06	−1.50	−4.73	−2.23	*−3.10*	−6.29	−1.31
Excise tax revenue	*13.83*	16.81	10.39	16.87	7.97	13.83	10.59	15.55	*13.83*	18.27	11.52
Industry revenue	*−5.14*	−2.66	−8.01	−2.60	−10.03	−5.14	1.37	−8.52	*−5.14*	−1.44	−7.07

*Excise tax as percentage of retail price.
†Excise plus VAT as percentage of retail price.

specific excise tax increases ET from 40 to 48, and P from 100 to 109.2, using equation (2). The retail price increases by 9.2%, which is less than the excise tax increase (20%). The total tax burden increases to 57% (=(109.2−46.96)/109.2). Based on a ϵ_P value of −0.6, cigarette consumption decreases by 5.1%, using the midpoint formula.[ii] Smoking prevalence (with −2.1%), smoking intensity (−3.1%) and industry revenue (−5.1%) all decrease; and excise tax revenue increases (+13.8%). The increase in the excise tax has obvious public health and fiscal benefits.

Columns (2) and (3) consider the impact of a relatively low (20%) and high (65%) initial excise tax burden on the output variables. For a sample of 120 countries, ranked from the lowest to the highest excise tax burden, these percentages represent the 17th and the 92nd percentiles, respectively.[5] For a given increase in the excise tax, a low initial excise tax burden (20% vs 40%) has a smaller impact on the retail price (4.6% vs 9.2%) and consumption (−2.7% vs −5.1%), than had the initial excise tax burden been higher (40%).[iii] However, a low initial tax burden results in a larger percentage increase in government excise revenue (16.8% vs 13.8%). A 20% increase in the excise tax, when the initial tax burden is high (65%) results in a larger increase in the retail price (15.0% vs 9.2%), a larger decrease in consumption (−8.0% vs −5.1%), and a smaller increase in excise revenue (10.4% vs 13.8%).

Two values are used to illustrate the impact of price elasticity differences on consumption and excise revenue. If demand is highly inelastic (ϵ_P=−0.3, column (4)), a 20% excise tax increase decreases consumption by a smaller percentage (−2.6% vs −5.1%), but increases excise tax revenues by a greater percentage (16.9% vs 13.8%) than in the default scenario. In contrast, if the demand is relatively price elastic (ϵ_P=−1.2, column (5)), a 20% excise tax increase decreases consumption by a greater percentage (−10.0% vs −5.1%) and increases excise tax revenues by a smaller percentage (8.0% vs 13.8%).[iv]

The value of ϵ_P influences the relative size of the public health and fiscal benefits of an excise tax increase. For a given excise tax change, the public health benefit is greater and the fiscal benefit is smaller if the demand is more price elastic; the fiscal benefit is greater and the public health benefit is smaller if the demand is less elastic. However, this is only a *relative* trade-off; both public health and fiscal causes are served in an absolute sense if the excise tax is increased.

Column (5) indicates that, even if the price elasticity is in the elastic region of the demand curve, an increase in the excise tax increases excise tax revenue. Standard economic theory posits that demand elasticity increases with the price.[4] Cash-strapped ministries of finance may worry that, if initial consumption is close to the point of unit elasticity, a further tax increase may push the price into the inelastic region of the demand curve and result in a decrease in tax revenue.[v] This analysis indicates that such fears are unfounded. Only if the demand is unrealistically price elastic ($|\epsilon_P|$=1.8, given the other default parameters) will an increase in the excise tax per cigarette decrease tax revenue.

In column (6) 70% (rather than 40% in the default scenario) of the decrease in cigarette consumption is attributed to a decrease in smoking prevalence. This parameter change does not change the fiscal and overall consumption scenarios. Smoking prevalence would decrease by a greater percentage (−3.7% vs −2.1%) and smoking intensity by a smaller percentage (−1.5% vs −3.1%) than in the default scenario. Since smoking-related mortality is more closely associated with smoking prevalence than smoking intensity, a larger decrease in smoking prevalence is a better public health outcome. [10]

The analysis so far assumed that the tobacco industry does not change the net-of-tax price in response to an excise tax

[ii] Using the point formula, the decrease in consumption would be −0.6×9.2=5.5%, but as indicated earlier, the point formula gives implausible results if the price changes are large, which makes the midpoint formula preferable. The midpoint formula is also used to determine the impact of the price change on smoking prevalence.

[iii] In this section, unless stated otherwise, all comparative (ie, second-mentioned) values shown in parentheses refer to the percentage changes in the default scenario (ie, column (1)).

[iv] Reviewing the literature, Van Walbeek[1] found that less than 10% of all published $|\epsilon_P|$ estimates were greater than one. Where they were, they usually applied to sub-populations, rather than the whole population. These sub-populations were typically youths in the USA and low-skilled and/or low-income groups in other countries.

[v] This belief is probably derived from the fact that an increase in the *price* will increase *total expenditure* (by consumers) only if the price elasticity is less than one. However, since the excise tax is always a fraction of the retail price, an increase in the excise tax increases the retail price by a lower percentage.

change. The increase in the excise tax is fully passed on to consumers; no more and no less. In such an environment industry revenues fall by the same percentage as consumption; see the last row of columns (1) through (6).

In most countries the cigarette-manufacturing industry is highly concentrated, and individual firms have significant control over the net-of-tax price.

In column (7) the tobacco industry increases the net-of-tax price by 10%, coincident with a 20% excise tax increase. The retail price increases by a greater percentage than had only the excise tax been increased (14.6% vs 9.2%). Not surprisingly, cigarette consumption (−7.8% vs −5.1%), smoking prevalence (−3.3% vs −2.1%) and smoking intensity (−4.7% vs −3.1%) decrease by a greater percentage than in the default scenario. Excise revenues increase by a smaller percentage (10.6% vs 13.8%). However, despite the substantial decrease in cigarette consumption, industry revenues have increased (by +1.4% vs −5.1%)!

The industry has been able to increase its own revenue at the expense of consumers *and* government. Given that $|\epsilon_P|$ is less than 1, an industry-sponsored additional increase in the retail price increases total expenditure on cigarettes, and reduces government's additional excise tax revenue from 13.8% to 10.6%. Increased industry revenue, coupled with decreased total costs (because fewer cigarettes are produced) enhances the tobacco industry's absolute and per-unit-of-sales profitability.[vi]

Becker and colleagues[11] argue that, given the addictiveness of nicotine, it is rational for the cigarette industry to keep prices below the profit maximising level in the short term, since this strategy will increase the number of consumers. However, if cigarette smoking is in decline this principle no longer applies and the best strategy is to increase the net-of-tax price in order to extract as much consumer surplus as possible in the long term.[12] Industry documents from the USA reveal that the cigarette industry, and in particular Philip Morris, increased the real retail price of cigarettes by more than the increase in the federal tax in the early 1980s.[13] Similarly, an analysis of price and tax data in South Africa reveals that a significant proportion of the increase in the real retail price since 1994 was due to increases in the net-of-tax price, rather than to excise tax increases.[14]

As an example of how the industry uses increases in the excise tax as a smoke-screen to hide net-of-tax price increases, on 14 April 2005 the Jamaican government raised the special consumption tax (SCT, ie, an excise tax) on cigarettes by a nominal 49%, primarily to raise more government revenue. The tax increase was well-publicised in the local media. The next day Carreras, the BAT-affiliated Jamaican cigarette monopoly, published an advertisement that said, "as a result of the increase in the tax on cigarettes", the recommended retail price would increase from $J180 to $J220 per pack.[15] A more thorough investigation reveals that, given the complexity of the SCT formula, the tax increased by no more than $J7 per pack.[vii] At least $J33 of the retail price increase was captured by the industry, while smokers were led to believe that the price of cigarettes had increased to generate revenues for their cash-strapped government.[16]

While this is a rational and profitable industry response to an excise tax increase, the pricing strategy is not sustainable in the long term. The industry's client base shrinks at a faster rate than if only the excise tax were increased. More importantly, high net-of-tax prices attract competitors, and the added competition automatically subdues net-of-tax prices. Between 1994 and 2000 the South African government raised the real excise tax by 180%. In the same period the industry (a near-monopoly) increased the real net-of-tax price by nearly 60%, resulting in a 20% increase in real industry revenue, despite a 25% decrease in consumption.[14] The high net-of-tax price attracted numerous foreign tobacco firms to South Africa in the early 2000s, despite the unwelcoming legislative environment. Between 2000 and 2008 the real excise tax increased by another 56%, but the real net-of-tax price increased by a modest 12%.[17]

Column (8) considers the impact of a 5% reduction in the net-of-tax price in response to a 20% increase in the excise tax. Even though the industry mitigates the decrease in consumption somewhat (−3.7% vs −5.1%), it comes at the cost of a significantly larger reduction in its revenues (−8.5% vs −5.1%). Also, by decreasing the net-of-tax price, the industry increases government revenue (15.6% vs 13.8%) at the industry's expense. The upshot of this analysis is that, unless there are very strong competitive pressures (eg, a highly competitive market or a price war between oligopolists), it is not in the industry's interests to reduce their prices when faced with an increase in a specific excise tax.

Excise tax levied ad valorem

Whereas a specific excise tax is levied as an amount per quantity of cigarettes, an ad valorem excise tax is levied as a percentage of value. Columns (9) to (11) of table 1 illustrate the impact of a 20% increase in the ad valorem excise rate on the variables of interest.[viii] If the industry does not change the net-of-tax price in response to an increase in the excise tax, as shown in column (9), it is immaterial whether the tax is levied as a specific tax or ad valorem, since the numbers in column (9) are identical to those in column (1).

This section aims to show that, if the tax is levied ad valorem, the incentive to raise the net-of-tax price in response to an increase in the excise tax is much lower than if the tax had been levied specifically. In fact, the industry has a much stronger incentive to reduce the net-of-tax price in response to an ad valorem excise tax increase.

In column (10) the tobacco industry increases the net-of-tax price by 10%, coincident with a 20% increase in the ad valorem excise tax. An increase in the net-of-tax price automatically ratchets up the absolute amount of excise tax per cigarette (by 32%, not shown in table 1), which amplifies the retail price increase (20.1% vs 9.2%). As a result, consumption decreases more sharply (−10.1% vs −5.1%). In comparison, if the excise tax had been levied specifically, a 10% net-of-tax price increase in response to a 20% tax increase would reduce consumption by 7.8%. The fiscal benefit of an increase in the net-of-tax price in response to the 20% ad valorem tax increase is also enhanced (18.3% vs 13.8% increase in tax revenue).

While this is an extremely positive fiscal and public health outcome, it is unlikely to materialise. Even though the tobacco industry will improve its short-term financial position marginally (change in revenue of −1.4% vs −5.1%), the long-term

[vi] Without knowledge of the industry's cost structure (and thus profit margins), one cannot calculate by how much industry profits will increase.

[vii] The SCT on cigarettes is levied as a specific tax, but if the "base price" (essentially an ex-works price) is greater than a threshold value, the additional value is taxed at a much higher ad valorem rate. In 2005 the Jamaican government increased the specific tax component by 49%, but also raised the threshold where the ad valorem component became effective. In effect, the higher *specific* SCT component replaced the *ad valorem* SCT component, with the result that the SCT increased only marginally.

[viii] Note that this is a 20% and not a 20 percentage point increase in the excise rate. Given the information in column (9), the initial excise tax rate is 40/(100−13.04−40)=85.2% on the net-of-tax price. The new excise tax rate is 85.2×(1+(20/100))=102.2% on the net-of-tax price, *not* 85.2+20=105.2%.

Table 2 Model simulation growth rates versus actual growth rates, South Africa, 1994–2004

	1994 Value (1)	2004 Value (2)	Actual percentage change (3)	Predicted percentage change (4)
Retail price (Rand per pack, constant 2000 prices)	4.26	8.98	110.8	113.1
Consumption (millions of packs)	1769	1202	−32.1	−29.0
Per capita consumption (packs/adult)	69.6	38.5	−44.7	−42.3
Excise tax revenue (R million, constant 2000 prices)	1605	3927	144.7	163.2
Industry revenue (R million, constant 2000 prices)	5011	5541	10.6	15.6
Smoking prevalence (percentage)	31.0	23.5	−24.2	−24.4

cost—an additional 5 percentage points decrease in consumption (−10.1% vs −5.1%)—is probably too high for this to be considered a feasible strategy. This strategy greatly enhances the public health and fiscal benefits of an excise tax increase, at the industry's expense, which is not in the industry's financial interests.

In column (11) the industry decreases the net-of-tax price by 5% in response to a 20% increase in the ad valorem tax rate. This industry strategy undermines both the public health (−2.2% vs −5.1% change in consumption) and fiscal objectives (11.5% vs 13.8% increase in excise revenue) of the tax increase. This pricing strategy imposes a modest cost on the tobacco industry in terms of their revenue (−7.1% vs −5.1%). However, an industry interested in its long-term survival is likely to accept this modest short-term loss.

DISCUSSION

This paper presents a simple model that examines the likely outcomes of a change in cigarette excise taxes. The online application can be calibrated to approximate the cigarette tax structure in many low-income and middle-income countries. It will hopefully empower tobacco control advocates in their discussions with policy makers, in particular officials of the ministries of finance. Tobacco control advocates would be able to provide numerical estimates of the impact of a change in the excise tax, rather than talking in vague and general terms. Where there is uncertainty about the magnitude of certain parameters, the model allows the user to perform sensitivity analyses.

The online model also has a module that considers the impact of sustained increases in the excise tax and/or the net-of-tax price on the outcome variables for a 10-year period, using the same mathematical model as the one-off model presented in this paper, but taking cognizance of the fact that cigarette consumption increases as average income increases. In order to test the model's predictive ability, the outputs of the 10-year model are compared to South Africa's actual experiences between 1994 and 2004, a period marked by sharp increases in both the excise tax and the net-of-tax price. The price and income elasticity estimates of −0.8 and 0.9, respectively, are derived from a comprehensive time-series econometric study.[1] The realised average annual growth rates for relevant inputs for South Africa are the following: excise tax (in real terms, levied as a specific tax): 14%; real net-of-tax price: 5%; real income (approximated by GDP): 3%; and population: 2.1%. The VAT rate remained unchanged at 14%.

Comparing columns (3) and (4) in table 2 indicates that the model predicts the actual changes in the variables of interest quite well. Actual cigarette consumption decreased somewhat more rapidly than predicted, probably reflecting the fact that tobacco control legislation (banning tobacco advertising and introducing smoke-free indoor areas in 2001) has reduced cigarette consumption by a greater proportion than is explained by changes in the price alone. As a result, the actual increase in excise tax revenue and industry revenue is slightly less than predicted. Despite these minor deviations, the model seems to be adequate in predicting the underlying trends in the important variables. A similar accuracy test is more difficult for the short-term model, given stochastic variation, but since the short-term and long-term models have the same mathematical structure, one can infer that the short-term predictions should be of a similar quality as the long-term predictions.

A number of simulations were presented in this paper. While the quantitative conclusions depend on the parameter values, one can make a number of general conclusions for a wide range of parameter values. First, for all price elasticity values, an increase in the excise tax decreases cigarette consumption, smoking prevalence, smoking intensity and smoking-related mortality. The more elastic the demand for cigarettes, the greater the effect will be. Second, for a wide range of price elasticities, covering all realistic (and even some unrealistic) values, an increase in the excise tax will increase a government's excise revenue. Third, by increasing the net-of-tax price, the tobacco industry can reduce cigarette consumption by a greater percentage than had only the excise tax increased. As long as the tax structure creates the appropriate incentives for the tobacco industry to raise the net-of-tax price on cigarettes, the industry can be an unlikely ally in reducing tobacco consumption.

The structure of the excise tax plays a critical part in this regard. If the tax is levied specifically, an excise tax increase typically creates an incentive for the industry to increase the net-of-tax price, enhancing the tobacco control impact. If the excise tax is levied ad valorem, there is very little incentive for the industry to increase the net-of-tax price; it is more likely that the industry reduces the net-of-tax price. This strategy would impose a comparatively minor cost on the industry itself, but it would greatly undermine the public health and fiscal benefits of an excise tax increase.

The relative benefits and drawbacks of specific and ad valorem taxes have been discussed at length[3] and this paper does not wish to add to this literature, other than illustrating one important point: from the perspective of reducing tobacco consumption, a specific tax is more appropriate than an ad valorem tax. Also, increases in specific taxes have, given the incentive structures facing the industry, more predictable consequences than increases in an ad valorem tax. It is quite conceivable that, if the tax is levied ad valorem, the industry responds in a way that undermines the increase in the excise tax. This is not likely to happen if the tax is levied specifically.

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CONTENTS

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Chapter I

INTRODUCTION

"Sugar, rum, and ***tobacco, are commodities which are no where necessaries of life, which are become objects of almost universal consumption, and which are therefore extremely proper subjects of taxation.*** *..... In the mean time the people might be relieved from some of the most burdensome taxes; from those which are imposed either upon the necessaries of life, or upon the materials of manufacture. The labouring poor would thus be enabled to live better, to work cheaper, and to send their goods cheaper to market. The cheapness of their goods would increase the demand for them, and consequently for the labour of those who produced them. This increase in the demand for labour, would both increase the numbers and improve the circumstances of the labouring poor. Their consumption would increase, and together with it the revenue arising from all those articles of their consumption upon which the taxes might be allowed to remain."* Adam Smith, *An Inquiry into the Nature and Causes of The Wealth of Nations,* Book V, Chapter III, pages 474-476, 1776; edited by Edwin Canaan, 1976 (emphasis added).

TOBACCO USE is the single largest cause of preventable death globally, killing more than five million people each year. Tobacco use also creates considerable economic costs, from greater spending on health care to treat the diseases it brings on in users and those exposed to tobacco smoke to the lost productivity resulting from the premature deaths it causes. The primary objective of the World Health Organization is to protect public health; given the death and disease it causes, reducing tobacco use is a priority focus of WHO's activities. These efforts include the effective implementation of the WHO Framework Convention on Tobacco Control (WHO FCTC), with a particular emphasis on the strategies contained in the MPOWER measures introduced by WHO to assist in the country-level implementation of tobacco demand reduction measures contained in the WHO FCTC: Monitoring tobacco use and prevention policies; Protecting people from tobacco smoke; Offering help to quit tobacco use; Warning about the dangers of tobacco; Enforcing bans on tobacco advertising, promotion and sponsorship; and Raising taxes on tobacco products.

Of all of these interventions, a significant increase in tobacco product taxes and prices has been demonstrated to be the single most effective and cost-effective intervention for reducing tobacco use, particularly among the young and the poor. At the same time, because of the inelasticity of demand for tobacco products in most countries and the low share of tax in price in many, significant increases in tobacco taxes generate significant increases in the revenues generated by these taxes.

This technical manual aims to help governments achieve both objectives by identifying a set of 'best practices' for tobacco taxation. It documents governments' existing approaches to tobacco taxation, discusses barriers to using tobacco taxes to achieve health and revenue objectives, and provides case studies of effective tobacco tax administration. This manual is intended to be useful to tax administrators at the Ministry of Finance level by making them aware of the practices used and challenges faced by other countries. It will also be useful to officials in a country's Ministry of Health or similar organizations by providing them with a more thorough understanding of key issues in tax structure and administration.

Government Objectives

Governments around the world have followed Adam Smith's advice above, with nearly every country in the world imposing taxes of various types and sizes on the wide variety of tobacco products available. Many of these taxes have been in place for decades, if not centuries, with periodic changes to their magnitude, structure and administration. The variety of taxes applied to tobacco products include excises (both specific and *ad valorem*), customs duties, value added taxes, general sales or consumption taxes, and special levies that fund particular programmes. The labels given to these taxes may vary from country to country, but the forms they take have many similarities.

Of the various types of taxes applied to tobacco products, excise taxes are of the most importance when considering health objectives. These taxes will raise the price of tobacco products relative to the prices of other goods and services, unlike taxes that apply to a wide variety of goods and services, such as value added taxes and general consumption taxes. Moreover, relative to other products also subject to some form of excise, it is the excess over the average excise tax rate that increases the effectiveness of the tobacco excise.

Governments have used tobacco taxes in efforts to achieve multiple, at times competing goals. Historically, revenue generation has been the primary aim of most, if not all, governments that tax tobacco products, and many governments today raise taxes when they need additional revenues. Tobacco products are generally good candidates for taxation, given that they are typically produced by a small number of manufacturers, have few ready substitutes, and have relatively inelastic demand, at least in the short run. As such, they tend to satisfy the so-called "Ramsey Rule" for economically efficient consumption taxes (Ramsey, 1927). That is, because of the relative inelasticity of demand, they can generate considerable revenues while creating fewer distortions in the market than would result from taxes on goods and services with more elastic demand. Of course, there are many other goods and services with equal or greater levels of inelastic demand, for which the same would be true.

Some governments have pursued other goals (in addition to revenue generation) through the types of tobacco taxes they apply. Some have used high customs duties to protect domestic tobacco growers and tobacco manufacturers from outside competitors. Others have done the same by applying excise taxes to tobacco products that vary based on the source or type of tobacco contained in the product, the price of the product (where foreign brands are expensive relative to those produced domestically), or other product characteristics. In other cases, governments have adopted what they consider to be a "pro-poor" policy that keeps taxes low on relatively inexpensive products or brands while more heavily taxing more expensive products or brands, in order to keep retail prices low for the products/brands most widely used by the poor.

Over the past half-century, as evidence on the health consequences of tobacco use has accumulated, governments have begun to use tobacco taxes as a way to promote public health by reducing tobacco use and the death and disease it causes. Growing research evidence that demonstrates that higher taxes, by increasing prices, lead to reductions in tobacco use, with relatively larger impact on vulnerable populations—youth and young adults, the poor, and pregnant women—has led many governments to adopt and increase tobacco taxes with the stated intent of reducing tobacco use (Chaloupka et al., 2000; Ross and Chaloupka, 2006).

Similarly, as the evidence on the health consequences of tobacco use has grown, market failures in tobacco product markets have become increasingly apparent, strengthening the economic rationale for government intervention that includes increased tobacco taxes (Jha and Chaloupka, 2000). There are clear negative externalities from tobacco use, given the well documented health consequences of exposure to environmental tobacco smoke (USDHHS, 2006). To the extent that health care is publicly funded, there are costs imposed on non-smokers resulting from smokers' increased use of health care to treat diseases caused by smoking.

Information failures exist in many countries regarding these health consequences, with the full risks from tobacco use poorly understood by a

significant portion of the population. These failures are exacerbated by the increasingly early ages at which tobacco use is initiated and by the addictiveness of tobacco use, something few new users in these countries comprehend. The 'internalities' that result from individuals' self-control failures that lead to greater tobacco use than desired are yet another market failure that strengthens the case for government intervention in tobacco markets (Gruber and Koszegi, 2008). While higher tobacco taxes may be a blunt policy for curbing tobacco use, they are highly effective, particularly among young people and the poor for whom these market failures are likely most important.

Given the evidence on the effectiveness of higher tobacco product prices in reducing tobacco use, higher tobacco taxes are a central element of the WHO FCTC. Article 6 (Annex Figure 1), calls for Parties to the treaty to use tax and price policies to reduce tobacco use, while Article 15 (Annex Figure 2) calls for the adoption and implementation of measures aimed at eliminating the illicit trade in tobacco products that can undermine the effectiveness of increased tobacco taxes.

Tobacco Taxes and Tobacco Use

Well over one hundred studies have examined the impact of tobacco product taxes and prices on overall tobacco use[1]. Until recently, nearly all of these studies came from high-income countries including the United States, Canada, the United Kingdom, Australia, and several others. These studies consistently find that increases in taxes and prices on tobacco products lead to reductions in tobacco use. Most studies have focused on cigarette smoking, given that cigarettes account for the nearly all tobacco use in high-income countries. While these studies have produced a wide range of estimates of the magnitude of the effects of price on overall cigarette consumption, the vast majority of these studies estimate price elasticities in the range from -0.25 to -0.5, with most of these clustered around -0.4 (this number means that if price

[1] See Chaloupka et al., 2000 and Ross and Chaloupka, 2006, for reviews of the research discussed in this section.

was increased by 10% consumption would go down by 4%). Several of these studies have modelled the addictive nature of tobacco use, finding that demand is more responsive to price in the long run than it is in the short run.

Over the past decade, a growing number of studies have examined the impact of taxes and prices on tobacco use in low and middle-income countries. These studies have estimated a wide range of price elasticities with most, but not all, indicating that demand for tobacco products is more responsive to price in low and middle-income countries than it is in high income countries. For example, Hu and Mao (2002) estimate that the price elasticity of cigarette demand in China ranges from -0.50 to -0.64, while John (2008) estimates price elasticities in the range from -0.86 to -0.92 for bidis and -0.2 to –0.34 for cigarettes in India. As in studies for high-income countries, studies from low and middle-income countries that account for the addictive nature of tobacco use find that demand responds more to price in the long run. For example, Aloui (2003) estimates short run price elasticities for tobacco use in Morocco in the range from -0.51 to -0.73, and estimates long run elasticities that range from -1.36 to -1.54.

Findings from studies based on individual-level survey data on adult tobacco use indicate that taxes and prices influence both tobacco use decisions (prevalence) and the frequency and amount of tobacco consumption among smokers (conditional demand). In general, estimates from high-income countries suggest that about half of the impact of price on tobacco use results from its effect on prevalence. Given that relatively little initiation occurs during adulthood, these changes largely result from cessation among adult users. This is confirmed by a small number of studies finding that increases in prices lead a number of current users to try to quit, with some successful in doing so in the long run.

Studies using survey data from low and middle-income countries similarly find that price affects prevalence, although the relative impact on prevalence and consumption varies considerably across studies/countries. For example, Adioetomo et al. (2005) find no impact of price on the prevalence of smoking in Indonesia, while estimating an elasticity for conditional cigarette

demand of -0.62. In contrast, Kyaing (2003) estimates a prevalence price elasticity of -1.28 and a conditional demand elasticity of -0.34 in Myanmar.

Several studies based on survey data have examined the differential responses of various population subgroups to changes in the prices for tobacco products, including those based on age, gender, income, education, race/ethnicity, and location (urban vs. rural). Findings for gender, race/ethnicity and location vary across countries, while consistent patterns are more evident with respect to age and socioeconomic status (as measured by income and/or education). Studies looking at tobacco use among adolescents and young adults find that young people are two to three times more responsive to tax and price than are older persons (Chaloupka, forthcoming). Studies that examine the uptake of tobacco use find that higher taxes and prices are particularly effective in keeping young people from moving beyond experimentation with tobacco use, preventing them from becoming regular and, eventually, addicted users. Similarly, as predicted by economic theory, lower SES populations are more responsive to price than are higher SES populations. For example, Sayginsoy et al. (2002) estimate cigarette demand elasticities of -1.33, -1.00 and -0.52 for low, middle and high income populations in Bulgaria. Similarly, van Walbeek (2002) estimates elasticities by income quartile ranging from -1.39 for the lowest quartile to -0.81 for the highest quartile in South Africa.

Finally, several studies examine the potential for substitution among tobacco products in response to changes in the relative prices of these products. In general, these studies find that part of the reduction in the use of one tobacco product in response to an increase in its price will be offset by increased use of other products if the prices of these products are not also increased. For example, Laxminarayan and Deolalikar (2004) find that changes in relative prices for cigarettes and rustic tobacco in Viet Nam lead to substitution between the two, particularly for substitution from cigarettes to rustic tobacco in response to an increase in the relative price of cigarettes. This potential for substitution highlights the importance of increasing taxes and prices for all tobacco products, if the public health benefits of higher prices are one of the motives for tobacco tax increases.

To summarize, a large and growing literature clearly demonstrates that the overall demand for tobacco products is significantly affected by changes in tobacco product taxes and prices. These studies demonstrate that price affects all aspects of tobacco consumption, with higher prices preventing initiation among potential users, inducing cessation among current users, and reducing the frequency of consumption and amount consumed by continuing users. Consistent with economic theory, demand is generally found to be more responsive to price in low and middle income countries than in high income countries and, within a given country, use among younger and/or lower SES populations responds more to price than does use among older and/or higher SES persons. As predicted by economic theories of addiction, the impact of a permanent increase in price will be larger in the long run than in the short run. Finally, several studies show that changes in the relative prices of tobacco products will lead to some substitution among products, partially offsetting the impact on overall tobacco use of an increase in the price of one product.

Overview of the Manual

This technical manual aims to help governments maximize the benefits that they can receive from higher tobacco taxes by identifying a set of best practices for tobacco taxation. This is one of several available or forthcoming products that focus on tobacco taxation, including: the forthcoming monograph on the economics of tobacco and tobacco control being jointly produced by WHO and the US National Cancer Institute (NCI); the handbook on the effectiveness of tobacco tax and price policies forthcoming in the tobacco control handbook series produced by the International Agency for Research on Cancer (IARC); and the series of reports on tobacco taxation produced by the Bloomberg Global Initiative to Reduce Tobacco Use (BI).

These products differ in their breadth and depth, as well as their target audiences. The IARC handbook, for example, will provide an in-depth review of the global research evidence on the impact of tobacco taxation and price-related policies on tobacco use, while the NCI/WHO monograph provides a

broader review of the global evidence on the public health and economic impact of a range of tobacco control policies and other interventions, with an emphasis on impact in low and middle-income countries. In contrast, most of the BI reports are focused on country-specific evidence and on estimating the potential impact of increased tobacco taxes on tobacco use, preventable deaths, and revenues in a given country. This technical manual aims to provide more practical guidance on tax structure and tax administration issues for tax administrators and other government officials interested in increasing tobacco product taxes. Taken together, these and other materials provide a complementary and comprehensive picture of the economics of tobacco, tobacco taxation, and tobacco control.

Chapter 2 of this technical manual begins by providing an overview of tobacco taxes globally, highlighting the different types of taxes that governments apply to tobacco products, describing the alternative tax structures used in various countries, and reviewing the theoretical and limited empirical evidence on the impact of tax structure on tobacco product prices, tax revenues, and tobacco use.

Chapter 3 describes issues in tax administration, given that strong tax administration is necessary for tobacco taxes to be effective in protecting health and generating revenues. The chapter begins with a discussion of the need for strong technical capacity among tax administrators, including an understanding of the impact of alternative tobacco taxes on tobacco product prices, tobacco use, and revenues, as well as an understanding of other key determinants of tobacco demand. It goes on to describe the challenges associated with effective tobacco tax administration, from the monitoring of tobacco production and collection of taxes to approaches to limiting tax avoidance and evasion.

Chapter 4 focuses on the political economy of tobacco taxation, highlighting the obstacles and challenges that governments face when they consider adopting and implementing higher tobacco taxes. The arguments used by opponents of higher tobacco taxes are reviewed, including: questions about the potential and sustainability of tobacco tax revenues; the macroeconomic

impact of higher tobacco taxes, particularly their impact on employment and inflation; possible harmful effects of higher tobacco taxes on the poor; and the possibility of increased illicit trade in tobacco products in response to higher taxes. The chapter also provides examples of the tobacco industry's role in negotiating tobacco tax rates in some countries, as well as manufacturers' responses to tax increases. Finally, this chapter also describes the dedication or earmarking of tobacco tax revenues for various programmes, generally health focused ones, in a growing number of countries.

Given the experiences and issues described in these chapters, the final chapter provides a set of "best practices" for tobacco taxation—practices that will help maximize the public health benefits of higher tobacco taxes while at the same time producing new tax revenues for at least the short to medium term. In addition, given the gap in many countries between current practices and identified best practices, this chapter includes suggestions for how governments using various approaches can best transition from their current approach to these best practices.

However, there is relatively limited empirical evidence on many of the topics covered within. As governments begin to make the transition from their current practices to "best practices", much will be learned from their experiences.

Chapter II

TOBACCO TAX LEVELS AND STRUCTURE: A THEORETICAL AND EMPIRICAL OVERVIEW

THIS CHAPTER provides an overview of the different types of excise taxes on tobacco products, and their public health and revenue implications. Choosing an appropriate tobacco tax structure for a country is paramount to a successful strategy for promoting both public health and public finance, by reducing the consumption of tobacco products while raising government revenues. Both political and economic feasibilities determine a government's decisions on the design or reform of the tobacco tax system.

While import duties and sales taxes such as the Value Added Tax (VAT) may also apply on tobacco products, excise taxes constitute a greater share of tobacco product prices in most countries, produce more government revenues, and have a greater public health impact. Hence, this chapter focuses mainly on excise taxes, including taxes uniquely applied to tobacco products but that are called by other names. Furthermore, this manual focuses on the application of excises on cigarettes and provides limited information on excise application for the other tobacco products (e.g. roll-your own, chewing tobacco, snuff, waterpipes) due to limited available data or no (or low) excise levies on these products.

Section 2.1 of this chapter describes the different types of taxes levied on tobacco products, while section 2.2 provides an overview of tax rates and tax share in prices by income group, region and country level. Section 2.3 discusses the design and implementation of taxes on cigarettes. Based on the existing theoretical and empirical evidence, section 2.4 addresses the issue of which type of tax is more appropriate for a given objective and section 2.5 looks at the choice between implementing a uniform and a differential tax rate, followed by conclusions in section 2.6.

2.1 Types of taxes levied on tobacco products

Excises and VAT are the most common forms of domestic consumption taxation levied on tobacco products. Based on available data, about 90 percent of countries (163 out of 182) levy excises on cigarettes. Exceptions apply in the Gulf Cooperation Council (GCC) countries (including Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and UAE), some Pacific island countries (e.g., Cook Islands, Marshall Islands, Nauru, Niue, Palau and Kiribati), some Caribbean island countries (including Antigua & Barbuda, Grenada and St. Lucia), and Afghanistan, Benin, Maldives, and Sao Tome & Principe. Nearly as many countries—156 of the 182 countries—levy a VAT on cigarettes (WHO GTCR, 2009)

- **Excises:** There are two types of excise taxes—specific and ad valorem. A specific excise tax is a monetary value per quantity (e.g. pack, weight, carton, piece) of tobacco products. An ad valorem excise tax is levied as a percentage of the value of the tobacco products. We will look at both of these in more detail in the next section.
- **Value Added Taxes:** VAT is a widely adopted consumption tax. In general, it is applied as a single rate and on a broad range of goods and services. In principle, VAT is a general tax on consumption of goods and services, leaving relative prices unaffected, and as such has great practical appeal for revenue generation. It minimizes the amount of detailed information needed for tax administration as only the total value of sales needs to be recorded. Tax authorities

have no need to be concerned with the nature of the goods and services traded.

VAT rates vary by countries. Currently, the statutory rate for VAT varies between 2 and 10 percent in 28 countries, 10 and 15 percent in 58 countries, and 15 and 20 percent in 64 countries. Only 30 countries do not levy any VAT tax on tobacco products (WHO GTCR, 2009).

- **Other taxes:** Consumption taxes are named differently in different countries and some act as excises despite their names (for example, the stamp duty in Brazil and the General Sales Tax (GST) in Egypt). Most other taxes are additional taxes on tobacco products to finance various programmes through earmarking.
- **Import duties:** Almost all countries levy a tariff on imported cigarettes.[2] An import duty is a tax on a selected commodity imported in a country and destined for domestic consumption (i.e., the goods are not in transit to another country). In general, import duties are collected from the importer at the point of entry into the country.

  Import duties also vary among countries. Countries impose high import duties either to protect their domestic industry or to generate government revenue. Some examples of countries with relatively high import duties are Nigeria (35%), Guyana (100%), Sri Lanka (SLR1,370/kg), Zimbabwe (60% US$5/50 packs), Egypt (83%), Jordan (75%), Mexico (67%), and Honduras (55%) (TMA, 2009). Countries with no substantial cigarette production or no excise taxes have a tendency to levy higher import duties on cigarettes for revenue purposes. The Gulf Council Countries are good examples of this; Bahrain, Kuwait, Qatar, Saudi Arabia and the United Arab Emirates (UAE) each impose a 100 percent duty based on importers' declared CIF (*Cost, Insurance, Freight*) value.

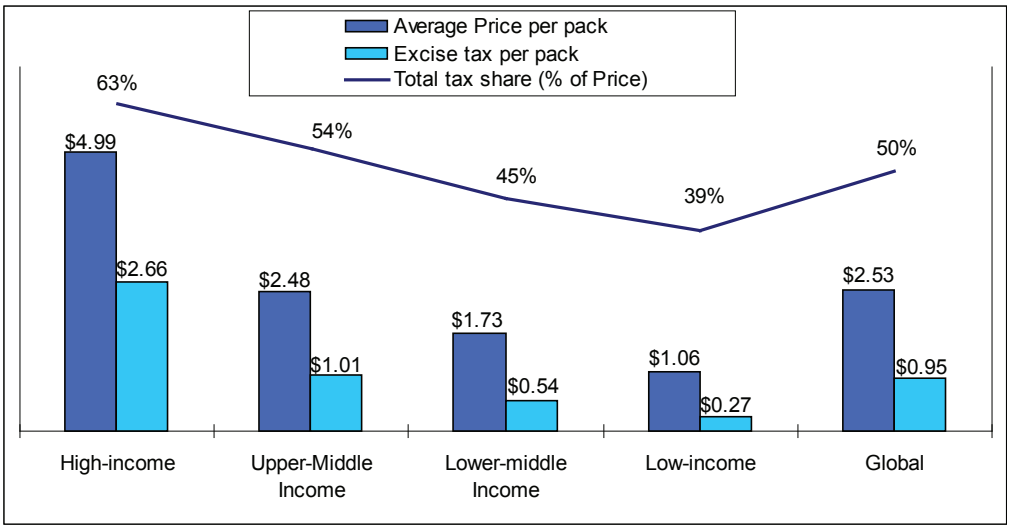
[2] There are a couple of exceptions, for example Singapore. Also, many countries are members of a number of regional or bilateral trade agreements under which tobacco products are subject to different or no import duties for member countries.

In recent years, given bilateral, regional and global trade agreements, import duty rates have been reduced dramatically by many countries. Import duties discriminate against imported products and free trade agreements usually require participating countries to gradually phase them out. As import duties are phased out, the government loses the revenues they generated. Excise tax increases can compensate for these revenue losses. Brunei used to levy a 200% CIF tariff on cigarette imports, but recently replaced its import duties with excise taxes. As it does not manufacture any cigarettes, there is no real effect on the economy, only a need for an administration adjustment to importers. The change was part of the government's commitment to World Trade Organization (WTO) and other international and regional trade agreements.

2.2 Overview of tobacco prices and taxes at global and regional level

The prices of cigarettes that consumers face and the total tax share in consumers' prices vary considerably across countries grouped by income and regions (Figure 1 and 2, respectively). The highest average price per pack of cigarettes in US$ declines by income group, with the highest average price and tax share in the group of high income countries. On average, at the global level, total taxes on cigarettes account for about 50 percent of the average retail price for cigarettes, with the average price being US$2.53. The average price and tax share in the lower-middle income group (US$1.73/pack and 45% respectively) and in the low-income countries (US$1.06/pack and 39% respectively) are below the global average.

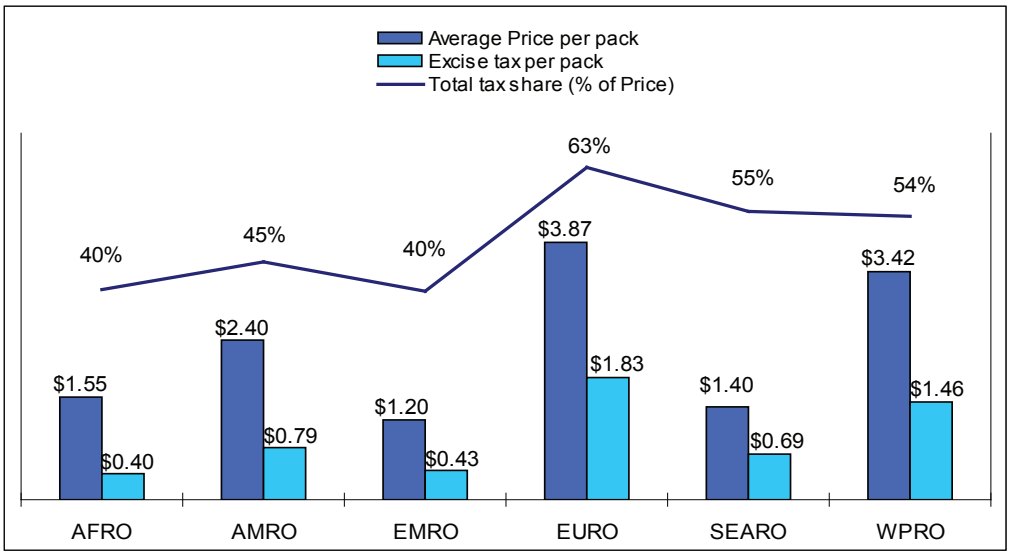
Figure 1: Simple Average Price of the Most Sold Brand, Excise Tax per pack, and Total Tax Share by Income Group, 2008



Source: WHO GTCR, 2009

Across WHO regions (Figure 2), the EURO region has the highest average retail price and total tax share in average retail price (US$3.87/pack and 63% respectively), mainly because of the European Union countries. The EMRO region has the lowest average consumer price and tax share, with AFRO second lowest. Regional comparison displays two interesting results. First, the SEARO region has the second highest tax share in consumer prices but the second lowest average consumer price, given relatively low manufacturers' prices in the region. Second, the AFRO region has a relatively higher average consumer price, but the share of tax in consumer price is one of the lowest among the regions.

Figure 2: Simple Average Price of the Most Sold Brand , Excise Tax per pack, and Total Tax Share by Region, 2008



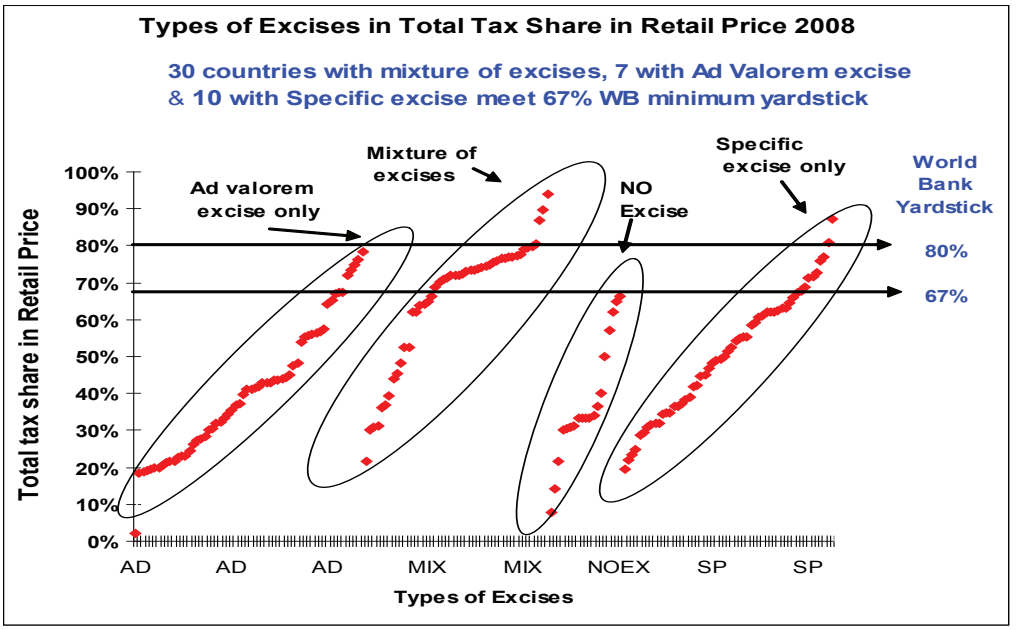
Source: WHO GTCR 2009

Based on most popular brand categories, 47 out of 182 countries meet the World Bank's 2/3rd yardstick (67% of price as total tax).[3] And among those 47 countries, only 8 countries meet or go over the 4/5th yardstick (Poland, Slovakia, Bulgaria, Cuba, Mauritius, France, UK, and the Czech Republic). Among those 8 countries, Cuba (87%) and Mauritius (68%) rely on a uniform specific excise only, and three countries (Slovakia, UK, and the Czech Republic) levy a mixture of both excises but rely heavily on the specific component, compared to the ad valorem one, as a share in the retail price. Among the other 39 countries, more than half (23 countries) rely on an ad valorem excise or impose a mixture of both excises but rely heavily on the ad valorem component.

Figure 3 below groups countries by tax structure and shows that most of them are still below the World Bank's 1999 yardstick.

[3] In 1999, the World Bank announced a yardstick after observing that the tax accounts for two-thirds to four-fifths of the retail price of cigarettes in countries with comprehensive tobacco control policies.

Figure 3: The World Bank Tax Yardstick and Country Status, 2008



Source: Authors' calculations using WHO GTCR 2009 data

Turning to other tobacco products, bidis are hand-rolled tobacco products commonly consumed in countries in South-East Asia, including Bangladesh, Bhutan, India, Maldives, Nepal, Sri Lanka and Timor-Leste.[4] Bidis are usually excluded from tobacco excises, with the exceptions of India, Bangladesh and Nepal. Bidis account for around 85% of total smoking tobacco consumption in India, with the remainder consisting of cigarette consumption. The bidi industry has a large number of small scale producers, with over 98% of bidis being handmade (Euromonitor, 2007). None of the over 300 brands of bidis command even a 5% market share within India (Goodchild, forthcoming; Sunley, 2008). Historically, excises on bidis have been close to zero. The most popular cigarette brand in India in 2008 was Gold Flake, on which a specific excise of INR 1,759 per 1000 cigarettes was levied. In contrast, the excise rate on machine-made bidis was INR 26 per 1000 sticks, while the excise on handmade ones was INR 14 per 1000 pieces. Similarly, in Bangladesh bidis account

[4] Bidis are the Indian version of cigarettes and are made by rolling a dried, rectangular piece of temburni leaf with 0.15-0.25 gram of sun-dried, flaked tobacco into a conical shape and securing the roll with a thread; the product is then available for smoking.

for 75% of total sticks smoked and are produced by small companies; they are subject to a 20 percent ad valorem tax levied on the pre-tax retail price (Barkat et al, forthcoming). In Nepal, the excise rate on the most popular cigarettes was NPR 415 per 1000 pieces in 2008, but that on bidis was NPR 50 per 1000 pieces.

Water pipes are another form of smoking tobacco widely used in the Eastern Mediterranean region, including Bahrain, Djibouti, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libyan Arab Jamahiriya, Oman, Pakistan, Qatar, Saudi Arabia, Syrian Arab, Tunisia, United Arab Emirates, West Bank and Gaza Strip, and Yemen. Little information is available with regards to excises on tobacco products for water pipes, but for example Lebanon, Libya, Syria and Turkey levy an ad valorem excise while Israel levies a mix of excises.[5] The tax rates also vary widely, from 2% of the producer price in Libya, to 15% in Syria and 108% in Lebanon, and 58% of retail price in Turkey (WHO GTCR, 2009).

Taxation of smokeless tobacco products has received comparatively little attention in most countries. However, this is becoming an important policy issue because of the emergence of new smokeless tobacco products in tobacco product markets. These new smokeless products include a variety of dissolvable tobacco products and snus, in addition to the more traditional moist snuff and chewing tobacco products produced by a number of tobacco manufacturers.[6] The issue of how to tax these products remains an open question for further study.

In the United States, for example, the excises imposed on moist snuff tobacco products vary considerably across states. Taxes range from no tax in Pennsylvania to 90% of wholesale price in Massachusetts and $1.49 per ounce in Vermont. The lowest tax rates on these smokeless tobacco products appear to be in the southern US states (where most tobacco is grown). Although the US federal government taxes moist smokeless tobacco based on weight, which is essentially a tax on quantity, most state governments impose ad valorem

[5] Turkey levies 58 percent ad valorem on retail price per package not exceeding 500gram of waterpipe tobacco or 0.02TL/gram specific excise, whichever has the higher value.

[6] An introduction to these emerging smokeless tobacco products can be found at http://tobaccoproducts.org/index.php/Main_Page#New_Smokeless_Products.

taxes based on wholesale or manufacturer prices; only 9 out of 51 states impose specific excises. This is interesting as, with respect to taxing cigarettes, each state imposes a specific excise per pack. The weight based taxes, however, lead to considerable differences in the taxes on various products, as some of the new products are much lighter than more traditional products. Application of excises on moist snuff also differs across countries. Norway, for example, levies a specific excise of NKr0.68 per 100 gram of moist snuff (ERC, 2008), and Turkey imposes a minimum specific excise floor while imposing the same ad valorem rate of 58% as on cigarettes (Yurekli et al., forthcoming).

2.3 Design and implementation of cigarette taxation

The design and implementation of cigarettes excises vary greatly by countries. The base on which taxes are levied can take many forms.

When the tax is uniform, that is, the same rate applies to all cigarettes, the tax base can be:

- **Quantity:** The most common base for a specific excise is a pack of 20 cigarettes or a tax per 1,000 cigarettes, but there are exceptions such as a pack of 25 cigarettes (e.g. Australia), a carton, 5 packs of 25 cigarettes (e.g. Canada), a stick (e.g. Indonesia), a meter (e.g. Nepal) or the weight (e.g. New Zealand[7]).
- **Price**: The ad valorem excise may be applied based on the manufacturer's price (e.g. China) or the retail price (e.g. Bangladesh, Turkey, Russia, Ukraine, EU). In Indonesia, up until 2009, the ad valorem excise was based on the banderol price[8], which is based not only on firm production costs but also on a modification administered by the Ministry of Finance.

[7] This applies to cigarettes exceeding in weight 0.8 kg.

[8] The banderol price is a price set by the government for each brand sold in Indonesia. It is calculated based on the cost of production, producer profit as well as distributors', agents' and retailers' margins

When the tax rate is not uniform, the tax can be based on :

- **Price category and other brand characteristics (e.g. retail or manufacturer's price level, sales volume, length, filter, packaging, tobacco origin):** In some countries, the specific excise varies by tiers, typically depending on the characteristics of brands. For example, in Egypt the specific excises vary by the ex-factory price of cigarettes, ranging from EGP 1.08 per pack for low-priced brands to EGP 3.25 per pack for high-priced brands in 2009. India, Nepal and Sri Lanka impose different specific tax rates depending on the length of cigarettes. Kazakhstan, Russia and Ukraine apply different specific excises for filtered and non-filtered cigarettes. In Turkey the specific excise system was originally multi-tiered, based on the value of the cigarettes, was later based on the tobacco origin (oriental versus non- oriental leaf), and, as of 2009, became a uniform ad valorem tax at a rate of 58% of the retail price is imposed with a minimum specific excise of 2 TRY per pack (Yurekli et al., forthcoming).

  Some countries levy tiered or differential ad valorem excises based on cigarette characteristics, however this is less frequent compared to specific excises. A total of 6 countries apply differential ad valorem rates on cigarettes. Different tiers mainly depend upon the retail price but can also depend on the producer price (e.g. China) or sales volume (e.g. Myanmar).

According to the latest data available, only 19 out of 182 countries do not levy any excises on cigarettes (WHO GTCR, 2009).[9] Some countries apply a uniform tax rate, either specific or ad valorem, on all types of cigarettes, while others prefer to impose differential tax rates depending on the characteristics of the cigarettes. As Table 1 shows, a large number of countries (60 out of 182) rely on ad valorem excises only, while 55 countries impose only a specific excise. About one quarter of countries (48 out of 182) levy both specific and ad valorem excises.

[9] Table 1, in the Annex, provides detailed information on the type of excise tax imposed by different countries.

Table 1: Excise system on cigarettes

	Number of countries
Total covered	182
Specific excise only	55
Ad valorem excise only	60
Mixture of both excises	48
No Excise	19

Source: Authors' calculations using WHO GTCR 2009 data

Annex Tables 1 and 2 provide more detailed information on 155 countries: 32 of them levy differential tax rates based on prices, production, packaging, type of product, product characteristics or source of materials used (TMA, 2009).

The choice of excise(s) applied by countries varies by income group and by region. In general, low-income countries are more likely to lean towards an ad valorem excise: 28 out of 40 low-income countries that levy an excise tax on cigarettes rely solely on ad valorem excises compared to 10 that apply only a specific tax, while two use a combination of the two. In contrast, high-income countries are less likely to lean towards an ad valorem excise: only 2 of 38 high-income countries that apply an excise tax to cigarettes rely on an ad valorem tax, while 11 rely on a specific tax and 25—mostly European Union countries—use a mixture of both excises. For middle income countries, the trend is less clear, where 30 countries out of 85 rely only on ad valorem, while 34 rely on specific excises only and 21 have a mixture of both.

Table 2: The types of cigarette excise taxes applied by income group and WHO region

	Excise System on Cigarettes				
Income Group	Only specific	Only ad valorem	Both specific and ad valorem	No Excise	Total countries *
High	11	2	25	7	45
Upper Middle	16	11	9	6	42
Lower Middle	18	19	12	3	52
Low	10	28	2	3	43
By Region					
AFRO	14	29	1	2	46
AMRO	13	16	2	3	34
EMRO	1	7	5	7	20
EURO	10	3	36	0	49
SEARO	3	2	2	1	8
WPRO	14	3	2	6	25
All Countries	55	60	48	19	182

* Countries for which data are available

Source: *Authors' calculations using WHO GTCR 2009 data*

Geographically, most countries in WPRO (74% or 14 out of 19) rely solely on specific excises, while a large number of countries in Africa (66% or 29 out of 44) rely solely on ad valorem taxation. In the Pan American region, about half of countries (52% or 16 out of 31) rely on ad valorem excises, nearly half (42%, 13 out of 31) rely on specific excises, and only 2 countries (El Salvador and Dominican Republic) impose both excises. Among 48 countries that impose both types of excise, the share of the total excise tax accounted for by the ad valorem component is higher in more countries (28 out of 48); all low and lower-middle income countries except Congo, the Dominican Republic, Ukraine and Pakistan, lean towards ad valorem taxation.[10]

[10] These results depend on where the most popular brand stands on the excise tax system.

Annex Table 3 provides more detailed information by country level. Most high-income countries impose a mixture of both specific and ad valorem taxation. Many of these are the EU Member states; under current rules, EU Member States' cigarette excises must include both a specific and an ad valorem component. Excise duties must account for at least 57% of the retail selling price, inclusive of all taxes, and be at least €64 per 1000 cigarettes for the cigarettes belonging to the most popular price category (MPPC). The specific component of excise duty must not be less than 5% or more than 55% of the total tax share in final price of cigarettes in the MPPC. Member States may levy a minimum excise tax that may not be more than 100% of the total excise on the MPPC. However, there are also a number of derogations and transitional periods. Currently, 24 out of the 27 Member States impose a minimum tax floor, most of them applying a high or average ad valorem rate. In all but three Member States excises account for at least 57% of retail price in MPPC while all Member States satisfy the minimum tax of €64/1000 cigarettes. (See Annex Figures 3 through 5).

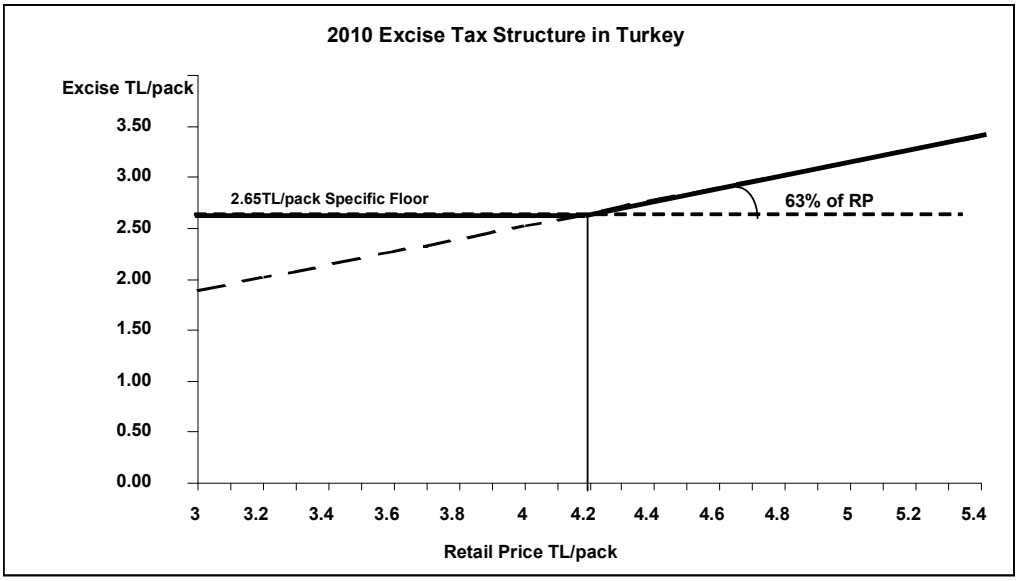
In November 2008, the Council reached a political agreement on a draft directive aiming at updating EU rules so that a higher level of public health is ensured. The concept of the MPPC will be replaced by a weighted average price (WAP) as a reference point for EU minimum requirements. This is appropriate as nowadays markets are more dynamic, with several popular brands and regular changes in cigarette prices. Replacing the MPPC with the WAP of all cigarettes for determining the tax base ensures transparency and a level playing field for manufacturers. Moreover, in an effort to emphasize the health objectives of tobacco excises, the monetary minimum duty will apply to all cigarettes and will be increased gradually over the next five years to €90 on all cigarettes, irrespective of the WAP, with an overall excise duty on cigarettes of at least 60% of the WAP.

This increase in the minimum duties will decrease the gap between the cheapest and most expensive cigarettes in the EU. As from 1 January 2011, the minimum tax floor will no longer have a maximum cap. As from 1 January 2014, the specific component of the excise may not be less than 7.5% and

more than 76.5% of the amount of the total tax share, giving Member States more flexibility in determining the balance between the two excise elements depending on the characteristics of their national cigarette market.[11]

Looking at Upper Middle Income countries, Turkey, for example, imposes an ad valorem tax at a rate of 63% with a minimum specific floor of 2.65TL/pack (see Figure 4, below). Russia, on the other hand, adopted a more complicated system: both specific and ad valorem taxation with a minimum tax, differentiating at the same time between filter and non-filtered cigarettes, taxing filtered ones at a higher rate (see Figure 5, below).

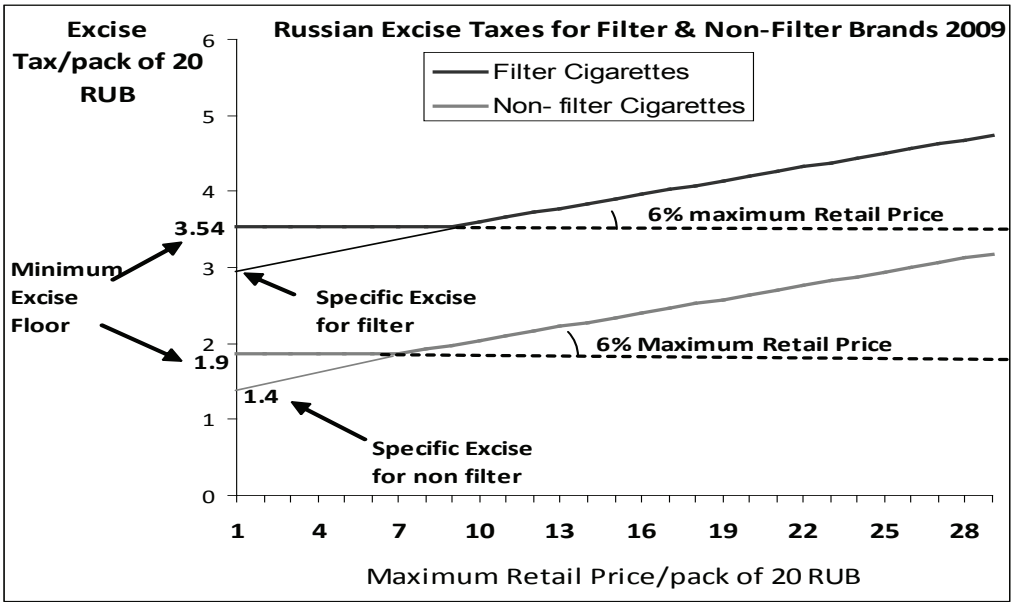
Figure 4: Cigarette excise taxes in Turkey, 2010



Source: Authors' calculations using data from Yurekli et al.(forthcoming)

[11] http://ec.europa.eu/taxation_customs/taxation/excise_duties/tobacco_products/legislation/index_en.htm

Figure 5: Cigarette excise taxes in Russia.



Source: Authors' calculations using data from TMA (2009)

2.4 Considering the appropriate type of excise on tobacco products

This section reviews existing theoretical and empirical evidence on alternative approaches to the choice of (uniform) specific and ad valorem excises and their effects on price, consumption, quality and variety of tobacco products, government revenue and tax administration. Quality here does not refer in any way to the health impact of the product. It may be evaluated based on the packaging or the blend used for the cigarette, or anything that makes the product more appealing to consumers. In that sense, cigarettes might be of "higher or lower quality" but they are equally harmful.

The choice between specific and ad valorem taxes is a long-standing issue in tax policy, and both the level and the structure of excises have different implications for the interests and goals of various groups. Given the market structure of the tobacco industry—typically a monopoly or oligopoly for most

products in most countries—different excises may have a different effect on government's revenues, manufacturer's profit, consumer's price, product's "quality" and variety, and ability to administer taxes (see, for example, Keen, 1998; Kay and Keen, 1982; 1983; 1987; 1991; Delipalla and Keen, 1992; Suits and Musgrave, 1953; Skeath and Trandel, 1994; Myles, 1994). Consequently, the two types of excise taxes may have different implications for public health to the extent that they affect individual consumption via their impact on product "quality", variety, and prices. Moreover, governments have the potential to manipulate tobacco excises to manage demand, raise revenue and promote public health.

The key challenge for policy makers is how to choose which type of excise to levy and at what rate, or find the appropriate balance between specific and ad valorem taxation, so that the public health objective is achieved while generating higher revenues. For this, we need to look closely at the relative effects of the two types of excises. The main differences between the two types of excises, as well as practical combinations of the two, are summarized in Table 3 below.

Table 3: Comparison of (uniform) specific and ad valorem excise regimes

	Specific excise	**Ad valorem excise**	**Ad valorem with specific floor**	**Mixed specific and ad valorem excise**	**Mixed specific and ad valorem excise with a minimum specific tax floor**
Tax base	The unit of product (e.g. 1000 cigarettes)	The value of the product. (e.g. retail, wholesale or manufacturer price)	The excise is calculated on an ad valorem basis; however, if the calculated tax falls below a specified minimum floor, a specific tax rate applies.	Unit and value of product	Both unit and value, unless tax below specified minimum, in which case the tax base is the unit
Administrative requirements	The tax should be collected at the point of manufacturing and at the time of importation				
	Low as only the volume of the products has to be ascertained.	Requires strong tax administration with technical capacity. Otherwise, the administrative burden can be high.	Requires strong tax administration with technical capacity. Otherwise, the administrative burden can be high as with a pure ad valorem regime.	Requires strong tax administration with technical capacity. Otherwise, the administrative burden can be high as it requires assessing and collecting both ad valorem and specific excises.	Requires strong tax administration with technical capacity. Otherwise, the administrative burden can be high as it requires assessing and collecting both ad valorem and specific excises, as well as minimum floor compliance.
Undervaluation	Not an issue.	Susceptible to undervaluation, but this can be overcome by establishing a minimum retail sale price.	This provides an easy tool to prevent undervaluation of low-priced brands subject to the specific floor.	The ad valorem part of the excise collection may be susceptible to undervaluation depending on the choice of tax base.	The specific tax floor prevents possible ad valorem tax base undervaluation of low-priced brands.
Impact on product "quality"	Upgrading effect tends to reduce the relative tax on higher-priced brands.	Multiplier effect provides a disincentive to costly "quality" improvement.	No incentive to upgrade higher-priced brands	No incentive to upgrade higher-priced brands	Eliminates incentive to upgrade higher-priced brands while at the same time provides such an incentive for lower-priced brands.

	Specific excise	Ad valorem excise	Ad valorem with specific floor	Mixed specific and ad valorem excise	Mixed specific and ad valorem excise with a minimum specific tax floor
Impact on price	Tends to lead to relatively higher prices, particularly for low-priced cigarettes.	Tends to lead to relatively lower prices; price reductions will be "subsidized" if the multiplier effect is strong.	Tends to lead to relatively higher prices for low-priced cigarettes.	An increase in the specific tax will increase the ad valorem payment as well.	An increase in the specific tax will increase the ad valorem tax amount as well. Increases in the ad valorem and /or specific tax will raise the minimum tax paid, if floor is a percentage of total tax on e.g. WAP It will reduce price gaps given impact on "quality".
Inflation	The real value of the excise will be eroded unless adjusted in line with inflation.	The real value of the excise will be preserved as prices increase; at least, to the extent that tobacco product prices follow inflation.	The real value of the specific floor will be eroded over time unless adjusted in line with inflation.	The real value of the specific excise will be eroded unless adjusted in line with inflation.	The real value of the specific excise tax and floor will be eroded unless adjusted in line with inflation.
Health benefits	The tax will discourage consumption of tobacco products irrespective of the price.	The tax may encourage more "trading down" in favour of cheaper cigarettes reducing health benefit.	Specific floor reduces incentives for trading down.	May reduce trading down.	Reduces trading down.

- Specific excises tend to increase consumer prices relatively more than ad valorem excises, and hence lead to relatively higher reductions in consumption (e.g. Delipalla and Keen, 1992; Delipalla and O'Donnell, 2001).

Under ad valorem taxation firms have an incentive to increase production: when supply increases, price falls but part of the price reduction is borne by the tax office, since the per unit tax payment falls. That is, under ad valorem taxation government "subsidizes" production expansion and lower prices. Along the same lines, if producers increase prices, part of the increase in prices accrues to government as tax revenue. Under specific taxation, though, any increase in producer's price will go to the producer as revenue, and thus would increase producers' incentive to raise prices of their products.

Crude country data compilation suggests trends in support of this finding. The average retail cigarette price is much higher among countries leaning towards specific excise. Excluding the 19 countries that did not levy any excises in 2008, the average cigarette price among countries levying a mixture of specific and ad valorem excises (most of them EU member states) is $3.87 in countries leaning towards specific excise, and $3.14 in those leaning towards ad valorem. The evidence is even stronger if we look only at countries relying solely on one type of excise. The average cigarette price is $2.46 in countries relying solely on specific excise, while it is $1.29 in countries relying solely on ad valorem. This pattern holds once one accounts for the income level of countries, as shown in Table 4.

Table 4: Average price, excises and excise as a percentage of average price, 2008

Countries by Income Group[§]	Average Price (AP)/pack of 20 USD*	Average Excise /pack of 20 [†]	Excise as % of AP
High Income			
Both Excises	$5.30	$3.15	59.4%
Specific dominates ad valorem	$5.49	$3.31	60.3%
Ad valorem dominates specific	$5.12	$3.00	58.6%
Specific only	$5.09	$2.56	50.3%
Middle Income			
Both Excises	$1.51	$0.63	41.6%
Specific dominates ad valorem	$1.73	$0.73	42.1%
Ad valorem dominates specific	$1.43	$0.59	41.4%
Specific only	$1.98	$0.70	35.2%
Ad valorem only			
Upper Middle Income			
Both Excises	$1.76	$0.90	51.0%
Specific only	$2.07	$0.76	36.9%
Ad valorem only	$1.87	$0.72	38.7%
Lower Middle Income			
Both excises	$1.33	$0.46	34.5%
Specific only	$1.90	$0.64	33.6%
Ad valorem only	$1.19	$0.32	27.2%
Low Income			
Specific Only	$1.19	$0.30	25.3%
Ad Valorem Only	$0.99	$0.24	24.8%

Notes: * Un-weighted arithmetic average of price of the most sold brand of cigarettes in the country converted into US dollars using official (principal or market) exchange rates at end of time period;

[†] Un-weighted arithmetic average of excise tax applied on most sold brand;

[§] July 2008 World Bank classification of countries by income.

Source: Authors' calculations using data from WHO GTCR 2009 (price and tax), IMF (official exchange rate)—except for Myanmar (unofficial exchange rate from the CIA world factbook)

- Consumer prices are more likely to rise by more than the tax increase when the tax is specific (tax over-shifting).

Tax over-shifting means that, when tax increases, the consumer price rises by more than the tax increase itself.[12] The higher impact of specific taxes on prices, discussed above, is consistent with a greater possibility of over-shifting of such a tax. Empirical evidence supports this possibility. When taxes are increased, prices are usually adjusted to reflect not only the tax increase but also other cost increases during the last year or so. However, Harris (1987), using data for the US where cigarette taxes are specific, finds that increases in cigarette taxes lead to significant price increases, more than double the size of the tax increase, and this could not be explained by increases in manufacturing costs.

Under specific taxation, any increase in producer's price will go to the producer as revenue, and thus would increase producers' incentive to raise prices of their products. This is not the case under ad valorem taxation, as part of the increase in prices accrues to government as tax revenue.

- Specific excises provide incentives for more appealing and higher-priced products, as well as greater variety (e.g. Barzel, 1976; Kay and Keen, 1983, 1987, 1991; Keen, 1998; Cremer and Thisse, 1994).

Producers' ability to pass taxes on to consumers depends on market power and, as product differentiation creates some monopoly power, producers go to great lengths to differentiate their products. Product differentiation can be vertical or horizontal. In the first case, firms produce the same product but quality varies; all consumers prefer the best quality or, in terms of cigarettes, the most appealing brand, but differ in their willingness to pay for it. In the second case, firms produce different variants of a product.

[12] The degree of over-shifting depends on industry characteristics.

Multiplier Effect: Ad valorem taxation has a multiplier effect that favours low "quality": for example, to cover the costs of a $1 "quality" improvement (i.e. improving packaging to make the brand more appealing) requires $1 more pre-tax revenue under specific taxation, but $1.25 more if the tax is ad valorem at a tax-inclusive rate of 20%.[13] The multiplier effect of the ad valorem tax generates a price increase higher than the cost of package improvement: a $1 improvement per unit leads to a price increase of $1.25, as the government taxes the cost of improvement and earns $0.25 extra revenue. In other words, under ad valorem taxation, as producer prices increase to cover the cost of improvements, government tax revenue increases as well due to the multiplier effect.

As far as variety is concerned, an increase in the ad valorem tax makes markets relatively more competitive, which induces the exit of some firms (brands), reducing product variety in the market.

The result that specific taxation is favourable to more appealing high-priced cigarettes and greater brand variety is important from the tobacco control point of view. Young people are the primary source of new customers for tobacco manufacturers. As brand and image are important for youth, they prefer higher-priced, more heavily marketed cigarettes. Glossy packaging and greater variety offers more satisfaction and choices to consumers and thus increases their willingness to pay. Packaging becomes even more important when other promotional activities are restricted or eliminated by law.

- Specific excises are less likely to induce substitution from high- to low-priced brands (e.g. switching down).

Consumers of tobacco products may reduce consumption of their preferred brand or may "switch down" when facing tax or price increases. As a result, a price increase due to higher taxes, although it will still reduce cigarette consumption, it may not reduce it as much as expected. When a uniform

[13] At a tax-inclusive rate of 20%, the price will have to increase by 1/(1-0.20) to cover the cost of a $1 improvement.

specific tax is levied on all brands of cigarettes, an increase in the excise would reduce the relative price of higher- to lower-priced brands. Such a change in relative prices would reduce consumers' incentive to substitute downwards. The opportunity of downwards substitutability arises at the higher end and middle of the price distribution of cigarette brands. With ad valorem taxation, as its tax base is the value of cigarettes, a uniform increase in the tax would keep relative prices unchanged.

However, one might argue that an upwards substitutability might occur when the price gap between cheaper and more expensive brands narrows. The price increase, due to higher taxation, may alter consumers' marginal willingness to pay for product "quality" subject to income. The hypothesis that the market share of lower-priced cigarettes falls when specific excises increase, as the relative price between higher- and lower-priced cigarettes is reduced, has been supported by empirical evidence. Sobel and Garrett (1997) find that increases in specific taxes reduced the market share of generic (lower-priced) brands in the U.S. significantly.[14]

The European Commission, recognizing the health objectives of cigarette excises as well as the fact that specific taxation favours producers of expensive brands, favours a more customized system: effectively apply a specific tax to lower-priced brands (through a minimum specific tax floor) and an ad valorem tax to the higher-priced ones. This way, taxes contribute to a level-playing field among manufacturers[15].

[14] Recent evidence in Turkey shows that the share of lower priced brands declined over several years of consistently increasing specific excises. We must note though that at the same time per capita income also increased.

[15] http://ec.europa.eu/taxation_customs/taxation/excise_duties/tobacco_products/legislation/index_en.htm

- Relying on specific taxation will in the long run increase market concentration and industry profits.

Theory shows that profits are relatively higher under specific taxation (e.g. Delipalla and Keen, 1992). Moreover, a tax increase may lead to an increase in profits. More than 100% over-shifting (i.e. prices rise by more than the tax increase itself) is a requisite for an increase in profits: as a higher tax increases consumer price and reduces demand, for profits to rise, the after-tax mark up must rise. It is not therefore surprising that tobacco multinationals prefer specific taxes.

Along with increases in the specific tax, governments may find they need to implement other policies to counteract the tobacco industry's increased market power.

- In general, the level of revenue from each tax differs according to the market characteristics.

With respect to tax revenue, governments care not only about its level but also its certainty and stability, as well as the ease of administration and enforcement.

Level of tax revenue: Theory suggests that there is probably an optimal balance between ad valorem and specific excises in terms of maximizing government revenue, assuming this is the government's objective, and/or minimizing variations in tax revenues (e.g. Bohanon and van Cott, 1984; 1991; Kay and Keen, 1987; Keen, 1998; Delipalla and Keen, 2006).

As taxes affect prices both directly and indirectly through their effect on "quality" and the number of different brands available in the market, consumers may consume less of their preferred brand, may consume the same units as before but of a cheaper brand, or may consume less of a more expensive brand. Predicting revenue in an accurate way is very difficult as one has to predict changes in consumer behavior. If we want to eliminate changes in consumer behavior, other than the ones induced by the price increase,

one should impose whichever form of taxation has the least effect on product characteristics. If the government's goal is to raise revenue, it should do this with minimum distortion: distorting prices is inevitable but distorting quality serves no useful purpose (e.g. Kay and Keen, 1987; Delipalla and Keen, 2006).[16]

Certainty of tax revenue: As specific excises are independent of changes in price, they generally produce a more stable stream of government revenue.

As taxes increase, the industry also increases its own price, but the level of increase is not certain; this fact is likely to cause uncertainty in the level of the tax-inclusive consumer price. In general, when there is price uncertainty, price elasticity plays a crucial role in the determination of the type of excise levied on cigarettes to ensure expected tax revenue or to eliminate the variation in revenue (Kay and Keen, 1982; Keen, 1998). Cigarette consumption will not change as price changes, if demand is completely inelastic (zero price elasticity). In such a case, as quantity remains constant after a tax increase, taxing quantity (i.e. specific taxation) would remove any variations in government revenue. Alternatively, if demand elasticity is constant (e.g. price elasticity of 1 at all price levels), consumers spend on cigarettes the same amount of income no matter what the price level; in this case, ad valorem taxation ensures more stable government revenue. However, empirical evidence shows that cigarette demand elasticity is somewhere between zero and one in most countries (see Table 4, in Annex). In the face of uncertainty, Kay and Keen (1982) show that stability of expected tax revenue requires a ratio of ad valorem to total taxation below the expected value of elasticity.

Ease of administration: Specific taxes are much easier to administer. Once the 'unit' of quantity is defined, the government revenue can be collected at any stage (e.g. manufacturer, wholesaler or importation). Under ad valorem taxation, administration relies on the manufacturers' declaration of price at manufacturing or retail level. To avoid undervaluation, technically

[16] From a public health point of view, however, distorting product characteristics (not just prices) might be desirable.

sound tax administration and awareness of the manufacturers' pricing policies are required.

Ease of enforcement: Ad valorem taxation is more likely to involve valuation problems, especially if the tax base is the manufacturer's price. That is, under ad valorem taxation tobacco manufacturers have the potential to sell their products to a related marketing company at an artificially low price, in order to reduce the excise tax liability (transfer pricing). Consequently, the government revenue from ad valorem tax declines due to the reduction in tax base. It is just this valuation problem that led the Philippines to abandon ad valorem taxes on cigarettes in favour of specific excises and the Russian Federation to impose specific excises on imported cigarettes instead of ad valorem taxes in 1996.

Keeping pace with inflation: An ad valorem tax maintains revenue value under high inflation given that the amount of the tax increases as prices increase, while specific taxes need to be adjusted with the Consumer Price Index (CPI) to keep pace with inflation[17].

Discouraging tax avoidance: Under specific taxation the manufacturer can manipulate the length of the cigarette or the size of the pack to reduce tax payment. As an example, in the UK, the market share of smaller cigarettes—which had dominated the market—fell from 83% to 25% between 1975 and 1981 due to a switch from a tax system based on weight of tobacco content to one with roughly equal parts of specific and ad valorem components (Kay and Keen, 1983).

Discouraging tax evasion: The tobacco companies oppose tax increases relying on the argument that higher taxes are an incentive for smuggling. According to the tobacco industry, increased tobacco taxes will reduce legal sales, but not total sales. They argue that increases in taxes will lead to an increase in smuggling, resulting in less revenue for governments and undermining taxation as an effective tool for health policy. The existence of an illegal market, particularly if its size is significant, might affect the characteristics

[17] However, most countries that impose a specific excise tax on tobacco do not automatically adjust it to keep pace with inflation.

of the legal tobacco market, and undermine the taxation policy in general.[18]

Policy makers are interested in the effect of taxes on both taxed and untaxed consumption, whether public health or revenue impact (or both) is the primary concern. Therefore, when tax policy is being reformed, the focus should be on encouraging the implementation of tax systems that are easy to administer and enforce. Given the different effects of specific and ad valorem taxes on market characteristics, it is likely that not only the level of taxation but also the balance between specific and ad valorem taxation might be important for reducing the incentives for smuggling.

2.5 The choice between a uniform and a differential rate tax system

A simple and unified excise tax system that taxes all cigarettes (or tobacco products) at the same level is more appropriate for reducing smoking (tobacco use) while at the same time leading to a more effective tax administration and higher tax revenues. A unit-rate excise tax system would reduce incentives for substitution among different brands (or tobacco products), reduce non-compliance and eliminate incentives for various pricing strategies by manufacturers to reduce their tax liability.

The global trend is for governments to simplify their excise tax systems. However, a significant number of countries still differentiate within brands and among products by taxing them at different rates as well as levying different types of excises. As shown in Annex Table 1, 33 of 155 countries impose a differential excise tax system, and among those, 21 countries levy a tiered specific rate, including large cigarette consuming countries such as Brazil, Egypt, India, Indonesia, and the Philippines; 6 countries, including Bangladesh, levy a differential ad valorem excise; and 6 countries including China, Pakistan, Russia, and Ukraine levy a differential mixture of both excises.

A tiered tax system, be it specific or ad valorem, may be an outcome of various political economy reasons, the most common one being protecting

[18] Tax evasion and tax avoidance are discussed in more detail in chapter 4.

domestic producers. However, it provides incentives for price manipulations to the extent that manufacturers can alter their pricing or production behavior to avoid higher tax liabilities.

An increasing number of countries have eliminated their differential excise tax system (e.g. Mexico, Viet Nam) and imposed a uniform tax rate on all brands, or have reformed excises in a way that reduces the price gap among brands. Egypt, Poland, Russia, Turkey, and Ukraine are among those countries that have restructured their excise systems by increasing tax rates relatively more for the lower-end of prices and consequently put pressure on companies to increase prices on the economy brands. Table 5 shows price per pack and total tax share for the most popular, cheapest, and most premium brands for the 15 countries with 2/3 of the burden of tobacco related deaths, also known as the Bloomberg Initiative countries.

Table 5. Price per pack versus total tax share by cigarette price category

	Price			Total tax share		
Country	**Most popular USD**	**Cheapest USD**	**Premium USD**	**Most popular USD**	**Cheapest USD**	**Premium USD**
Bangladesh	0.38	0.17	1.04	67%	47%	87%
Brazil*	1.03	1.03	1.28	58%	58%	63%
China	0.73	0.29	1.76	38%	40%	44%
Egypt*	0.49	0.49	1.52	59%	59%	39%
India	1.65	1.40	1.86	55%	50%	50%
Indonesia**	0.96	0.46	0.87	51%	44%	50%
Mexico***	2.07	1.26	2.07	65%	65%	65%
Pakistan	0.23	0.16	0.80	53%	63%	68%
Philippines*	0.53	0.53	0.84	54%	54%	76%
Poland	1.94	1.15	2.65	94%	91%	85%
Russian	0.51	0.14	1.26	37%	47%	27%
Thailand	1.29	0.75	1.81	64%	65%	63%
Turkey	1.97	1.41	3.15	73%	87%	73%
Ukraine	0.39	0.08	0.65	45%	61%	39%
Viet Nam	0.65	0.15	0.94	45%	45%	45%

* Most popular and cheapest are the same brand

** Most popular and cheapest are Kreteks

*** Most popular and premium are the same brand

Source: Authors' calculations using data from WHO GTCR 2009

2.6 Summary

The WHO's objective is to improve public health. In each country, the Ministry of Health has the same objective. Decisions on tobacco tax rates and structure, however, are made by the Ministry of Finance, for whom revenue generation is likely to be a key objective. In general, governments want to improve public health without compromising tax revenues. Raising extra revenues will take care of the resource problem that troubles tobacco control funding. Tobacco tax revenues can be used to subsidize tobacco cessation products (particularly among the poor), anti-tobacco media campaigns and other tobacco control efforts. This would lead to larger reductions in tobacco consumption and a better public health outcome than would be achieved from tobacco tax increases alone.

In this chapter, we reviewed the merits of each type of excise depending upon the objective. It is a generally accepted tax principle that one instrument is used per target. Targeting public health, specific taxation is the appropriate instrument, as it has two favourable effects. First, increases in specific excises would lead to relatively higher price increases, causing price sensitive consumers to reduce their consumption relatively more. Second, it reduces consumers' incentives to substitute higher-priced brands for lower-priced ones, especially when consumers find it difficult to quit or reduce consumption after a tax increase. This impact will be greater on poor and youth smoking behavior given their budget constraints. On the other hand, though, we have to acknowledge that specific taxation is favourable to higher-priced and more appealing brands as well as greater variety of them, offering more satisfaction and choices to consumers, especially influencing young ones who are brand and image oriented.

Both types of excises are instruments the government can use to control tobacco demand. The government can impose a high specific tax to increase retail prices and reduce the market share of cheap cigarettes. This action would certainly reduce (or prevent) demand for cigarettes by poor and young smokers. The government can impose an ad valorem tax to adjust the

"quality" and variety of products to a desired level.

When it comes to which excise generates more revenues, either type of excise can be the appropriate instrument depending on the characteristics of the product consumed most widely and the structure of the industry.

Moreover, higher revenue targets are usually constrained by political economy considerations. Voter preferences are taken into account by elected officials as they wish to be re-elected. Achieving higher prices for all brands and reducing price differentials would improve the public health target and tax revenues. However, governments may hesitate to raise taxes on a widely consumed and inexpensive brand or tobacco products, and may try to preserve the price differential as much as possible. Governments will find it politically feasible to raise taxes on such brands gradually when health awareness improves and reaches all socioeconomic groups in the country. Thus, depending on individual country situation, gradual and transitional reforms can be undertaken.

There is no single rule where one size fits all. Governments may prefer one instrument over the other depending on industry characteristics, public choice issues, and the level of health awareness at the time. Consumer preferences gradually change as people become more informed of the health effects of the consumption of tobacco products and industry's advertising policies are banned, giving governments more leverage to raise taxes on all brands.

Given the evidence (see Annex Table 3), most developing and even developed countries still have great potential to raise tobacco excises. Only in a few low- and middle-income countries are cigarette excises are higher than 50% of the retail price. Indeed, only 4 out of the 45 low-income countries, 15 out of 58 lower-middle countries and 15 out of 43 upper-middle income countries tax cigarettes at a rate of 50% or higher. On the contrary, only 12 out of 48 high-income countries tax cigarettes at a rate less than 50%. On average, the total cigarette excise is 25% of the retail price for low-income countries, 31% for lower-middle countries, 41% for upper-middle countries, and 53% for higher income countries.

Studies show that choosing a excise tax that represents at least 70% of the retail price will make a difference with respect to lives saved (e.g. Ross et al, 2008, 2009). A 70% benchmark does seem to be a feasible target given that it has already been reached by a few countries around the globe, including some developing countries. A quick estimate of the average excise tax share of the most popular brand among the ten countries with the highest excise share, gives an average of about 74%.[19] Reaching the 70% standard, however, might involve different steps by different countries, and may depend on factors such as their starting point with respect to tax structure and tax rates. We turn to these issues in the next chapter.

[19] The countries are: Brunei Darussalam, Bulgaria, Cuba, Fiji, Mauritius, Myanmar, Poland, Seychelles, Slovakia and Venezuela (WHO GTCR, 2009).

Chapter III

TAX ADMINISTRATION

THERE ARE at least three reasons why governments impose or increase excise taxes on tobacco products: to raise revenue, to correct for externalities, and to discourage the use of tobacco products (McCarten and Stotsky, 1995; Warner *et.al*, 1995). In this chapter, we will focus on tax administration capacity and the key factors tax administrators should be aware of given these goals.

3.1 Tax Administration's Capacity

Tax administration should be effective in the sense of ensuring high compliance by taxpayers, and efficient in the sense that administrative costs are low relative to revenue collected. Good tax administration requires strong technical capacity by the administrative agency but also a well-designed tax. The administrative agency should be able to identify and evaluate the effects of both current tax policies and tax policies under consideration, be able to simplify the current tax system if needed, within the economic and political spectrum, be aware of any law changes and emerging avoidance practices, and maintain a connection between the rule of law and tax administration.

i. Identify and evaluate the effects of tobacco tax policies

When generating higher revenue or reducing tobacco use is the goal, the administrative agency should aim at increasing taxes on goods that have large sales volumes and few producers—hence making it easy to collect taxes, with inelastic demand, a low share of tax on retail prices, easy definability, and a lack of close substitutes. These goods provide a relatively sustainable and profitable revenue stream. Tobacco products have most, if not all, of these characteristics. We will discuss a number of features of tobacco products and the importance for government to evaluate their impact on tax revenues and consumption.

Price elasticity of tobacco products: Based on evidence from a growing number of countries, including Lower Middle Income Countries (LMICs), demand for tobacco products is inelastic (price elasticity is less than -1 in absolute value), with price elasticity ranging between -0.2 to -0.8 (with a few exceptions; see the summary in Annex Table 4). Consequently, an increase in taxes will result in a net gain in total tax revenues.[20]

Share of tax in retail price: As seen in Annex Table 3, the share of total tax in retail price varies between 8 percent and 89 percent among countries (WHO GTCR, 2009). The share of tax in retail price ensures revenue increases as long as the tax rate increase is far larger than the price increase it generates. That means, revenue increases would be ensured in many instances, even when the price elasticity is greater than -1 (in absolute value).

Table 6 below shows the percentage of increase in revenues under different price elasticity scenarios and different tax shares by income groups, as the excise tax per pack of cigarettes increases by 50%, 75% and 100%. It demonstrates that low and lower middle income countries could generate significant revenues if they increase their excises, even when demand for cigarettes becomes elastic in the near future. Note that estimations here do not take into account the impact of increases in per capita income on cigarette consumption and hence on revenues.

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

Table 6. Percentage increase in excise revenues under different price elasticity scenarios

	Total tax as % of retail price	Excise as % of retail price	As excise tax per pack increases by	% increase in excise revenue when the price elasticity of demand is equal to			
				-0.4	-0.6	-0.8	-1.0
Low Income Countries	40%	25%	50%	40%	35%	30%	25%
			75%	58%	49%	40%	31%
			100%	73%	60%	47%	33%
Low-Middle Income Countries	45%	30%	50%	38%	32%	26%	20%
			75%	54%	43%	33%	23%
			100%	68%	52%	36%	20%
Upper Middle and High Income Countries	56%	45%	50%	32%	23%	14%	5%
			75%	43%	28%	12%	-4%
			100%	52%	28%	4%	-20%
	65%	50%	50%	30%	26%	10%	0%
			75%	40%	22%	5%	-12%
			100%	47%	20%	-7%	-33%
High Income Countries	85%	70%	50%	22%	8%	-6%	-20%
			75%	18%	1%	-3%	-68%

Note: These calculations do not take into account brand substitution (cross price elasticities), income effects or illicit trade. VAT and retailers' margin (RM) are assumed to be 15% and 10% of retail price respectively.

Source: Authors' calculations using data from WHO GTCR 2009

Income effect: Empirical evidence from most low and middle income countries indicates that there is a positive relationship between demand for cigarettes and per capita income. When per capita income increases, consumers may increase their consumption or switch towards more expensive brands, and these would contribute positively to the revenue stream. However, data between 1990 and 2007 reveal that the relationship between income and cigarette consumption has been reversed in higher income countries. During this time, average real GDP per adult population (15 years old and up) increased by 19.5 percent worldwide, from US$6,848/adult to US$8,181/adult. At the same time global cigarette consumption per adult population decreased by 17 percent from 1,453 pieces to 1,208 pieces. Although higher income countries experienced a 26 to 27 percent increase in per adult income (GDP/adult), per adult

cigarette consumption declined by 35 percent in high income countries and 14 percent in upper middle income countries. Lower middle income countries experienced the highest increase in per adult income[21] (an increases of 121 percent), but consumption in these countries fell by only one percent, likely reflecting the impact of other tobacco control measures that about offset the effects of income increases on demand. The positive relationship between income and consumption is most evident in low income countries where average per adult income increased by 26 percent and cigarette consumption per adult increased by 24 percent, from 337 pieces in 1990 to 418 pieces in 2007 (IMF, 2009; ERC, 2008).

Despite reductions in global per capita consumption, evidence from a growing number of countries shows that the market share of premium brands has been increasing, suggesting that consumers are shifting their preferences towards higher-priced brands as income increases. For example, in recent years, gross domestic product (GDP) more than doubled in Viet Nam, while the market share of upscale foreign brands increased from 5 percent in 1998 to 20 percent in 2005. The retail prices of foreign brands ranged from $0.63 to $1.88/pack whereas lower grade brand prices ranged from $0.07 to $0.63/pack (Guindon et al., 2010).

In Russia, the market share of premium cigarette brands was the fastest growing segment of the cigarette market between 2004 and 2005, even in rural areas which have experienced strong economic growth accompanied by growing purchasing power (Ross et al., 2008). In Pakistan, a low income country, the share of premium brands is predicted to increase from 15 percent to 17% between 2006 and 2011, while mid-priced and economy brand shares are expected to decline from 85 percent to 83 percent during that time (Euromonitor, 2009). Similar trends are also observed in Turkey and Egypt. The price for Marlboro cigarettes in Egypt was EL 4.50/pack and its market share was 3.6 percent in 2001 (Euromonitor, 2009). In 2009, the price almost doubled to EL 8.50/pack while its market share increased to over 6 percent (MoF Egypt 2009). In Turkey, there are two to three fold differences in prices between premium

[21] Income divided by the adult population.

and economy brands. Despite this, the market share for the premium brands increased from 7.5 percent in 2001 to 18.4 percent in 2006 (Euromonitor, 2009), and 20 percent in 2008 (Yurekli et al., forthcoming). The market share for economy brands decreased from 59 percent in 2001 to 45.4 percent in 2006 (Euromonitor, 2009) and 41 percent in 2008 (Yurekli et al, forthcoming).

Overall impact of cigarette tax increases on consumption and tax revenue

Tax authorities should be aware of the market conditions and the factors affecting consumer purchasing behavior. From a revenue perspective, large volumes of sales help generate more revenues as excises increase, despite tax-induced reduction in sales. However, the positive relationship between income and tobacco consumption can level off the expected tax-induced reductions in sales, leading to higher revenues for the government but smaller reductions in consumption.

Designing the tax structure and determining the level of tax increase should be evaluated carefully by taking into account the price and income sensitivity of consumers, so that tax policy serves both public health and revenue objectives. As shown in Annex Table 3, the majority of countries have ample of room to increase their revenues as they increase taxes. However, a rule of thumb suggests that in order to achieve public health objectives by increasing prices and reducing consumption, increase in tobacco taxes should be higher than inflation and increases in income, so that the tobacco products become less affordable.

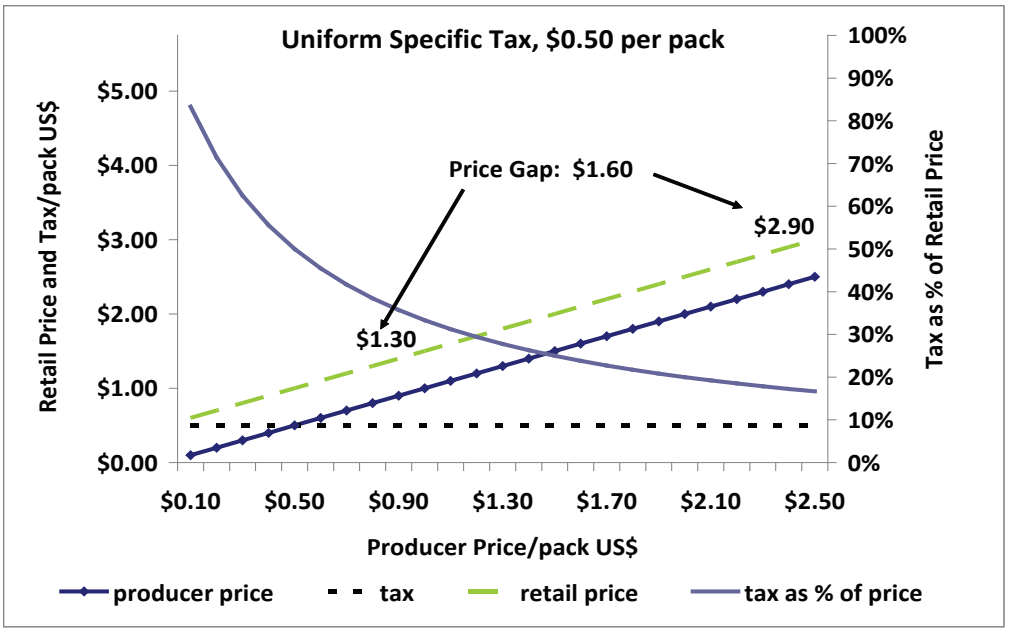
ii. Have a Well-Designed Tax Policy

A well-designed excise tax policy exhibits transparency and easy definability, increasing efficiency by reducing administrative costs.

A good candidate for a well-designed tax system is a simple and unified excise tax system with all tobacco products taxed at the same level. Such a system would be an ideal system for tax authorities with respect to generating more revenues while reducing cigarette consumption. A strong case

can be made for a uniform specific excise tax in terms of generating more revenues, by reducing non-compliance and unfavourable pricing strategies among producers, while reducing cigarette consumption by increasing average cigarette prices. Furthermore, a uniform specific excise reduces price gaps between brands and tobacco products, minimizing substitution behavior of consumers among brands and products. The impact of such a system on price gaps is illustrated in figure 6 for higher priced brands and lower priced brands. In this figure a uniform tax of 0.5$ per pack is considered. Figures 6 to 11 that follow also estimate the impact of different tax structures using comparable hypothetical assumptions (same distribution in the producer price). The price gap in a uniform specific tax seems the be the smallest compared with all other tax structures.

Figure 6 : Uniform specific tax and price gap between cigarettes



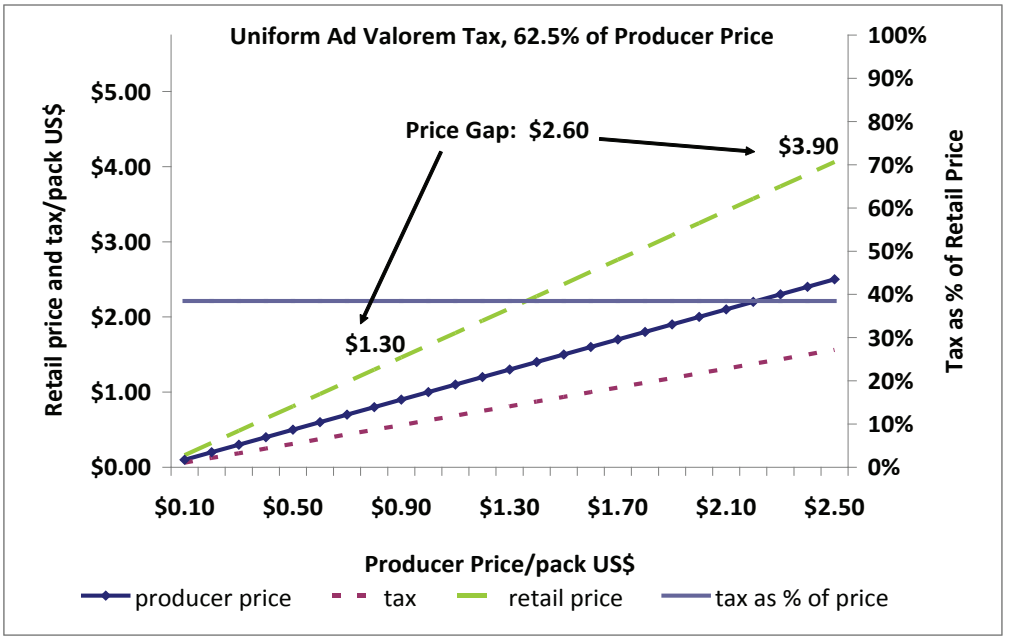
Reforming tax structures

As described in chapter 2, countries use different tax structures for their taxes on tobacco products. This section examines some of these structures, discusses the drawbacks and suggests possible next steps.

Uniform ad valorem tax structure

Under a uniform ad valorem excise system, as illustrated in Figure 7 for low priced brands and high priced brands, the resulting price gap between brands can be quite wide.

Figure 7: Uniform ad valorem tax and price gap between cigarettes



Tax system with a minimum specific excise floor

Large price gaps between high and low priced brands that result under an ad valorem tax structure also produce large gaps in the amount of tax collected on these brands. As a result, some governments have introduced a minimum specific excise floor (e.g. Russia, Ukraine, Turkey) to ensure higher revenues from brands in lower price bands, while levying either an ad valorem excise (e.g. Turkey) or a mixture of both excises (e.g. Russia and Ukraine) on higher-priced brands. These structures are illustrated in Figures 8 and 9 for low priced brand to high priced brand. In such a structure, the excise tax applied is either a mixture of both excises or only ad valorem, unless the associated tax payment is less than the specific minimum, in which case the minimum excise applies. A minimum specific excise ensures revenues from low priced brands while at the same time puts pressure on those brands to increase their prices. Prices for low priced cigarettes go up while higher taxes are paid for expensive cigarettes, ensuring higher revenues.

Figure 8: Mixed system with a minimum specific floor

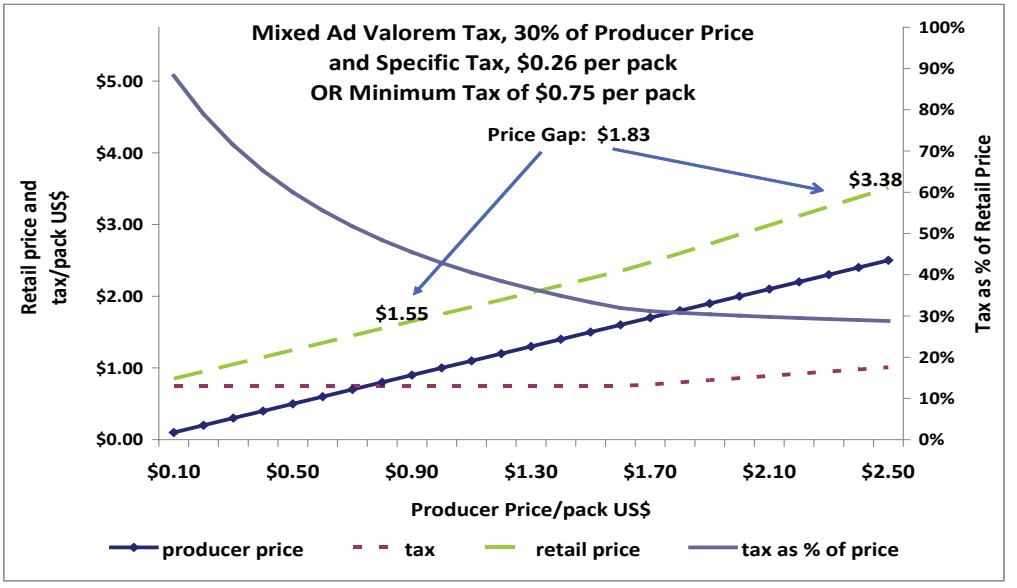
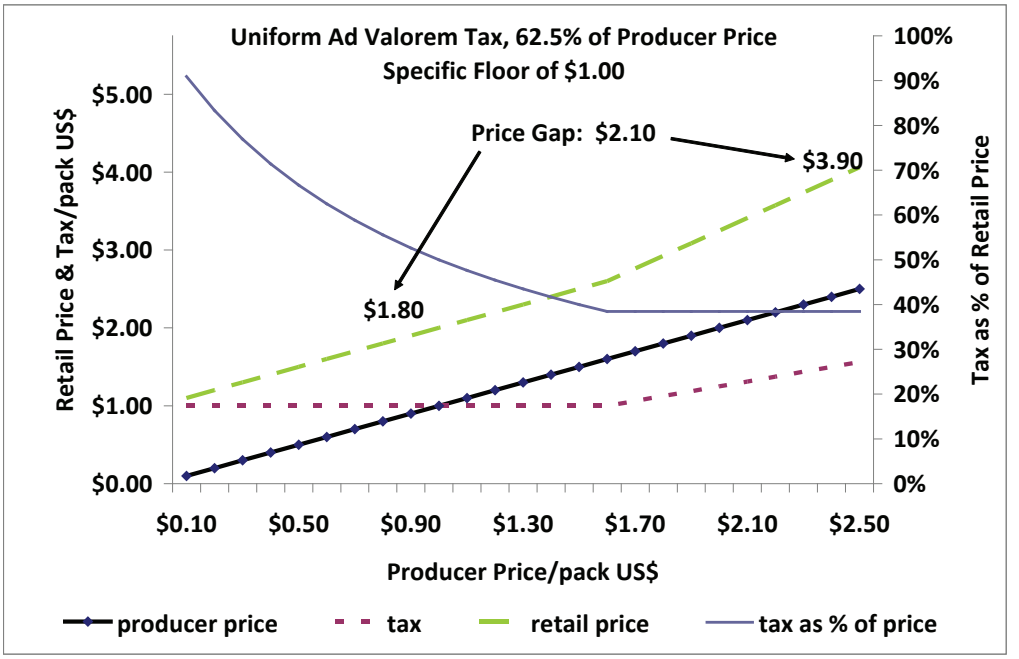


Figure 9: Ad valorem tax with a minimum specific floor



This tax structure, however, carries some drawbacks.

As the ad valorem excise increases, the revenue stream depends on the manufacturers' pricing decision. Depending on higher-priced brands' share in total tobacco excise revenues, any unexpected industry price reductions will jeopardize the expected revenues from higher ad valorem rates. For example, Turkey generates most of its revenues from mid-priced to premium brands that are subject to ad valorem taxes and its revenue stream depends on manufacturers' pricing decisions. At times, tax administrators negotiate with manufacturers to increase their prices in order to increase revenues. However, such negotiations do not always produce the desired results, leading to lower than anticipated revenues.

The cost of administering the ad valorem part of the tax system may increase in this process because of (i) negotiations with the manufacturers to increase their prices and (ii) monitoring for tax avoidance practices, as the corresponding price serving as the tax base is determined by the manufacturers. Russia is a good example. Prior to 2007, Russia levied an ad valorem tax on the wholesale price (ex-factory price exclusive of sales tax or VAT). Some manufacturers declared a very low wholesale price, but after the tax was levied, the wholesalers added their own price margins and shared the profit with the manufacturers (Ross et al, 2009). Since 2008, Russia levies an ad valorem excise based on the maximum retail price.

Suggested Next Steps: Given the existing evidence, a minimum specific floor system requires strong technical capacity, implies higher costs of administration, and higher likelihood of experiencing "unfavourable" pricing strategies and possible tax avoidance compared with a uniform specific excise system.

In order to avoid unexpected results and ensure revenue flows in the mid- to long term, the minimum specific floor system can be moved towards a uniform specific excise system by increasing the minimum specific floor tax relatively more than the ad valorem rate. The ad valorem rate in the meantime needs to be adjusted carefully so that current excise liabilities and the revenue stream of the premium and mid priced brands are not compromised.

Differential excise system

As mentioned in chapter 2, many countries, including large cigarette producing and consuming countries (e.g. Bangladesh, Brazil, China, Egypt, India, Indonesia, Pakistan, Philippines, and Ukraine), impose a differential excise tax system by levying different rates within and among tobacco products. One of the consequences of such differential tax systems can be even wider price gaps among brands, as illustrated in Figures 10 and 11, where a lower rate is applied to a low priced brand and a higher rate is applied to a higher priced brand.

Figure 10: Price gap in a differential excise system (specific)

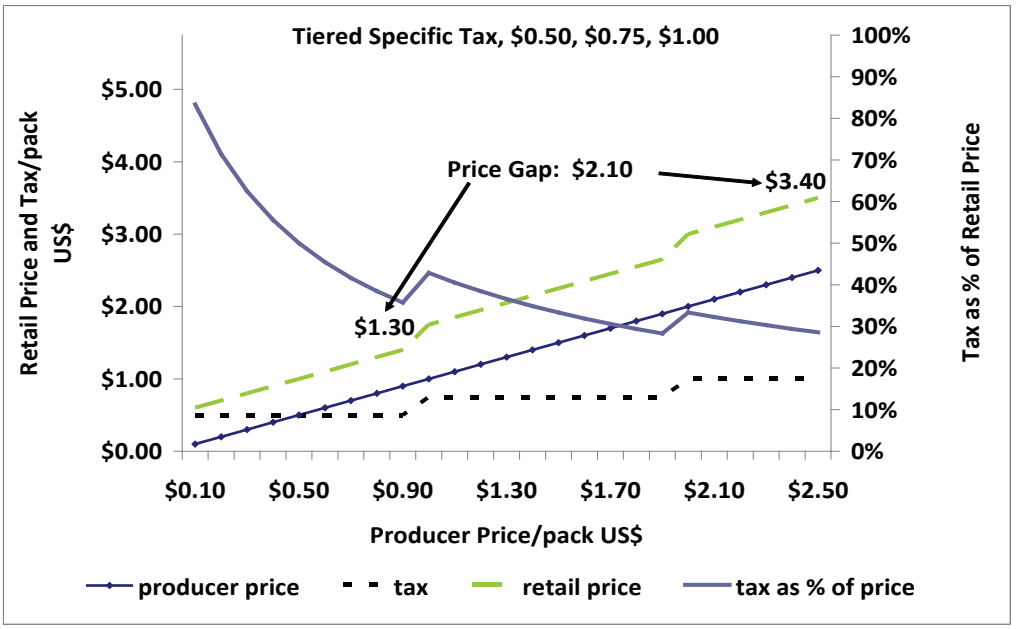
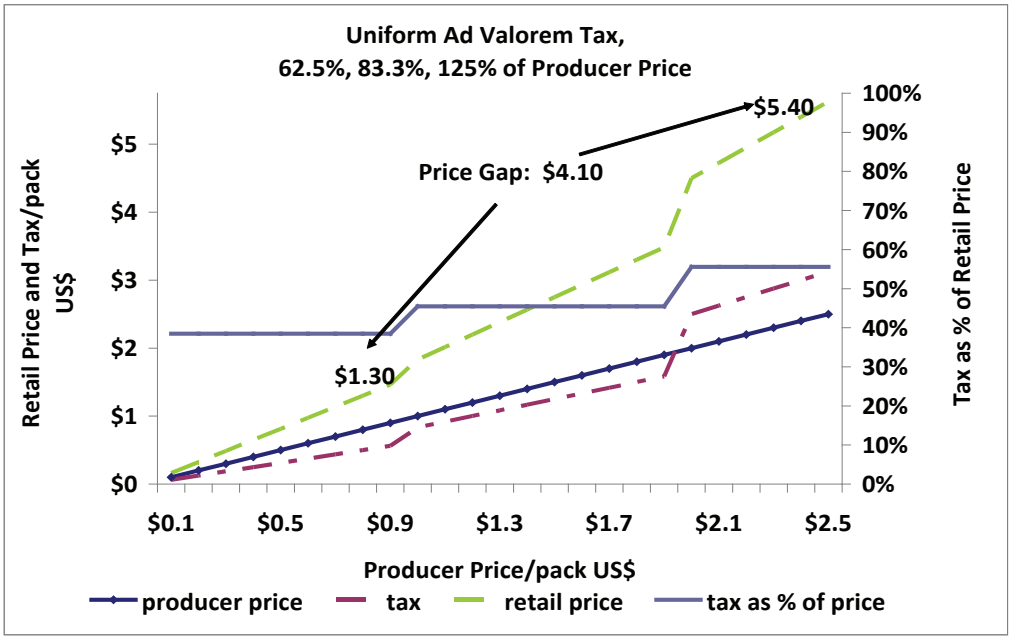


Figure 11: Price gap in a differential excise system (ad valorem)



Since a differential tax system is based on various product characteristics, it provides incentives for tax avoidance to the extent that manufacturers can alter their pricing or production decisions to avoid higher tax liabilities. For example, when the tax authorities in Turkey set up a differential excise system by imposing tax rates favouring brands with high oriental tobacco content, companies quickly adjusted the content of their brands and avoided the higher taxes. Actual revenues ended up well below expected revenues due to the product alteration. In 2009, the retail price of one of the premium brands in Egypt was reduced in order to avoid higher taxes, falling into the mid-level category on which a lower tax was applied. In Indonesia, the differential tax system favours companies with small production systems, and currently there exist about 4,500 small to mid scale companies producing white and kretek cigarettes. In order to eliminate such tax avoidance, the Indonesian government passed legislation banning the establishment of new small to mid-scale companies.

Suggested Next Steps: Governments may have various justifications for imposing a differential tax system, including a strong interest in protecting domestic producers by favouring small-scale producers over the larger ones or domestic producers over foreign companies. This is probably the case in China, Thailand, and Egypt, where the government owns the company or has a major share in it. However, differential tax systems increase the possibilities for undesirable tax minimization behavior via manufacturers' pricing policies and lead to revenue losses for governments.

In the short term, given economic and political realities, governments have at least two options before reaching a uniform specific excise system. They may: (1) reduce tiers gradually and have just one rate in the mid- to long term, and (2) if there is a wide gap between price bands, adopt a minimum specific floor similar to the EU system with a mixture of both excises, or with just an ad valorem tax, similar to the Turkish system, in the short term to reduce price gaps; finally, adopt a uniform specific excise in the long term.

iii. Ensure tax compliance for higher revenues

The strength of administration comes from the administrators' ability to monitor and strengthen tax compliance, and ensure higher revenues by reducing opportunities for tax evasion and tax avoidance.

The rationale for monitoring tax compliance derives from the primary goal of tax administration which is to "collect the taxes and duties payable in accordance with the law and to do this in such manner that will sustain confidence in the tax system and its administration. The actions of taxpayers—whether due to ignorance, carelessness, recklessness, or deliberate evasion—as well as weaknesses in a tax administration mean that instances of failure to comply with the law are inevitable. Therefore, tax administration should have in place strategies and structures to ensure that non-compliance with tax law is kept to a minimum" (CTPA, 2008).[22]

Tax authorities in many countries may implement the following compliance measures as they may be indicated in tax laws:

- Require producers, importers and exporters to register for tax purposes and get a license for production, distribution, and retail sales;
- Eliminate non-compliance by monitoring domestic production and trade activities by
  - Conducting physical control,
  - Requiring tax stamps on tobacco products, and
- Require tax payers (manufacturers, importers) to file tax returns and pay the tax liability within a specific period of time after the tobacco products leave the factories or before entering the country.

Monitoring production: Effective administration of excise taxes requires a well established integration between tax payers and the tax administration agency. In countries with well established tax collection systems, excise taxes are administered by relying on the taxpayer's registration, filing and payment of tax returns. Tax authorities, in return, carry out enforcement actions in

[22] Center for Tax Policy and Administration (2008). Forum on Tax Administration: Compliance subgroup. Final report. Monitoring taxpayers' compliance: A practical guide based on Revenue body experience. www.oecd.gov.

order to ensure the compliance by verification. The most common enforcement action is that tax administrators audit tax payers' account books periodically. In addition, some countries rely on relatively more costly enforcement methods in order to combat illicit activities and ensure higher revenues.

1. Conducting physical control: In general, in countries with poor administration systems, "enforced compliance" is carried out by imposing physical control over the production/ manufacturing process. Cost of physical control increases when the potential for fraud by excise officers is considered. However, fraud can be diminished significantly when excise officers are rotated frequently among different locations and supervisors make surprise visits. India and Georgia are good examples of countries that use intensive controls on tobacco manufacturing. In India, a tax administrator is placed around the clock in cigarette and large bidi-manufacturing facilities. Each officer records the daily production and the quantity of cigarettes/ bidis that leaves the factory and reports to the next officer (MoF India, 2009). In Georgia, the government strictly supervises the sale, transportation and storage of tobacco products (Euromonitor, 2008). The physical control system was also adopted by high-income countries in the past, where some used intensive physical controls on excisable goods (Sunley et al, 2000). For example, whiskey 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 house provided next door to the distillery, and no activity could take place without the officer being present to unlock the locks. Similarly, 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.

In order to reduce non-compliance, and control for illicit production and trade, most governments require manufacturers to affix tax stamps on tobac-

co products. In recent years, an increasing number of countries are choosing more costly measures by adopting new technologies for monitoring the production level directly.

2. Tax stamps: Tax stamps are required by many countries as a way of ensuring tax payers' compliance by monitoring production and distinguishing licit tobacco products from illicit ones. Products that don't carry tax stamps are considered to be illegally produced or smuggled. However, the application of tax stamps varies by countries. For example, tax stamps are required for brands produced by companies producing over 50 million pieces of cigarettes annually and their brands meet the national standards by Viet Nam, or hard packs of cigarettes first, then for all cigarettes, in Bangladesh (ERC, 2008). Uruguay do not require tax stamps on cigarettes sold in duty free shops located in border areas and in airports, but require orange stickers on them with the message "For sale only at duty free shops" in order to avoid their resale in the country (Euromonitor, 2008). Similarly, Serbia required a red stamp for locally manufactured brands, green for licensed brands and blue for imported brands (ERC, 2008).

   Cost of tax stamps: Companies pay the cost of tax stamps or banderoles at the time of purchase from the tax or other dedicated authorities. The value of each stamp is calculated differently, by piece of cigarette (e.g. Indonesia), cigar, cigarillo, per 1000 pieces (e.g. EU), or a pack of a number of cigarettes, and per kilogram for tobacco. The relatively low cost of stamps is paid by the manufacturers or distributors but this cost is shifted to consumers as a price increase. Initially some countries subsidized the cost (e.g. Viet Nam), but today manufacturers pay and shift the cost to consumers, increasing the retail price.

3. Enhanced-tax stamps (Banderoles): In recent years, some governments (e.g. Turkey and Brazil, State of California in USA) have adopted a new technology on tax stamps in order to reduce the risks of counterfeit tax stamps, monitor domestic producers more efficiently,

and increase the efficiency in information flow. The system requires manufacturers' compliance since monitoring scanners are placed at production facilities. Monitoring scanners read the tax stamps and electronically transfer the information to the Ministry of Finance. Consequently, the tax administration agency receives live information on how many packs of cigarettes are produced, in which factories, what the brands are, when the products are produced by which factories, and other useful information for tracking, tracing and enforcement. The system enables the tax administrators to verify manufacturers' compliance.

4. Digital tax stamps: Another alternative is a digital tax stamp. Similar to the banderole stamps, digital tax stamps provide an effective tracking and tracing system to reduce tax evasion. They carry information about the brand and manufacturer's name, the facility where the products are produced, the time the stamp was produced and purchased and so on, so that the product can be traced back to its source. The main difference between the two high tech stamps may be in the way they operate. With the banderoles, the Ministry of Finance gets all the necessary information live, as the cigarettes are being produced. The digital system on the other hand, requires distributors to place an order via a secure connection to a designated government authority. After the authority verifies and approves the order, the distributor fulfils the order by delivering encrypted codes and authorizing digital stamps. However, it is not clear how the authority verifies the order. It is the cigarette distributor that prints the digital stamps and then the cigarettes are shipped to retail outlets (Authentix, 2006).[23]

   Cost of advanced tax stamps: The banderole system is a more expensive system than a traditional tax stamp systems. A number of countries have been examining its adoption, including Phil-

[23] Presentation made by Authentix in 2006 at the FTA Technology Center, Albuquerque, New Mexico, August 14, 2006

ippines, Indonesia, Pakistan, Russia, and Ukraine, but cost has been an impediment to adoption and implementation. In Turkey, the total cost of the system is divided into a five year payment plan based on the production of the cigarettes and alcohol. For cigarettes, the cost is spread over the price of banderoles based on the quantity of cigarette production; this has increased the cost and raised the retail price by 6TL/1000 cigarettes (0.38% to 0.21% increase of the average retail price/pack for economy and premium brands respectively, in 2009) for five years. In Brazil, it was the duty of cigarette manufacturers to pay for the installation and maintenance of the system on each production line (1% to 1.6% of retail price/pack). For Philippines, the cost of implementing the system for the tobacco and alcohol industry will be borne by the tobacco and liquor companies.[24]

3.2 Other Tax Administration Issues

Payment of excises

The global application of tax payments is usually based on the manufacturers' declaration of their production level. The tax is paid within a minimum of 15 to a maximum of 30 days after cigarettes leave the factories, as is the case in Turkey, Pakistan, Egypt, and the EU. In Turkey, manufacturers pay excise tax revenues on the 15th day of each month for the last month's excise sales. In Egypt, it is on the 30th of each month that the revenues are paid.

Tax credit or refund

The manufacturers file requests to tax authorities for tax refunds or credits for either unused or damaged banderols, or tobacco products returned unsold to the manufacturers. These credits or refunds are granted after the tax authorities verify these requests, with credit often extended for the costs of tax stamps or banderols.

[24] The Manila Times, 11 May 2009 *Link:* http://tiny.cc/cngKE

Floor-stock tax

When the manufacturers, wholesalers or the retailers expect a tax increase, they may stock a number of cigarettes to take advantage of the current, lower tax level. If the excise is levied at the manufacturing stage, and the manufacturers declare the production before the new tax becomes effective, then these products may be subject to the old tax, which is often the case by law (Sunley et al., 2000). In order to eliminate this possibility, and its corresponding tax avoidance, the tax law may be changed to enable tax administrators to collect the new tax for the cigarettes that were produced, and kept in stock, before the new tax became effective. Collecting new taxes on cigarettes that are stocked at the manufacturing or wholesale stage could be easy and efficient, but this is often not the case at the retailer level. From an efficiency standpoint, the law can specify that a floor tax can be imposed when the stocks are at a "certain level" and the increase in tax rate is significant. In that case, the tax loss can be covered and higher prices are ensured for those products.

3.3 Summary

Strong tax administration is a requisite for ensuring high compliance effectively and administering tax policies efficiently. Good tax administration requires strong technical capacity supported by a well-designed tax. Given the low price elasticity and low share of excises in retail prices, countries still have room to increase their excises in order to increase revenues while reducing tobacco consumption. However, administrative agencies should be aware of the market conditions and the factors affecting tobacco sales and hence their impact on the revenue stream. These factors should be taken into consideration when a tax policy is designed so that both public health and revenue objectives are achieved. It is a rule of thumb that tax should increase more than the inflation rate and the increases in per capita income level. That would reduce the affordability of cigarettes by increasing retail prices while achieving higher revenues.

A simple and unified specific excise system can be considered a well-designed tax policy in terms of ensuring transparency, easy definability and increasing tax administrations' efficiency. Although countries levy different excise taxes, given economic and political feasibilities, excise systems can be simplified in the short-term and may move towards a unified specific system in the mid to long term.

Compliance with the tax system can be ensured in various ways, including adopting a state of the art monitoring, tracking and tracing system, supported by an increased number of enforcement officers/investigators on the ground. Governments should evaluate these systems based on their needs. Existing evidence suggests that old tax stamps are less effective in deterring illicit or counterfeit cigarette production and trade, but are better than having no tax stamps. New technologies are emerging that provide better enforcement tools for governments. Evidence shows that the banderole system helped Brazil detect illicit production of domestic cigarettes and generated an additional US$100 million tobacco in excise tax revenue in 2008 (MoF Brazil, 2009). In 2007, the California tax collection agency estimated that annual cigarette tax evasion dropped by 37 percent (from $292 million to $182 million), generating an additional US$110 million in cigarette tax revenue due to increased enforcement and the new high-tech tax stamps (banderole)[25]. Such experiences suggest that the costs of adopting and implementing a new technology can generate more than enough revenues to pay for itself in the revenues collected on products that would have otherwise not been tax-paid.

New technologies should be viewed as tools to enhance enforcement and reduce the size of the illicit market. In order to reduce tax evasion and tax avoidance, governments still need to implement other effective measures including employing more enforcement officers supported by strong laws. In Brazil, despite their success in reducing illicit domestic production, illegal trade via Uruguay is an ongoing problem that both governments are trying to resolve. In Malaysia, the illegal market for cigarettes accounted for 25 percent

[25] California State Board of Equalization (27/06/2007) www.boe.ca.gov/news/newsroom07.htm

of the volume of the legal market in 2004. It declined 10 percentage points in 2005, despite a cigarette price increase. Although Malaysia used technologically advanced tax stamps, strong measures taken by the Malaysian government to control the illegal market were believed to be behind the decline in the size of the illegal cigarette market (ERC, 2008). Similarly, the UK achieved a significant reduction in the illicit market by imposing strong measures and investing in enforcement officers on the ground (Johnson, 2009). These measures will be discussed further in the next chapter.

New technologies are necessary but not sufficient to minimize noncompliance. Governments with effective tax administration systems also regularly apply other enforcement measures and require producers to keep records (e.g. inputs, stocks, banderoles, shipments) that are periodically inspected by the tax authority.

Chapter IV

THE POLITICAL ECONOMY OF TOBACCO TAXATION

EXCISE TAXES are an effective tool for generating higher revenues. In recent years, in addition to satisfying revenue needs, an increasing number of governments have used tobacco tax increases in order to reduce the health and economic burden of tobacco use. Studies have shown that tobacco taxes are the most cost effective way to reduce tobacco consumption. Implementation of a package of price and non-price policies (e.g. banning smoking in public places, banning advertising etc.) is also highly cost-effective (World Health Report 2002, Jha et al. 2006a, Asaria et al. 2007).

However, with respect to the decision to increase tobacco taxes, political considerations have to be taken into account. Such considerations include, but they are not limited to, concerns about the expected impact of a tax increase on: tax evasion (smuggling) and tax avoidance; employment; inflation; affordability of cigarettes and other tobacco products, especially for low income smokers: and the relative prices of foreign and domestic brands. Furthermore, in some countries, a culture of negotiated tax increases has developed between some governments and manufacturers. Manufacturers' responses to tax increases affect governments' expected revenues. Crucial to the success

of the tobacco tax policy is an understanding of the political and economic environment in each country.

4.1 Tobacco taxation and public health benefits

Growing evidence clearly shows that as taxes on tobacco products increase, a significant number of premature deaths will be averted as youth are deterred from taking up tobacco use and adult users quit, leading to substantial reductions in the health and economic burden caused by tobacco use.

In India, for example, nearly one million people are expected to die prematurely from a disease caused by smoking by the early 2010s; these include deaths from causes such as heart disease, cancer, respiratory diseases and tuberculosis. Taxes on cigarettes are low in India, while taxes on bidis have historically been close to zero. Significantly increasing these taxes would dramatically reduce the prevalence of tobacco smoking and the death and disease it causes, while at the same time raising substantial government revenues. Research shows that a 10% increase in cigarette prices would reduce cigarette consumption by 3.4% in rural India, while a 10% rise in bidi prices would reduce consumption by 9.2% and 8.5% in rural and urban India, respectively. These price increases would translate to a 1.7% and 11.7% decrease in youth cigarette and bidi smoking prevalence, respectively (John et al., forthcoming).

In terms of the health impact, a price increase of 52.8% on bidis through increased taxes would avert about 4.6 million premature deaths among current bidi smokers, while a cigarette price increase of 153% through increased taxes would avert an additional 2 million premature deaths among current cigarette smokers. In addition, by deterring the current cohort of Indian youth from initiating smoking, these price increases would prevent an additional 1.6 million premature deaths caused by cigarette smoking and 10.9 million premature deaths caused by bidi smoking. The impact of these higher taxes on employment is not expected to be significant, given India's growing economy and an expected slow reduction of tobacco-related jobs concurrent with increases in jobs in other sectors as funds once spent on tobacco are

spent on other goods and services (John et al., forthcoming).

In Russia, the tax increase based on the prospective tobacco excise law could avert up to 80,000 deaths (about 0.4 percent of the expected tobacco-related mortality in this cohort). However the number of smokers would be reduced only marginally. If Russia chooses to raise tobacco taxes so that they account for 70 percent of the retail price, up to 2.7 million tobacco-related deaths among the current Russian population could be avoided. This would reduce tobacco-related mortality up to 12 percent with an even greater impact possible in the long run. At the same time, the government would collect an additional RUB 153 billion (US$6 billion) in excise tax revenue per year. (Ross et al, 2008).

In Ukraine, a relatively small tax increase that raises the tax to 50 percent of the retail price could reduce the number of smokers by up to 500,000, avert 253,000 deaths (about 3.1 percent of the expected tobacco-related mortality in this cohort), and annually generate about UAH 1.4 billion (US$ 281 million) in additional excise revenues. If Ukraine were to raise tobacco taxes to 70% of the retail price, the number of smokers would decline by almost two million, and about one million tobacco-related deaths would be avoided in this cohort, reducing tobacco-related mortality by 12 percent. At the same time, the government would collect an additional UAH 4.2 billion (US$ 860 million) in excise tax revenue each year. Taxes in Ukraine are low compared to neighbouring countries, creating an incentive for smuggling duty-paid cigarettes out of the country. Therefore, a tax increase in Ukraine would reduce incentives for illicit cigarette trade and reduce duty-paid sales. However, even if all illegal cigarette exports are eliminated, tax revenue would still increase by UAH 2.6 billion to 3.6 billion (US$ 539 million to US$ 727 million), an increase of about 150 to 200 percent (Ross et al., 2009).

One has to recognize the highly political nature of tobacco control in general, and tobacco taxation in particular, as well as the complex vested interests concerned. Although the exact nature and extent of each actor and their interests may be unique in each country, there are some widely used arguments used to oppose tax increases. These include concerns about the effect

of tax increases on tax avoidance activities, smuggling, inflation, employment, poverty and protection of national industry. We turn to these issues now.

4.2 Tax avoidance and tax evasion

One of the challenges tax administrators face is how to sustain the revenue base and flow, especially after a tax increase. The level of expected tax revenues depends on limiting opportunities for tax avoidance and tax evasion, trends in consumption, adoption of other tobacco control policies, and industry responses to tax increases. Tax avoidance and tax evasion can make tobacco products more affordable and more widely available and accessible, especially for youth and low income smokers. Such activities undermine the health impact of higher tobacco taxes and other tobacco control efforts.

Given the structure of the excise tax system and enforcement process, taxpayers are faced with opportunities to reduce their tax payments. Any changes in the tax system will induce different behavioural responses. For example, an increase in tobacco excises may create an incentive to engage in tax avoidance and tax evasion activities by both manufacturers and individuals, depending on enabling environments (e.g. weak law enforcement and long judicial procedures, corruption and weak governance) while encouraging some smokers to reduce consumption (or discouraging others to take it up).

Tax evasion should be distinguished from tax avoidance; tax avoidance is legal, it is a change in economic or other activity, possibly at some cost, in order to reduce tax payments. Tax evasion, however, involves illegal activities to completely avoid tax payments.

There is a private cost to taking advantage of opportunities that reduce tax payments. This cost may take the form of a change in consumption or purchase behavior, an increasing probability of detection and penalty for evasion, and the real resource costs of effecting avoidance and/or concealing evasion. These costs depend on government policies that can be costly to implement, such as administration and enforcement policies, but also on the setting of tax rates and tax bases.

4.2.1 Tax avoidance

Tax avoidance by consumers involves legal activities such as purchases for personal consumption from a lower-tax jurisdictions or duty-free shops. For example, smokers living in high tax jurisdictions may legally engage in cross-border shopping in neighbouring low-tax jurisdictions, as happens in the US, the EU, and other countries with significant population near borders (e.g. CIS countries, and in Latin America, especially between Brazil and Paraguay (Ramos, 2009)). In some countries, people may also buy cigarettes directly from other types of vendors such as native reservations where some taxes are not applied.

The extent of cross border shopping and/or other tax avoidance activities by individuals can be significant in some countries—for example, in Luxembourg, because of its low taxes and its proximity to large populations in higher tax countries. In practice, however, it is unlikely that individuals will travel long distances at high cost just to buy cigarettes and save a modest amount of money.

The sale of duty-free tobacco products makes cheaper tobacco products more readily available for consumption. This defeats the health purpose of taxation and harms public health by encouraging personal consumption. The WHO FCTC calls for a ban (or restriction) on the sale and import by international travellers of tax and duty-free tobacco products, in order to increase the effectiveness of tobacco taxation in reducing consumption. Eliminating duty free sales of tobacco products will reduce opportunities for tax avoidance. There is growing evidence of government and international actions to ban duty free sales (FCA, 2009). Duty free tobacco product sales have been banned since 1999 to individuals travelling within the EU; banned altogether in Romania (2010); and banned by Bulgaria at land borders with non-EU countries. They were also recently banned altogether in Nepal (2008). Since 2001 Canada has imposed a federal tax on tobacco products sold in duty free stores (Canadian Cancer Society, 2010).

Just as duty-free tobacco product sales encourage consumption, so do allowances for arriving travellers to bring in tobacco products duty-free and/or tax-free. Although many countries still have a duty-free import allowance of 200 cigarettes (or similar amount for other products), and sometimes even higher, an increasing number of governments are eliminating or reducing the duty-free allowance for arriving travellers. For example, in February 2010, the Hong Kong Special Administrative Region Government announced, "as a means to further protect public health," a reduction in the limit to 19 cigarettes, meaning duty would be required for an unopened package of 20 cigarettes (Hong Kong SAR Government, 2010). Countries like Barbados, Singapore and Sri Lanka do not permit any duty-free allowances for cigarettes. In some EU countries duty-free import allowance is restricted to 40 cigarettes (Bulgaria, Greece, Hungary, Lithuania, Poland Romania and Slovakia).[26] The amount is restricted to 80 cigarettes in Guatemala (Canadian Cancer Society, 2010; European Commission 2009.)

Tax avoidance by manufacturers is less explored in the literature although it does take place worldwide. It involves legal activities such as changing the characteristic of the product, the package, the size of the production plan and the pricing policy. For example, under specific taxation, manufacturers can manipulate the length of the cigarette or the size of the pack to reduce tax payment. In some developing countries where multi-tiered tax systems are in place, we observe various industry responses. In countries where the tier classification is based on price level, for example, Egypt, Pakistan, Philippines, we observe that prices of the brands tend to cluster near the top of each tier. To avoid a higher tax, producers choose a different pricing policy to avoid a tax higher than the one they might face in the presence of a single tax rate.

Some countries apply excise rates that vary with the type of the product and/or the level of production. For example, in Indonesia the tax rates vary by both the type of the product and the level of production. As lower rates

[26] Applies in those countries (except for Romania) only for arrivals by land or sea (but not air) from non-EU countries (duty-free sales within the EU are banned

apply for lower levels of production, manufacturers can avoid higher taxes by establishing a few smaller companies instead of a large production plant. Tiered tax rates by production scale allow firms to avoid paying the highest tax, increasing profit margins while reducing selling prices. When the tax rate depends on the type of product, manufacturers may re-classify their product so that they are taxed at a lower rate as seen recently in the United States where roll-your-own taxes increased significantly compared to pipe tobacco taxes, leading to the repackaging of roll-your-own tobacco as pipe tobacco. In general, under differential taxation, there may be many ways to avoid tax. To eliminate tax avoidance, achieving higher revenues and a larger health impact in the process, governments need to close such loopholes in the tax law.

The degree and form of tax avoidance is of concern for several reasons. It constrains government's ability to raise revenue and control consumption through taxation. Tax avoidance affects estimates of the level of smoking and price responsiveness when the analysis is based on sales data that are collected from country cigarette tax receipts. As a tax rate increases, both taxed consumption and avoidance activities change. Any estimate of the effect of tax on consumption will be overstated if it fails to account for the triggered change in avoidance activities.

Governments need to prevent tax avoidance or at least control it. To do this, they must frame tax rules so as to minimize opportunities for avoidance. In practice, as governments amend legislation to close loopholes, tax advisers look for new loopholes in the amended rules. Such loopholes are more likely to arise when the tax structure is overly complex, as is the case in many developing countries. Simplifying the tax structure will help reduce opportunities for tax avoidance as well as monitoring costs per unit of revenue raised.

4.2.2 Tax evasion

Tax evasion usually involves taxpayers deliberately misrepresenting or concealing their true economic activities to the tax authorities in order to reduce their tax liability. For example, importers may evade customs duties and manufacturers may evade domestic consumption taxes by under-invoicing or

mis-declaration of the quantity or description of the product. When the duty is ad valorem, under-invoicing will reduce the tax base; when the duty is specific, mis-declaration of quantity is more relevant.

Tax evasion involves both illicit trade and illicit production. It may involve genuine products or counterfeit. Smuggling is the trade of products through unauthorized routes. It implies total or substantial evasion of customs duties and excises, as well as income taxes. It can be long-distance, large-scale organized smuggling or cross-border smuggling. Large-scale smuggling occurs when large quantities of tobacco products are illegally transported, distributed and sold without paying any tax at all, even in the country of origin. During transport, export goods have in-transit status in which the goods can leave the country of export without being assessed any taxes or duties. In-transit goods are often temporarily stored in a country other than their final destination as they await onward transfer. Large-scale smugglers often divert cargo at this point. What gives rise to long-distance smuggling are the huge value differences between export prices of major cigarette producing countries and the retail price of legal cigarettes. Because taxes on cigarettes account for a large share of their price—relatively to other products (70-80% in the EU, 50-66% in some low and middle income countries)—and because tobacco products are relatively light, they are especially appealing to smugglers.

Smugglers and legal traders may not always be two distinct groups. Smugglers could be distributors camouflaging their smuggling with legal imports and reducing the costs of their legal imports with contraband (Fausti, 1999; Thursby and Thursby, 2000). Major tobacco multinationals have been the subject of several legal cases worldwide to determine the extent of their involvement: they were accused of supplying the smuggled cigarettes or at least being aware of their illegal destination.[27]

There is some evidence that the availability of duty-free sales of tobacco products has facilitated illicit trade in tobacco products in many countries. The evidence includes government statements, internal tobacco industry

[27] See, for example, http://www.ash.org.uk/smuggling/ or http://www.public-i.org/

documents (an admission from British American Tobacco) and other reports on the issue. (British American Tobacco, 2009; Collin et al., 2004; WHO 2009a; Canadian Cancer Society, 2010). Cigarettes marked for duty-free sales may end up as contraband, often diverted into illegal distribution channels prior to even reaching duty-free stores.

Reports from customs officials in countries have outlined the link between duty-free and illicit trade. For example, according to the Organized Crime and Corruption Reporting Project (OCCRP) (2008)—a watchdog on organized crime and corruption in Eastern Europe and Eurasia—in July 2008, police officials in Romania stated that half of all cigarettes smuggled into the country pass through duty-free shops on the border. The Center for the Study of Democracy—an interdisciplinary public policy institute dedicated to the values of democracy and market economy—published in 2007 a short paper recognizing the link between duty-free shops and increased smuggling in cigarettes in Bulgaria. Bulgaria (except at the airport) and Romania have since banned duty-free tobacco product sales, and reduced the duty-free import limit (for travellers from non-EU countries) from 200 to 40 cigarettes in order to combat illicit trade (Sofia News Agency, 2010; Mediafax, 2010).

Several approaches have been used to obtain estimates of the extent of tobacco smuggling, including relying on expert opinion, monitoring tobacco trade, comparing tobacco sales with total consumption estimated from survey data and econometric modeling of the determinants of aggregate sales data (Merriman et al, 2000). Joossens et al. (2009) review a variety of estimates and conclude that 11.6% of global cigarette market was illicit in or around 2007. A KPMG study, commissioned by the European Commission, estimated that in 2004 illicit trade represented approximately 8-9% of the EU-25 tobacco market (Joossens et al., 2009).

With regards to econometric studies, there is no existing work on cigarette large-scale smuggling in Europe and only one of bootlegging[28]

[28] Bootlegging involves the purchase, by individuals or small groups, of tobacco products in low tax jurisdictions, in amounts that exceed customs limits, for resale untaxed in high tax jurisdictions (Joossens et al., 2009).

(Merriman et al., 2000). Most of the evidence comes from North America (Baltagi and Levin, 1986, 1992; Thursby and Thursby, 1991; Galbraith and Kaiserman, 1997). Yurekli and Zhang (2000) reveal significant long distance smuggling in the cigarette market and its importance as a source of revenue lost. Worldwide, it is estimated that in 1995 approximately 6% of total tobacco products sold were smuggled through diversion of untaxed exports from legal to illegal channels (Merriman et al., 2000). Yurekli and Sayginsoy (2010) estimate that 3.4% of global cigarette consumption in 1999 was smuggled.

To evaluate the size of the informal tobacco sector, let alone its composition, is difficult, especially as it evolves over time. In 2000/01 in the UK, most illicit cigarettes were genuine, locally manufactured products, exported to continental Europe and then smuggled back to the UK. In 2002 and 2003, leading UK tobacco manufacturers signed the Memoranda of Understanding under which they agreed to control the supply chain. These agreements were voluntary and non-binding, and as such their effectiveness depended on the manufacturer's goodwill. In 2006, the UK introduced changes in its legislation, setting high penalty payments. As a result of these measures, smuggling of UK genuine brands was reduced. However, this type of smuggling was replaced by smuggling of counterfeit and cheap non-UK brands. Looking at other tobacco products, smuggling in hand rolling tobacco (HRT) remained a serious problem: more than half of HRT consumed in the UK is illegal (ASH, 2009). There is still scope for improving the supply chain control.

Illicit production may involve production of genuine brands by legal manufacturers who declare only a fraction of their production to the tax authorities. This form of tax evasion is prevalent among large cigarette producing countries such as Egypt, India (Bidis), Indonesia, Russia, Pakistan and Philippines. It may involve production of counterfeit products by illegal domestic manufacturers. This occurs in, for example, Russia and South East Asia, with most of the counterfeit cigarettes coming from China. In 2007, three reports concerning the discovery of illegal plants for cigarette production in Austria, the Czech Republic, and Slovakia were submitted to the World Customs Organization (WCO, 2007). Strengthening cooperation, exchange of necessary

information. and granting greater investigative powers to Customs services may result in dismantling of more illegal manufacturing lines.

It is usually the size and composition of seizures that give us an idea of the composition of the illicit market. However, seizures may not be representative of the illicit market as a whole. Moreover, making comparisons across countries on the basis of seizures is not meaningful, as, for example, customs investigative techniques, reporting procedures and law enforcement differ.

The presence of an illicit market, especially if it is of a considerable size, has an impact on both consumption and tax revenues. If smuggled cigarettes account for a high fraction of the total market, the average price of all cigarettes will fall, leading to an increase in consumption. As illicit tobacco products become more available, their share in individual consumption will increase and the average price paid by smokers will decrease. Apart from affecting consumption by current smokers, the price decrease affects potential future smokers, as individuals are more likely to take up smoking the lower the price. Evidence shows that those who buy illicit tobacco products are more likely to be young and belong to semi-skilled and unskilled occupation groups, as these groups are found to be more price sensitive (West, 2008). As a result, higher consumption will contribute to higher mortality from smoking-related diseases.

High tax increases may provide financial incentives for smuggling, especially when enforcement and tax laws are weak, penalties are small, and it takes a long time to prosecute smugglers. Literature does not provide clear cut results on the effect of commodity tax increase on total sales and tax evasion, in noncompetitive environments (e.g. Thursby et al, 1991; Thursby and Thursby, 2000) or on the relative effects of specific and ad valorem taxes (Delipalla, 2009a, 2009b). It is clear, however, that an increase in penalties or detection probability has a clear negative effect on tax evasion. In practice, corruption often renders control of evasion difficult. Moreover, as corruption reduces the expected cost of smuggling, it encourages it. Some governments have resorted to privatization of tax enforcement to enhance efficiency of the tax system, the assumption being that leakage of revenue will be smaller

under a privatized regime. In Bangladesh, for example, a part of Customs administration was privatized as early as 1991.

Governments should require identifying information to be included on all tobacco products produced domestically so as to facilitate tracking and tracing of these products through the distribution process and should work with others in the region to adopt similar requirements. This information would be highly useful in enforcement efforts, and allow Customs to identify illicit products more easily and to identify those higher up in the distribution chain that are responsible. Severe administrative penalties should be imposed on those caught engaging in illicit trade so as to significantly increase the swiftness and severity of these penalties, making them a greater deterrent.

Moreover, measures of the extent of illicit tobacco product availability and pricing should be incorporated into a broader industry surveillance system in each country. Reliable measures would reduce Customs authorities' reliance on the tobacco industry for estimates of the extent of illegal trade in their country.

Spain provides a good example of effective measures to control the supply of smuggled tobacco. Investments in strengthening intelligence, increasing customs activity in border areas, and developing international collaborations targeting smuggling rose from €4 million in 1993/94 to almost €40 million in the period 1996-2000 (Joossens and Raw, 2008). As a result, the market share of smuggled cigarettes fell from 16% to 2%, and tax revenues increased from €2300 million to €5200 million, equivalent to €68 in tax revenue for every €1 spent on anti-smuggling measures (ASH, 2009).

In 2000, the European Commission (EC) took a number of tobacco companies to court accusing them, among other things, of smuggling. In 2001, ten European countries led by Italy joined the lawsuit. In 2004, the case against Phillip Morris International (PMI) was dropped as PMI agreed to pay the EC $1 billion over 12 years and to control future smuggling of its brands. PMI developed a special tracking and tracing system and marked 200 million master cases with unique codes. Italy's illicit trade in cigarettes fell from 15% in the 1990s to 1-2% in 2006 (Joossens and Raw, 2008). Since 2008, PMI introduced

tracking and tracing at the carton level in Eastern Europe. Japan Tobacco International (JTI) signed a similar agreement in 2007. In 2009, the UK joined in signing anti-smuggling agreements.

Recognizing the importance of strong international cooperation to eliminate illicit trade in tobacco products, the Parties to the WHO Framework Convention on Tobacco Control (WHO FCTC) created a negotiating body to develop a protocol on illicit trade in tobacco products. Negotiations started in February 2008 and are ongoing. A draft of the text of the protocol will be presented at the fourth session of Conference of the Parties to the WHO FCTC in November 2010 for their consideration. The current draft of the protocol includes provisions to control the tobacco supply chain, measures to define offences and set sanctions, measures to facilitate international cooperation and data sharing and institutional measures with regards to the Protocol itself. The main elements of the tobacco supply chain section are:[29]

- Licensing (required for all engaged in manufacturing of tobacco products but also in manufacturing equipment, commercial activities, transportation and primary processing of tobacco products)
- Customer identification and verification (due diligence)
- Tracking and tracing (affixing secure and non-removable markings on tobacco products and manufacturing equipment used in the manufacturing of local and imported tobacco products)
- Record-keeping (of activities of those engaged in the commercial sale of tobacco or in the manufacture, sale, distribution, storage, shipment, import or export of tobacco products or manufacturing equipment used in the manufacture of tobacco products)
- Security and preventive measures (to ensure compliance with regulation)
- Banning or ensuring compliance to obligations of the Protocol in the internet and other telecommunication-based modes of sale

[29] Source: http://www.who.int/fctc/inb/en/

- Limiting, licensing or prohibiting tobacco in free-trade areas and for duty-free sales (major sources of illicit tobacco trade).[30]

Although all forms of tax avoidance and tax evasion may affect revenues and tobacco control, policy makers need to know their absolute and relative importance when deciding whether and how to allocate resources to prevent them. For example, when both border crossing and large scale smuggling is present, border crossing might be considered less harmful than smuggling because, although it encourages consumption, causes unnecessary transportation costs, and shifts tax revenues between governments, it is legal if the quantities purchased fall below specified limits. Smuggling, in contrast, is illegal and, apart from encouraging smoking, it may direct revenue to criminal organizations and generate costs associated with violence or law enforcement.

4.3 Protecting Domestic Brands

Until the mid-1990s, governments in many countries were the sole producers of a variety of products including tobacco products. One of the main reasons for government's involvement was to provide affordable products for mass population. Today, with the exception of a few countries, government owned tobacco industries have been privatized. China, Thailand, Egypt (52% still owned by the government), Viet Nam, Japan (less than 49%), Moldova, and Iran still maintain full or partial control of tobacco manufacturing and distribution. Historically, cigarettes produced by government owned companies have been priced much lower and used lower grades of tobacco than foreign brands.

Currently, governments that impose a differential excise system often levy higher taxes on premium or high price brands, often produced by foreign manufacturers, than they do on lower grade, lower priced brands that

[30] A recent study demonstrates that the benefits from implementing the protocol in the UK are highly likely to exceed the costs (ASH, 2009).

are often produced domestically. As taxes increase, premium and high-price brands are expected to generate more stable revenue than the other price bands due to their less price sensitive consumption base. High income smokers are more likely to smoke premium, high price brands and are less responsive to price than are smokers in lower income groups. Given their market share and the high taxes that are applied to them, premium brands generate a relatively high share of total tobacco tax revenues in various countries, as shown in Table 7.

Table 7: Excise revenue by price band, share in tobacco excise revenues and sales, 2008

	PAKISTAN			EGYPT			TURKEY		
	Excise Mil. Rs	Share* in Excise Rev. %	Share in Sales %	GST Mil. LE	Share* in GST Rev. %	Share in Sales (%)	Excise Mil. TL	Share* in excise Rev %	Share in Sales %
Premium	11,231	29	10	832	12.2	6.6	3,129	28	20
Mid price	24,266	63	79	990	14.6	14.5	4,396	40	40
Economy	2,744	7	10	4,983	73.2	78.9	3,591	32	41
Total		100	100		100	100		100	100

Note: *Share in tobacco excise revenue.

Sources: Authors' calculations using data from MoF Egypt (2009), FBR Pakistan (2009) and Yurekli et al. (forthcoming)

Governments also have a tendency to keep the prices of tobacco products consumed by the majority of population relatively lower, by either not taxing these products or by keeping the tax rates on these products significantly lower. This is especially the case for bidis and smokeless tobacco in India (Sunley, 2008; Goodchild, forthcoming), papirosy and non-filtered cigarettes in Russia (Ross et al,, 2008), and waterpipes in Egypt (MoF Egypt, 2009). In some cases, due to low consumption level, governments impose either no or very low tax on some products (e.g. loose tobacco). Consequently, as the tax gap increases, consumers switch towards those products, as is the case for example in Viet Nam (Guindon et al., 2010) and Poland (WHO, 2009b).

4.4 Tobacco taxes and affordability

To the extent that governments decide to use higher tobacco taxes to reduce the health and economic consequences of tobacco use, they need to consider more than just the absolute level of taxes. Changes in the prices of other goods and services need to be taken into account. Increases in taxes on tobacco products that do not result in increases in prices that are larger than the increase in other prices will result in a drop in the prices of tobacco products relative to other goods and services (a drop in the real or inflation adjusted price). Rising nominal but falling real prices for tobacco products will lead to increases, not decreases, in tobacco use and its consequences.

The U.S. in the 1970s provides a clear example of this. Despite continually increasing and well disseminated information about the health consequences of smoking, a new health warning label on cigarette packaging and advertising, a ban on broadcast advertising for cigarettes, the spread of restrictions on smoking in public places, including restaurants and workplaces, and an increase of over 53 percent in nominal cigarette prices, per capita cigarette consumption rose by 11.4 percent from 1970 to 1979. The increased consumption was caused by a 16 percent fall in the real prices of cigarettes during this period, largely the result of no increase in the country's specific tax at the national level and small increases in specific taxes in some states that were not enough to keep pace with inflation.

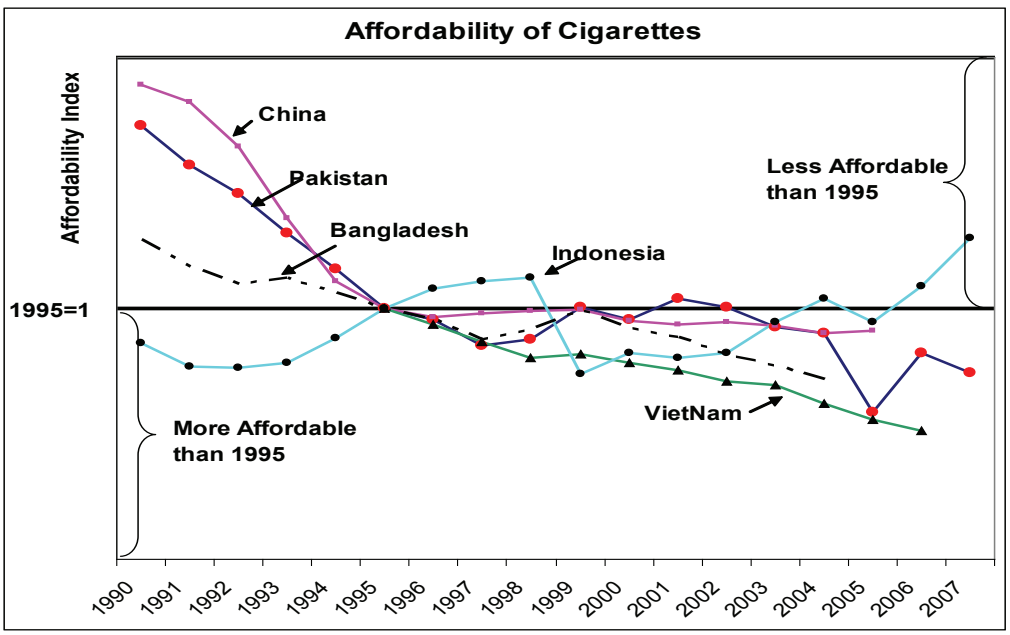
Some countries that use tobacco taxes as a way to reduce tobacco use and improve public health have addressed this problem by adopting policies that automatically increase their specific tobacco taxes so as to keep up with inflation and maintain their real value. Australia, for example, adjusts its cigarette taxes twice each year so that the inflation adjusted value is maintained.

Similarly, the impact of income on tobacco use needs to be considered when evaluating the affordability of tobacco products. In most countries, particularly LMICs, consumption of tobacco products increases as incomes increase. As a result, the reductions in tobacco use caused by tobacco tax increases may be more than offset by the increases in tobacco use that result

from higher incomes. While this would result in a larger increase in tax revenues than would result from the increased tax alone, it also implies an increase rather than a reduction in tobacco use and its consequences.

This illustrates the importance of reducing the affordability of tobacco products when a key goal of tobacco taxation is to reduce tobacco use, given that affordability depends on both price and income. As Blecher and van Walbeek (2004; 2009) show, in high income countries tax and price increases have generally outpaced growth in incomes, so that the affordability of cigarettes has, on average, declined considerably since 1990, contributing to the reductions in smoking that have occurred in these countries. In contrast, affordability of cigarettes (and almost certainly all other tobacco products) has increased significantly in low and lower middle income countries where tax and price increases have been modest and well below increases in incomes. Figure 12 shows cigarette affordability over time in 5 countries. Using 1995 as the base year, estimated values greater (less) than 1 indicate that cigarettes are less (more) affordable relative to 1995.

Figure 12: Cigarette affordability in five countries



Notes: The affordability index is the ratio of the price of the most popular brand to per capita income.
Sources: WHO GTCR 2009

Looking at China in particular, Hu et al. (2008) show that, despite a more than doubling of real cigarette prices between 1990 and 2005, cigarettes became more than twice as affordable because of the sharp growth in income in China during this period. Consistent with economic theory, one result of this increased affordability is that the demand for cigarettes in China has become much more inelastic (less sensitive to price changes) over time. Moreover, the increased affordability of cigarettes led to about a nine percent increase in per capita cigarette consumption in China during this period. To date, no country has adopted a policy that automatically adjusts tobacco product taxes in order to prevent them from becoming more affordable over time as incomes increase.

4.5 Tobacco taxes and tobacco product substitution

Tobacco tax rates that differ across products, and tobacco tax changes that affect prices across products differently, will lead to some substitution among these products (Chaloupka et al., 2000). For example, in Poland cigarette tax increases leading up to the country's accession to the European Union led some smokers to switch from manufactured cigarettes to roll-your-own tobacco (RYO). This led to subsequent increases in the RYO tobacco tax to bring it closer to the tax on manufactured cigarettes, along with further increases in both taxes. However, other tobacco product taxes increased modestly by comparison, leading to further substitution—this time to pipe tobacco, which many consumers used to make cigarettes rather than smoking it in pipes. The most recent Polish tobacco tax increases (in March 2009) addressed this by bringing the pipe tobacco tax up to the same level as the RYO tax.

Taxing tobacco products consistently—so that the tax accounts for a comparable share of price on different products and so that tax increases result in proportionate increases in the prices on all products—reduces the potential for substitution among these products. However, one has to take into account the extent to which the price elasticity of demand varies among different tobacco products, which products are close substitutes (cross price

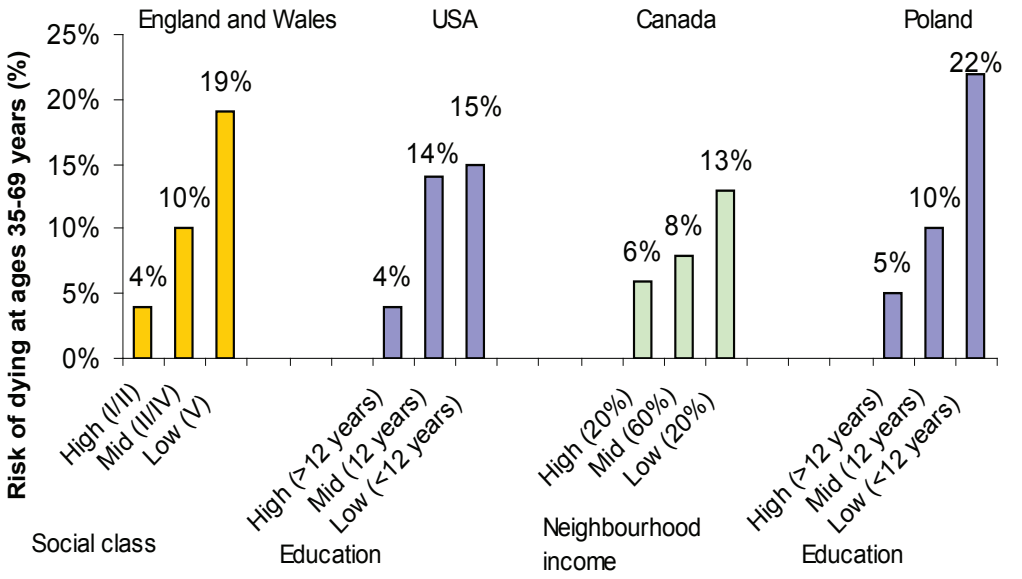
elasticities), as well as the starting tax rates on each tobacco product.

As the starting tax rates may be very low (or even zero) for some tobacco products, substantial tax increases to reach a tax share in price that is comparable with other tobacco products may prove to be difficult to implement politically. In India, bidis are consumed by relatively poorer individuals. As a result, bidi consumers are much more sensitive to price changes (e.g. exhibit a much higher price elasticity of demand) compared to cigarette smokers. Different price elasticities of demand among tobacco products mean that the same proportionate change in price across these products will lead to different changes in consumption.

4.6 Tobacco taxes and poverty

Concerns about the burden of tax increases on the poor are another barrier to higher tobacco taxes. Indeed, in some countries, tobacco tax levels and structure are in part designed to produce low prices on some brands or products in order to keep them affordable for poor users. Rather than being "pro-poor", a policy like this results in greater tobacco use among those on lower incomes. As a consequence, the poor end up bearing a disproportionate share of the health and economic burden of tobacco, with differences in tobacco use among the rich and poor accounting for much of observed socio-economic differences in health (Bobak et al., 2000). Moreover, tobacco use can increase poverty as funds are diverted from spending on basic necessities like food, housing, education and health care to spending on tobacco products (Nargis et al., forthcoming). Figure 13 shows that the health consequences from smoking are much higher among lower socio-economic group in selected countries, leading to higher death in these groups and accounting for much of the health gap between the rich and the poor. This is exacerbated by family income losses that result from missed work time due to diseases and premature death caused by tobacco use and increased spending on health care to treat illnesses caused by tobacco.

Figure 13: Differential health outcome due to smoking



Note: Social inequalities in male mortality in 1996 from smoking. Values are percentages of 35-year-old men dying at ages 35–69 years from smoking if the population death rates of 1996 were to remain unchanged.

Source: Jha et al., 2006b

Whether or not tobacco taxes fall more heavily on the poor depends on several factors, including tax structure and tobacco use patterns for those at different income levels. Tobacco taxes will generally be regressive when prevalence of tobacco use and consumption patterns are similar across income levels and when taxes are similar across tobacco products, given that tobacco taxes paid will account for a greater share of income for the poor than for the rich. The regressivity of tobacco taxes will be more pronounced in countries where tobacco product consumption is greater among the poor than among those on higher incomes. However, tobacco taxes can be less regressive or even progressive in countries where consumption levels increase with income and/or where higher taxes are applied on the products consumed by higher income consumers.

Similarly, whether or not tax increases will fall more heavily on the poor depends on how tobacco use among the poor and rich changes in response to the tax increases. Consistent with economic theory, studies from a growing

number of countries generally find that there are considerable differences in price elasticity of tobacco use among socioeconomic groups in a given country, with tobacco use in lower income populations much more sensitive to price than tobacco use in higher income populations. For example, Sayginsoy et al. (2002) estimate cigarette demand elasticities of -1.33, -1.00 and -0.52 for low, middle and high income populations in Bulgaria. Similarly, van Walbeek (2002) estimates elasticities by income quartile ranging from -1.39 for the lowest quartile to -0.81 for the highest quartile in South Africa. In Indonesia, Adoietomo et al. (2005) estimate cigarette demand elasticities of -0.67, -0.33 and -0.31 for low, middle and high income populations. These estimates imply that a tax increase will reduce tobacco use most among the lowest income populations while having less of an impact on higher income populations.

As lower socio-economic groups have lower response to health education than higher socio-economic groups, increases in the real cost of cigarettes, through taxes, will help reduce differences between different socio-economic groups in prevalence of smoking and smoking-related diseases (e.g. Townsend et al, 1994)

Given these findings, even if the tobacco tax itself is regressive, a tobacco tax increase can be progressive. Based on existing evidence, Nargis and colleagues (forthcoming) summarize this for Thailand, Bulgaria, and Turkey. They show that because of differences in price responsiveness across income groups, increases in cigarette taxes lead to a reduction in the overall share of tobacco taxes paid by the lowest income groups in each country, while the share paid by the highest income groups increases. Moreover, because of the relatively larger reductions in tobacco use among the poor, they will gain more of the health and economic benefits that result from the tax increase.

Moreover, when one accounts for self control problems—that individuals do not make optimal tradeoffs between the immediate gratification they get from consumption now and their long run desires—that result in over-consumption of tobacco products, and accounts for the benefits from reduced consumption, taxes that appear regressive are less so and may even be progressive (Gruber and Koszegi, 2008). This is more likely as there are greater

differences between the poor and rich in the responsiveness of tobacco use to price; as the poor are more responsive, the benefits that accrue to them from tax-induced reductions in consumption will be larger than those that go to the rich.

Gruber and Koszegi (2008) demonstrate this for the U.S., where those in the poorest income quartile spend ten times as much of their incomes on cigarettes as do those in the top income quartile, and where they estimate that cigarette demand among the poor is much more responsive to price than demand among the rich. In this case, for plausible assumptions about the extent of time inconsistency in smokers' behavior (the extent of the difference between the taste for immediate gratification and long run preferences), cigarette taxes are quite progressive. Given that differences in spending on tobacco products by income are less pronounced in most low and middle income countries, and given the evidence from these countries that demand among the poor is more sensitive to price than demand among the rich, tobacco taxes are likely to be even more progressive.

Finally, to the extent that there are continuing concerns about the impact of tobacco tax increases on the poor, governments can address these concerns by using the new revenues from a tax increase in a way that provides greater benefits to the poor. In this sense tobacco taxation becomes a pro-poor policy. A growing number of governments do this by dedicating some portion of tobacco tax revenues to programmes targeting the poor. For example, Egypt is considering increasing taxes on cigarettes and use the revenue generated to widen the coverage of health insurance and improve health services among the poor. Also, following the recent tax increase in Turkey, the government is considering using a portion of the extra revenues to increase health coverage and improve health services, which will benefit the poor.

4.7 Tobacco tax increases and inflation

At times the inflationary impact of cigarette and other tobacco product tax increases is raised as an argument for not increasing these taxes. This may be particularly true in countries where wages and/or a significant share of government spending is indexed to inflation (e.g. for public pension payments) and/or where government policy is to keep inflation low.

The extent to which tobacco product tax increases lead to increases in inflation depends on several factors, most notably the share of these taxes in prices and the weight tobacco prices are given in computing a price index. For example, if taxes account for 25 percent of tobacco product prices, a doubling of the tax (100 percent increase) will increase prices by 25 percent. If the weight given to tobacco products in the price index is three percent, the index will rise by 0.75 percent in response to the tax increase. As tobacco taxes account for a larger share of tobacco product prices, the inflationary impact of a tax increase will be greater. Similarly, as tobacco products are given more weight in computing a price index, a given tax increase will have a greater inflationary effect. In general, for most countries, the inflationary impact of tobacco product tax increases will be relatively small. The generally small impact of tobacco taxes on inflation is illustrated in Table 8 where various combinations of tax levels (as a percent of price) and tobacco weights in the price index are examined.

Table 8: Inflationary impact of tobacco tax increases

Tax as a share of price			**Tobacco weight in price index**			**Inflationary impact**		
Low (<40%)	Medium (40-70%)	High (>70%)	Low (<2%)	Medium (2-4%)	High (4-8%)	Low (<1.0%)	Medium (1-2.5%)	High (>2.5%)
x			x			x		
	x		x			x		
		x	x			x		
x				x		x		
	x			x			x	
		x		x			x	
x					x		x	
	x				x		x	
		x			x			

Note: Midpoints of ranges for tax and tobacco weight are used for computing inflationary impact.
Source: Authors' simulations

Consumer price indices have multiple purposes. They are an important economic indicator for most countries and are often a key determinant of monetary policy. Inflation rates directly impact on interest rates and exchange rates. In many countries, changes in wages, social security benefits, and other payments are tied to inflation, as measured by a price index. In some countries, various taxes are linked to price indices; for example, US income tax brackets are adjusted annually to reflect changes in consumer prices, while Australia and New Zealand regularly increase their cigarette taxes to keep pace with inflation. Price indices are used to provide more accurate comparisons of changes in expenditures, incomes and prices for specific goods over time as well as to allow comparisons across countries.

Given the many uses of consumer price indices and the potential inflationary impact of tobacco tax increases, some governments have developed alternatives that exclude tobacco (and sometimes other goods) for some uses. For example, since 1992, France has excluded tobacco products from the price index used for adjusting minimum wages. Given its utility for indexing various payments, some governments exclude prices for a variety of products they consider unnecessary or inappropriate, including those for alcoholic beverages, gambling, and tobacco. For example, since 1991, Luxembourg has excluded tobacco products, hard liquor, and 'certain services closely linked to sliding wage scales' from its consumer price index. To date, however, while many countries do report consumer price indices that exclude tobacco products, their most widely used indices— including those used for indexation of wages, pension payments, and other outlays—continue to include tobacco products.

To the extent that concerns about their impact on inflation are a barrier to tobacco tax increases, excluding tobacco products from the basket of goods used in developing key price indices would greatly reduce these concerns. In addition, some have observed that the inclusion of tobacco products in key price indices results in a distorted measure of price for many consumers, particularly in countries where a small and declining minority of the population use these products. Likewise, given that the weights used to compute price indices in many countries change infrequently, the inflationary impact of to-

bacco product tax increases will be overstated as consumption of these products falls in response to tax increases. Finally, some have suggested that excluding tobacco products from price indices would increase the public health impact of tobacco tax increases by providing less of a cushion for users whose wages or benefit payments are indexed (Alchin, 1995).

4.8 Tobacco taxes and employment

Opponents of tobacco tax increase often suggest that the tax increases will result in job losses, noting that many are employed in tobacco growing, manufacturing and distribution. However, as Warner (2000) has noted, an economic presence of tobacco does not imply an economic dependence on tobacco. Many of the jobs that are counted in estimates of the economic contribution of tobacco are far from dependent on tobacco, but rather involve tobacco in some limited way, often indirectly (e.g. retailers who sell tobacco products, among many other products, or jobs in the heavy equipment sector where farming equipment is produced). Similarly, these estimates include so-called "expenditure induced employment"—jobs that result from spending by those whose incomes are earned in the jobs counted as tobacco related. In general, only jobs in tobacco farming (which are often part time and for which tobacco is one of several crops), tobacco leaf drying and warehousing (which involves very few jobs), and tobacco product manufacturing can be considered truly dependent on tobacco.

In most countries, employment in tobacco dependent sectors has been falling over time as farming techniques have improved and as tobacco product manufacturers have adopted new, more capital intensive production methods. In some countries, increased imports of tobacco leaf and/or tobacco products have contributed to reduced domestic employment in tobacco dependent sectors. For most countries, the job losses in tobacco dependent sectors that have resulted from these factors exceed any job losses resulting from higher taxes and other tobacco control efforts. (Lei et al., forthcoming).

More importantly, any tobacco dependent jobs lost in response to the

reduced demand for tobacco products caused by higher tobacco taxes will be offset by new jobs in other sectors. The money not spent by tobacco users who quit or spend less on tobacco products after a tax increase will not disappear from the economy, but will instead be spent on other goods and services, creating jobs in these sectors. Similarly, government spending of the new tax revenues that result from a tax increase will create jobs in other sectors. Study after study has demonstrated that increases in tobacco taxes or implementation of other tobacco control measures do not lead to net job losses; in many countries, such efforts result in net increases in jobs as spending is shifted to more labour intensive goods and services (Lei, et al., forthcoming; Jacobs, et al., 2000). This is particularly true for countries where significant shares of tobacco leaf and/or tobacco products are imported, given that much of the money spent on tobacco products will flow out of the country, in contrast to the spending that replaces spending on tobacco in response to tax increases or other tobacco control measures.

Even global tobacco tax increases are unlikely to have a significant impact on tobacco dependent employment in most countries. For a few agrarian countries that do depend heavily on tobacco leaf exports (e.g. Malawi), a sharp, immediate reduction in global demand for tobacco products would lead to significant job losses in the short run. However, given the current upward trend in global demand, higher taxes and other tobacco control measures are not likely to result in a sharp drop in demand in the short run, but rather a slowing of the increase in the near term followed by slowly falling demand in the longer term. This implies that any job losses in these countries will not happen for many years, allowing for a gradual transition from tobacco to other crops.

Countries that are concerned about the impact of tobacco tax increases on domestic employment in tobacco dependent sectors can alleviate these concerns by adopting programmes that would ease the transition from tobacco farming and manufacturing to other economic activity. Crop diversification programmes that support farmers and retraining programmes for those involved in tobacco product manufacturing could easily be funded by a small

portion of the new revenues that result from increases in taxes on tobacco products. In Turkey, for example, the government sponsored "alternative crop programme" that was implemented in anticipation of the privatization of the country's cigarette monopoly has proven effective in moving many tobacco farmers to other crops (Yurekli et al., forthcoming).

4.9 Tobacco taxation and harm reduction

A wide variety of tobacco products are on the market today, with new products seeming to emerge continuously (see www.tobaccoproducts.org for more details). These products can be grouped into two broad categories—combustible (smoked) products and non-combustible (usually used orally) products. In some countries, a range of both products have been available for many years, and, in a few, manufactured cigarettes account for a relatively small share of overall tobacco use. For example, in India, many more tobacco smokers use bidis (dried tobacco hand-rolled in a tendu leaf) than manufactured cigarettes, while a large portion of the population chews tobacco in the form of paan masala or gutka. In Indonesia, kreteks (clove cigarettes) are widely smoked, while in many Middle Eastern countries, waterpipe smoking of tobacco is common (e.g. hookah or shisha smoking).

In recent years, the variety of available products has expanded considerably, particularly in high-income countries, as the tobacco industry has introduced products that are marketed as "reduced risk" products. Some new cigarettes, for example, claim to reduce the carcinogens contained in their smoke while others deliver considerably less tar, nicotine and/or carbon monoxide. Many new non-combustible products are being similarly marketed, from Swedish Match's "snus" (a moist snuff product that uses tobacco cured in a way that is supposed to significantly reduce cancer causing agents) to the lozenges, dissolvable strips, tobacco chewing gum, and others. At the same time, the number of available non-tobacco products that deliver nicotine has risen, ranging from those intended for smoking cessation (nicotine gum, patches, inhalers, etc.) to the 'e-cigarette' (a battery powered device that de-

livers nicotine through a mixture of air and water vapor).

Governments have struggled with how to regulate these products and, given experiences with filtered and low-tar and nicotine cigarettes, have been reluctant to allow these products to be marketed as less harmful. Research has clearly demonstrated that smokers' perceptions that low-tar and nicotine cigarettes, for example, were safer than regular cigarettes led many who might have otherwise quit smoking to continue. Only decades after their introduction did it become clear that the machine measurements of tar and nicotine did not reflect human exposure and that these cigarettes were not safer than regular cigarettes.

The variety of tobacco products available have led some to suggest that tobacco excises be set differentially, so as to more heavily tax those that have greater health risks, while taxing those perceived to be safer at lower levels (or not at all). Harris (1980), for example, suggested that a differential tax based on tar and nicotine content could promote public health by encouraging smokers to move from high tar/nicotine brands to low tar/nicotine brands, assuming that the latter were less harmful. However, given what we now know about the relative risks of these cigarettes, it's clear that such a policy would have done more harm than good as it would have likely kept even more smokers in the market consuming what they perceived to be safer products.

To date, differential taxation of various tobacco products (e.g. for filtered vs. unfiltered cigarettes or for smoked vs. smokeless products) does not seem motivated by interests in promoting harm reduction. Where differential taxes exist, they appear more motivated by efforts to protect domestic producers (e.g. those producing unfiltered cigarettes) from multinational firms (e.g. those producing filtered cigarettes) or by efforts to increase revenues (e.g. by taxing the manufactured cigarettes consumed by higher income, less price sensitive consumers more than the hand-rolled bidis smoked by more price sensitive, lower income smokers).

Recognizing past misrepresentations and current uncertainties, at this point in time, designing a tobacco tax system that favours products perceived to be safer while disfavouring those perceived to be more harmful should

await clear evidence of a harm reduction benefit for both the individuals using the products and the public health of the general population.

4.10 Tobacco tax revenues, health expenditure and earmarking

Financing the health-care system is crucial in most countries as it serves to improve health care access and the quality of the services provided. This also reduces the risks of high economic costs due to disease and consequent death. In low- and middle-income countries, financing has become a central issue of health reform, given the large proportion of out-of-pocket expenses on health and the financial constraints this imposes on poor households (Prakongsai et al., 2008).

The use of government tax revenues to pay for health services is a fairly recent innovation in health care financing. Until the mid-twentieth century, the major alternatives to out-of-pocket payments for health care services were private philanthropies, mutual associations or social insurance plans (e.g. sickness funds) (WHO, 2004). In the case of tobacco products, earmarking (through passing a law) or dedicating (commitment by the Government but no legislation needed, which is more flexible than earmarking) revenues from tobacco taxes for health purposes can be seen as a way to correct for the negative health consequences of tobacco use.

Earmarking can be classified according to two criteria. First, according to the link between the tax and the expenditure it finances: a *strong* or *tight* link implies that all or most of the revenue goes towards financing a particular expenditure, and that the expenditure does not benefit (significantly) from other financing sources (e.g. the general fund). A *weak* or *loose* link implies that only a portion of the proceeds of the tax finances the expenditure in question, and/or the expenditure benefits (significantly) from other financing sources. Second, according to the type of expenditure benefiting, earmarking can be *specific/narrow* (e.g. a service provided by a public enterprise), or *broad/wide* (e.g. social security, education). The main argument against earmarking is that it may introduce rigidities in the budgetary process that limit the use

of funds for alternative purposes, discouraging the optimal allocation of resources and hence reducing social welfare.

Buchanan (1963), starting with the median voter-taxpayer as the decision maker in the tax-spending process (instead of the fiscal authority), showed that earmarking can be desirable. If voters are offered a series of public goods/services with each financed by a corresponding tax, the outcome of their choice is likely to reflect their preferences better than voting on a package of expenditures financed by a general fund. Since Buchanan's seminal work, a number of economists have shown why certain types of earmarking can be desirable or indeed observed in practice. For example, Pirttilä (1998) argues that earmarking revenue from a corrective environmental tax to compensate those who suffer the most from such a tax may be desirable. Marsiliani and Renstrom (2000) show that earmarking can act as a commitment mechanism where there is a time-inconsistency problem in environmental tax policy: future politicians can be prevented from eliminating the tax or reducing it because its use is earmarked for a desirable expenditure programme. Along the same lines, Brett and Keen (2000) explain earmarking as a means by which a weak incumbent politician locks in the use of certain tax revenues (from environmental Pigovian taxes) and prevents future politicians from altering that use. Dhillon and Perroni (2001) justify earmarking on the basis that it improves the monitoring of government spending by private individuals.

Earmarking in modern public finance finds its strongest support in the principle of benefit taxation and user fees. According to this principle, tobacco taxes must be paid by those who benefit from tobacco-related health services, a condition that is impossible to satisfy as not all tobacco smokers suffer from tobacco-related diseases, and tobacco tax revenue may not be enough to finance spending needs. It could be argued, however, that the tax can take the form of a compulsory health contribution to finance a health insurance programme for tobacco-related diseases. There are two weaknesses in this argument: first, it is not clear why tobacco-related health services should be financed by a specific insurance scheme instead of a general one covering

all health services. For example, Egypt imposes a tax of EGP 0,10 per pack of cigarettes to finance part of a health insurance programme rather than earmarking a specific insurance scheme for tobacco-attributable diseases. Second, health spending under this scheme would have to be narrowly defined; it would exclude, for example, spending on smoking prevention.

Consequently, earmarking or dedicating revenues from tobacco taxes for the health system could make more sense. Revenues from tobacco taxes can be substantial in a number of countries and can provide important resources for health, particularly in low income countries where resources are scarce. WHO estimates show that current revenues (2008 data) from excise taxes can represent more than 50% of government health expenditures in countries like Democratic Republic of Congo, Pakistan or Viet Nam. Even dedicating the resulting revenues of tax increases for health programmes is an efficient way of raising resources internally, addressing at the same time any political opposition to such tax increases. A 50% excise tax increase would increase the excise tax revenues of 22 low-income countries (for which data was available) by 33%. The extra revenue alone would be equivalent to 29% of these country's public health expenditures. Revenues from tobacco excise taxes where consumption is very high are sometimes almost equivalent to what is spent on health by the government. In 2008, cigarette excise tax revenues generated by a 50% excise tax increase were equivalent to 31% and 26% of government health expenditures in Pakistan and Viet Nam respectively (WHO, forthcoming).

Tobacco taxes are earmarked by a number of governments. For instance, several US states (notably California, Massachusetts, Arizona, and Oregon) and several countries (e.g. Ecuador, Egypt, Estonia, Finland, Iceland, India, Korea, Nepal, and Thailand) earmark part or all their tobacco tax revenues for different purposes. In the case of health programmes, these include mainly tobacco control and/or health promotion. Earmarking tobacco taxes for health purposes is practiced by more than 20 countries around the world (WHO, 2009c). In California, 57% of the excise tax funds the Children and Families First Trust Fund, 29% is spent on health education, hospital services, physician services

and research, and another 2% of the excise funds the Breast Cancer Fund. In the light of the success of an earmarked tobacco tax in California, similar earmarking of part of the state excise on cigarettes also takes place in Kentucky (mainly on cancer research), Louisiana (primarily for tobacco prevention), Massachusetts (mainly on health insurance) and Oregon (mainly for the health fund). Studies from California found, for example, that cigarette consumption has been reduced as a result of increases in both taxes and tobacco-control activities funded by the tax increase (Flewelling et al., 1992; Keeler et al., 1996).

Nepal imposes a 2 paisa health tax per manufactured cigarette (domestically produced or imported). The revenue generated by this tax is earmarked for cancer control. Other types of funded activities include social and health programmes (Argentina, Costa Rica, Jamaica, Panama, Mongolia, Philippines), programmes for the protection of children, the elderly and disabled populations (Costa Rica), education (Costa Rica, Iceland, Korea), emergency care (El Salvador, Paraguay), and sports activities (Colombia, Estonia and to some extent Switzerland). Several Australian states and New Zealand use tobacco tax revenues to fund sporting and artistic events that were previously funded by the tobacco industry.

Thailand may be the best success story to be noted in the case of tobacco (and alcohol) tax earmarking. In 2001, the Government of Thailand passed the Health Promotion Foundation Act, which led to the setting-up of the ThaiHealth Promotion Foundation. ThaiHealth receives 2% of the total national tax revenue on alcohol and tobacco products—equivalent to about US$35 million per year. ThaiHealth acts as a catalyst and supports groups and organizations that are already working on public health issues. It reports directly to the cabinet and parliament each year. The success of ThaiHealth has inspired other countries to adopt or contemplate setting up the same policy. For example, Mongolia and Togo have adopted the same structure as Thai Health and received technical assistance by ThaiHealth in the process of setting up the policy.

Annex Table 5 summarizes tobacco tax revenue earmarking in various countries at the central and sub-central levels of government. As one would expect, the link between revenue and spending is weak, with only a portion of tobacco revenue earmarked to spending programmes in the majority of countries. For example, of the 53 countries currently in the WHO's European region, 9 of them earmark taxes for tobacco control and other public health measures; the average level of allocation is less than 5 percent of total tax revenue (WHO, 2009c). Moreover, these programmes tend to be broadly defined, for example, health, education, social security. Earmarked funds that support broad health and social services (such as other disease programmes) broaden the political and civil society support base for tobacco control. For example, in Australia, historically, broad political support from the Ministries of Sports and Education helped convince the Ministry of Finance that raising tobacco taxes was possible. Indeed, after earmarked taxes passed, the Ministry of Finance went on to raise tobacco taxes further without earmarking (Galbally, 1997). Only a small number of countries earmark revenues to tobacco control activities and cancer treatment, which could be considered as narrowly defined spending programmes.

Additionally, targeting revenue from tobacco taxes to other health programmes for the poorest socioeconomic groups could produce double health gains—reduced tobacco consumption combined with increased access to and use of health services. In China, a 10 percent increase in cigarette taxes would decrease consumption by 5 percent and would increase government revenue by 5 percent. The increased earnings could finance a package of essential health services for one-third of China's poorest 100 million citizens in 1990 (Saxenian and McGreevey, 1996).

For countries, particularly low and middle income countries where health coverage is low, tobacco excise tax revenues—earmarked or dedicated, depending on political support—can provide an important source for much needed expenditure on health.

Chapter V

BEST PRACTICES

THIS CHAPTER describes best practices for tobacco tax policy, emphasizing the public health impact of tobacco taxes while also recognizing the importance of the revenues generated by the taxes. Based on the accumulated empirical evidence and published literature described above, these best practices represent a roadmap that most countries can readily implement. For many countries, the best practices described here will be considerably different than current tobacco tax practices and will require a transition strategy. Where relevant, the best practices described below include some discussion about effective transition strategies.

- ***Use tobacco excise tax increases to achieve the public health goal of reducing the death and disease caused by tobacco use***

Extensive economic and other research has clearly demonstrated the effectiveness of higher tobacco product taxes and prices in reducing tobacco use and its consequences, particularly among the poor and the young. At the same time, tobacco excise tax increases will generate sizable new revenues that will be sustained in the short to medium term. In the long run, continued

increases in tobacco taxes coupled with implementation of other evidence-based tobacco control policies and programmes will lead to even larger reductions in tobacco use and its consequences and, eventually, to declining tax revenues.

- ***Set tobacco excise tax levels so that they account for at least 70 percent of the retail prices for tobacco products***

Tobacco excise taxes (or other taxes uniquely applied to tobacco products) in nearly all countries account for less than 70 percent of retail prices, with taxes in most accounting for less than half of retail prices. Raising tobacco taxes so that they account for at least 70 percent of retail prices would lead to significant price increases, induce many current users to quit, and deter numerous youth from taking up tobacco use, leading to large reductions in the death and disease caused by tobacco use. At the same time, such tax increases will generate significant increases in tobacco tax revenues. It is important to note that this best practice focuses on tobacco excise taxes (or other tobacco-specific taxes) and not on all taxes applied to tobacco products, given that these are the taxes that lead to increases in the prices of tobacco products relative to the prices of other goods and services and, consequently, to reductions in tobacco use. In countries that have already reached this threshold, further increases in tobacco taxes in line with other practices described below would be appropriate.

- ***Simpler is better***

Complex tax structures are more difficult to administer, create more opportunities for tax avoidance and evasion, and are less effective in achieving public health and revenue goals. Simplifying the structure of tobacco excise taxes will ease tax administration, reduce tax avoidance and evasion and enhance revenues, and have a greater impact on tobacco use by reducing incentives to substitute among tobacco products/brands in response to tax increases. In countries with complex tax structures, an appropriate transition strategy involves reducing the variations in taxes over time with the aim

of implementing a single uniform tax on a given tobacco product. Countries with multiple tiers based on price should reduce the number of tiers over time, eventually ending up with a single uniform tax. Similarly, those that levy different taxes based on product characteristics should reduce and eventually eliminate these differential taxes.

- ***Rely more on specific tobacco excises as the share of excise taxes in retail prices increases***

Greater reliance on specific excise taxes maximizes the impact of tobacco taxes on public health by reducing the gap in prices between premium and low priced alternatives and limiting opportunities for users to switch down in response to tax increases. Applying the same specific tax to all brands of a given tobacco product sends the clear message that all are equally harmful. For countries that currently rely on an *ad valorem* tax or a mix of *ad valorem* and specific taxes, an appropriate first step would be to set a sizable specific tax that applies to all brands with an *ad valorem* tax applied above this. Over time, the *ad valorem* rate could be reduced with greater increases in the specific tax so that the total tax increases as a share of retail price and so that the specific tax accounts for a greater share of the total excise tax.

- ***Rely more on excise taxes than on import duties***

The effectiveness of import duties in generating higher revenues and increasing retail prices has been decreasing as countries adopt bilateral, regional, and global trade agreements. Consequently, relying on specific tobacco excises would ensure sustainability of tobacco tax revenues. For countries that currently rely heavily on import duties from tobacco products, an appropriate transition strategy would be to reduce import duties over time while adopting and increasing specific tobacco excises so that total taxes on tobacco products are increasing.

- ***Adopt comparable taxes and tax increases on all tobacco products***

Increasing excise taxes on some tobacco products but not on others results in changes in the relative prices of these products that induce substitution towards relatively less expensive products. As a result, the overall reduction in tobacco use is smaller than it would have been had all taxes increased by comparable amounts. Comparable increases in the taxes on all tobacco products maximize the public health impact of tobacco tax increases by minimizing opportunities for substitution. Similarly, increases in taxes on all tobacco products will generate larger increases in tobacco tax revenues than would increases in taxes on selected products.

- ***Eliminate tax and duty free sales of tobacco products***

The WHO Framework Convention on Tobacco Control, in Article 6, calls for "prohibiting or restricting, as appropriate, sales to and/or importations by international travellers of tax- and duty-free tobacco products". Doing so increases the public health impact of higher tobacco taxes by raising all tobacco product prices and by reducing opportunities for tax avoidance while at the same time generating additional revenues.

- ***Where revenue increases are a goal, rely on tobacco tax increases to achieve revenue increases***

Industry price increases (when taxes are ad valorem) or increases in sales volume will generate increases in tobacco tax revenues, but tax increases are more effective in achieving public health goals and will generate new revenues in the short to medium term. Relying on increases in sales volumes to increase revenues will worsen the public health consequences of tobacco use. Relying on industry price increases to achieve revenue increases results in tobacco tax revenues being less predictable and more unstable over time, given the dependence on industry pricing strategies.

- ***Automatically adjust specific tobacco taxes for inflation***

Unless regularly adjusted, the real value of specific tobacco taxes will fall over time as general price levels increase. When this happens, the real value of tobacco taxes revenues will fall and the effectiveness of the tax in reducing tobacco use will be diminished. Governments can avoid this by establishing a mechanism for automatically adjusting specific taxes so as to keep pace with inflation. To date, only Australia and New Zealand have done this. To the extent that inflation is low, an annual adjustment should be sufficient; where inflation is higher, more frequent adjustment would be needed.

- ***Increase tobacco taxes by enough to reduce the affordability of tobacco products***

In order to maximize the public health impact of higher tobacco taxes, while at the same time generating higher revenues, governments should raise taxes so as to raise prices and reduce the affordability of tobacco products. In many LMICs, tobacco use increases with incomes and incomes are rising faster than tobacco product prices so that these products are becoming more affordable. In order to reduce affordability, tax increases need to result in real price increases that are higher than the increases in real incomes.

- ***Include tobacco excise tax increases as part of a comprehensive strategy to reduce tobacco use***

Governments should adopt a comprehensive tobacco control strategy that includes objectives for reducing adult tobacco use and preventing youth tobacco use. In addition to higher tobacco taxes, such a strategy should include other interventions to reduce tobacco use including, but not limited to, comprehensive smoke-free air policies, total bans on tobacco company marketing activities, strong warnings about the consequences of tobacco use, broad efforts to help current users quit, and mass media public education campaigns. Implementation of a comprehensive strategy to reduce tobacco use leads to greater reductions in the consequences of tobacco use, builds public and political support for higher taxes, and maximizes the effectiveness of tax increases in achieving public health goals.

- ***Use a portion of tobacco tax revenues to support other tobacco control and/or health promotion efforts***

Significant increases in tobacco product excise taxes generate substantial new revenues that can be used to support a variety of activities, including other tobacco control interventions and health promotion efforts. Empirical evidence demonstrates that using tax or other revenues to fund tobacco control programmes results in greater reductions in tobacco use than result from a tax increase alone. Experiences in many countries have demonstrated that public support for higher tobacco taxes is greater when at least some of the increased revenues are used to support health-focused programmes. Tobacco taxes in most countries generate hundreds or thousands of times more in revenues than are spent on tobacco control activities, leaving considerable room for increased funding of tobacco control programmes. While hard earmarking of tobacco tax revenues for tobacco control and other health promotion efforts may be infeasible in some countries, soft earmarking should be possible in all countries.

- ***Do not view low taxes and prices for some tobacco products as a "pro-poor" policy***

Keeping tobacco taxes and prices low on some products, so as to ensure affordability of these products for the poor, is not a pro-poor policy. Instead, it results in greater tobacco use among the poor, causing them to bear a disproportionate share of the burden of the health and economic consequences of tobacco use and increasing the likelihood of future poverty. High tobacco taxes on all tobacco products will result in greater reductions in tobacco use among the poor and to a progressive distribution of the health and economic benefits that result—a truly "pro-poor" policy.

- ***Do not allow concerns about the regressivity of higher tobacco taxes to prevent tobacco tax increases***

While existing tobacco taxes may be regressive given traditional measures of tax incidence, these taxes may be progressive once the greater price

sensitivity of the poor and the internalities associated with tobacco use are taken into account. Even using traditional measures of tax incidence, tax increases can be progressive given differences in price responsiveness by income, with higher taxes increasing the overall share of tobacco taxes paid by higher income groups. Countries particularly concerned about the regressivity of tobacco excise taxes might employ an ad valorem tax on top of a high specific tobacco excise. To the extent that concerns about the impact of tax increases on the poor remain, these can be offset by using the revenues generated from a tax increase to support efforts to help poor tobacco users quit, other health promotion efforts targeting the poor, and/or other programmes directed to those in poverty.

- ***Do not allow concerns about employment impact to prevent tobacco tax increases***

Reductions in tobacco-dependent employment following tobacco domestic tax increases will be offset by increases in employment in other sectors as spending on tobacco products is replaced by spending on other goods and services. Given the capital intensive nature of tobacco product manufacturing in most countries, it is likely that there will be either no net impact on jobs or even a small increase in jobs following a tax increase. To the extent that there are concerns about job losses in tobacco-dependent sectors, using a portion of new tobacco tax revenues to move tobacco farmers into other crops and/or to retrain those employed in tobacco product manufacturing for work in other sectors would significantly reduce these concerns.

- ***Do not allow concerns about the inflationary impact of higher tobacco taxes to deter tax increases***

In most countries, either tobacco taxes are a relatively low share of tobacco product prices or the weight given to tobacco product prices in computing national price indices is low, implying that tobacco tax increases will generally have a small impact on inflation. To the extent that there are concerns about the inflationary impact of a tobacco tax increase given that wages

or some government spending may be tied to a price index, governments can reduce these concerns by using a price index that excludes tobacco products, as recommended by the EU and, for example, done in France (for the index used to adjust minimum wages).

- ***Strengthen tobacco tax administrators' capacity to monitor tobacco product markets and evaluate the impact of tobacco tax increases***

Regardless of how well the tax system is integrated between the tobacco manufacturers and tax administrators, tax authorities should "trust but verify". To accomplish this, a well established monitoring system should be put in place that employs new technologies for monitoring the production and distribution of tobacco products and that includes physical control over these products as they move through the distribution chain. In addition, tax authorities should audit taxpayer account books periodically. Where one does not already exist, a tobacco excise department should be established. This department should collaborate with Customs in order to minimize non-compliance and monitor trade. It should also maintain and update a comprehensive database for use in assessing tobacco product markets, conducting analyses of demand for tobacco products, and evaluating current tobacco excise taxes and the impact of increases in these taxes. Such efforts will be most effective when done in cooperation and collaboration with tax authorities from neighbouring countries and regional and global organizations.

- ***Adopt new technologies to strengthen tobacco tax administration and minimize tax avoidance and evasion***

Tax administrators should adopt up-to-date technologies in order to increase the efficiency of tax collection and minimize tax avoidance and evasion. These new technologies include more sophisticated, harder to counterfeit tax stamps and tracking-and-tracing systems that can be used to follow tobacco products through the distribution chain. Tax authorities should be able to assess production levels and accurately estimate manufacturers' tax liabilities, independent of claims filed by tobacco manufacturers. Adoption

of these technologies could be financed by small increases in tobacco excise taxes, when needed; in most countries, it is likely that the adoption of these technologies would more than pay for itself through the revenues collected on products for which taxes would otherwise not have been paid.

- ***Strengthen tobacco tax administrators' capacity by licensing all involved in tobacco product manufacturing and distribution***

Licensing of all involved in tobacco production and distribution facilitates monitoring of tobacco product markets, makes it easier to identify illicit tobacco products, and increases administrators' ability to identify and penalize those engaged in tax evasion. This is particularly true when done in combination with the adoption of the technologies discussed above.

- ***Ensure certain, swift and severe penalties for those caught engaging in illicit trade in tobacco products***

Economic theory and empirical evidence demonstrates that an increase in the expected penalty for illegal behavior reduces crime. Strong tobacco tax enforcement will raise the likelihood that those engaging in illicit trade in tobacco products will be caught, while high administrative penalties will raise the swiftness and severity of the punishment for such illegal activity. Stronger enforcement efforts would almost certainly more than pay for themselves through the increased taxes collected from previously untaxed products. Countries that have significantly increased enforcement efforts and raised penalties have effectively reduced illicit trade in tobacco products. This is particularly true when they "go after the big fish"—those running the illicit operation—rather than focusing on those at the end of the distribution chain.

Conclusions

Tobacco excise taxes are a powerful tool for protecting public health while at the same time an efficient source of government revenues. The best practices identified above should help governments in maximizing the impact of tobacco taxes in reducing tobacco use and its consequences, while at the same time enhancing the revenue generating capacity of these taxes. As governments begin to make the transition from their current practices to the "best practices", much will be learned and best practices will be refined.

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Annex

Figure 1

WHO FCTC Article 6:
Price and Tax Measures to Reduce the Demand for Tobacco

1. The Parties recognize that price and tax measures are an effective and important means of reducing tobacco consumption by various segments of the population, in particular young persons.
2. Without prejudice to the sovereign right of the Parties to determine and establish their taxation policies, each Party should take account of its national health objectives concerning tobacco control and adopt or maintain, as appropriate, measures which may include:
   a. Implementing tax policies and, where appropriate, price policies, on tobacco products so as to contribute to the health objectives aimed at reducing tobacco consumption; and
   b. Prohibiting or restricting, as appropriate, sales to and/or importations by international travellers of tax- and duty-free tobacco products
3. The Parties shall provide rates of taxation for tobacco products and trends in tobacco consumption in their periodic reports to the Conference of the Parties in accordance with Article 21.

Figure 2

WHO FCTC Article 15:
Illicit Trade in Tobacco Products

1. The Parties recognize that the elimination of all forms of illicit trade in tobacco products, including smuggling, illicit manufacturing and counterfeiting, and the development and implementation of related national law, in addition to subregional, regional and global agreements, are essential components of tobacco control.
2. Each Party shall adopt and implement effective legislative, executive, administrative or other measures to ensure that all unit packets and packages of tobacco products and any outside packaging of such products are marked to assist Parties in determining the origin of tobacco products, and in accordance with national law and relevant bilateral or multilateral agreements, assist Parties in determining the point of diversion and monitor, document, and control the movement of tobacco products and their legal status. In addition, each Party shall:
   a. require that unit packets and packages of tobacco products for retail and wholesale use that are sold on its domestic market carry the statement: *"Sales only allowed in (insert name of the country, subnational, regional, or federal unit)"* or carry other effective marking indicating the final destination or which would assist authorities in determining whether the product is legally for sale in the domestic market; and
   b. consider, as appropriate, developing a practical tracking and tracing regime that would further secure the distribution system and assist in the investigation of illicit trade.
3. Each Party shall require that the packaging information or marking specified in paragraph 2 of this Article shall be presented in legible form and/or appear in its principal language or languages.
4. With a view to eliminating illicit trade in tobacco products, each Party shall:

a. Monitor and collect data on cross-border trade in tobacco products, including illicit trade, and exchange information among customs, tax and other authorities, as appropriate, and in accordance with national law and relevant applicable bilateral or multilateral agreements;
b. enact or strengthen legislation, with appropriate penalties and remedies, against illicit trade in tobacco products, including counterfeit and contraband cigarettes;
c. take appropriate steps to ensure that all confiscated manufacturing equipment, counterfeit and contraband cigarettes and other tobacco products are destroyed, using environmentally-friendly methods where feasible, or disposed of in accordance with national law;
d. adopt and implement measures to monitor, document and control the storage and distribution of tobacco products held or moving under suspension of taxes or duties within its jurisdiction; and
e. adopt measures as appropriate to enable the confiscation of proceeds derived from the illicit trade in tobacco products.

5. Information collected pursuant to subparagraphs 4(a) and 4(d) of this Article shall, as appropriate, be provided in aggregate form by the Parties in their periodic reports to the Conference of the Parties in accordance with Article 21.

Table 1: Countries applying different types of taxes with tiers or at a uniform rate

Type of tax (Total number of countries 155)					
Specific (51)		**Ad Valorem (47)**		**Mix (47)**	
Tiers (21)	**Uniform (30)**	**Tiers (6)**	**Uniform (41)**	**Tiers (6)**	**Uniform (41)**
Bosnia, Brazil, Belarus, Croatia, Egypt, Fiji, Ghana, India, Indonesia, Kazakhstan, Kenya, Kyrgyzstan, Nepal, New Zealand, Papua New Guinea, Philippines, Republic of Korea, Sri Lanka, Tajikistan, Tanzania, Uzbekistan	Albania, Algeria, Andorra, Armenia, Australia, Azerbaijan, Barbados, Belize, Botswana, Brunei, Canada, Colombia, Cuba, Georgia, Haiti, Jamaica, Japan, Lesotho, Malawi, Mauritius, Namibia, Norway, Singapore, South Africa, Suriname, Swaziland, Trinidad & Tobago, Uganda, Uruguay, USA	Angola, Bangladesh, Burkina Faso, Côte d'Ivoire, Myanmar, Senegal	Bolivia, Burundi, Cambodia, Cameroon, Chile, Costa Rica, Congo, Ecuador, El Salvador, Ethiopia, Gabon, Guatemala, Guinea, Guyana, Honduras, Iran, Laos, Lebanon, Liberia, Lybia, Mali, Mauritania, Mexico, Mozambique, Nicaragua, Niger, Nigeria, Panama Paraguay, Peru, Rwanda, Sierra Leone, Sudan, Togo, Turkey, Turkmenistan, Venezuela, Viet Nam, Yemen, Zambia, Zimbabwe	China, Madagascar, Moldova, Pakistan, Russia, Ukraine	Argentina, Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Dominican Republic, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Jordan, Latvia, Lithuania, Luxembourg, Macedonia, Malta, Montenegro, Morocco, Netherlands, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Syria, Thailand, Tunisia, UK

Note: 1 - Out of the 155 countries for which there are data in TMA, 10 countries had no excise
2 - The following countries imposed a minimum tax in addition to their statutory rates: the 27 EU countries, Israel, Russia, Switzerland, Turkey, Turkmenistan and Ukraine.

Source: TMA (2009)

Table 2: Different bases for tiered systems around the world

Differential /Tiered Excise taxes on cigarettes			
			Number of countries
Total covered			156
With tiers			32
Base of tiers	Retail price		11
	Producer price		2
	Sales volume		1
	Production volume		1
	Type -	filter/non filter	12
	Type -	hand/machine made	2
	Type -	kretek/white cigrette	1
	Packaging	soft/hard	3
	Cigarette length		4
	Trade	domestic/imported	1
	Weight (tobacco content in cigarette)		1
	Leaf content (domestic/imported)		3

Note: Of the 155 countries with available data in TMA, 10 countries has no excise
Some countries differentiate based on more than on criteria.
8 countries differentiate their excises based on more than 1 criteria

Source: Authors' calculations using data from TMA (2009)

Table 3: Cigarette Price, Excises, and Total Tax as a Percentage of Price in 2008, by Income Group[§]

Country	Price in USD*	Specific Excise	Ad Valorem Excise	Total tax share[†]
Low-income economies				
No excise				
Afghanistan	0.51	0.00%	0.00%	7.79%
Benin	1.06	0.00%	0.00%	21.67%
Sao Tome and Principe	1.31	0.00%	0.00%	36.55%
Average[‡]	*0.96*	*0.00%*	*0.00%*	*22.00%*
Specific only				
Gambia	0.36	30.00%	0.00%	62.05%
Ghana	1.16	13.33%	0.00%	29.30%
Kenya	1.54	41.67%	0.00%	55.46%
Kyrgyzstan	0.61	14.17%	0.00%	30.83%
Malawi	1.03	37.33%	0.00%	51.50%
Nepal	0.84	13.38%	0.00%	24.89%
Papua New Guinea	4.21	26.29%	0.00%	46.92%
Uganda	0.51	44.00%	0.00%	62.97%
United Republic of Tanzania	1.09	18.03%	0.00%	34.69%
Uzbekistan	0.50	14.87%	0.00%	31.54%
Average‡	*1.19*	*25.31%*	*0.00%*	*43.02%*
Ad valorem only				
Bangladesh	0.38	0.00%	52.00%	67.00%
Burkina Faso	1.06	0.00%	4.53%	19.79%
Burundi	0.49	0.00%	46.08%	53.92%
Cambodia	0.30	0.00%	10.67%	19.76%
Central African Republic	0.64	0.00%	12.31%	28.46%
Chad	1.06	0.00%	13.35%	33.27%
Comoros	2.83	0.00%	17.73%	19.58%
Côte d'Ivoire	1.49	0.00%	16.35%	26.30%
Eritrea	1.63	0.00%	44.64%	55.36%
Ethiopia	0.44	0.00%	44.48%	56.03%
Guinea	0.39	0.00%	11.05%	37.09%
Guinea-Bissau	2.12	0.00%	2.69%	18.42%
Laos	0.57	0.00%	32.26%	41.35%
Liberia	0.78	0.00%	5.73%	39.84%
Madagascar	0.75	0.00%	50.65%	67.32%
Mali	1.49	0.00%	5.28%	20.53%
Mauritania	1.35	0.00%	20.00%	34.49%
Mozambique	0.60	0.00%	33.67%	48.20%
Niger	1.06	0.00%	6.45%	22.95%
Nigeria	1.89	0.00%	27.21%	31.97%
Rwanda	0.89	0.00%	35.56%	57.37%
Senegal	1.27	0.00%	12.54%	27.79%

Country	Price in USD*	Specific Excise	Ad Valorem Excise	Total tax share†
Sierra Leone	0.16	0.00%	25.04%	41.73%
Togo	1.06	0.00%	15.00%	30.33%
Viet Nam	0.65	0.00%	35.81%	44.90%
Yemen	0.75	0.00%	47.37%	47.37%
Zambia	1.14	0.00%	30.61%	44.41%
Zimbabwe	0.40	0.00%	34.29%	42.86%
Average‡	*0.99*	*0.00%*	*24.76%*	*38.51%*
Both excises				
Congo	0.94	14.67%	13.82%	30.92%
Pakistan	0.23	34.46%	4.24%	52.49%
Average‡	*0.58*	*24.56%*	*9.03%*	*41.70%*
Lower-Middle Income Economies				
No excise				
Kiribati	5.54	0.00%	0.00%	50.00%
Maldives	1.56	0.00%	0.00%	30.00%
Marshall Islands	2.50	0.00%	0.00%	40.00%
Average‡	*3.20*	*0.00%*	*0.00%*	*40.00%*
Specific only				
Albania	1.48	30.77%	0.00%	49.95%
Algeria	0.98	53.14%	0.00%	67.67%
Armenia	1.63	16.83%	0.00%	31.74%
Azerbaijan	0.87	5.14%	0.00%	21.83%
Colombia	0.80	23.80%	0.00%	34.31%
Egypt	0.49	59.27%	0.00%	59.27%
Georgia	0.60	40.00%	0.00%	55.25%
India	1.65	43.98%	0.00%	55.09%
Lesotho	2.36	25.28%	0.00%	38.32%
Micronesia (Federated States of)	1.75	34.29%	0.00%	39.00%
Mongolia	0.39	27.98%	0.00%	37.07%
Namibia	2.47	28.78%	0.00%	41.83%
Philippines	0.53	43.52%	0.00%	54.23%
Samoa	2.69	49.49%	0.00%	62.53%
Sri Lanka	2.83	58.63%	0.00%	71.67%
Swaziland	3.44	12.03%	0.00%	32.03%
Tonga	3.56	39.47%	0.00%	52.52%
Vanuatu	5.68	12.50%	0.00%	61.11%
Average‡	1.90	33.60%	0.00%	48.08%
Ad valorem only				
Angola	0.67	0.00%	15.80%	37.05%
Bolivia	0.78	0.00%	29.50%	41.00%
Bosnia and Herzegovina	1.42	0.00%	41.97%	56.50%
Cameroon	1.06	0.00%	5.60%	21.74%

Country	Price in USD*	Specific Excise	Ad Valorem Excise	Total tax share†
Cape Verde	2.52	0.00%	3.25%	21.72%
Congo	0.89	0.00%	16.32%	32.21%
Djibouti	0.68	0.00%	43.51%	43.51%
Ecuador	2.20	0.00%	53.57%	64.29%
Guatemala	1.29	0.00%	46.00%	56.71%
Guyana	1.75	0.00%	13.58%	27.37%
Honduras	0.95	0.00%	28.00%	41.05%
Iran (Islamic Republic of)	1.32	0.00%	5.13%	19.16%
Iraq	0.63	0.00%	8.53%	22.75%
Myanmar	0.81	0.00%	75.00%	75.00%
Nicaragua	1.06	0.00%	7.75%	23.15%
Paraguay	0.20	0.00%	9.74%	18.83%
Peru	1.27	0.00%	25.21%	42.95%
Sudan	0.97	0.00%	58.91%	71.95%
Turkmenistan	2.12	0.00%	30.00%	43.04%
Average‡	*1.19*	*0.00%*	*27.23%*	*40.00%*
Both excises				
China	0.73	1.20%	20.45%	36.18%
Dominican Republic	2.82	26.00%	20.00%	62.00%
El Salvador	1.40	7.14%	9.19%	31.38%
Indonesia	1.14	5.60%	38.64%	52.64%
Jordan	1.97	22.86%	31.99%	68.64%
Macedonia	1.61	2.86%	21.23%	39.34%
Morocco	2.16	0.57%	50.05%	66.36%
Republic of Moldova	0.58	2.00%	3.00%	21.67%
Syrian Arab Republic	0.62	3.00%	12.30%	30.30%
Thailand	1.29	2.22%	55.02%	63.78%
Tunisia	1.30	2.35%	47.33%	64.94%
Ukraine	0.39	20.00%	8.74%	45.40%
Average‡	*1.33*	*7.98%*	*26.49%*	*48.55%*
Upper-Middle Income Economies				
No excise				
Cook Islands	6.02	0.00%	0.00%	64.84%
Grenada	2.96	0.00%	0.00%	30.38%
Nauru	3.05	0.00%	0.00%	62.05%
Niue	4.63	0.00%	0.00%	66.25%
Palau	3.50	0.00%	0.00%	57.14%
Saint Lucia	3.70	0.00%	0.00%	14.22%
Average‡	*3.98*	*0.00%*	*0.00%*	*49.15%*

Country	Price in USD*	Specific Excise	Ad Valorem Excise	Total tax share†
Specific only				
Belarus	0.86	8.00%	0.00%	23.25%
Belize	3.50	25.71%	0.00%	34.81%
Botswana	2.33	38.97%	0.00%	48.06%
Brazil	1.03	28.73%	0.00%	58.39%
Croatia	2.91	42.67%	0.00%	60.70%
Cuba	0.30	87.14%	0.00%	87.14%
Dominica	1.40	11.64%	0.00%	49.43%
Fiji	1.30	76.94%	0.00%	76.94%
Jamaica	5.05	29.63%	0.00%	45.15%
Kazakhstan	0.75	8.89%	0.00%	19.60%
Mauritius	2.05	67.69%	0.00%	80.74%
Saint Vincent and the Grenadines	2.00	1.67%	0.00%	28.75%
Seychelles	3.98	75.76%	0.00%	75.76%
South Africa	2.04	32.44%	0.00%	44.72%
Suriname	1.82	6.40%	0.00%	42.19%
Uruguay	1.85	47.79%	0.00%	65.82%
Average‡	*2.07*	*36.88%*	*0.00%*	*52.59%*
Ad valorem only				
Argentina	1.11	0.00%	60.90%	67.50%
Chile	2.07	0.00%	60.40%	76.37%
Costa Rica	1.35	0.00%	44.22%	55.72%
Gabon	2.12	0.00%	5.91%	21.17%
Lebanon	1.33	0.00%	33.38%	44.01%
Libyan Arab Jamahiriya	0.80	0.00%	1.96%	1.96%
Mexico	2.07	0.00%	52.17%	65.22%
Panama	1.96	0.00%	28.26%	43.52%
Saint Kitts and Nevis	1.85	0.00%	10.45%	30.31%
Turkey	1.97	0.00%	58.00%	73.25%
Venezuela	3.96	0.00%	70.00%	78.26%
Average‡	*1.87*	*0.00%*	*38.70%*	*50.66%*
Both excises				
Bulgaria	1.98	29.82%	40.50%	86.98%
Latvia	2.93	24.55%	32.20%	72.01%
Lithuania	1.83	35.27%	20.00%	71.23%
Malaysia	2.60	40.00%	3.56%	48.32%
Montenegro	0.84	3.33%	26.00%	43.86%
Poland	1.94	34.49%	41.32%	93.84%
Romania	2.22	32.71%	25.00%	73.68%
Russian Federation	0.51	16.00%	5.50%	36.75%
Serbia	0.95	16.10%	33.00%	64.35%
Average‡	1.76	25.81%	25.23%	65.67%

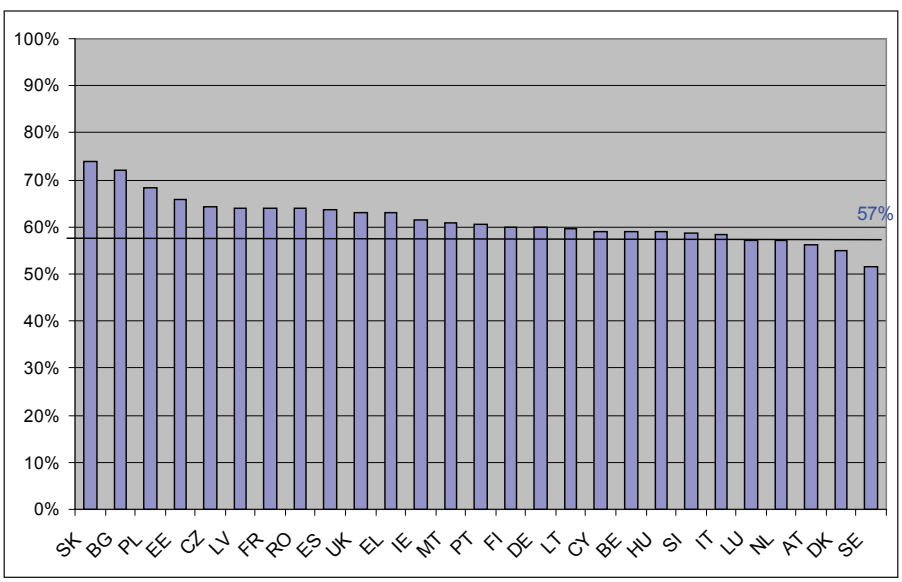
Country	Price in USD*	Specific Excise	Ad Valorem Excise	Total tax share†
High Income Economies				
No excise				
Antigua and Barbuda	2.56	0.00%	0.00%	31.37%
Bahrain	1.60	0.00%	0.00%	33.33%
Kuwait	1.70	0.00%	0.00%	34.04%
Oman	1.56	0.00%	0.00%	33.33%
Qatar	1.65	0.00%	0.00%	33.33%
Saudi Arabia	1.60	0.00%	0.00%	33.33%
United Arab Emirates	1.77	0.00%	0.00%	30.77%
Average‡	*1.78*	*0.00%*	*0.00%*	*32.79%*
Specific only				
Australia	6.65	53.02%	0.00%	62.11%
Barbados	5.50	34.18%	0.00%	48.84%
Brunei Darussalam	1.17	71.43%	0.00%	71.43%
Canada	6.48	57.56%	0.00%	64.63%
Japan	3.31	58.29%	0.00%	63.29%
New Zealand	5.90	57.77%	0.00%	68.88%
Norway	10.14	52.68%	0.00%	72.68%
Republic of Korea	1.98	52.90%	0.00%	61.99%
Singapore	8.06	60.69%	0.00%	67.23%
Trinidad and Tobago	2.22	23.64%	0.00%	36.69%
United States of America	4.58	31.55%	0.00%	36.57%
Average‡	*5.09*	*50.34%*	*0.00%*	*59.48%*
Ad valorem only				
Bahamas	4.29	0.00%	24.62%	24.62%
Equatorial Guinea	2.12	0.00%	19.39%	35.36%
Average‡	*3.21*	*0.00%*	*22.00%*	*29.99%*
Both excises				
Austria	5.57	13.35%	43.00%	73.01%
Belgium	5.79	7.66%	52.41%	77.43%
Cyprus	3.92	14.54%	44.50%	72.08%
Czech Republic	3.00	35.52%	28.00%	79.48%
Denmark	6.24	38.58%	13.61%	72.19%
Estonia	2.88	31.25%	31.00%	77.50%
Finland	6.12	6.88%	52.00%	76.91%
France	7.38	6.03%	57.97%	80.39%
Germany	6.55	35.15%	24.66%	75.77%
Greece	4.18	3.67%	53.83%	73.47%
Hungary	3.02	29.08%	28.30%	74.05%
Iceland	5.52	38.65%	12.68%	71.00%
Ireland	11.27	43.28%	18.26%	79.24%
Israel	5.00	5.00%	53.68%	72.10%

Country	Price in USD*	Specific Excise	Ad Valorem Excise	Total tax share†
Italy	5.98	3.15%	54.74%	74.56%
Luxembourg	4.45	9.62%	47.44%	70.10%
Malta	5.29	11.58%	48.70%	75.53%
Netherlands	6.12	39.65%	20.87%	76.49%
Portugal	4.94	36.48%	23.00%	76.83%
Slovakia	2.45	49.74%	24.00%	89.70%
Slovenia	3.06	15.00%	43.21%	74.88%
Spain	4.18	3.67%	57.00%	76.64%
Sweden	5.63	14.09%	39.20%	73.29%
Switzerland	6.20	30.00%	25.00%	62.06%
United Kingdom	7.64	42.77%	24.00%	79.82%
Average‡	*5.30*	*22.58%*	*36.84%*	*75.38%*

Notes: ‡ Price of the most sold brand in the country converted into US dollars using official (principal or market) exchange rates at end of time period; †total tax share includes specific excise, ad valorem excise, value added tax (VAT), imported tax duty (if the most popular brand in the country is imported), and others (if applicable); ‡un-weighted arithmetic average; § July 2008 World Bank classification of countries by income.

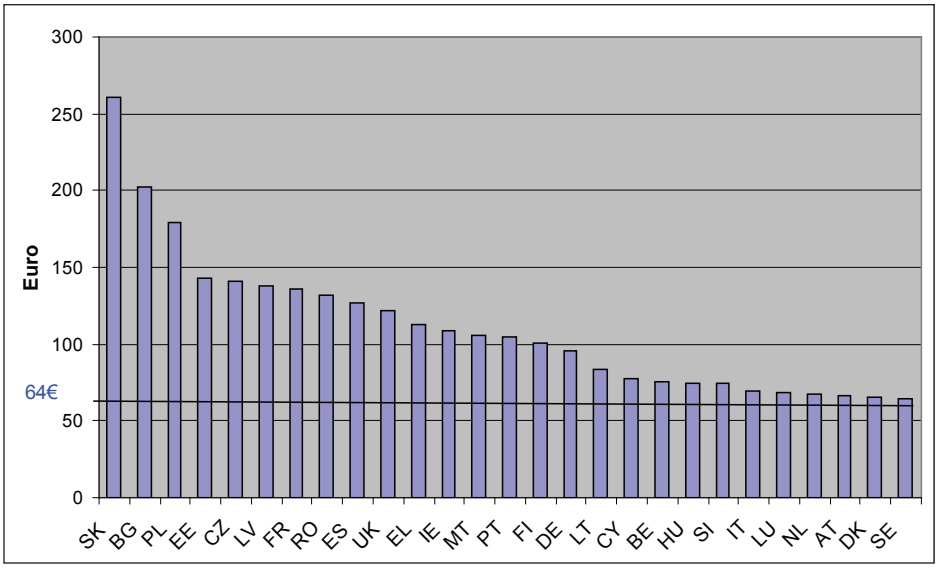
Source: Authors' calculations using data from WHO GTCR 2009 (price and tax), IMF (official exchange rate)—except for Myanmar (unofficial exchange rate from the CIA World Factbook)

Figure 3: Excise tax share as % of Retail Selling Price, EU, January 2010



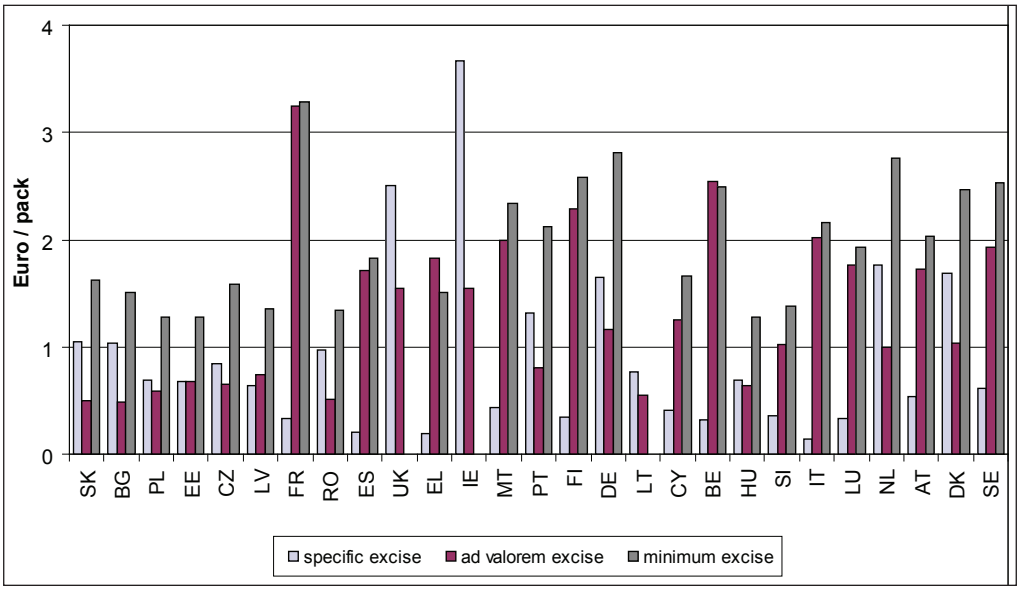
Source: Authors' calculations using data from the European Commission, Taxation and customs Union

Figure 4: Excise yield on MPPC (€ / 1000), EU, January 2010



Source: Authors' calculations using data from the European Commission, Taxation and Customs Union

Figure 5: Excises applied (€ / 1000), EU, January 2010



Source: Authors' calculations using data from the European Commission, Taxation and Customs Union

EU countries abbreviations:

AT	Austria	DE	Germany	FI	Finland	LT	Lithuania	NL	Netherlands	SE	Sweden
BE	Belgium	DK	Denmark	FR	France	LU	Luxembourg	PL	Poland	SI	Slovenia
BG	Bulgaria	EE	Estonia	HU	Hungary	LV	Latvia	PT	Portugal	SK	Slovakia
CY	Cyprus	EL	Greece	IE	Ireland	MT	Malta	RO	Romania	UK	United Kingdom
CZ	Czech Republic	ES	Spain	IT	Italy						

Table 4: Price elasticities estimates (η_p) - Summary

Countries-Province/ Authors	Data/Year	Results
Argentina Rozada (2006)	Monthly data Jan 1996 to June 2004	η_p = -0.265
Bolivia Alcaraz (2006)	Yearly data 1988-2002	η_p = -0.85
Brazil Iglesias (2006)	Quarterly data 1991-2003	η_p = -0.25 to -0.279
Bulgaria Sayginsoy, Yurekli, de Beyer (2002)	Living Standards Measurement Study household survey of 1995	η_p = -1.33
Chile Debrott (2006)	Quarterly data 1993-2003	η_p = -0.21
China Mao ZZ, Jiang, JL (1997) Sichuan province	Aggregate times series 1981-1993	η_p = -0.47 to -0.8
China Mao ZZ, Jiang, JL (1997) Sichuan province	Cross section 1995	η_p = -0.69
China Hu TW, Mao Z (2002)	Aggregate times series 1980-1996	η_p = -0.54
China Lance, Akin, Loh and Dow (2004)	Micro-level data, survey, 1993 and 1997 panels (9 Provinces)	η_p = -0.007 to -0.08
China Mao Z, Hu TW, Yang GH (2005)	Cross sectional 2002	η_p = -0.154
China Mao Z, Hu TW, Yang GH (2005)	Aggregate times series 1980-2002	η_p = -0.18 to -0.61
China Bai Y, Zhang Z (2005) Provincial and special municipalities	Pooled cross-section/ time series 1997-2002	η_p = -0.84
China Mao Z, Yang GH, Ma H. (2003)	Cross section 1998 (16 counties)	η_p = -0.51
China Bishop, J. A.; Liu, H. Y.; Meng, Q. (2007)	1995 Chinese Household Income Project	η_p = -0.47 to -0.51
Egypt Nassar (2001)	Cross sectional data on family budget 1994/1995 and 1995/1996 surveys	η_p = -0.27 to -0.82
Estonia Taal et al (2004)	Monthly data taken from - Household income and expenditure study be Emro 1992 to 1999 - Statistical Office of Estonia 1996 to 1999	η_p = -0.32
Europe (Region) Gallus, S.; Schiaffino, A.; La Vecchia, C.; Townsend, J.; Fernandez, E. (2006)	2000, Tobacco Control Country Profiles (TCCP) Data.	η_p = -0.4 to -0.85
India Bhall et al (2005) Not published	- National Sample Survey Organisation's National Sample Survey 1983 and 1999 - National Family Health Survey for 1998-1999	Cigarettes: η_p = -0.79 to -0.85 Bidis: η_p = -0.58 to -0.83
India John, R. M. (2008)	1999-2000 NSSO Survey	Bidis: η_p = -0.86 to -0.92 Cigarettes: η_p = -0.18 to -0.41

Countries-Province/ Authors	Data/Year	Results
Indonesia Adioetomo, Djutaharta, Hendratno (2001)	1999 National Socio-economic Survey data	η_p = -0.61
Indonesia Djutaharta, Surya, Pasay, Hendratno, Adioetomo (2002)	1- Yearly data: 1970-2001 2- Monthly data: January 1996- June 2001	η_p = -0.32 to -0.57
Indonesia Adoietomo et al. (2005)	1999 National Socio-Economic Survey (Susenas), collected by the Central Bureau of Statistics.	η_p =-0.61
Malaysia Ross, H.; Al-Sadat, N. A. M. (2007)	1990-2004	η_p = -0.077 to -0.76*
Maldives InfoGlobal consultants (2002)	Monthly data December 1997 to October 2000.	η_p = -1
Myanmar Kaing (2003)	Household level data (2000)	η_p = -1.619
Nepal Karki (2003)	Household level data (2003)	η_p = -0.886
Russia Ogloblin et al. (2003)	Household data from national surveys 1996 and 1998	Price elasticity of the decision to smoke = -0.085 to -0.628
Russia Lance, Akin, Loh and Dow (2002)	Longitudinal household surveys, 1992-2000	η_p = – 0.02 to – 0.176
South Africa Berg and Kaempfer (2001)	Household survey, 1997 (6500 black households and 1350 white households)	η_p Black = -0.8 to -1.79
South Africa Van Walbeek (2002)	The Income and Expenditure household surveys of 1990 and 1995	η_p = -0.81 to -1.39
Sri Lanka Arunatilake (2001)	Monthly time series data 1999 to 2000	η_p = -0.227 to -0.908
Sri Lanka Arunatilake (2002)	Household level data 1999/2000	η_p = -0.45
Thailand Supakorn (1993)	na	η_p = -0.67
Thailand Sartinsart (1993)	Linear Expenditure System and household level data of 1988	η_p = -0.09
Thailand Sartinsart et al. (2003)	Household socio-economic survey 2000. Consumer price index from the Department of Business Economics, Ministry of Commerce)	η_p = -0.393
Turkey Onder (2001)	Household level data Survey, 1994	η_p = -0.41
Ukraine Krasovsky, Andreeva, Krisanov, Mashliakivskyand Rud (2001)	June 2001 national survey	η_p = - 0.4
Ukraine Maksym Mashlyakivskyy (2004)	Monthly data 1997 to 2003	η_p = -0.3 to -0.48
Uruguay Ramos (2006)	Quarterly data 1991-2003	η_p = -0.34 to -0.55

Table 5: Countries Earmarking Tobacco Tax Revenues by Region

Region/ Country	Number of countries/ states	Link between tax and spending program	Type of spending program
Africa	3	Weak	Broad: youth, sports and recreation (Madagascar), University hospital of Brazzaville (Congo), health (Comoros)
Central and South America	9	Weak	Broad: health (El Salvador, Guatemala, Jamaica), education, social and old age security (Costa Rica), sports (Colombia), debt cancelling and Anti-Cancer Commission (Uruguay), Agriculture, including subsidies to tobacco producers (Argentina), emergency relief (Paraguay). Narrow: Oncologic institute (Panama).
Europe	10	Weak	Broad spending examples: health, social security, culture. Narrow spending examples: smoking prevention, treatment of tobacco-related diseases (Finland, Iceland, Poland, Serbia and Switzerland).
North America U.S.A. (Federal and States)	36	Weak	Federal: Broad (Children's health insurance policy) States: Broad in all States. Often revenues are shared among spending programmes according to predetermined percentages. Spending examples: health, education, sports and recreational activities.
North Africa and Middle East	7	Weak	Broad: High Council for the Youth (Jordan), Solidarity National Fund (Tunisia). Narrow: tobacco control and treatment of tobacco diseases (Yemen), tobacco control (Djibouti, Iran and Qatar), health insurance for students (Egypt).
South-East Asia	3	Weak	Broad: health (India, Nepal, Thailand), social security (India)
Western Pacific	6	Weak	Broad: health (Korea, Mongolia, Philippines), education (Marshall Islands), railways and forest special service accounts (Japan) Narrow: tobacco control (Tuvalu).

Source: WHO data collection through the GTCR questionnaire and personal communication

Notes: This table is not exhaustive, and relies on publicly available information from governments' websites. 1/ "Weak": Tobacco revenues are partially earmarked, or spending benefiting from earmarked revenues also benefit from other financing sources (e.g. general fund). "Tight": all revenues are earmarked and the spending programme is exclusively financed by earmarked revenues. 2/ "Broad": spending program is broadly defined (e.g. health, education). "Narrow": spending programme is narrowly defined or specific (e.g. smoking prevention).

10
The taxation of tobacco products

Frank J. Chaloupka, Teh-wei Hu, Kenneth E. Warner, Rowena Jacobs, and Ayda Yurekli

This chapter reviews a variety of issues related to the taxation of cigarettes and other tobacco products. The empirical evidence showing that higher cigarette taxes result in higher cigarette prices is reviewed. This is followed by a discussion of the econometric literature examining the impact of prices and taxes on the demands for tobacco products. The small but growing body of research for low-income and middle-income countries clearly shows that higher prices would lead to significant reductions in tobacco use. Similarly, numerous studies from high-income countries reach the same conclusion. The estimated price-elasticities for low-income and middle-income countries are about double those for high-income countries, where estimates center on –0.4. Because of the addictive nature of tobacco use, demand for tobacco products is more elastic in the long-run. In addition, estimates from high-income countries indicate that youth and young adults, less educated persons, and those with lower incomes will be relatively more responsive to price changes. This review is followed by a discussion of the various motives for tobacco taxation, including the use of these taxes to generate revenues and to improve economic efficiency and public health. Finally, several other issues in tobacco taxation, including the earmarking of tobacco tax revenues and barriers to tobacco taxation, are discussed.

Sugar, rum, and **tobacco, are commodities which are no where necessaries of life, which are become objects of almost universal consumption, and which are therefore extremely proper subjects of taxation**. . . . In the mean time the people might be relieved from some of the most burdensome taxes; from those which are imposed either upon the necessaries of life, or upon the materials of manufacture. The labouring poor would thus be enabled to live better, to work cheaper, and to send their goods cheaper to market. The cheapness of their goods would increase the demand for them, and consequently for the labour of those who produced them. This increase in the demand for labour, would both increase the numbers and improve the circumstances of the labouring poor. Their consumption would increase, and together with it the revenue arising from all those articles of their consumption upon which the taxes might be allowed to remain.

(Smith, 1776, Book V, Chapter III, pp. 474–476.) (Emphasis added.)

10.1 Introduction

Shortly after Columbus returned to Europe bringing tobacco from the New World with him, tobacco use was subject to much controversy. Indeed, a number of countries soon

adopted laws prohibiting the sale of tobacco and/or its public use, while others described tobacco as a 'social menace'—among the more severe penalties for selling and/or consuming tobacco products were whippings, beheadings, and nose slittings in Russia, China, Turkey, India, and elsewhere (Wagner 1971; Dillow 1981). However, it was not long before these laws were repealed as treasuries realized that significant revenues could be generated from the sale and taxation of tobacco and tobacco products. For centuries, nearly every country in the world has taxed tobacco and/or tobacco products, largely because the relatively inelastic demands for these products make them an easy source of revenues. Over time, however, as the health consequences of cigarette smoking and other tobacco use were discovered, increased taxation of these products has been used, by at least some governments, as a way of reducing the health damage caused by tobacco.

This chapter reviews a variety of issues related to the taxation of cigarettes and other tobacco products, beginning with a review of the economics literature on the impact of tobacco taxation on price and the subsequent effects of prices on the demands for cigarettes and other tobacco products. The various rationales for tobacco taxation, including those related to revenue generation, equity, and as a means to improve public health, are then discussed. Issues related to the design and administration of tobacco taxes are covered elsewhere (Chapter 17).

10.2 The impact of tobacco taxes on the prices of tobacco products

Increases in taxes on cigarettes and other tobacco products are expected to result in higher prices for these products. This is clearly reflected by the data in Table 10.1, which describes cigarette taxes, prices, and taxes as a percentage of price in selected countries. As expected, prices generally rise with taxes. In general, taxes in low- and middle-income countries are well below taxes in high-income countries; consequently cigarette prices in low- and middle-income countries are well below prices in high-income countries. Moreover, the cigarette tax usually accounts for two-thirds or more of price in higher-income countries (with the notable exception of the United States), compared to half or less of the price in many low- and middle-income countries.

When specific excise taxation (based on quantity) is the primary form of taxation, the real value of the tax will fall over time, unless regularly increased to account for inflation. Given that taxes are important components of the prices of tobacco products, one consequence of using specific excise taxes is that the real prices of tobacco products will decline over time as the prices of other goods and services increase more rapidly. In the United States, for example, the relative stability of federal and state cigarette excise taxes in the 1970s contributed to a drop of nearly 40% in real cigarette prices between 1971 and 1981 that was reversed by a series of federal and state tax increases in the 1980s and 1990s. In contrast, under a system that primarily uses *ad valorem* taxation (based on value), the real value of the tax and the real price of tobacco products will likely be stable over time as nominal prices rise with the prices of other goods and services.

Table 10.1 Cigarette prices and taxes, selected countries, by income group

	Price (US$)	Tax (US$)	Tax as percentage of price
Low-income countries			
Armenia	0.20	0.10	50
Bangladesh	0.09	0.03	30
Cambodia	0.05	0.01	20
China	0.20	0.08	38
India (white sticks)	0.37	0.28	75
Pakistan	0.28	0.21	73
Sri Lanka	1.05	0.25	24
Vietnam	0.10	0.04	36
Zambia	0.65	0.20	30
Zimbabwe	0.43	0.34	80
Lower-middle-income countries			
Albania	0.29	0.20	70
Bolivia	0.32	0.20	61
Bulgaria	0.60	0.25	42
Colombia	0.06	0.03	45
El Salvador	0.67	0.28	42
Indonesia	0.0004	0.0001	30
Jamaica	0.37	0.16	42
Philippines	0.22	0.14	63
Thailand	0.60	0.37	62
Turkey	0.51	0.22	42
Venezuela	0.07	0.04	50
Upper-middle-income countries			
Argentina	1.38	0.97	70
Brazil	1.05	0.79	75
Chile	0.88	0.62	70
Czech Republic	0.33	0.0003	0.1
Hungary	0.52	0.22	42
Malaysia	0.68	0.23	33
Mexico	0.63	0.38	60
Poland	0.50	0.20	39
Slovak Republic	0.58	0.20	34
Slovenia	1.08	0.68	63
South Africa	1.32	44	33
High-income countries			
Australia	4.85	3.15	65
Austria	2.96	2.16	73
Belgium	3.32	2.49	75
Canada	3.98	2.04	51
Denmark	5.21	4.38	84
Finland	4.49	3.28	73
France	2.90	2.17	75
Germany	3.38	2.43	72
Greece	1.90	1.39	73
Ireland	1.69	1.27	75

Table 10.1 (*Cont.*)

	Price (US$)	Tax (US$)	Tax as percentage of price
Italy	2.19	1.60	73
Japan	2.43	1.46	60
Korea, Republic of	0.77	0.46	60
Netherlands	2.99	2.15	72
New Zealand	4.69	3.19	68
Norway	7.01	5.47	78
Portugal	1.47	1.19	81
Spain	1.38	0.99	72
Sweden	4.58	3.16	69
Switzerland	2.80	1.45	52
United Kingdom	4.16	3.24	78
United States	1.94	0.58	30

Source: unpublished data, World Bank.

In a perfectly competitive market with constant long-run costs of production, an increase in tobacco taxes would be fully passed on to consumers in the form of an equivalent price increase. At the opposite extreme, a private monopolist would share the burden of the tax increase with smokers, with consumers bearing relatively more of the burden when demand is relatively inelastic. In the past, a single firm dominated the tobacco industry in many countries; in some countries, the government was the monopolist. Over time, however, with increasing trade liberalization and the growth of multinational tobacco companies, this has changed (as described in Chapter 14). As shown by Jacobs *et al.* (Chapter 13), the tobacco industry in nearly every country is at neither extreme, but is instead an oligopoly. The oligopolistic nature of the tobacco industry in most countries has significant implications for the effects of tobacco tax increases on the prices of tobacco products.

Nearly all of the empirical analyses of the relationship between tobacco taxes and prices are based on data for cigarettes from the United States. The earliest studies produced generally inconsistent findings, with some concluding that price increased by less than the amount of a tax increase (consistent with monopoly behavior), while others concluded that the tax increase was fully passed on to consumers (consistent with more competitive behavior) (Barzel 1976; Johnson 1978; Sumner 1981; Sumner and Ward 1981; Bulow and Pfleiderer 1983; Bishop and Yoo 1985; Sullivan 1985; Sumner and Wohlgenant 1985; Ashenfelter and Sullivan 1987). One general weakness of these studies is that they failed to account for the dynamic interaction of firms in an oligopolistic industry, a factor that has become increasingly important in recent years as the growth of multinational tobacco companies has led to greater competition in once monopolized markets and increased consolidation in markets that were once relatively more competitive.

More recent studies have attempted to more formally model the dynamic nature

of an oligopolistic industry when estimating the impact of cigarette taxes on cigarette prices. Models of oligopoly behavior, however, have less clear implications for the effects of tax increases on price. Those in which there is relatively little collusion among firms, for example, suggest that increases in taxes would be at least partially borne by tobacco firms. Those where there is more coordinated behavior, however, could result in price increases of the same or greater magnitude than the tax increase. Historically, there is consistent evidence of collusive behavior among tobacco firms (although it falls short of perfectly collusive, or monopoly, behavior). For example, internal industry documents recently uncovered as part of Washington state's lawsuit against US tobacco companies suggest that Philip Morris and British American Tobacco (the two largest multinational tobacco companies) colluded to fix cigarette prices and divide markets in Costa Rica, Argentina, Venezuela, and other Latin American countries (Levin 1998). The collusion was not perfect, however; for example, one British American Tobacco memo suggests that a price war in Venezuela resulted when smuggled cigarettes became more common.

Most of the more recent empirical studies of the tax-price relationship that have modeled the dynamic, oligopolistic behavior of tobacco companies conclude that increases in cigarette taxes lead to significant increases in cigarette prices. Harris (1987), for example, used data on wholesale and retail cigarette prices, as well as data on manufacturing costs and state cigarette taxes, to estimate the impact of the doubling of the US federal cigarette tax (from 8 to 16 cents per pack) in 1983 on US cigarette prices. He concluded that the tax increase led to a price increase that was more than double the size of the tax hike (17 cents), which could not be explained by increases in manufacturing costs. Harris argued that firms in the US cigarette market used the scheduled tax increase as a coordinating mechanism for an oligopolistic price increase, noting that the price increases began shortly after the tax increase was announced, but well before the tax was actually increased.

This issue was re-examined by Barnett and his colleagues (1995), who argued that Harris attributed too much of the price increase to the tax increase, noting that the underlying upward trend in cigarette prices predated the debate over the US tax increase. Instead, they argued that the introduction of generic cigarettes in 1981 was used as the mechanism for coordinated, oligopolistic increases in the prices of premium cigarettes. The lower-priced, lower-quality generic cigarettes kept at least some of the more price-sensitive smokers in the market.

In a series of papers, Keeler and his colleagues (Sung *et al.* 1994; Barnett *et al.* 1995; Keeler *et al.* 1996) explored the relationship between state and federal cigarette tax increases and cigarette prices. Their models accounted for the interaction of supply and demand, the oligopolistic nature of the cigarette industry, and, in some cases, the addictive nature of cigarette smoking. Using annual, state-level data for the period from 1960 through 1990, Keeler *et al.* (1996) estimated that a 1-cent increase in a state's cigarette tax would lead to a 1.11-cent increase in the state's average cigarette prices. Moreover, they estimated that a national tax increase would lead to an even larger increase in price. The relatively smaller increase in state prices was attributed to the potential for cross-border shopping for cigarettes in nearby lower tax and price states. In addition, Keeler and his colleagues concluded that cigarette producers price-

discriminate by state. That is, cigarette producers charge relatively low prices in states where there are stronger state and local tobacco control policies than they do in places with weaker policies. However, they noted that the effect of this price discrimination on retail prices was relatively small.

In addition, recent theoretical advances in the modeling of addictive behavior also imply that increases in tobacco taxes will lead to disproportionate increases in the prices of tobacco products. Becker *et al.* (1994) describe the behavior of a monopolist producing an addictive good like cigarettes. They argued that the monopolist will set a price below the short-run profit-maximizing level when consumption is addictive and future prices will exceed future marginal costs because of their monopoly power. The lower price 'hooks' consumers on their addictive product, thus raising the future demand for this product. When cigarette taxes are increased, Becker *et al.* argued that cigarette companies will raise price by more than the amount of the tax increase in order to obtain the maximum profits from current, addicted smokers. The increase in current profits helps them offset the future losses from the reduced smoking initiation that results from the tax and price increase. Becker and his colleagues explained this apparent paradox as follows (1994, p.413):

> If smokers are addicted and if the industry is oligopolistic, an expected rise in future taxes and hence in future prices induces a rise in current prices even though current demand falls when future prices are expected to increase.

The key conclusion to draw from both the empirical and theoretical research is that increases in cigarette and other tobacco taxes, because of the addictive nature of consumption and because of the oligopolistic structure of the industry, will lead to increases in the prices of tobacco products that are likely to match or exceed the increase in the tax in most countries. Relatively larger increases in prices will occur in countries where there is less potential for cross-border shopping (i.e. relatively low tax-and-price countries surrounded by relatively high tax-and-price countries).

10.3 Tobacco taxes, prices, and the demands for tobacco products

10.3.1 Theoretical foundations

Perhaps the most fundamental law of economics is that of the downward-sloping demand curve derived from the consumer's constrained utility-maximization process. This law states that as the price of a product rises, the quantity demanded of that product falls. For many years, however, numerous researchers viewed cigarette smoking and other addictive behaviors as exceptions to this most basic law of economics because of the seeming irrationality of these behaviors (i.e. Schelling 1978, 1984; Elster 1979; Winston 1980). A now substantial and rapidly expanding literature, however, clearly indicates that the demands for tobacco products do respond to changes in prices and other factors. This is apparent from the simple descriptive data presented in Figs 10.1–10.3, as well as from the econometric research that has applied both traditional models of demand and the more recent studies that explicitly account for the addictive nature of cigarette smoking and other tobacco use (see Chapter 5 for a detailed discussion of the economics of addiction).

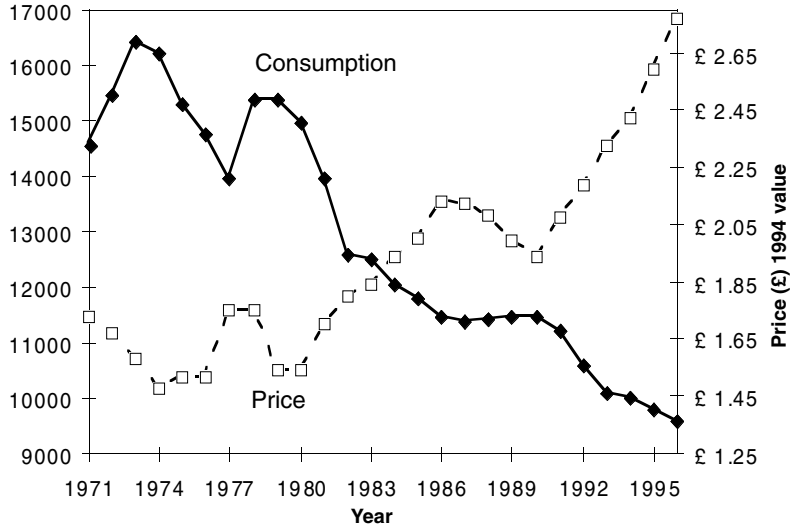


Fig. 10.1 Real cigarette prices and cigarette consumption, United Kingdom, 1971–96. (Source: Townsend 1998.)

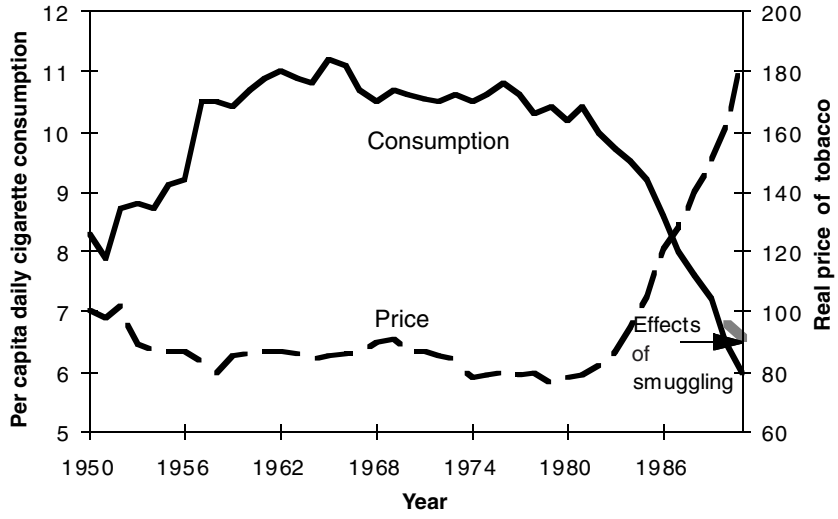


Fig. 10.2 Real cigarette prices and daily per capita cigarette consumption among persons 15 and older, Canada 1950–91. (Source: Townsend 1998.)

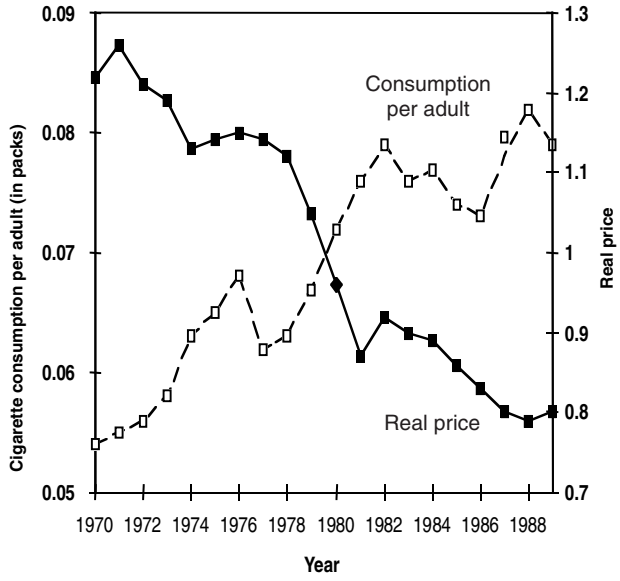


Fig. 10.3 Real cigarette prices and cigarette consumption, South Africa, 1970–89. (Source: Townsend 1998.)

10.3.2 Estimation issues

Over the past several decades, numerous studies have examined the effects of taxes and prices on the demands for cigarettes and other tobacco products. Most of the earliest involved applications of a traditional model of demand, but many of the more recent studies have modeled the addictive nature of tobacco use. These studies have employed diverse econometric and other statistical methods on data from numerous countries. Many have used aggregate time-series data on cigarette sales for a single geographical unit, while others have employed pooled cross-sectional time-series data. Still others have used data on individuals taken from surveys. One clear conclusion emerges from this literature: increases in the prices of cigarettes and other tobacco products significantly reduce cigarette smoking and other tobacco use. Most estimates for the price-elasticity of demand from the large literature on high-income countries fall into the relatively narrow range from – 0.25 to – 0.50, with many clustering around – 0.40. In contrast, estimates from the much smaller literature on low-income and middle-income countries suggest that demand in these countries is more responsive to price than demand in high-income countries, with most estimates in the range from – 0.50 to – 1.00.

Several difficulties are likely to be encountered by researchers when using aggregate data to estimate the demand for cigarettes. In a time-series model, the estimated price and income elasticities of demand will be sensitive to the inclusion of variables controlling for the effects of other important determinants of smoking, including advertising, changes in existing policies for reducing tobacco use, and increased awareness of the health consequences of smoking. High correlations among these variables

can lead to unstable estimates for the parameters of interest. However, excluding potentially important variables that are correlated with those that are included can lead to biased estimates of the included variables. Many of the studies discussed below, however, have used state-of-the-art methods for time-series to address these difficulties. In general, the aggregate measures of cigarette consumption reflect tax-paid cigarette sales rather than actual consumption. When cross-border shopping and smuggling are important, sales are likely to understate consumption in relatively high tax-and-price jurisdictions, while overstating consumption in relatively low tax-and-price jurisdictions. If these factors are not controlled for, then estimates of the effects of taxes and prices on demand based on sales data are likely to overstate the impact of price on cigarette smoking. However, many of the recent studies employing aggregate data have made careful efforts to allow for cross-border shopping and organized cigarette smuggling; although imperfect, these efforts should significantly reduce the biases associated with the use of sales data as the measure of consumption. An additional problem in the analysis of aggregate data arises from the fact that cigarette prices are determined by the interaction of supply and demand. Failing to account for this simultaneity leads to biased estimates of the price-elasticity of demand. Again, several recent studies have theoretically and empirically modeled the supply and demand for cigarettes. Alternatively, others have taken advantage of natural experiments (such as large increases in cigarette taxes) to avoid the simultaneity problem. Finally, studies employing aggregate data are limited to estimating the impact of changes in prices and other factors on aggregate or per capita estimates of cigarette consumption. Consequently, these studies cannot provide information on the effects of these factors on the prevalence of tobacco use, initiation, cessation, or quantity and/or type of tobacco product consumed. Similarly, these studies cannot explore differences in responsiveness to changes in price and other factors among different population subgroups, including those defined by age, gender, race/ethnicity, and socio-economic status.

The use of individual data taken from surveys avoids some of the problems associated with the use of the aggregate data. For example, the data collected in the surveys provide measures of the prevalence of tobacco use and consumption of tobacco products, avoiding some of the difficulties associated with using sales data as a proxy for consumption. Similarly, many of the key determinants of tobacco use at the individual level are likely to be much less correlated with one another than comparable aggregate measures, creating fewer estimation problems and likely resulting in more stable parameter estimates. Likewise, because individual smokers' purchase decisions are too small to affect the market price of cigarettes, the use of individual-level data is not as likely to be subject to the simultaneity problems inherent in the use of aggregate data. The use of individual-level data, particularly longitudinal data, also allows researchers to explore issues that are difficult to adequately address with aggregate data, including the separate effects of price and other factors on the prevalence of tobacco use, frequency and level of tobacco consumption, initiation, cessation, and type of product consumed, as well as the differential effects among population subgroups. However, the use of individual-level data is not without its own problems. These data may be subject to a significant ecological bias to the extent that omitted variables affecting tobacco use may be correlated with the included determinants of demand. Excluding these variables will, consequently, produce biased estimates for the included variables.

In addition, the use of individual-level data is subject to potential reporting biases; the potential under-reporting of tobacco consumption can lead to problems in interpreting the estimates that are produced from these data. In general, studies using individual-level data have implicitly assumed that the degree of under-reporting is proportional to the actual level of use, implying that the estimated effects of price and other factors will not be systematically biased. Finally, one of the limitations of using survey data is that data on price, availability, advertising, policies, and other important, macro-level determinants of demand, are generally not collected in the surveys. As a result, many relevant variables may be omitted from the analysis, while others added from archival sources may be subject to measurement errors.

10.3.3 Estimates from low-income and middle-income countries

A small but growing number of studies have examined the demands for cigarettes and other tobacco products in a few low- and middle-income countries, while new research is beginning to focus on others. Warner (1990) argued that economic theory suggests that demand in these countries is likely to be more sensitive to price than demand in more affluent countries given the relatively low incomes in these countries. Similarly, the economic models of addiction suggest that the generally lower level of education in lower-income countries is likely to make the demand for tobacco products in these countries relatively more responsive to changes in monetary prices than demand in higher-income countries. In general, the findings from these studies are consistent with these hypotheses, suggesting that cigarette demand in lower-income countries is two or more times as sensitive to price as demand in higher-income countries.

Chapman and Richardson (1990) were the first to empirically estimate the impact of tobacco taxes on the demands for cigarettes and other tobacco products in a developing country. Using annual data on the weight of cigarette and non-cigarette tobacco consumed in Papua New Guinea for the period from 1973 through 1986, they estimated excise tax elasticities of –0.71 for cigarettes and –0.50 for other tobacco products. Their relatively simple double-log regression analysis modeled each of the measures of tobacco use as a function of the excise tax on cigarettes, the excise tax on other tobacco products, income, and a time trend. In addition to the strong own-tax effects that they estimated, Chapman and Richardson also found significant cross-tax effects. Their estimated cross-tax elasticity of cigarette consumption, with respect to other tobacco taxes, was 0.50, while that for other tobacco consumption with respect to the cigarette tax was 0.62. Their estimates clearly indicate that cigarettes and other tobacco products are substitutes for one another. That is, an increase in the cigarette tax, all else constant, would reduce cigarette smoking in Papua New Guinea, with much of the reduction in cigarette tobacco consumption offset by an increase in other tobacco consumption. In addition, Chapman and Richardson found strong, positive income effects for both types of tobacco products.

As Warner (1990) and the authors note, their tax elasticity will understate the true price-elasticity of demand given that taxes are less than 100% of price. Assuming that the tax is fully passed on to consumers, the price-elasticity of demand will be directly related to the inverse of the share of tax in price. For example, if half of price is accounted for by the tax, then the price-elasticities of cigarette and other tobacco

demands in Papua New Guinea would be –1.42 and –1.00, respectively. Unfortunately, the authors' efforts to obtain information on the relationship between taxes and prices were 'fruitless'. Nevertheless, their estimates provided the first evidence that the demand for tobacco products in low-income countries was more responsive to price than demand in high-income countries.

Tansel (1993), however, reached the opposite conclusion for Turkey, a lower-middle income country. Using annual time-series data on cigarette consumption per adult over 15 for the period from 1960 through 1988, Tansel estimates a series of double-log models that include cigarette prices, income, and an indicator for the period when health-warning labels were required on cigarette packages. Additional specifications include an indicator for the years when anti-smoking media campaigns were in place, measures of secondary and higher education enrollment, and/or a measure of lagged consumption (consistent with assuming myopically addictive behavior). He found a negative and significant effect of price on cigarette demand in all specifications. The average short-run price-elasticity of demand implied by the alternative estimates was –0.21. Moreover, lagged cigarette consumption had a positive and significant impact on current consumption, consistent with the assumption of addictive behavior. As expected, the estimated long-run price-elasticity of demand (– 0.37) was well above the short-run estimates. In addition, Tansel found a strong positive effect of income on cigarette demand in Turkey, as well as negative and significant effects for the various indicators for health information and education.

Several recent studies provide some estimates on the price-elasticity of cigarette demand in China (Mao *et al.* 1997; Mao and Xiang 1997; Hsieh and Hu 1997; Xu *et al.* 1998). These estimates, in a range centering on – 0.75, are consistent with the hypothesis that cigarette demand in China is relatively more responsive to price than demand in most developed countries. The first, by Mao and his colleagues (1997), used annual time-series data from the Sichuan province for the period from 1981 to 1993 to estimate the price-elasticity of cigarette demand. Their time-series model included the price of cigarettes, personal disposable income, and per capita alcohol consumption. Two alternative specifications, one including a time-trend variable and one excluding it, were estimated using weighted least squares methods; both produced significant estimates for the cigarette price variable. Based on these results, Mao and his colleagues estimated that the price-elasticity of cigarette demand was in the range from – 0.656 to – 0.803. In contrast to trends in developed countries, the coefficient on their time-trend variable was positive and significant, indicating that cigarette smoking in Sichuan was increasing during the period covered by their data. In addition, Mao *et al.* also estimated models accounting for the addictive nature of cigarette consumption, producing estimated long-run price-elasticities of –1.03 and –1.32 from models that assumed myopic and rational behavior, respectively. Given these estimates, and information on the share of cigarette taxes in price, the authors concluded that raising cigarette taxes in China would lead to both significant reductions in smoking and large increases in cigarette tax revenues.

In a follow-up study, Mao and Xiang (1997) used a cross-sectional survey of 2431 adults in the Sichuan province to estimate a two-part model of cigarette demand. Cigarette price data were collected at the retail level based on the survey respondents' location. They estimated a price-elasticity for smoking participation of – 0.89 and a conditional demand elasticity of – 0.18. These estimates imply that sizable increases in

Chinese cigarette taxes would lead to sharp reductions in smoking prevalence among adults.

Hsieh and Hu (1997) produced similar estimates for Taiwan using annual time-series data for the period from 1966 through 1995. The authors estimated several alternative specifications, including one that allowed for the potential endogeneity of price and another allowing for myopically addictive behavior. In addition to price, their models included income, the market share of low tar cigarettes (which they interpret as reflecting the spread of information about the health consequences of smoking), an indicator for the time when strong health warning labels were required, the female labor force participation rate, and the market share of imported cigarettes (to capture the effects of the opening of the Taiwanese cigarette markets in the late 1980s, described in more detail by Taylor *et al.* in Chapter 14). In addition to estimating overall cigarette demand, Hsieh and Hu separately estimated the demands for domestically produced and imported cigarettes. In all equations, they found strong negative and significant price effects, with estimated price-elasticities of demand from the various specifications in the range from – 0.5 to – 0.7. In addition, they found that the demand for imported cigarettes was much more price sensitive than the demand for domestic brands, with a price-elasticity for imports of –2.7, and that Taiwanese smokers viewed domestic and imported cigarettes as substitutes for one another. In addition, they conclude that both increased income and the opening of the Taiwanese cigarette markets led to an increase in demand, while new information on the health consequences of smoking reduced demand. Similarly, current smoking was found to be positively related to past consumption, consistent with myopic addiction. Finally, they noted that their estimates clearly imply that higher cigarette taxes (which they point out are low in Taiwan compared to most developed countries) are an important policy tool for reducing cigarette smoking in Taiwan.

Most recently, Xu *et al.*(1998) estimated the demand for cigarettes in China using annual time-series data for the period from 1978 through 1992. As the authors described, the data limitations that are typical for many empirical studies are particularly severe for low-income countries, including China. The authors begin their analysis with 1978, since prior to that government control of the cigarette markets in China was very tight and the price of cigarettes was largely fixed. After 1978, however, cigarette prices were allowed to vary, enabling them to conduct an econometric analysis of demand. In addition to estimating the impact of prices on demand, the authors estimated the effects of cigarette taxes on demand in models that also include a measure of per capita income and a time-trend variable. They found that both higher cigarette taxes and prices lead to a significant reduction in per capita cigarette consumption. They estimate a price-elasticity of demand of – 0.987. Their estimate of the tax elasticity of demand, – 0.57, is very consistent with this given the share of taxes in cigarette prices in China and the assumption that taxes are fully passed on to smokers. Xu and his colleagues used their estimates to compute the revenue maximizing value of the tax and the optimal tax in China, concluding that the actual tax was well below both of these.

Studies conducted as part of the Economics of Tobacco Control Project (ETCP) at the University of Cape Town's School of Economics project provide estimates of the price-elasticity of cigarette demand for other low-income countries (Maranvanyika

1998; van der Merwe 1998). As part of this project, researchers estimated the demand for cigarettes in South Africa in a series of alternative specifications that modeled the simultaneity of cigarette demand and supply, as well as the addictive nature of cigarette smoking. In addition to price and income, these models included measures of cigarette advertising, an indicator for years when anti-smoking advertising was broadcast, and unemployment and divorce rates. Using sophisticated econometric methods applied to annual time-series data for the period from 1970 through 1994, the ETCP estimated that the short-run price-elasticity of demand for cigarettes in South Africa was – 0.59. In addition, they estimated a long-run price-elasticity of demand of – 0.68 in their empirical application of a rational addiction model; their estimates, however, did not support the hypothesis of rational addiction. Similarly, the ETCP researchers employed a similar approach to estimate the demand for cigarettes in Zimbabwe using annual time series data for the period from 1970 through 1996. Data limitations, however, required them to estimate a relatively lean specification that included cigarette price, income, and lagged consumption. Based on this model, the researchers concluded that the price-elasticity of demand for cigarettes in Zimbabwe was – 0.85, well above most estimates from high-income countries. Costa e Silva (1998) provided similar estimates for Brazil in a study presented at the ETCP's 1998 Cape Town conference. Using the very limited annual data available for the period from 1983 through 1994, she applied the rational addiction model in an econometric examination of cigarette demand in Brazil. Her estimates from these very limited data indicate that higher cigarette prices would lead to significant reductions in cigarette demand, with a long-run price-elasticity of demand of – 0.80, well above the short-run estimate of – 0.11. However, given the rational addiction model's demands on the very limited data, these should be viewed as a suggestive rather than definitive estimates of the magnitude of the effect of price on demand in Brazil.

One clear conclusion emerges from the econometric studies of the effects of prices on the demands for tobacco products in low- and middle-income countries: higher taxes on cigarettes and other tobacco products would lead to significant reductions in cigarette smoking and other tobacco use. This finding is consistent with a fundamental principle of economics—the law of the downward-sloping demand curve—as well as with the substantial body of research from higher income countries discussed in the next section. In addition, the estimates from low- and middle-income countries suggest that demand in these countries is relatively more responsive to price than demand in high-income countries. Estimates of the price-elasticity of demand for China (including Taiwan), Turkey, Papua New Guinea, and South Africa fall in the relatively wide range from – 0.1 to –1.0 (or higher, given the tax elasticity estimated for Papua New Guinea), with most in the range from – 0.5 to –1.0, while those from higher income countries tend to fall in the range from – 0.25 to – 0.5. This difference in relative price sensitivity is consistent with standard economic theory that suggests that price sensitivity will be greater among those with lower incomes as well as the economic theories of addictive behavior that suggest that less educated, lower income persons will be more responsive to changes in monetary prices than those with more education and higher incomes.

In addition, these studies suggest two interesting, policy relevant conclusions. First, they suggest that cigarettes and other tobacco products are substitutes for one another.

Increases in the prices of one type of cigarettes, for example, will lead to reductions in the consumption of that type of cigarettes that will be partially offset by increases in consumption of other types of cigarettes as well as other tobacco products. Second, the estimates that have attempted to account for addiction provide mixed support for the hypothesis of rational addiction, but are more generally supportive of myopic addiction. This implies that the long-run reductions in cigarette smoking and other tobacco use resulting from a price increase will exceed the short-run effects.

10.3.4 Estimates from high-income countries

In contrast to the relatively small number of studies for low- and middle-income countries, there is a large and growing body of research on the demands for cigarettes and other tobacco products in high-income countries, including the US, Canada, the UK, Ireland, Finland, Austria, Switzerland, other Western European countries, Australia, New Zealand, Japan, and others. Many have used aggregate time-series data comparable to that used in the studies from low- and middle-income countries described above, although the time-period covered in the studies for high-income countries is typically much longer than that for the studies of low- and middle-income countries. Many others have employed pooled cross-sectional times-series data for countries (i.e. OECD countries) or political divisions within a country (i.e. the states of the United States). Still others have employed individual-level data taken from surveys within a given country. Most of the early studies ignored the impact of addiction on the demands for tobacco products; several of the more recent studies, however, do account for the addictive nature of smoking and other tobacco use.

In general, the studies from high-income countries are consistent with those from low- and middle-income countries, in that they find strong and consistent evidence that increases in the prices of cigarettes and other tobacco products will lead to significant reductions in cigarette smoking and other tobacco use. The studies from high-income countries produce estimates of the price-elasticity for overall cigarette demand that fall in a relatively wide range, but most fall in the relatively narrow range from – 0.25 to – 0.5 (for more detailed reviews, see: US Department of Health and Human Services 1989, 1992, in press; and Chaloupka and Warner, in press). In addition, the studies from high-income countries have addressed a number of issues that, to date, it has not been possible to address in the studies for low- and middle-income countries given the limitations of the data on cigarette smoking and other tobacco use in these countries. These findings, and their implications for the effects of tobacco taxes and prices in low- and middle-income countries are the focus of this section.

A relatively small, but growing number of cigarette-demand studies have used data on individuals taken from large-scale surveys (mostly from the US). In general, the price-elasticities of demand estimated in these studies are very consistent with those obtained in studies that employ aggregate data. Because of their use of individual-level data, however, these studies are able to address issues that can not be addressed with aggregate data; most importantly, they can provide separate estimates of the impact of price on the prevalence of cigarette smoking and other tobacco use, and the conditional demands for cigarettes and other tobacco products (the consumption of these products conditional on being a consumer). In general, most of the recent studies that

used individual-level data on cigarette smoking have concluded that half or more of the effect of price on cigarette demand is on smoking prevalence; the remainder of the effect is on cigarette consumption by continuing smokers (i.e. Lewit and Coate 1982; Mullahy 1985; Wasserman *et al.* 1991; Chaloupka and Grossman 1996; US Centers for Disease Control and Prevention 1998). For example, a recent study by the US Centers for Disease Control and Prevention (CDC 1998) that used data from 13 large population surveys conducted from 1976 through 1993, estimated a prevalence elasticity of cigarette demand of – 0.15 and an overall demand elasticity of – 0.25. The same pattern is likely to apply in low- and middle-income countries; that is, approximately half of the impact found in the studies using aggregate data described above is likely to be on smoking prevalence. Given the epidemiological evidence on the health consequences of tobacco use and the benefits of cessation (Chapter 2), this implies that significant increases in cigarette and other tobacco taxes would lead to substantial reductions in the morbidity and mortality resulting from tobacco use.

In addition, a number of studies have employed aggregate and individual-level data from a variety of countries to estimate cigarette demand in the context of myopic and rational addiction models (Young 1983; Mullahy 1985; Baltagi and Levin 1986; Pekurinen 1989, 1991; Chaloupka 1991; Becker *et al.* 1994; Conniffe 1995; Duffy 1996; Cameron 1997; Bardsley and Olekalns 1998). In general, these models provide strong support for the hypothesis that cigarette smoking is an addictive behavior, based on their findings that higher past consumption has a positive and significant impact on current cigarette smoking. In contrast, the estimates from these studies provide mixed support for the hypothesis of rational addiction. In general, estimates from studies for the US (Chaloupka 1991; Keeler *et al.* 1993; Becker *et al.* 1994; Sung *et al.* 1994), Finland (Pekurinen 1991), and Australia (Bardsley and Olekalns 1998) are inconsistent with myopic addiction, although the relatively high discount rates implied by some estimates are not consistent with fully rational behavior. Estimates for the UK (Duffy 1996), Greece (Cameron 1997), and Ireland (Conniffe 1995), however, generally provide little support for the rational addiction model; the relatively small number of observations available for their analyses and the use of several highly correlated regressors, however, generally limit these studies. As discussed above, the key implication of applications of the economic models of addiction to the demands for tobacco products is that demand will adjust slowly to changes in price. These studies consistently produce estimates of the long-run price-elasticity of demand that are about double that obtained for the short-run. The key policy implication of this is that the impact of tax increases that result in sustained increases in the real prices of cigarettes and other tobacco products will grow over time. As a result, the long-run health benefits of higher tobacco taxes will be larger than the more immediate benefits (Townsend 1993).

Several recent studies from the US have used individual-level data to explore differences in the price-elasticity of cigarette demand by age, with a particular emphasis on youth and young adults given that most smoking initiation takes place during the teenage years and becomes firmly established during young adulthood. Grossman and his colleagues (Lewit *et al.* 1981; Grossman and Chaloupka 1997) have suggested that younger persons would be more sensitive than older persons to changes in cigarette prices for several reasons. First, given the addictive nature of cigarette smoking, they

argued that youth who had been smoking for a relatively short time would be likely to adjust more quickly to changes in price than long-term, more addicted adult smokers. Second, peer smoking has a much greater impact on youth smoking than it does on adult smoking, implying a multiplicative effect of price on youth smoking. That is, an increase in cigarette price directly reduces a given youth's smoking and then indirectly reduces it by lowering peer smoking. Third, the fraction of disposable income a young smoker spends on cigarettes is likely to exceed that spent by an adult smoker; economic theory implies that this will make youth smokers more responsive to price. Finally, compared to adults, youth are likely to be more present-oriented. In the context of the economic models of addiction, this implies that a change in the monetary price of cigarettes will have a greater impact on youth smoking than it will for adults.

The earliest research on this issue supported the hypothesis that younger persons would be more responsive to changes in cigarette prices than older persons. Lewit and his colleagues (Lewit *et al.* 1981; Lewit and Coate 1982) concluded that there was an inverse relationship between price-elasticity and age, with teenagers up to three times more sensitive to price than adults. A decade later, however, Wasserman and his colleagues (1991), Chaloupka (1991), and Townsend and her colleagues (1994) concluded that youth and young adults were not significantly more responsive to cigarette price changes than were older adults. A number of recent US studies, however, based on several large, nationally representative surveys, have supported Lewit and his colleagues' findings of an inverse relationship between price and age (Chaloupka and Grossman 1996; Chaloupka and Wechsler 1997; Lewit *et al.* 1997; Evans and Huang 1998; Tauras and Chaloupka 1999; CDC 1998). Chaloupka and Grossman (1996), for example, used data on over 110 000 eighth-, tenth-, and twelfth-grade students to examine the effects of price and a variety of tobacco control policies on youth smoking. They estimated an overall price-elasticity of demand for youth smoking of –1.31, concluding that just over half of the effect of price was on youth smoking prevalence. Similarly, the CDC's estimated price-elasticity of cigarette demand by young adults (– 0.58) was more than double their overall estimate (– 0.25). These results have important implications for low- and middle-income countries where youth smoking prevalence has been increasing in recent years (see Chapter 2). Given that tobacco use among youth is relatively more responsive to price and that most smoking initiation occurs before age 20, significant increases in tobacco taxes in developing countries would be effective in producing long-run reductions in smoking in all segments of the population.

In general, researchers examining the effects of price on smoking prevalence using individual level data have assumed that the impact of higher prices in reducing smoking prevalence reflects reduced smoking initiation among youth and increased smoking cessation among adults. A few recent studies have attempted to address these issues more directly. Douglas (1998) and Douglas and Hariharan (1994), for example, applied hazard methods to retrospective data on smoking initiation taken from two large US surveys to estimate the impact of price on smoking decisions in the context of the Becker and Murphy (1988) model of rational addiction; Douglas (1998) was able to do the same for smoking cessation. Both studies found little evidence that higher prices reduced smoking initiation. However, as the authors noted, the errors-in-variables problems associated with both the retrospective data on smoking initiation

and the cigarette price data biased their estimates for price towards zero. Two recent studies using data from a longitudinal survey of youth in the US produce mixed evidence on this issue (DeCicca *et al.* 1998; Dee and Evans 1998). DeCicca and his colleagues concluded that higher cigarette prices have little impact on smoking initiation, while Dee and Evans estimated price effects consistent with those obtained in the recent studies based on cross-sectional data described above. Differences in variable construction and the treatment of missing data account for the differences in findings between the two studies. In contrast to the findings for initiation, Douglas (1998) did find strong evidence that higher prices reduced the duration of smoking, with an estimated price-elasticity of –1.0; that is, he concluded that an increase of 10% in price would reduce the duration of smoking by approximately 10%. Clearly, more research using appropriate longitudinal data is needed before rejecting the consistent findings from recent studies based on the cross-sectional survey data.

Several recent studies suggest important differences in the price sensitivity of demand among different socio-economic groups. The US Centers for Disease Control and Prevention (1998), for example, concluded that US Hispanics and Blacks were much more sensitive to price than were White non-Hispanics; Chaloupka and Pacula (1999) found similar differences among black and white youths. To the extent that socio-economic status is correlated with race and ethnicity in the United States, these findings suggest that people on lower incomes may be more sensitive to price. More compelling evidence resulted from the CDC's (1998) separate estimates of cigarette demand by low- and high-income persons in the United States. They estimated that the price-elasticity of cigarette demand by persons at or below the median family income in their sample was over 70% larger than their estimate for persons in families above the median. Chaloupka's (1991) finding, in the context of the rational addiction model, that less educated persons were relatively sensitive to price, while more educated persons were generally insensitive to price, is consistent with the hypothesis that there is an inverse relationship between the price-elasticity of cigarette demand and income. Townsend and her colleagues (1994) provided additional support for this hypothesis. Using data from the British General Household Survey, they concluded that people in the highest socio-economic groups were relatively unresponsive to price, while those in the lowest socio-economic groups were very responsive to price. These findings are consistent with the discussion above comparing the estimates obtained from low- and middle-income countries to those from high-income countries, and provide additional support for the contention that proportionate increases in the prices of tobacco products would have a larger impact on tobacco use in low- and middle-income countries than they would in high-income countries.

Finally, several studies from a variety of countries have examined the impact of taxes and prices on other tobacco products on the demands for these products, generally producing results consistent with the estimates from studies of cigarette demand (Thompson and McLeod 1976; Pekurinen 1989, 1991; Leu 1984; Ohsfeldt and Boyle 1994; Chaloupka *et al.* 1997; Oshfeldt *et al.* 1997, 1999). In addition, these studies generally found evidence that cigarettes and other tobacco products are substitutes for one another, consistent with the conclusion suggested above for developing countries. Similarly, recent work by Evans and Farrelly (1998) concluded that increases in cigarette taxes lead to compensating behavior by smokers. Using data from the United

States, they found that smokers in high-tax states were more likely to smoke longer cigarettes and/or higher tar and nicotine cigarettes, potentially offsetting some of the health benefits of the higher taxes. Similar substitution away from manufactured tobacco products that are more easily subjected to taxation and other regulation towards other more difficult to tax/regulate products (such as *bidis* in SE Asia) might also result from increases in taxes. The main policy implication of these findings is that comparable increases in the taxes on all tobacco products, and differential treatment of products epidemiologically proven to by more harmful, are likely to be needed to maximize the health benefits associated with increased tobacco taxation.

10.4 Motives for tobacco taxation

Cigarettes and other tobacco products have long been taxed in nearly every country around the world. As the introductory quotation highlights, even those who least support government intervention in the marketplace have supported the taxation of tobacco products as an easy source of revenues that imposes relatively few distortions. More recently, as the information on the health consequences of tobacco use has expanded, tobacco taxes have been seen as an appropriate 'user's fee' that covers the social costs of tobacco use, and as a powerful tool for improving public health. Nevertheless, proposed increases in tobacco taxes raise a host of philosophical and practical questions. This section reviews the theoretical and empirical evidence from the economics literature relevant to addressing many of these questions.

10.4.1 Tobacco taxation and revenues

The primary historical motivation, and still the most common rationale for tobacco taxation, is its revenue-generating potential. While tobacco tax revenues have historically accounted for as much as 3–5% of total government revenues in many high-income countries, their importance has generally declined over time. In contrast, tobacco tax revenues account for a significant share of total government revenues in many upper middle-income countries, but are relatively less important in most lower income countries (see Table 10.2).

A fundamental principle related to the efficiency of taxation is that taxes which generate substantial revenues, while minimizing the welfare losses associated with the higher prices resulting from the taxes, are preferable to those that result in greater welfare losses. As the so-called 'Ramsey Rule' dictates for consumption taxes (Ramsey 1927), the level of taxes will be inversely related to the price-elasticity of demand (holding the supply elasticity constant). Thus, goods with relatively inelastic demands should be taxed more heavily, while those with relatively elastic demands should be taxed least.

Given the evidence described above, cigarettes and other tobacco taxes appear to satisfy the Ramsey Rule. In the short-run, at least, the demand for tobacco products is relatively inelastic in most countries. Thus, increases in the 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. This is in large

Table 10.2 Tobacco tax revenues as a share of total government revenues, selected countries

	Percentage of total government revenues accounted for by tobacco taxes
Low-income countries	
China	9.05
India	1.81
Nepal	5.40
Zimbabwe	1.04
Lower-middle-income countries	
Bulgaria	2.80
Colombia	0.73
Costa Rica	1.35
Egypt	0.78
Estonia	1.15
Upper-middle-income countries	
Argentina	4.00
Brazil	4.88
Chile	3.38
Greece	7.72
High-income countries	
Australia	3.04
Denmark	1.73
Finland	1.73
Spain	2.20
United Kingdom	2.98
United States	0.41

Source: World Bank.

part why institutions such as the International Monetary Fund have viewed increased tobacco taxes favorably (Sunley 1998).

For example, consider South Africa, where the long-run price-elasticity of cigarette demand was estimated to be – 0.68 and where taxes account for almost 40% of price. Assuming that an increase in cigarette taxes is fully passed on to consumers, and that the long-run price-elasticity of demand is constant, a permanent doubling of the South African cigarette tax would reduce cigarette demand by over 27% in the long-run, while raising cigarette tax revenues by nearly 50%. This positive relationship between cigarette taxes and cigarette tax revenues is clearly shown in Figs 10.4–10.6 that plot real cigarette taxes and cigarette tax revenues over time for the United States, South Africa, and Zimbabwe.

In general, the revenue-generating potential of cigarette and other tobacco taxes will be highest where the demands for these products is more inelastic and/or where taxes as percentages of prices are relatively low. Given the available estimates, there is ample

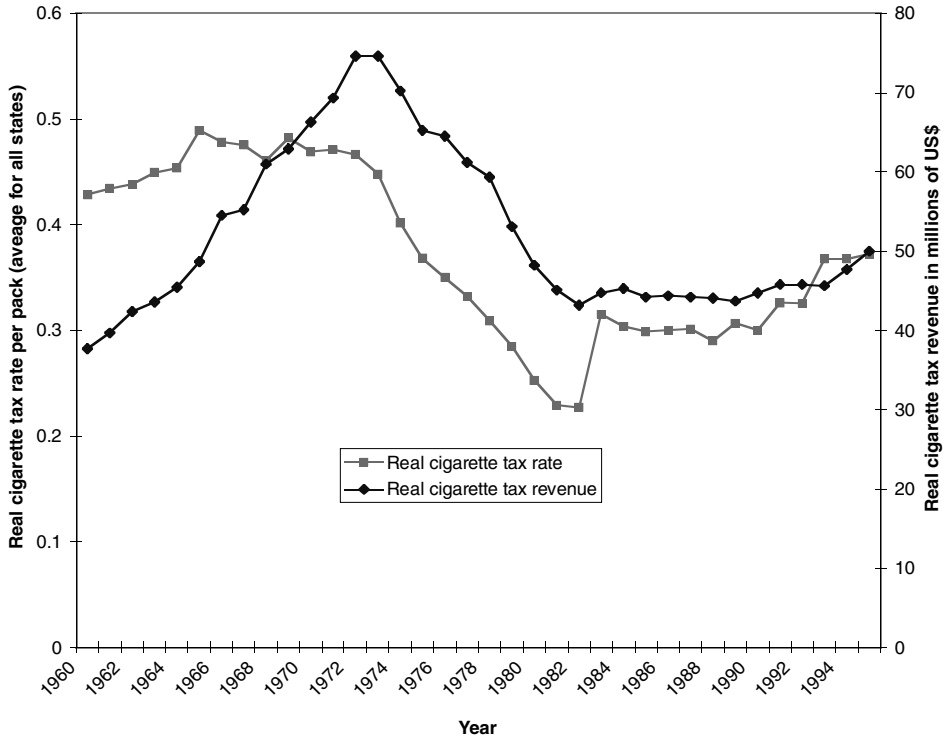


Fig. 10.4 Cigarette tax rate and cigarette tax revenue in the US 1960–95.

room for most countries to raise cigarette and other tobacco taxes, and at the same time generate additional revenues from these taxes. Consider China, for example, where estimates of the short-run price-elasticity of demand for cigarettes range from – 0.65 to –1.00. Assuming the low-end elasticity of – 0.65, a cigarette tax increase that led to a 10% increase in Chinese cigarette prices would result in a 6.5% reduction in cigarette sales, while total sales revenues would rise by 2.9% (Hu 1997). With an effective tax rate of 38% in 1992, these estimates imply that cigarette tax revenues would rise by 18.2%. On the other hand, assuming the price-elasticity of demand was constant at –1.00 and that a tax increase would be fully passed on to smokers, Hu (1997) estimated that a doubling of the Chinese cigarette tax would reduce cigarette consumption by nearly 40%, while raising cigarette tax revenues in China by approximately 20%. Given that cigarette-tax revenues in China account for about 9% of total revenues, Hu concluded that cigarette taxes are a very important government fiscal instrument (see Chapter 17 for a similar exercise for 70 countries and additional discussion).

To summarize, given the relative inelasticity of the demands for cigarettes and other tobacco products, tobacco taxes appear to satisfy the Ramsey Rule. That is, they generate substantial revenues in the short-run, while having a relatively small impact on social welfare. Moreover, given the share of taxes in prices, these taxes are likely to be

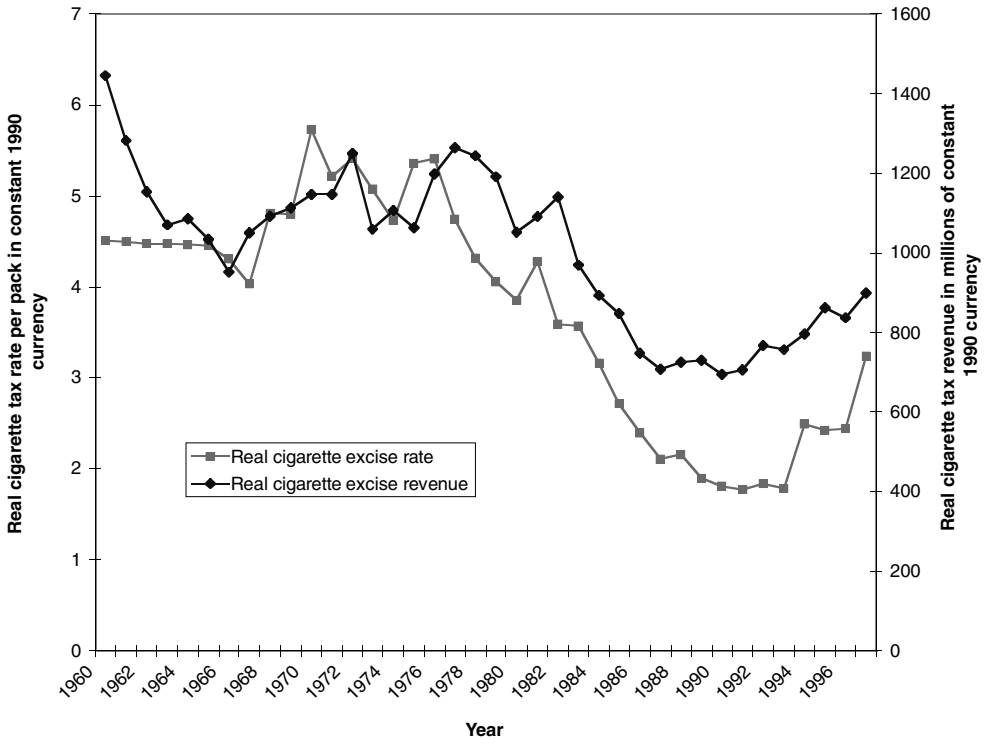


Fig. 10.5 Real cigarette tax rate and real cigarette tax revenue in South Africa 1960–97.

well below their revenue maximizing levels in most countries, including nearly all low- and middle-income countries.

10.4.2 Fairness standards

Debates over the appropriate level of tobacco taxes will necessarily encompass issues of equity and efficiency. With respect to equity, the focus has been on issues related to vertical equity—specifically on the apparent regressivity of cigarette and other tobacco taxes—and the 'benefit principle' of taxation. With respect to efficiency (aside from the efficiency arguments embedded in the Ramsey Rule), the focus has been on the use of tobacco taxes to cover the net social costs of cigarette smoking and other tobacco use. Each of these issues is discussed in more detail below.

Vertical equity

A basic principle of tax policy is the notion of vertical equity, which suggests that individuals with the greatest ability to pay should be taxed more heavily. This notion is reflected, for example, in progressive income tax systems where marginal tax rates rise as incomes rise. Cigarette and other tobacco taxes, however, appear to violate this

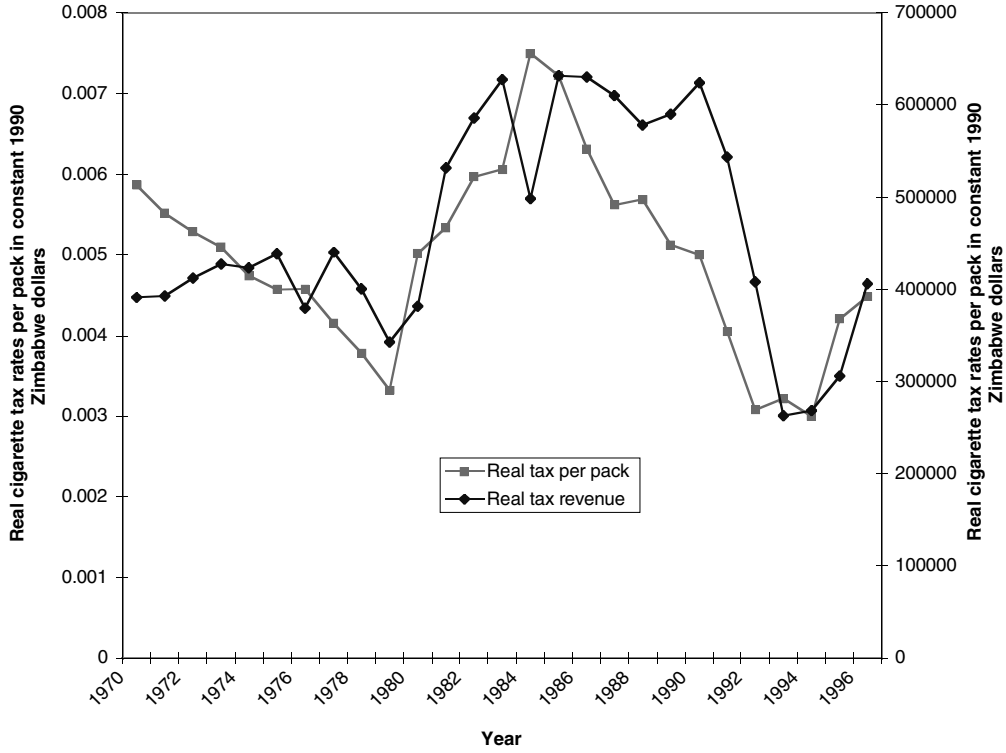


Fig. 10.6 Real cigarette tax rates and real cigarette revenue in Zimbabwe 1960–97.

principle. These taxes would be regressive with respect to income if the consumption of tobacco products was the same for both more affluent and poorer individuals. An additional concern in tax policy is the principle of horizontal equity, which implies that all individuals should be treated equally. Clearly, tobacco taxation violates this principle, since otherwise identical people who consume different quantities of tobacco products will be taxed differently.

In high-income countries, where tobacco use tends to be inversely related to income in recent years, the apparent regressivity of tobacco taxes is exacerbated. In most low- and middle-income countries, where tobacco consumption often rises with income, the regressivity of the taxes is less severe, although tobacco taxes as a share of income or total expenditures generally rises in these countries as income falls (see Chapter 3 for a more detailed discussion of the relationship between tobacco use and income in low-, middle- and high-income countries).

As discussed earlier, several recent studies found an inverse relationship between the price-elasticity of cigarette demand and socio-economic status (Chaloupka 1991; Townsend *et al.* 1994; CDC 1998). These estimates suggest that even though cigarette taxes may fall most heavily on lower income smokers, increases in these taxes may be progressive given the significantly larger reductions in smoking that occur among lower income smokers in response to a tax increase. Consider the following simple example.

Assume there are two smokers consuming the same number of cigarettes (x), one with relatively low income (y) and the second with relatively high income (3y). As implied by estimates of the price-elasticity of demand for different income groups, assume that the low-income smoker is relatively more price-sensitive (elasticity of – 0.80), while the high-income smoker is less price-sensitive (elasticity of – 0.20). Finally, assume that the cigarette tax is 50% of price (treat price per cigarette as the numeraire; i.e. p = 1) and assume that a tax increase is fully passed on to smokers. Given this, both pay x/2 in cigarette taxes; for the low-income person, this is x/2y of income as compared to x/6y for the high-income person. This tax is clearly regressive. However, the same is not true for a tax increase. Doubling the cigarette tax, assuming constant price-elasticities of demand, will reduce both smokers' cigarette consumption, with a relatively larger reduction for the lower income smoker. In addition, the total tax paid by both smokers will rise (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 0.1x/y, while that for the high-income smoker is 0.133x/y. Thus, while the existing tax may be regressive, a tobacco tax increase may be progressive and the overall regressivity of the tobacco tax will be reduced.

Moreover, given the estimated differences in the price-elasticity of demand by income, the health benefits resulting from tax-induced reductions in smoking would be disproportionately larger in the lowest income populations. Particularly appropriate would be 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 (see Chapter 12 for more on this issue).

Finally, as has been pointed out by a number of analysts, the tax systems of most countries are a mix of many different taxes, where the overall goal of the taxation and expenditure system is to be progressive or proportional, even though specific elements of the system may be regressive (US Congressional Budget Office 1990; Warner *et al.* 1995). Increased progressivity of other tax and transfer programs could be used to offset the potential regressivity of tobacco tax increases. This is clearly the case when new tobacco tax revenues are earmarked for programs targeting low-income populations, including many of those discussed below that have used tobacco taxes to subsidize the provision of healthcare to low-income individuals.

The 'benefit principle'

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. This notion is reflected in petroleum taxes and highway tolls that are then dedicated to financing road maintenance and construction. Thus, the taxes serve as 'user fees' that are paid roughly according to an individual's level of use. For cigarettes and other tobacco products, this concept is tied to the tobacco user's consumption of publicly funded healthcare to treat the consequences of his or her cigarette smoking and/or other tobacco use, as well as the use of other publicly funded services associated with tobacco use.

The direct application of the benefit principle to tobacco taxes will clearly depend

on the mix of publicly versus privately provided healthcare and other services and the impact of cigarette smoking and other tobacco use on the costs of these services. These issues are discussed extensively by Lightwood *et al.* in Chapter 4. In addition, the notion of tobacco taxes as user fees is inextricably tied to issues concerning the negative externalities associated with tobacco use. These issues are discussed in the following section on the economic efficiency of tobacco taxes.

10.4.3 Economic efficiency and tobacco taxes

Two notions of economic efficiency are important when discussing the appropriate levels of tobacco taxes. The first, discussed above, is reflected in the Ramsey Rule. That is, given that governments need to generate revenue and that consumption taxes are to be used for this purpose, taxes that are applied to goods and services with relatively inelastic demands will be more efficient than taxes applied to those with more elastic demands (holding the elasticity of supply constant). Given the estimates from the econometric studies of tobacco demand, tobacco taxes appear to be 'efficient' taxes, at least in the short run and in most countries.

A second notion of economic efficiency relates to the issue of externalities. This concept implies that individuals should bear the full costs of their consumption. When one individual's consumption imposes costs on others (a negative externality), others are paying part of the burden of that individual's consumption. Pigou (1962) has suggested that taxes could be used to improve economic efficiency in this situation. The Pigovian tax that would raise the tobacco user's marginal cost to the point where it was equal to the marginal social cost of tobacco use would produce an economically efficient outcome. Consequently, estimates of the net social costs of tobacco use are critical in determining the appropriate level of tobacco taxes. As Cook and Moore (1993) note, however, taxes that equated the user's marginal cost with the social marginal cost, for some goods, could generate tax revenues that exceed the net social cost, since the efficient tax would be based on marginal rather than average external costs.

Estimating the costs of the negative externalities resulting from cigarette smoking and other tobacco use is a highly controversial subject. In general, these externalities fall into two categories:

(1) 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
(2) the costs associated with the health and other consequences of exposure to environmental tobacco smoke (ETS).

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. (See, for example, the discussion of the health consequences of tobacco use in Chapter 2, as well as that on the impact of tobacco use on health systems costs in Chapter 4.) In addition, some have argued that the indirect morbidity and mortality costs associated with the lost earnings from work loss attributable to tobacco use should also be included when calculating the social costs of tobacco use. In general, these costs are included in most calculations of the

costs of smoking. In contrast, there are a number of costs that are typically not included, including the treatment of burn victims from smoking-related fires, the short-term healthcare costs and longer-term developmental costs associated with maternal smoking during pregnancy, the costs of treating illnesses related to exposure to ETS, intangible costs of tobacco-attributable morbidity and mortality (that is, the pain and suffering associated with the illness and the grief experienced by family and friends), and the annoyance costs of exposure to ETS.

Even if all of these costs were included in the calculus, the economist attempting to compute the net social costs of cigarette smoking and other tobacco use would face a number of challenges. First, one must determine an appropriate approach to valuing the life-years lost as a result of tobacco use, as well as which of these should be included in the computations. Most studies have taken a human capital approach to valuing life-years, an approach that critics argue significantly understates the value of a life. Using even relatively conservative figures for the value of a life-year, obtained from a willingness-to-pay approach, will significantly increase the estimates of the indirect costs of tobacco use. In addition, most studies of net social costs treat the indirect morbidity and mortality costs for tobacco users as internal costs, while the comparable costs from exposure to environmental tobacco smoke are more appropriately treated as external costs.

Similarly, only the healthcare and other costs that are not covered privately would be included as social costs in the conventional economist's accounting framework. In most high-income countries, where a substantial portion of healthcare is publicly provided, the social costs from treating tobacco-related illnesses will be substantial. In many low- and middle-income countries, however, where there is less publicly provided healthcare, and where the health consequences of smoking and other tobacco use are only beginning to appear, these costs will be modest. They will, however, grow over time as public insurance programs are adopted and as the health toll from tobacco grows. Moreover, even if there were no changes in public insurance, tobacco use would impose a significant social cost as a result of the increased demand for healthcare to treat tobacco-related illnesses, driving up the costs of all medical care, including that consumed by people who do not consume tobacco products.

A more difficult conceptual issue relates to determining whether or not the effects of an individual's tobacco use on his or her spouse and children should be included as an internal or external cost. Many of the economic studies on the social costs of smoking treat the family as the decision-making unit, with the earliest studies assuming that all of the health consequences of ETS exposure occurred within the family (i.e. Manning *et al.* 1991). Given the assumption that the family is the decision-making unit, the health consequences of a child's exposure to environmental tobacco smoke produced by parents' smoking would be considered an internal rather than external cost. Although many economists would accept treating the health costs of spouses as internal costs, there is considerable debate on applying this approach to fetuses and children who are relatively powerless to alter parents' consumption decisions that affect their health (see Chapter 7 for further discussion). Moreover, the disease and developmental problems associated with fetal and infant exposure to tobacco smoke have support costs that spill over into the broader society, as public institutions in many societies pick up part of the medical, institutional, and other costs related to these

problems. Similarly, as information on the health consequences of ETS exposure has increased, it has become clear that many of these costs are external to the family.

A more controversial question concerns the inclusion of transfers in the calculations of external costs. These transfers include the reduction in income taxes and insurance premiums paid by tobacco users because of reduced earnings associated with tobacco-related illnesses, the value of public and private retirement pensions foregone because of tobacco-attributable premature deaths, higher healthcare costs paid by public and private insurance plans that result from treating illnesses related to tobacco use, and the increased sick pay and disability benefits paid during these illnesses. Particularly objectionable to many is the idea that foregone public and private pension benefits should be considered a 'benefit' to non-tobacco users in the computation of the social costs of tobacco use. In high-income countries, where publicly financed retirement programs are important, the inclusion of the 'benefits' from tobacco-attributable premature death significantly reduces the estimates of the net social costs of tobacco use (i.e. Shoven *et al.* 1989; Manning *et al.* 1991; Viscusi 1995). In contrast, in most low- and middle-income countries, where old-age expenses are largely a private matter, the inclusion of these 'benefits' would have little impact on the estimated social costs.

As this discussion clearly demonstrates, the calculation of the 'true' net social costs of tobacco use is an exceedingly difficult challenge that involves difficult conceptual questions, epidemiologic and other data considerations, and moving targets in terms of both knowledge and institutional structures. More research is clearly required, particularly for low-income and middle-income countries, given the relevance of this task to determining economically efficient levels of tobacco taxes.

10.4.4 Public health standards

As the review of the studies on the demands for tobacco products clearly demonstrated, increases in the taxes on and prices of these products lead to substantial reductions in cigarette smoking and other tobacco use. These reductions are not limited to reductions in the frequency or quantity of tobacco products consumed, but also include reduced initiation among youth and young adults, and increased cessation among adults. Given the substantial health consequences of tobacco use and the significant health benefits from cessation (see Chapter 2 and Chapter 12), millions of premature, tobacco-related deaths could be averted by large increases in cigarette and other tobacco taxes.

The econometric evidence on the direct relationship between higher tobacco taxes and the health consequences of tobacco use is limited to two recent studies from the US (Moore 1996; Evans and Ringel, in press). Moore, using state-level data on tobacco-related death rates for the period from 1954 through 1988, concluded that higher cigarette taxes would significantly reduce smoking-related deaths. His estimates imply that a 10% increase in the cigarette tax would result in approximately 6000 fewer premature, smoking-related deaths in the United States each year. Similarly, Evans and Ringel (1999) used data on over 10.5 million births in the United States during the years from 1989 through 1992 to examine the impact of cigarette smoking and cigarette taxes on the incidence of low-birthweight births. They estimated a smoking prevalence elasticity of – 0.5 for pregnant women and, consistent with the medical literature,

found a strong positive relationship between cigarette smoking and the probability of a low-birthweight infant, leading them to conclude that increased cigarette taxes would significantly raise birthweight and reduce the adverse health and developmental consequences associated with low birthweight .

Similarly, several researchers in the United States have used estimates of the price-elasticities of smoking prevalence for different age groups to predict the likely impact of increased cigarette taxes, concluding that large tax increases would delay hundreds of thousands of premature, smoking-related deaths (Warner 1986; Harris 1987; US General Accounting Office 1989; Chaloupka 1998). Elsewhere in this volume, Ranson *et al.* employ a similar methodology to estimate the health benefits of global increases in the prices of cigarettes and other tobacco products (Chapter 18). Even under relatively conservative assumptions about the impact of price increases on demand and the impact of tobacco use on health, they conclude that millions of premature deaths could be avoided over the next several decades with even modest increases in tobacco taxes and prices.

10.5 Other issues in tobacco taxation

10.5.1 Tobacco tax earmarking

A significant feature of the tobacco tax structure in a growing number of countries is the hypothecation or earmarking of tobacco tax revenues for spending on specific activities. In part, these earmarked taxes reflect the growing use of increased tobacco taxes as a way to promote public health and/or more directly cover the social costs resulting from cigarette smoking and other tobacco use. For example, governments in several countries, including one of China's largest cities (Chongquing) and several US states (most notably California, Massachusetts, Arizona, and Oregon) earmark a portion of tobacco taxes for tobacco-related education, counter-advertising, and other tobacco-control activities. Still others dedicate a portion of their tobacco tax revenues to funding healthcare for under-insured populations, cancer control research, and other health-related activities, as well as, in others, general education (e.g. Canada, Ecuador, Finland, French Polynesia, Guam, Iceland, Indonesia, Korea, Malaysia, Nepal, Peru, Poland, Portugal, Romania, the United States, and others). Similarly, several Australian states, New Zealand, and others have adopted the 'Vic-Health model', using tobacco tax revenues to fund sporting and artistic events previously funded by the tobacco industry. An often debated, but yet to be adopted, form of earmarked tobacco taxes would dedicate a portion of the taxes to helping tobacco farmers and those employed in the manufacturing of tobacco products move into other crops and industries.

Many public finance economists have long opposed earmarked taxes because of the rigidities they introduce that make it more difficult to allocate general revenues among competing uses, while others have argued that the use of earmarked tobacco taxes to fund health promotion and disease prevention is consistent with the 'benefit principle' of taxation and can reduce the loss of producer and/or consumer surplus resulting from higher taxes (Hu *et al.* 1998). Moreover, given that many publicly provided health insurance programs target lower-income populations, this type of earmarking is

consistent with an overall system of taxes and transfers that promotes vertical equity. Similarly, to the extent that tobacco farmers and those employed in tobacco manufacturing bear part of the burden of increased tobacco taxes in the short run (although, as described in Chapter 13, the impact of higher taxes on tobacco-related employment has been overstated by the tobacco industry), earmarking part of the new revenues from tobacco tax increases for crop-substitution and retraining programs can significantly reduce the impact on tobacco growers and producers. As Hu and his colleagues described, many of the activities funded by earmarked tobacco taxes significantly reduce the welfare losses resulting from tobacco tax increases.

Moreover, tobacco tax increases that are 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. As described by Saffer (Chapter 9), Kenkel and Chen (Chapter 8), and Novotny *et al.* (Chapter 12), the variety of anti-tobacco activities funded by earmarked tobacco taxes have led to reductions in cigarette smoking and other tobacco use that exceed those that would have been achieved in the absence of earmarking.

10.5.2 Tobacco tax increases and consumer price indices

Opponents of tobacco tax increases have argued that tax hikes would be inflationary, given that tobacco products are included in the basket of goods and services used in computing price indices in most countries, and given that many wages and salaries, and other public and private expenditures, are tied to these indices. While it is true that large tobacco tax increases would lead to increases in prices as measured by most consumer price indices, the impact of large tax increases on inflation would be very modest. Moreover, relatively modest tax increases would have almost no detectable effect on these indices.

One possible solution to the potential inflationary impact of tobacco tax increases is the construction of multiple price indices that are used for different purposes, as has been done in a number of countries. France, Luxembourg, and Belgium, for example, compute one consumer price index that excludes tobacco products and a second that includes these products. The latter is used for historical and international comparisons, while the former (excluding tobacco products) is used for the indexation of wages and social security allowances (Joossens, personal communication). Sweden did the same with petroleum products in the 1980s (Nordgren, personal communication).

10.5.3 Tobacco taxation and other market failures

As described more fully by Jha *et al.* (Chapter 7) and Kenkel and Chen (Chapter 8), there are other failures in the tobacco markets that justify government intervention in these markets, most notably the imperfect information in these markets. While many of the health consequences of cigarette smoking and other tobacco use are well known, others are continually being discovered. Similarly, while some populations are well aware of these risks (i.e. more educated persons), others are much less informed and/or myopically discount away the future health and other consequences of tobacco use to

their later regret. Moreover, even though the risks of tobacco use are generally understood in some countries (Viscusi 1992), tobacco users in these countries do not necessarily internalize these risks (Schoenbaum 1997). This suggests that the prevalence of tobacco use is much higher than it would be if users were well informed about the risks from tobacco use and appropriately internalized these risks.

Governments could use a variety of policies, including the increased taxation of tobacco products, to correct for these other market failures (see Chapter 7 for a discussion of alternative approaches). While clearly an appropriate tool for correcting for the net social costs of tobacco use, tobacco taxes are, in some respects, a less than ideal approach to correcting for these other market failures. Specifically, tobacco taxation is a blunt policy tool that reduces the welfare of tobacco users who choose to use these products with a clear understanding of the consequences of their addiction. However, in the absence of adequate knowledge, higher taxes can be justified (Cordes *et al.* 1990). This is particularly true when it comes to tobacco use among youth. A group of leading health economists who have studied the economics of tobacco use recently concluded that protecting children from a future of nicotine addiction, with its associated health risks, was the most compelling reason favoring increased tobacco taxation (Warner *et al.* 1995). They perceived higher taxes as an appropriate way to balance children's inadequate perceptions concerning the addictive nature of tobacco products and their relatively myopic behavior that discounts away the future health consequences of tobacco use, as well as an environment in which tobacco companies' multi-billion dollar advertising and promotion campaigns target youth. Given their relatively more elastic demands for tobacco products, the benefits from the large reductions in youth tobacco use resulting from a tax increase would be substantially larger than the losses incurred by adult tobacco users. Similar arguments could be made for other less-informed populations that are relatively more responsive to price, including less educated and lower income groups.

10.5.4 Barriers to tobacco taxation

There are a number of political, economic, and social arguments that have long been used as arguments against significant increases in cigarette and other tobacco taxes. Upon more careful analysis, however, these arguments are not persuasive and should not be used to discourage governments from raising tobacco taxes. Objections to higher taxes include the following: that higher tobacco taxes will lead to significant increases in smuggling between high-tax and low-tax countries; that tobacco tax increases necessarily place a disproportionate burden on the poor; that higher tobacco taxes will lead to reductions in tobacco tax revenues; and that tobacco tax hikes will lead to significant reductions in employment and macro-economic activity. This section briefly addresses these arguments; more detailed discussions are contained in other sections of this chapter and other chapters in this volume.

Tax increases and smuggling

It has been argued that higher tobacco taxes will lead to increased smuggling and related criminal activity, while not reducing tobacco consumption or increasing tobacco

tax revenues. While it is true that cigarette smuggling is a serious problem and that tax increases can lead to increases in smuggling, the scale of the problem has been significantly overstated (see Chapter 15 and Chapter 16). Numerous countries have significantly increased tobacco taxes without experiencing dramatic increases in smuggling. Likewise, sharp, industry-initiated price increases in some countries have not led to a significant rise in smuggling in these countries. Moreover, several relatively easy-to-implement policies, including improved tracking of cigarette consignments and stronger penalties for smugglers who are detected, could be used to address this problem.

Tobacco tax increases and the poor

A second common objection to tobacco tax increases is that they will fall disproportionately on the poor. While it is true that current tobacco taxes are regressive in most countries, given that tobacco use is more prevalent among those with lower incomes, a growing literature suggests that tobacco tax *increases* might be progressive. As described above, several recent studies conclude that lower income persons are more responsive to changes in cigarette prices than higher income persons, implying that increased cigarette taxes would reduce smoking by more in lower income groups than in higher income groups, reducing the relative burden of tobacco taxes on the poor. Moreover, tobacco taxes are but one part of an overall fiscal system that in most countries includes a wide variety of other taxes and transfer programs, suggesting that increased progressivity of other tax and transfer programs could be used to offset the regressivity of tobacco taxes. This is most clearly the case when the new revenues generated from tobacco tax increases are earmarked for programs that target low-income populations.

Tobacco tax increases and revenues

A third frequent misperception, often coupled with the first, is that increases in tobacco taxes will actually lead to reductions in tobacco tax revenues. Those making this argument suggest that the reductions in tobacco sales resulting from the tax increase would be so large as to more than offset the impact of the higher tax rate. Given the relatively inelastic demand for tobacco products and the current share of tobacco taxes in price, nearly every country has substantial room for increasing tobacco tax revenues by increasing tobacco taxes. Estimates described by Sunley *et al.* (Chapter 17) indicate that a relatively modest increase of 10% in cigarette taxes would lead to an increase of almost 7%, on average, in cigarette tax revenues. Moreover, even in countries where demand is relatively more elastic and taxes account for a relatively high share of tobacco prices, increases in these taxes will lead to increases in tax revenues.

Tobacco tax increases and the macro-economy

A final argument that is often employed in the debate over increased cigarette taxes is that these tax increases would lead to significant reductions in employment in

tobacco growing and manufacturing, as well as more general wholesaling, retailing, and other sectors. Consequently, opponents argue, the tax increases would have an adverse impact on the macro-economy. While it is true that employment in jobs directly related to tobacco growing and manufacturing would decline as a result of the reductions in tobacco consumption induced by the tax increase, the impact on other sectors is likely to be minimal. Moreover, as described more fully by Jacobs *et al.* (Chapter 13), employment in other areas would likely increase as the money smokers would have spent on tobacco products is spent on other goods and services, with the net macro-economic impact of higher tobacco taxes being negligible or positive in all but a very few countries.

10.6 Conclusions

Several clear conclusions emerge from the review of the economics literature on tobacco taxation contained in this chapter.

Increases in cigarette and other tobacco taxes will significantly reduce both the prevalence and consumption of tobacco products. Estimates from numerous studies indicate that the short-run price-elasticity of cigarette demand in high-income countries is in the range from – 0.25 to – 0.5 implying that a tax increase that raises prices by 10% will reduce cigarette smoking by up to 5%. Several studies indicate that increased taxes will be particularly effective in reducing tobacco use among youth and young adults, for whom demand is estimated to be up to three times more sensitive to price. The reductions are the result of reduced initiation of tobacco use, increased cessation, and reductions in the consumption of tobacco products by continuing users.

Emerging evidence from low-income and middle-income countries, as well as recent research on different socio-economic groups in high-income countries, implies that the effects of tobacco tax increases in developing countries would be larger than the impact of comparable increases in high-income countries. These recent studies suggest that the short-run price-responsiveness of cigarette demand in low- and middle-income countries is about double that in high-income countries. Thus, a tax increase that raises tobacco product prices by 10% in low-income and middle-income countries would lead to a reduction of approximately 8% in tobacco use in these countries.

Large tobacco tax increases, by significantly reducing the prevalence of tobacco use, would have a major impact on the health and other consequences of tobacco use. Even relatively modest increases in taxes would generate significant health benefits. Estimates indicate that global cigarette tax increases that raised prices by 10% everywhere would reduce premature deaths attributable to smoking by approximately 10 million in the current cohort of smokers (see Chapter 18). Almost 90% of these extended lives would be for persons in low- and middle-income countries.

Given the inelasticity of the demands for tobacco products in most countries, increases in tobacco taxes will result in sizable increases in tobacco tax revenues. Given existing tax levels, nearly every country has significant scope for generating new tax revenues through large tobacco tax increases. Estimates suggest that a 10% cigarette tax increase will lead to an average increase of nearly 7% in cigarette tax revenues in the short-run. Larger increases in revenues are expected in countries where demand

is relatively more inelastic, while smaller, but still sizable, increases are expected in counties where demand is more responsive to price.

Significant increases in tobacco taxes can be justified on several grounds, including as a relatively efficient tool for generating tax revenues, as a means to reduce inequity, as an appropriate way to promote economic efficiency, as an effective approach to improving public health, and as a way to correct for the market failures inherent in the markets for tobacco products. Given the relatively low levels of cigarette and other tobacco taxes in many low- and middle-income countries, as well as in several high-income countries, a policy that aimed these taxes to the point where they account for two-thirds to three-quarters of the retail prices of tobacco products appears achievable and appropriate.

Earmarking of revenues from higher tobacco taxes is consistent with many of the principles of appropriate tax policy and is likely to produce larger reductions in tobacco use and greater health benefits than would result from the higher taxes alone. The use of these revenues for mass-media campaigns on the health consequences of tobacco use, increased accessibility to nicotine-replacement products and other approaches to smoking cessation, particularly for low-income smokers, and the public provision of medical care are but a few examples of what many countries are doing and/or can do with earmarked tobacco taxes.

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WORLD BANK
ECONOMICS OF TOBACCO TOOLKIT

Editors: Ayda Yurekli & Joy de Beyer

Tool 7. Smuggling

Understand, Measure, and Combat Tobacco Smuggling

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DRAFT

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I. Introduction

Purpose of this Tool

The intended purpose of this tool is to let readers gain the necessary knowledge about tobacco smuggling. With this knowledge, policy responses can be developed and further monitored in order to establish their effectiveness, appropriateness, and impact on other policy goals. For example, if enhanced tax revenue is one goal of a tobacco taxation policy, smuggling can be an important consideration, since smuggled tobacco avoids taxation. Likewise, tobacco smuggling can have an impact on health policies, as it can be difficult to regulate health warnings and conditions of sale on smuggled tobacco.

More specifically, by using the methods presented in this tool, a more accurate and objective understanding of tobacco smuggling can be gained. Tobacco manufacturers, distributors and sellers, and others with a narrow self-interest in the design of tobacco control policy often misrepresent the degree of tobacco smuggling. Well-documented, methodologically sound, quantitative estimates of tobacco smuggling are a useful tool for educating policymakers about the costs and benefits of various policies. Moreover, unbiased estimates of smuggling, and the change in smuggling over time, are essential tools to evaluate the success of many tobacco control policies.

Use several different methods of measuring tobacco smuggling to provide the most objective view of its illegal nature.

Why use this tool? Because of its illegal nature, smuggling can be more difficult to estimate than many other variables relevant to tobacco control. Analysts can demonstrate the reliability of these estimates by using several *different* methods and data sets, five of which are presented here. And while the precise quantitative estimates can vary with the method used, all estimates should yield compatible results if appropriate data and techniques are employed. Thus, presenting results from multiple studies increases the validity of one's conclusions.

Who Should Use this Tool

This tool is intended for researchers, analysts, and policymakers of tobacco control. This is a practical tool offering concise, step-by-step instructions on how to conduct measurements of tobacco smuggling. This is *not* another lengthy discourse and extensive review of the literature written solely for academic purposes.

This tool, therefore, is written and designed for the reader who has moderate to extensive knowledge of the background and empirical studies of tobacco smuggling, and is willing and capable of bringing about tobacco policy. However, for the reader who is less familiar with the issue, there are chapters providing background information, a brief review of other empirical studies on tobacco smuggling, and references to helpful resources and additional information.

How to Use this Tool

This tool presents five methods to measure illegal circumvention of tobacco taxes. Included are discussions on the strengths and weaknesses of each method and recommendations on the appropriateness of each method. Key definitions and background information on tobacco smuggling, a discussion on policies and economic models, and a review of empirical studies on tobacco smuggling are also provided.

All readers should become familiar with the **Key Information** chapter, which contains definitions and requirements for effectively using this tool, and the **Conclusions and Summary** chapter providing a wrap-up of this tool.

Knowledgeable readers can refer directly to the **How to Measure Smuggling** chapter, which discusses five methods and provides step-by-step instructions to implement each method.

Readers seeking either a refresher or a first-time discussion on tobacco smuggling should read the **Background Information on Tobacco Smuggling** chapter.

Those readers interested in the effects of policy should read the chapter called **What Happens when Policies and Actions are Implemented**.

Readers who are interested in additional research and empirical studies on tobacco smuggling should refer to the **Review of Literature on Tobacco Smuggling** and the **Additional References** chapters.

II. Key Information

Definitions

Smuggling

Smuggling is the evasion of excise taxes on goods by circumvention of border controls.

Smuggling of goods is often conducted for one or both of two reasons: to avoid excise taxes, and to evade rules prohibiting the sale of such goods (e.g., even though the sale of most foreign brands of cigarettes is forbidden in China, these brands are easily found, and advertised, in China). When similar products are sold at substantially different prices in different locations, there is an incentive to transport the product from the lower-priced to the higher-priced market. Therefore, smuggling can be defined as the evasion of excise taxes on goods by circumvention of border controls.

This definition of smuggling encompasses both illegal activities—typically thought of as "smuggling"—and tax avoidance activities which *are* legal and generally *not* considered "smuggling." Economists generally term illegal circumvention of taxes as tax "evasion" while legal circumvention is called tax "avoidance." Both illegal and legal circumvention can affect tax revenues and consumption, and hence can be important in the public policy debate. In this document the term "smuggling" is used rather broadly (and somewhat loosely) to refer to all attempts to circumvent taxes.

Illegal Tax Evasion

Bootlegging and wholesale smuggling vary from country to country. In general, price differentials among countries create incentives for bootlegging, while high tobacco taxes create an incentive for wholesale smuggling, even when tax systems are harmonized.

There are a number of illegal methods of circumventing tobacco taxes. Two predominant methods are

- bootlegging
- wholesale smuggling

Bootlegging

Bootlegging is the purchase of goods in one country but consumption or resale in another without paying applicable taxes and duties.

Bootlegging is the legal purchase of tobacco in one country but consumption or resale in another country without paying applicable taxes or duties. Joossens *et al* (2000) provide a clear description:

> *In general, bootlegging involves transporting cigarettes over relatively short distances (e.g., between neighboring countries or other nearby jurisdictions). As with the legal activities, significant price differentials between jurisdictions create incentives for bootlegging. In addition, greater corruption reduces the risks associated with bootlegging.*

They also say:

> *While the number of cigarettes involved in [bootlegging]…is large relative to those resulting from the legal circumvention activities described [below], it is relatively small compared to that involved in other forms of illegal smuggling.*

Wholesale Smuggling

Wholesale smuggling is the sale of goods without the payment of applicable taxes and duties.

Wholesale smuggling occurs when tobacco products are sold without the payment of taxes or duties, even in the country of origin. Joossens *et al* (2000) explain:

> *…in contrast, [wholesale smuggling] involves the illegal transportation, distribution, and sale of large consignments of cigarettes and other tobacco products, generally avoiding all taxes. This type of smuggling usually involves millions of cigarettes that are smuggled over long distances, often involving large organized crime networks and sophisticated systems for distributing smuggled cigarettes at the local level. Large-scale organized smuggling is likely to account for the vast majority of cigarettes smuggled globally.*

Legal Tax Avoidance

Tobacco taxes are one cause of price differentials that lead buyers and sellers to attempt to circumvent taxes. Because tobacco price differences are often substantial, tobacco is especially appealing to travelers. Joossens *et al* (2000) categorize a number of types of legal tax avoidance, including

- legal cross-border shopping
- legal tourist shopping
- legal duty-free sales

Legal Cross-Border Shopping

Legal cross-border shopping is the purchase of goods, for personal consumption, in a lower

Legal cross-border shopping involves the purchase of cigarettes, for personal use, in a neighboring lower tax jurisdiction at a price that includes all relevant local taxes. For example, smokers living in Windsor, Ontario during a time of high Canadian taxes have a strong

tax jurisdiction at a price that includes all relevant local taxes.

incentive to cross the border into Detroit to purchase cigarettes at prices that include all United States and Michigan excise and sales taxes.

The smoker's incentive for this type of cross-border shopping depends heavily on the differences in taxes and prices between neighboring tax jurisdictions, the distance the individual lives from the lower-priced area, and the costs of traveling between the two. For example, Buck *et al* (1994) examine the incentives for cross-border shopping between France and Britain in 1994, and conclude the savings on 800 cigarettes bought in France for consumption in Britain were not sufficient to cover the costs of the trip. In practice, it is unlikely smokers are willing to travel long distances at high cost in order to achieve relatively modest amounts of tax savings. Instead, it is more likely that much of the cross-border shopping in cigarettes occurs when smokers are already across the border for other reasons.

Legal Tourist Shopping

Legal tourist shopping is the purchase of goods in non-neighboring jurisdictions in amounts allowable under customs regulations.

Legal tourist shopping is similar to legal cross-border shopping, but involves the purchase of tobacco products in *non-neighboring* jurisdictions in amounts allowable under customs regulations. The incentives for this type of activity depend on the magnitude of the differences in prices among countries and the extent of international travel among countries. Much lower cigarette prices in countries that are popular tourist destinations lead to greater cigarette smuggling of this type.

In most countries this is a relatively minor problem. For example, Trackray (1998) estimates, based on survey data from over 48,000 international travelers in the United Kingdom, that legal tourist and cross-border shopping amounts to approximately 0.5 percent of cigarette sales and 3.0 percent of hand-rolled tobacco sales. In some countries, however, where prices are relatively high and international travel by residents is extensive, the scale of this problem is larger. In Finland, Lipponen *et al* (1998) estimate legal cigarette imports by international travelers are approximately 12 percent of total domestic cigarette sales. Similarly high legal imports are observed in Norway (Lund, 1990). In Barbados in 1999, the annual consumption per person above 15 years of age was 57 packs, but per smoker sales were 634 packs. Similarly, in Jamaica in 1999 consumption per person above 15 years of age was 34 packs, while per smoker sales were 235 packs (World Bank Tobacco Data).

Legal Duty-Free Sales

Legal duty-free sales are tax-free purchases of products in amounts that fall within specific allowances.

Legal duty-free sales are related to legal tourist shopping, but involve tax-free purchases of tobacco products in amounts within specific allowances (e.g., 200 cigarettes, 100 cigarillos, 50 cigars, 250 grams of tobacco). Most duty-free sales occur in airports, on airlines, and on ferries. Again, differences in price (in this case the net-of-tax price in the country visited and the price inclusive of taxes in the home country) and the extent of international travel are key

determinants of the magnitude of duty-free cigarette and other tobacco product sales.

Estimates indicate more than 45 billion cigarettes per year were sold duty-free in recent years, with the absolute number rising as international travel increases, despite tobacco's sharply falling share of the duty-free market over the past 15 years (Market Tracking International Ltd. (MTI), 1998). While significant in and of itself, total duty-free sales account for less than 1 percent of global cigarette consumption.

Supply Chain

A supply chain is the method by which tobacco products are accumulated and illegally transported across taxation boundaries. The supply chain used by bootleggers is quite different than that used by wholesale smugglers, as most bootleggers use relatively simple and low cost techniques to transport their cargo and avoid detection.

Bootleggers usually obtain tobacco products from discount retailers, and then travel short distances before offering the products for sale.

Bootleggers often obtain their supplies through ordinary discount retailers or wholesale purchases in the country of origin. These supplies are loaded into specially made delivery vans and trucks whose structures have been altered with false walls, roofs, floors, and other hiding places (Joossens *et al*, 2000). The tobacco products are then transported relatively small distances before being offered for sale. Transport methods vary from country to country.

In the United States, bootleggers who haul cigarettes from low-to high-tax states sometimes use leased minivans or sedans with false trunks. Although modest efforts are made to hide the contraband—it is generally covered with old mattresses or tarpaulins—it is often transported by superhighway without extensive efforts to avoid detection (Walsh and Ottaway, March 6, 2000). Scottish youths are sometimes given free vacations in Europe in exchange for smuggling tobacco back into the country (Scottish Daily Record October 16, 1994). Airline passengers from Russia attempt to smuggle a significant amount of tobacco into Sweden where prices are much higher (Pittsburgh Post-Gazette, November 4, 1994). In Malaysia speedboats are used for tobacco smuggling (New Straits Times, November 13, 1995). In Israel more traditional customs-evasion tactics are employed (The Jerusalem Post, September 25, 1991). In Hong Kong container trucks holding tobacco are sometimes disguised as containing duty-free components for assembly at factories within mainland China, making it possible to evade China's prohibitive tariffs on foreign tobacco imports. (Hong Kong Standard, July 11, 1999.)

The supply chain for wholesale smugglers is significantly more sophisticated and complex. Wholesale smugglers generally operate at a much larger scale than bootleggers. Since ordinary retail or wholesale purchases at such a large scale are easy to detect, wholesale smugglers have several methods of obtaining untaxed

tobacco products that can later be smuggled past border and tax authorities.

Wholesale smugglers often legally ship tobacco products to a neighboring tax free zone before smuggling the products into a taxed zone.

Perhaps the simplest method is to legally ship the tobacco products to a tax free zone near the country into which they will be smuggled. A report by the International Consortium of Investigative Journalists (January 2000) documented large shipments of cigarettes to the free-trade zones on the island of Aruba and in the Colombian town of Maicao. From these locations cigarettes are smuggled into other areas of Colombia, such as the city of Bogota, where they are offered for sale. The report quotes an estimate that US$400 million per year of contraband cigarettes are smuggled from Aruba into Colombia.

During transport, export goods are accorded "in-transit" status, in which the goods can leave the country of export without being assessed taxes or duties. Furthermore, in-transit goods are often temporarily stored in a country other than their final destination as they await onward transfer. Large-scale smugglers often divert cargo at this point in its journey.

Additionally, there is considerable evidence and many claims that tobacco producers themselves assist, both tacitly and explicitly, wholesale smugglers in transporting tobacco products. The International Consortium of Investigative Journalists (January 2000) reviewed thousands of pages of internal documents of the British American Tobacco (BAT) company and concluded that:

> *The selected documents, covering mostly 1990–1995, do not suggest that BAT employees themselves transported contraband cigarettes across customs borders, where taxes would be due. Instead, they show that corporate executives in Britain, the United States, and other locales controlled the volumes, brands, marketing campaigns, timing, and price levels throughout the smuggling distribution networks they exploited. Company officials worked closely with their local agents—giving them perks such as tickets to Wimbledon—and provided incentives to local black-market distributors.*

Such charges are not confined to BAT. The government of Canada has "sued R. J. Reynolds Tobacco Holdings Inc. alleging that the company has smuggled billions of cigarettes into Canada as of a carefully orchestrated tax-dodging scheme" (Segal, 1999). The suit contends that the tobacco companies made tax-free Canadian brand cigarettes available to smugglers in the United States. The government charges that smugglers evaded border controls by transporting the cigarettes back to Canada via the St.

Regis/Akwesasne Indian reservation.[1] Both R. J. Reynolds and BAT have denied the charges.[2]

Finally, knowledgeable observers believe that organized crime syndicates have significant involvement in wholesale smuggling of cigarettes (BAT, February 16, 2000; Joossens *et al*, 2000). One informed source claims that cigarette smuggling is the third largest illegal business in Germany, behind drug trafficking and illegal gambling, and that there is extensive involvement with organized crime (von Lampe, 1999). There are reports that Calabrian gangsters are involved in the smuggling of tobacco as well as other contraband in the southern coast of Italy (The Toronto Sun, December 28, 1997).

Tobacco Smuggling and Corruption

Smugglers, like other businessmen, operate to make a profit. As emphasized above, price differentials enable smugglers to profit by purchasing tobacco products in low price markets and reselling them in markets where prices are higher. Inevitably, smugglers' transport of tobacco products between markets involves circumvention of legal controls designed to assess taxes and tariffs. The ease with which these controls can be circumvented greatly influences the proclivity of individuals to engage in tobacco smuggling. In fact, it is the ease of evasion of border controls, rather than the price differentials, that most determines the level of tobacco smuggling in a country. Consider:

> *...it is not always true that the incentive for smuggling is linked to the level of taxes. For example, in countries with the highest taxes in Europe, such as the Scandinavian countries, there is little evidence of smuggling, while in Spain, Italy and many Central and Eastern European countries, where taxes and prices are much lower, the illegal sale of international cigarette brands is widespread. (Joossens 1998 p.146.)*

This apparent paradox is resolved by understanding that it is often the countries with the *lowest* level of taxes that have the *least effective* systems of border and tax evasion controls. Merriman *et al* (2000) performed a statistical analysis of the relationship between the perceived level of tobacco smuggling into a country and the transparency of the country's administrative rules and government and business transactions. Since it is easier to evade border controls and tobacco taxes in countries that are less transparent, all else equal, these countries should experience a higher level of tobacco smuggling.

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[1] The Flathead Indian Reservation, straddling the border between the U.S. States of Montana and Washington, has been used in a similar manner to evade cigarette taxes in Washington State (Magaw, 1997). Further information on the use of Indian reservations to smuggle between Canada and the U.S. is contained in Canadian Cancer Society *et al*, 1999.

[2] For BAT's views on smuggling, see British American Tobacco (February 16, 2000) and British American Tobacco (March 8, 2000).

The empirical results strongly support this hypothesis. Merriman *et al* find that transparency (lack of corruption) in a country is negatively and significantly correlated with the level of tobacco smuggling. In fact, the level of corruption (as measured by the transparency index) is found to be an even more important determinant of tobacco smuggling than price differentials. The estimates reveal that each one-point increase in a country's transparency index is associated with a two percent decrease in estimated tobacco smuggling. This implies that anti-tobacco smuggling policies that target corruption can be successful even when countries impose heavy tobacco taxes.

Retailing Network

Smuggled tobacco is generally offered for retail sale in informal markets, such as outside street markets or inside a pub.

Once transported beyond tax and border controls, smuggled tobacco is generally offered for retail sale in informal markets. Methods for retailing smuggled tobacco vary depending upon the country and the group involved. Joossens *et al* (2000) write that in Russia, street sellers, often older women, sell smuggled cigarettes, typically operating in front of transport stations. In the United Kingdom most smuggled tobacco products are apparently sold in pubs.

In many countries smuggled tobacco is distributed within tightly-knit cultural and economic communities. Walsh and Ottaway (2000) report that in the United States:

> *Arab smugglers make contacts in mosques and sell their goods to bodegas, newsstands and small retail shops which in turn sell to individual smokers. The Chinese form partnerships and deliver supplies to warehouses where they are distributed to retailers within their own communities. The Russians deliver only to private homes.*

Similarly, von Lampe (1999) reports that Vietnamese and Eastern Europeans dominate the street sale of smuggled cigarettes in Germany. Often street vendors operating out of mobile and temporary stalls sell the smuggled cigarettes. The street vendors generally operate quite openly and are very widespread. In Berlin, untaxed cigarettes can apparently be purchased in 1,200 locations.

Assumptions and Requirements

In most countries, legal tobacco tax avoidance is a relatively insignificant problem. Furthermore, its scale may be relatively easy to measure since duty free sales and legally declared purchases can be directly observed. The primary focus of this tool is on methods to measure illegal circumvention of tobacco taxes.

When attempting to understand tobacco tax avoidance and evasion in a particular country it is important for the analyst to learn as much as possible about the specific mechanisms that are used in that country. Information about these issues can often be gathered by reviewing

media reports about tobacco marketing and smuggling. Tobacco industry trade publications such as industry annual reports or *World Tobacco File* publications (see the **Additional References** chapter) can be especially useful. Further information can be obtained through review of documents or consultation with government authorities responsible for (1) monitoring border trade, (2) collecting excise tax revenues, and (3) suppressing criminal activity, especially organized crime.

III. How to Measure Smuggling

Overview

Reliable quantitative measures of tobacco smuggling can enhance tobacco control policy. Baseline measurements of tobacco use and tax avoidance and evasion can be built, upon which policies are then established. Further measurements can provide appropriate benchmarks to ensure the implementation, review, and improvement of such policies. And sound measurements of the association between changes in tobacco control policies and changes in smuggling can prove the success of these policies.

Estimating the true nature of smuggling is challenging because it is an illegal and hidden activity. A number of useful and reliable methods to measure smuggling are available, but each method has limitations. When time and resources permit, it is best to use several different methods in order to cross-validate estimates. In this manner, any methodological objections can be minimized or better placed within the greater tobacco use context.

This tool, then, offers five methods to measure tobacco smuggling. The methods are ranked, with the first requiring the least technical and statistical sophistication and the last requiring the greatest level of technical complexity and statistical inference.

1. Observe the producers and ask the experts for smuggling data.
2. Observe smokers directly and ask them about their methods of obtaining tobacco.
3. Monitor and analyze data on the export and import of tobacco.
4. Compare the sale of tobacco with estimated consumption of tobacco by using household surveys.
5. Compare the sale of tobacco with estimated consumption of tobacco by using a mathematical formula and economic inference.

For each method, this tool offers a brief discussion on its application, strengths, and weaknesses, and then provides a step-by-step process to use the method.

A final summary provides recommendations on the appropriate use of each method.

Ask the Experts

Brief Discussion

The most direct method to measure the size of the tobacco smuggling industry is the same as that used to measure the size of other industries: survey those in the industry and ask about their revenues, employment, shipments, etc.

Unfortunately, this is not a feasible approach, as a distinct disadvantage to this method is that those participating in the industry are difficult to identify and unlikely to willingly provide information to authorities about their operations.

There are, however, several ways to get reliable information indirectly from such experts and participants.

Information from Smuggling Researchers

Smugglers and other criminals do sometimes voluntarily provide anonymous information to academics, journalists, and others studying the industry. By piecing together information gathered over time from smugglers, these experts can obtain an accurate understanding of the size and scope of the tobacco smuggling industry.

Information from Law Enforcement

Police authorities also have significant information about the industry. They can observe seizures of smuggled tobacco and may be able to accurately estimate the likelihood that illegal cargo is intercepted. This information can be used to estimate the size of the industry. Even more importantly, by monitoring *changes* in seizures of smuggled tobacco, police can estimate changes in the size of the tobacco smuggling industry. For example, if police seizures doubled with little change in the level of scrutiny, one might conclude that the level of smuggling also doubled.

Further, while smugglers generally do not volunteer information to legal authorities, police can use legal leverage to extract information. For example, those intercepted in the act of smuggling may negotiate for lighter penalties in exchange for the provision of information about their industry. Police who specialize in this area of law enforcement often obtain an accurate view of the industry.

Information from Retailers

Another possible source of information is direct questioning of retailers. Often retailers have little to fear from researchers inquiring about the source of their products.

Information from Trade Publications and Professionals

The tobacco industry publication *World Tobacco File* contains estimates of smuggling in each country it covers based on a canvass of experts who are familiar with local market conditions. However, this publication does not use a consistent method over time or in different countries, nor does it present a detailed explanation of how it arrives at its estimates. Since both the interviewers and the experts differ from year to year and from country to country, comparisons using this source can be unreliable. Without detailed methodological information, one cannot know which experts were interviewed, precisely the questions that were asked how differing estimates were weighted, or how much uncertainty experts have about their estimates. Other published estimates of expert opinion share similar limitations. Furthermore, experts, particularly those interviewed anonymously, may have biases or agendas that influence their estimates.

On the other hand, such published estimates of experts do provide valuable background and corroborating information. For instance, weighted country estimates on the amount of tobacco smuggling, as compiled from *World Tobacco File* and other publications, accords well with global estimates using other methods. This suggests that, as a whole, expert estimates of smuggling can be relatively accurate even though they can be inaccurate in particular countries or for particular years.

Step-by-Step Process

Use this process to collect expert opinions of tobacco smuggling:

1. Identify the experts to be interviewed. Consider tobacco industry professionals, tobacco control advocates, academic experts, journalists, and police and customs officials. If possible, also arrange for direct interviews with smugglers.
2. Develop standard and identical questions that can be answered by all experts. This assures that different experts provide estimates of the same phenomena.
3. Pretest interview questions and procedures. Use the results of the pretest to refine questions and interviewing techniques. Upon completion of this step, no procedural changes should be made unless absolutely necessary—and then they should be made for *all* interviews.

4. Interview the experts, and clearly inform them of the time period and region the interview is meant to cover.
5. Conduct interviews at several points in time, unless resources prevent this. In general, seek estimates of *changes* in smuggling, as they are more useful and reliable than estimates of *levels* of smuggling.
6. Develop an explicit procedure to weight the answers of different experts when arriving at a final estimate. The simplest procedure may be to mathematically average the answers of various experts. However, in some circumstances certain experts may have knowledge that should be weighted more (or less) heavily than others.
7. Carefully document all procedures and estimates. Measures of dispersion such as the standard error or the range of estimates should be calculated and published along with point estimates of the amount of smuggling.

References and Additional Information

The following sources of information are applicable for this particular method. See the **Review of Literature on Tobacco Smuggling** and the **Additional References** chapters for a complete description of these and other sources.

Hu and Mao (2000) report success conducting informal personal surveys among retailers and street vendors in four Chinese cities.

Joossens (1998) discusses the limitations of other published estimates of expert opinion.

Merriman *et al* (2000) offer an analysis of *World Tobacco File* as a viable source of information.

Observe Smokers and their Buying Habits

Brief Discussion

In any market there are both sellers and buyers. The market for smuggled tobacco is no exception. Sellers of smuggled tobacco can be quite reluctant to provide information about their trade because they face potentially serious penalties if detected. However, tobacco consumers can provide direct evidence on tobacco smuggling.

The sections below present the advantages and disadvantages of directly polling consumers, as well as a discussion of two survey techniques successfully used by researchers.

Advantages of Interviewing Tobacco Buyers

Buyers of smuggled tobacco generally have little or no legal incentive to conceal their behavior. Laws against purchasing smuggled tobacco are typically nonexistent or, if enforced, have very light penalties. Furthermore, it is often possible to gather information from buyers while protecting their anonymity. Polling consumers directly is perhaps the simplest and most direct approach to obtaining estimates of smuggled tobacco. Asking them where they make purchases, whether they buy in the black market, if they have crossed borders to purchased lower priced tobacco, and so on has the potential to increase our knowledge about tobacco smuggling. But it also has some important limitations.

Disadvantages of Interviewing Tobacco Buyers

Buyers of smuggled tobacco may be significantly less likely to provide information about their purchases than buyers of legal (tax paid) tobacco. First, even in anonymous surveys, consumers may be unwilling to admit they have engaged in illegal behavior like purchasing smuggled cigarettes. Consumers are known to under-report legal purchases of cigarettes and alcohol on surveys even when the purchases are legal. Illegal purchases would almost certainly also be under-reported. Second, even when they wish to fully report their purchases, in some cases consumers are not certain if the tobacco they purchased legally cleared customs or whether applicable taxes were paid. Thus it can be difficult to obtain an accurate representative sample of information about the purchases of tobacco.

Person-to-Person Survey

In Spain and the Netherlands, interviewers, posted in areas with heavy foot traffic, asked passing smokers to show their cigarette packs. By studying the packs the interviewer determined whether taxes were paid on the cigarettes, and made note of such. At the end of the day the interviewer tallied the data of all cigarette packs examined and conducted a simple calculation to determine the percentage of smuggled tobacco.[3]

This method faces several technical obstacles. In some cases it is difficult, even for trained interviewers, to discern whether cigarettes are smuggled by a brief examination. The best evidence that cigarette taxes are paid is often the presence of a tax stamp. However, in some cases smokers remove the stamp when opening the pack. Therefore, the lack of a stamp cannot definitively prove that cigarettes have been smuggled.

Perhaps an even more serious problem is the difficulty of obtaining a sample of cigarette packs that accurately represents those carried by smokers in general. Since participation in the survey is voluntary

[3] This information was provided in a personal communication to the author from Luk Joossens on April 9, 2000.

those carrying smuggled cigarettes may avoid participation because they fear legal prosecution, confiscation, or embarrassment.

Even if those carrying smuggled cigarettes did not particularly wish to conceal that fact, it would be difficult to get a representative sample of the population by stopping people on the street. Some individuals such as the elderly or ill are unlikely to appear on the streets. Further, certain types of people are much less likely than others to consent to the interview. In general, those with higher incomes, employed people, underage smokers, and immigrants (who might not speak the local language) are less likely to respond. The survey results are biased if those who consent to show their cigarette packs have a different propensity to consume smuggled cigarettes than the general population.

In conclusion, while surveys conducted in this manner are more likely to under-estimate rather than over-estimate smuggling in the locale surveyed, they can provide a useful low-end estimate of the market penetration of smuggled cigarettes.[4] Furthermore, if several comparable surveys are taken at different points in time they can provide useful information about whether tobacco smuggling is increasing or decreasing over time.

Mail-In Survey

A similar approach was used in recent research sponsored by the Tobacco Manufacturers' Association in the United Kingdom. Data was collected via a series of advertisements offering consumers free gifts in exchange for sending in empty packages of hand-rolled tobacco and cigarettes. By examining the packages researchers were able to determine whether duty was paid on the pack.[5]

The postal code from which the packs were sent was also recorded. Using this method, researchers were unable to distinguish legal cross-border shopping from illegal smuggling. However, independent estimates of legal cross-border shopping indicate that it

[4] When evaluating the results of studies using this method, it is important that reviewers appraise whether sales in the survey area(s) are representative of tobacco sales in the market as a whole. That is, a researcher wishing to promote the idea that smuggling is a large problem can choose to survey only areas where smuggled cigarettes are known to be sold. In such a case a survey would probably over-estimate, rather than under-estimate, smuggling in the market as a whole.

[5] A variant to this approach is to extract used cigarette packs from garbage. If a representative sample of trash is assembled and investigated, this method can develop quantitative estimates of legal and smuggled consumption. A crude version of this technique was used to discover that "40 percent of discarded cigarette packets retrieved from football matches at British grounds were imports" (Studd, 2001). The viability of this technique depends upon whether it is possible to determine if duty has been paid on cigarette packs extracted from the trash collection system.

While going through garbage is quite messy, archeologists and anthropologists have used trash-sorting techniques to study consumption in a variety of settings. The proposed method is not totally unprecedented. This method can probably avoid most of the biases of alternative pack inspection methods, since consumers of smuggled cigarettes probably dispose of their packs in the same manner as consumers of legal cigarettes (at least holding income constant).

is relatively insignificant and the researchers attributed most non-duty paid packages to smuggling.

This method has some of the same limitations as that of the person-to-person survey, discussed above. It may not be possible to determine definitively whether duty is paid on all packs received via mail.

Furthermore, tobacco packs obtained in this manner can be even less representative of smokers in general than packs obtained from street collection. On the one hand, people who mail in their tobacco packs cannot be guaranteed anonymity if they receive incentives in exchange. Thus, those who possess smuggled tobacco may be unwilling to participate in the method.[6] On the other hand, mailing tobacco packs is a rather laborious enterprise that is unlikely to seem worthwhile for well-to-do or extremely busy individuals. It also seems likely that these individuals are less prone to consume smuggled tobacco because their adequate financial resources simply do not make it worth the risk. Therefore, this method could understate, or overstate, the share of smuggled tobacco in the market.

In conclusion, despite these limitations some valuable information may be obtained by examination of consumers' cigarette packs.

Step-by-Step Process

Use this process to collect tobacco smuggling data directly from consumers:

1. Instruct cigarette-pack examiners to carefully separate duty paid from non-duty paid packages. Test these examiners with packs of known origin to ensure successful instruction and package identification.
2. Use sampling techniques that produce an accurate representation of tobacco users. Whenever possible, social and demographic data about smokers whose packs are examined should be collected. This data can then be analyzed to determine if the sample represents all tobacco users. If the sample is not representative of the population, consider giving more or less weight to responses from under-represented and over-represented segments of the population.
3. Conduct interviews at several points in time, unless resources prevent this. In general, seek estimates of *changes*

[6] DTZ Pieda Consulting (2000) reports that "one would expect smokers of black market tobacco to be less likely to return empty packs than legal smokers, so…the survey data could under-represent the true size of the black market" (p. 33). However, the probability that smokers return their cigarette packs also depends, in part, on whether advertisements announcing the study are placed in the periodicals they read. Since the study provides no information about the placement of ads announcing the study, one cannot determine whether it targeted a representative sample of smokers.

in smuggling, as they are more useful and reliable than estimates of *levels* of smuggling.

4. Carefully document all procedures and estimates. Measures of dispersion such as the standard error or the range of estimates should be calculated and published along with point estimates of the amount of smuggling.

References and Additional Information

The following sources of information are applicable for this particular method. See the **Review of Literature on Tobacco Smuggling** and the **Additional References** chapters for a complete description of these and other sources.

DTZ Pieda Consulting (2000) discusses in further detail the results of the mail-in survey and the subsequent estimates of tobacco smuggling.

Joossens (2000) provided information about the person-to-person survey technique through e-mail correspondence with the author.

Monitor Tobacco Trade

Brief Discussion

International trade statistics contain substantial information about the legal flow of tobacco products between countries. Each country records the quantity of its exports of each product by country of destination. Similarly, each country records the quantity of its imports of each product by country of origin. In principle, at least, country A's exports of product X to country B ought to match with country B's imports of product X from country A. In practice, these two values often do not precisely match. While there are a number of possible reasons for this discrepancy, one explanation is purposeful misrepresentation in order to evade duties and taxes.

In most countries there are no export duties or taxes on tobacco products. Therefore, exporters do not have an incentive to under-represent their exports of these products. On the other hand, many countries impose duties and levy taxes on tobacco products at the point of import. Thus, importers can have a strong incentive to under-report tobacco imports. They may bribe customs officials to misreport quantities and values; they may circumvent the usual customs inspection by entering the country illegally; or they may disguise the tobacco products as other goods subject to lower taxes and tariffs.

One method to detect and measure such tactics of tobacco smuggling is to compare reported tobacco exports destined for a country to that country's reported tobacco imports. Persistent discrepancies between these amounts—discrepancies that cannot be explained by other

factors—provide an estimate of the amount of wholesale smuggled tobacco. The benefit of this method is that it relies on well-documented information, and its application is straightforward.

Assumptions and Limitations

Monitoring tobacco trade is most accurate in measuring tobacco smuggling at the global and regional levels.

This method requires the implicit assumption that all goods lost between export and import are eventually smuggled into the country designated as the destination country by the exporter and are not diverted to a third country (or even back to the exporting country). Readers are cautioned that there is no logical necessity for this assumption to be true. However, personnel in the exporting country have no financial incentive to misidentify the country for which their exports are destined. Thus, their reports can be an unbiased estimate of intended shipments to the importing country. When taxes or tariffs are collected in the process of clearing border controls, personnel in the importing country have a distinct financial incentive to understate imports.

On the other hand, this assumption cannot be entirely dismissed, most particularly when focusing on tobacco smuggling within only one country. Unaccounted tobacco is never really "lost" within a country, but is susceptible to being shipped to neighboring countries or regions. This is becoming increasingly so with the growth of international trade, wherein trade patterns have become more complex and many products stop at intermediate ports during their journey from origin to destination. Therefore, this method is best used to estimate global or perhaps regional tobacco smuggling, rather than to provide a fully accurate estimate when applied to a single country.

Furthermore, this method does not uncover bootlegging (the transport of tax paid tobacco from lower priced countries) and is not designed to discover the consumption of tobacco in the country of production without payment of taxes. Thus, use of this method is not recommended in countries that are significant producers of tobacco or in countries that have significant problems with tobacco bootlegging.

Presenting a Case Study as an Example

An excellent example of this method in use is the effort of Bhagwati (1974b) to study smuggling of various products (but not tobacco) into Turkey in the early 1960s. Some of the data used in this study is reproduced in Table 7.1.

The table shows France's recorded exports of various products to Turkey and Turkey's recorded imports of those same products from France. In every case France's recorded exports to Turkey exceed Turkey's recorded imports from France. For example, France recorded about $5.3 million of exports of machinery and transport equipment to Turkey but Turkey reported only about $3.8 million of imports of these goods from France.

Table 7.1
1960 Trade between France and Turkey (US$000)

SITC Code	Commodities	France's Exports	Turkey's Imports	Discrepancy
313	Petroleum products	9,059	617	–8,442
6	Main manufactured goods	3,212	3,196	–16
66	Non-metallic mineral manufactures	343	266	–77
68	Non-ferrous metals	4,412	3,464	–948
69	Metal manufactures	3,915	544	–3,371
7	Machinery and transport equipment	5,270	3,820	–1,450
8	Miscellaneous manufactured goods	1,246	595	–651
	Others	4,197	3,834	–363
	Total:	**31,654**	**16,336**	**–15,318**

Source: Bhagwati (1974b), Table 1.

There are several factors that might explain these discrepancies, including (1) errors of commodity classification, (2) time lags between export and the receipt of imports, (3) misallocation of imports by country, and (4) over-invoicing of exports. Each of these explanations is carefully considered, and in fact the discrepancy in petroleum products is attributed to misallocation by country (that is, some of France's petroleum exports to Turkey were misattributed to other countries).

However, Bhagwati cannot find explanations for discrepancies between trade partners' recorded exports and Turkey's recorded imports of other products. He concludes that there is "strong evidence of understatement of import values of manufactures, especially in the field of transport equipment and machinery" (1974b, p.141).

Step-by-Step Process

Use this process to monitor the import and export of tobacco products:

1. Gather data on your country's recorded imports of tobacco products by country of export. Collect several years' worth of data on all importing countries whenever possible.
2. Gather data on the exporting countries' recorded exports of tobacco products to your country. Collect several years' worth of data on all exporting countries whenever possible.

3. Prepare a table (similar to Table 7.2) of the collected data for each year. Record data by row in the table columns as follows:

   Column 1: Name of the exporting country

   Column 2: Exporting country's recorded exports of tobacco products to your country

   Column 3: Your country's recorded imports of tobacco products from the exporting country

   Column 4: The value in Column 3 minus the value in Column 2

4. Investigate for any discrepancies (values other than zero) listed in column 4. Confer with customs officials to assure that imports and exports are not misclassified or misallocated by country. Investigate time lags between export and importation. Make adjustments in recorded exports and imports to reflect this information.
5. Record the total sum of each column.
6. Determine and record the estimate of under invoicing of tobacco imports as a share of total imports of tobacco products by dividing the total sum of the discrepancies (Column 4) by the total sum of the recorded exports (Column 2). This value is an estimate of the extent of smuggled tobacco within your country.
7. Compare each year's estimated extent of smuggled tobacco to identify and monitor smuggling causes and trends.

Table 7.2
Hypothetical Data on Tobacco Trade between Home Country and Trade Partners per Year

Name of Exporting Country	Exporting Country's Recorded Tobacco Exports to Home Country	Home Country's Recorded Tobacco Imports from Exporting Country	Export/Import Discrepancy
A	70	25	–45
B	83	76	–7
C	23	20	–3
D	90	58	–32
E	89	60	–29
F	46	62	16
G	84	50	–34
Total:	**484**	**352**	**–134**

134 ÷ 484 = **27.7%** Estimate of under-invoicing of tobacco imports as a share of total tobacco imports.

References and Additional Information

The following sources of information are applicable for this particular method. See the **Review of Literature on Tobacco Smuggling** and the **Additional References** chapters for a complete description of these and other sources.

Bhagwati (1974b) and Simkin (1974) are apparently the first to use this method.

Merriman *et al* (2000) employ a variant of this method as one of their measures of worldwide tobacco smuggling.

Compare Tobacco Sales against Consumption via Surveys

Brief Discussion

In many countries it is relatively easy to obtain reliable statistics about tax paid sales of tobacco products. Such records are generally maintained by official government agencies—in most cases by the Tax Administration and Customs department. If reliable *independent* estimates of tobacco consumption are available, then the difference between consumption and tax paid sales can be used to estimate the amount of smuggled tobacco.

One major independent source of tobacco consumption is the household survey. These surveys, which typically ask respondents how much tobacco, alcohol, and other products they consume, can be appropriately weighted and totaled to estimate total tobacco consumption.

Assumptions

Unfortunately, it is well know that respondents consistently understate the quantity of tobacco consumed when responding to such surveys. So adjustments must be made to ensure that tobacco consumption, as derived from survey respondents, is fully accurate. Furthermore, since this method is useful in detecting trends in smuggling, the level of smuggling for the baseline year *must be known*, or at least safely assumed, in order for this method to be reliable. If the level of smuggling at the starting point is not known the method may still be used to estimate the increase in smuggling between the starting and ending point.

In addition, the assumption or stated level of under-reporting *must be consistent* from year to year. This consistency is crucial. Responses to survey questions about smoking rely on respondents' faulty memories. Furthermore, respondents often give the socially approved response even when it does not represent their actual experience. Thus, in an era when smoking is becoming less socially acceptable,

under-reporting of consumption on surveys may increase. If current trends continue this method may increasingly understate smuggling.

Presenting an Example

Consider the example provided in Table 7.3, in which changes in smuggling are monitored between two years. In 1992, tobacco consumption, derived from a survey, is 80 units while tax paid sales, derived from official statistics, is 100 units. This difference is not surprising because consumption is known to be under-reported in surveys. Further, this method assumes that smuggling is essentially zero in 1992, so tax paid sales become an accurate indicator of total consumption. Therefore, using this assumption, under-reporting of consumption in 1992 is estimated as the difference between tax paid sales and reported consumption, or 20 units, which in this example means the survey data under-reports consumption by 25 percent (20 units ÷ 80 units).

The method further assumes that this 25 percent of under-reporting on surveys does not change between 1992 and 1999. Therefore, survey-reported 1999 consumption of 72 units translates into estimated 1999 total consumption of 90 units. Smuggling is calculated as the estimated total consumption (90 units) minus tax paid sales (70 units). Thus, this method estimates that 20 units are smuggled in 1999.

Step-by-Step Process

Use this process to compare tobacco sales against estimated consumption by using household surveys:

1. Locate several years of reliable data on tax paid sales (for multiple regions if possible).

Table 7.3
Hypothetical Example of Estimating Smuggling Using Household Survey Data

Process Step	Year 1992	Year 1999	Change from 1992 to 1999
1. Reported consumption (from survey data)	80	72	–10%
2. Tax paid sales (from official statistics)	100	70	–30%
3. Assumed under-reporting (__% of reported consumption)[†]	20	18	–10%
4. Total estimated consumption (1 + 3)	100	90	–10%
5. Estimated smuggling (4 – 2)	0[‡]	20	
6. Estimated smuggling as a percent of total estimated consumption (5 ÷ 4)	0%	22%	

[†] In this example only, under-reporting is assumed to be 25% of reported consumption.
[‡] Estimated smuggling is assumed equal to zero in 1992.

2. Locate household surveys in order to estimate total tobacco or cigarette consumption. The survey region and period should correspond exactly with the region and period of the data on tax paid sales.
3. Investigate any factors that might lead to a change in under-reporting on the household survey. For instance, carefully investigate any changes in the wording of survey questions or the sampling strategy, since even small changes in survey procedures can significantly effect reported consumption.
4. Calculate total tobacco consumption using the household survey data. This will typically involve weighting survey responses so that they are representative of the population.
5. Calculate the percentage change in tax paid sales and the percentage change in reported consumption.
6. Estimate the change in smuggling using the step-by-step process outlined in Table 7.3.

References and Additional Information

The following sources of information are applicable for this particular method. See the **Review of Literature on Tobacco Smuggling** and the **Additional References** chapters for a complete description of these and other sources.

DTZ Pieda Consulting (2000) and HM Customs and Excise (March 2000) use this approach in estimating tobacco smuggling in the United Kingdom.

Compare Tobacco Sales against Consumption via Modeling and Calculations

Brief Discussion

Economic models provide an alternative estimate of tobacco consumption. Total tobacco consumption is correlated with the price of tobacco, consumer income, prior consumption, and certain other variables. Further, smuggling is positively correlated with the relative price of tobacco and the ease of cross-border transportation. Thus an econometric study (a mathematical formula using economic data) of the relationship between observed tax paid sales, variables associated with the demand for tobacco, and variables associated with smuggling can be used to determine the level of smuggling.

Advantages

This method advantageously exploits the fact that it is much more difficult to smuggle tobacco in some geographically isolated regions (e.g., the islands of Hawaii) than others. Thus, with little smuggling

in these areas, tax paid sales provide an accurate estimate of tobacco consumption. By studying the relationship between tax paid sales and tobacco price (measured in a common unit of currency), and controlling for non-price influences, one can estimate the shape of the tobacco demand curve. Furthermore, provided the ease (or difficulty) of smuggling in a region is not associated with factors that determine the shape of the tobacco demand curve, smuggling within the region can be accurately estimated.

Conceptual Explanation

Figure 7.1 illustrates the basic logic of this approach. (For illustrative purposes the steps involved in this method are discussed sequentially. In the econometric analyses all of the steps are undertaken simultaneously.) Suppose that one observes the price of tobacco and total sales in regions 1 and 2, both of which are known, beforehand, to experience little smuggling. In region 1, when price is 1.0 sales are 1.0; whereas in region 2, price is 10 percent higher (1.1) than in region 1 and sales are 10 percent lower (0.9). We infer that in these two regions a 10 percent increase in price causes a 10 percent decline in sales. Remember from above that, with little or no smuggling, *sales* equal *consumption*. Therefore, based on this data the following relationship between price and consumption is identified: when price equals 1 consumption equals 1, when price rises to 1.1 consumption falls to 0.9. Thus, there is an inverse relationship between tobacco consumption and price.

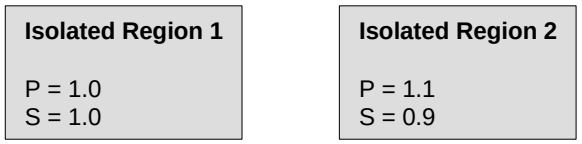
Figure 7.1
Basic Approach to Econometric Analyses

1. Tobacco Price and Sales in Two Isolated Regions

In a study of isolated regions (where no smuggling occurs), we observe that

when Price = P = 1.0, Sales = S = 1.0

when P = 1.1, S = 0.9

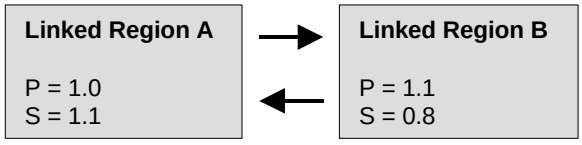


2. Tobacco Price and Sales in Two Linked Regions

In a study of linked regions (where smuggling is possible), we observe that

when P = 1.0, S = 1.1

when P = 1.1, S = 0.8



3. Conclusion

We infer that in linked regions

when P = 1.0 (Region A) and neighbor P = 1.1, smuggled exports = 0.1

when P = 1.1 (Region B) and neighbor P = 1.0, smuggled exports =- 0.1

Now consider the linked regions A and B. The linked regions are identical to the isolated regions in all respects except for geographic location. In region A, price is 1 and sales are 1.1 (higher than in an isolated region). In region B, when price is 1.1 sales fall to 0.8 (lower than in an isolated region.) The (sales) value of consumption in each linked region is known because of the analyses of the isolated regions. Smuggling can therefore be computed as a residual—that is, smuggling is the difference between expected consumption and observed sales. In region B expected consumption is 0.9, so 0.1 consumption must be serviced by smuggling. On the other hand, in region A expected consumption is 1.0, so smuggling must be equal to –0.1. Therefore, one can conclude that tobacco is exported from region A and sold in region B.

Mathematical Explanation

Using the conceptual approach above, Merriman *et al* (2000) developed an econometric model to estimate bootlegging among 17 European countries from 1989 to 1995. Their basic equation is:

Sales = consumption – bootlegged imports + bootlegged exports [7.1]

where Sales = observed tax paid sales, consumption is a function of observed variables as in:

Consumption = $f(P, Y, X)$ [7.2]

where P = price of cigarettes, Y = real per capita income, and X is a vector of other variables effecting tobacco consumption. Bootlegged imports and exports are not directly observed. Rather these variables are assumed to depend on the incentives for, and ease of, bootlegging, as in the equations below:

Bootlegged imports = $h_j (I_j, E_j)$ [7.3]

where I_j = the incentives for activity j (i = imports)

E_j = the ease of activity j (i = imports)

Bootlegged exports = $h_x (I_x, E_x)$ [7.4]

where I_j = the incentives for activity j (x = exports)

E_j = the ease of activity j (x = exports)

Equations 7.2–7.4 are substituted into Equation 7.1, and observed sales are calculated as a function of price, income, other variables effecting demand, and incentives and ease of bootlegged imports and exports.

An econometric analysis using this conceptual model requires data from these categories:

1. Observed tax paid sales
2. Tobacco prices in own and neighboring regions

3. Variables, such as income and demographic information, that influence the demand for tobacco at a given price
4. Variables that measure the incentives for, and ease of, bootlegging between regions

Data in categories 1–3 are similar to those needed in the estimation of demand curves when smuggling is not an issue. (Consult **Tool 2. Tobacco Data** for a discussion of data for economic analysis, and **Tool 3. Demand Analysis** for a discussion on economic analysis of tobacco demand.) Data in category 4 measure the incentives for, and ease of, smuggling, and play a crucial role in the econometric analyses.

- Incentives for smuggling depend primarily upon the relative price of tobacco in the origin and destination country.
- The ease of smuggling measures the effort required to transport tobacco past customs stations without prosecution.

Unfortunately, reality is rarely as simple as the scenario depicted in Figure 7.1, in which ease of smuggling is either impossible (the isolated regions) or possible (linked regions.) In general, ease of smuggling can be measured on a continuum from very difficult to very easy.

Example of Regression Analyses

Once a full data set is obtained, regression analyses is used to obtain econometric estimates of the parameters of Equation 7.1, above. For example, Merriman *et al* (2000) estimate a linear regression with independent variables that include price, income, country dummies, time dummies, and variables representing the incentive for bootlegged imports and exports. The dependent variable is the natural log of cigarette consumption per capita. Once econometric estimates of the coefficients are obtained, estimates of smuggling can be derived through statistical simulations.

This example is further illustrated in Table 7.4. Column A displays the estimation results. Incentives for imports and exports are defined so that they vary between zero and negative infinity. When incentives for smuggling equal zero no smuggling will take place. In column B, the estimated regression coefficients are used to simulate the level of smuggling for any value of incentives for bootlegged imports and exports.

Column C lists the sample averages for incentives for imports and exports. In this example, if incentives for bootlegging decline from the sample average of 0.23 to zero, the regression results predict that consumption declines by about 3 percent (0.23×-0.14). This is indicated in column C. Thus, in a country with the mean incentives for bootlegged imports, smuggling accounts for about 3 percent of consumption. Similarly, in a country with the mean incentives for bootlegged exports, about 1.2 percent of consumption is smuggled out of the country. Using the raw data on incentives for bootlegged

Table 7.4
Estimate of Smuggling Based on Linear Regression with Independent Variables

Independent Variable[†]	A.Estimated Regression Coefficients	B. Mean Value of Independent Variable	C. Simulated Percentage Change in Consumption if Variable is Reduced to Zero
Total incentive for bootlegged imports	–0.14	0.23	–3.2%
Total incentive for bootlegged exports	–0.02	0.53	–1.2%
Price	–0.11		
GDP per capita	1.09E-05		
Year dummies	yes		
Country dummies	yes		

[†] Dependent variable is natural log of packs of 20 cigarettes per capita.
Source: Based on Merriman *et al* (2000), Table 15.4.

imports and exports, it is possible to estimate the level of smuggling in each country in each year. Furthermore, the regression results can be used to forecast the change in smuggling as a result of policies that impact the incentives for smuggling.

Note that all statistical estimates have some margin of error. By using standard statistical procedures, it is possible to give a confidence interval on estimates of smuggling.

Step-by-Step Process

Use this process to compare tobacco sales against estimated consumption by using econometric analyses:

1. Assemble a data set containing the following variables:[7]
    - Tax paid sales of tobacco in the regions in which smuggled tobacco originates and terminates
    - Tobacco prices in each region
    - Tobacco taxes in each region[8]
    - Consumer income in each region
    - Measures of accessibility between regions (these might include simple measures of geographic proximity—how long is the shared border, density of population living near border—or more complex measures of inter-regional travel or trade)

[7] Refer to Tool 2 for a discussion of data sources and issues of data quality.
[8] Refer to Tool 4 for a discussion of tobacco taxes.

- Other variables relevant to tobacco consumption (e.g., changes in laws relating to tobacco labeling or advertising)

2. Determine measures of the incentive for smuggled imports and exports following previous literature. In particular, analysts are referred to the appendices in Becker *et al* (1994) and Merriman *et al* (2000) for technical explanation of the procedure.
3. Construct an econometric analysis to explain tax paid sales as a function of price, income, other variables, and incentives for smuggled imports and exports.[9]
4. Conduct simulations to develop estimates of bootlegged imports and exports.

References and Additional Information

The following sources of information are applicable for this particular method. See the **Review of Literature on Tobacco Smuggling** and the **Additional References** chapters for a complete description of these and other sources.

Merriman *et al* (2000), Thursby and Thursby (2000), and Becker *et al* (1994) have all employed this statistical method to analyze black market purchases of tobacco in developed countries.

Baltagi and Levin (1986) assumed that ease of bootlegging depended only upon geographical adjacency to lower priced sources of supply.

Becker *et al* (1994) consider population densities in border regions as well as the relative price in home and neighboring states.

Merriman *et al* (2000) recognize that the ease of bootlegging depends on the ease and frequency of inter-regional travel rather than geographic adjacency. They assume that the *incentive* to bootleg is proportional to the difference in price between the home and destination countries, while the *ease* of bootlegging is proportional to the total number of cross-border travelers.[10] Refer to their Appendix 15.2 for full details on the construction of these variables.

Recommendations

Though this tool presents only five methods to quantify smuggling, it should be clear there is a wider range of methods available. The five

[9] Refer to Tool 3 for a discussion of estimation techniques.
[10] Ideally, variables measuring the ease of bootlegging should also take into account the stringency of border controls. Unfortunately, it is difficult to measure stringency quantitatively and, to date, no study has included such a variable.

presented here have certain strengths and weaknesses, and no single method is recommended for every country in every situation. In fact, as a general practice it is best if several methods are used, so that estimates of smuggling are cross-validated.

Table 7.5 provides a brief summary of the data requirements, data availability, strengths, and weaknesses of each of the five methods. Select the method(s) most appropriate to your situation and relevant policy issues.

Methods 1 and 3 are most appropriate in countries that need an estimate of tobacco smuggling very rapidly and do not have adequate data or a high degree of funding. Method 5 is the most appropriate if the largest problem is perceived to be bootlegging (rather than wholesale smuggling) and adequate time and expertise are available. Method 3 is not appropriate if bootlegging is a significant concern.

Method 1 is not recommended in political environments in which tobacco smuggling is very controversial, because its objectivity may be questioned. Methods 2 and 4 are inappropriate in countries in which smoking is considered anti-social or shameful.

Table 7.5
Five Methods and their Data Requirements and Availability, Strengths, and Weaknesses

Method	Data Requirements	Data Availability	Strengths	Weaknesses
1. Ask the experts.	Open-ended survey of experts.	Primary collection of data is necessary in most countries.	Low cost. Provides an agreeable, "common sense" view. Highly specialized training not required.	Difficult to establish constant and consistent selection of experts. Results may not be objective and cannot be replicated.
2. Observe smokers and their buying habits.	Consumer surveys follow a precise and established process.	Primary collection of data is necessary in most countries.	Provable and reproducable. Potential bias isdiscernable to those who carefully study the methodology..	Very high cost. Requires high level of expertise to select appropriate survey locations. Smuggling may be underestimated in countries with strict legal codes.
3. Monitor tobacco trade.	Data on exports and imports by country and product.	Appropriate data is available in most countries.	Very low cost. Provable and reproducable. "Common sense" results are easy to explain.	Does not detect bootlegging. Relies on a questionable assumption about "lost" exports.
4. Compare tobacco sales against consumption via surveys.	Data on tax paid sales and a variety of income, demographic, and population characteristics in neighboring areas.	Appropriate data is available in some countries. Primary collection of data on cigarette smoking is necessary in some countries.	Provable and reproducable. "Common sense" results are easy to explain. Comparable to similar data in other countries.	High cost if cigarette consumption surveys not available. Results may be inaccurate in countries with changing perceptions about smoking.
5. Compare tobacco sales against consumption via modeling and calculations.	Data on tax paid sales and a variety of income, demographic, and population characteristics in neighboring areas.	Appropriate data is available in most countries.	Low cost if appropriate expertise is used. Provable and reproducable. Comparable to similar data in other countries.	Does not detect wholesale smuggling. Requires high level of expertise. Appropriate data not available in some countries.

IV. Background Information on Tobacco Smuggling

Overview

The potential gain from tobacco smuggling depends upon the difference between smugglers' purchase and sale price. Smugglers who purchase tobacco tax-free have the potential to make large profits if the tobacco can be resold in high tax and high price countries. However, obtaining tax-free tobacco can require a large-scale operation, capital investment, and significant risk of legal jeopardy. Purchasing tax-paid tobacco in a low price country and transporting it to a high price country can involve significantly diminished legal risk.

There is a large incentive to smuggle tobacco across national borders because prices in neighboring countries sometimes vary enormously. Delipalla and O'Donnell (1999) report that in 1997 the price of the most popular brand of cigarettes in France was more than twice the price of the most popular brand in neighboring Italy and nearly four times the price in France's western neighbor, Spain. Merriman *et al* (2000) document even larger price disparities between Germany and Eastern European countries. Scandinavian countries have much higher cigarette prices than those in southern Europe. Outside of Europe, there are large price disparities in Latin America and East Asia. Within North America, cigarette prices in Canada have been more than twice those in U.S. states along the Canadian border. In some cases, these geographic variations in price provide an incentive for tobacco bootlegging.

Reasons for Price Differences

When gathering data on average tobacco prices across regions or over time, the analyst should consider the mix of brands being

smoked.[11] Whenever possible, it is best to gather data on brand-specific prices and consumption. However, even after accounting for differences in the types and brands of tobacco there are substantial differences in price in some regions. For example, in Poland a pack of Marlboro may cost $1 while the same cigarettes cost $3 in Germany. Average price differences may be explained by one of the reasons enumerated below.

- Smoking patterns differ by culture. In some countries, premium international brands are very popular, while in other countries lower priced domestic brands are mainly consumed. Some types of cigarettes are smoked in only a few cultures. *Bidis* are widely smoked in India, Bangladesh, Pakistan, and Nepal, and *kreteks* are smoked in Indonesia and Malaysia but are almost non-existent in Eastern Europe and South America. Compared to most cigarettes sold in the United States and Europe, *bidis* and *kreteks* deliver higher levels of tar, nicotine, and carbon monoxide, and are inexpensive. In countries where the price of *bidis* is averaged with the price of conventional "white stick," the average cigarette price can be quite low. Similarly, countries in which hand-rolled cigarettes (Norway) or clove cigarettes or *kreteks* (Indonesia) are widely smoked may appear to have low prices.
- Suppliers price similar cigarettes differently. A fundamental principle of economics, called "the law of one price," demonstrates that competitive forces tend to equalize prices for similar products across geographic areas. That is, *over the long term* and *in competitive markets*, the prices of similar products differ geographically only to reflect differences in the cost of transport and retailing. However, because cigarettes have a high value-to-weight ratio, in most instances transportation costs are a relatively insignificant factor in their price. Likewise, retailing costs (other than taxes) are also generally a small fraction of cigarette prices. Thus, one would expect geographic variations in price to primarily reflect variations in taxes.

  However, in some countries *tobacco markets are not competitive* and a few sellers with significant market share dominate the tobacco industry. In the European Union five firms control 90 percent of the cigarette market, while the U.S. contains a similarly concentrated market (Delipalla and O'Donnell, 1999; U.S. Federal Trade Commission, 1997). Sellers with significant market share may "price to market." That is, they set different prices in different markets after considering both changes in demand and competitors'

[11] It is quite common for consumers in neighboring countries to have very different brand preferences. For example, the most popular cigarette brands in Canada have almost no market in the United States, and French and German consumers have very different brand preferences.

possible reactions. Additionally, in some countries government chartered monopolies have complete control over supply, and may set prices to achieve public goals such as revenue maximization. Thus, geographical price differences can reflect differences in the structure of the tobacco industry.

- Government policies on the importation and retailing of tobacco can affect price. Many countries impose significant constraints on the importation of tobacco, to include quotas, tariffs, and non-tariff barriers. Empirical evidence suggest that these measures significantly reduce the availability of certain brands of cigarettes and lead to changes in smoking behavior (Taylor *et al*, 2000). Such restrictions on the supply of imported tobacco can lead to significant price differences in neighboring countries, differences that may provide an opportunity for profit through smuggling.
- Taxes affect tobacco prices.[12] Taxes vary a great deal around the world. In the early 1990s European taxes averaged about US$1.50 per pack, ranging from US$5.47 cents per pack in Norway to just US$0.20 cents per pack in Poland (World Bank as referenced in Chaloupka *et al*, 2000).[13] In many countries taxes account for a large share of the price of tobacco products. European Union legislation requires that the tax burden on cigarettes account for at least 70 percent of the gross (retail) price (Delipalla and O'Donnell, 1999).

Gains and Advantages from Smuggling

There are two market conditions that almost undoubtedly provide an economic gain for smuggling.

1. If tax-free tobacco can be obtained, there is an incentive to smuggle it into countries with significant tobacco taxes, where the potential gain from such smuggling is directly related to the size of the tobacco tax and inversely related to the costs of smuggling.
2. If tax-paid tobacco prices differ between geographical areas because of the pricing policies of suppliers with market share or because of differences in taxation, there is an incentive to smuggle from low-priced to high-priced areas. The potential gain from smuggling tax-paid tobacco is directly related to the difference in price between the two areas and inversely related to the costs of smuggling.

The costs of smuggling include the cost of transporting and reselling the tobacco, and the possibility that the smuggler will be

[12] Refer to Tool 4 for a discussion of tobacco taxes.

[13] The situation in Poland has changed considerably as a result of a series of significant tax increases in recent years.

apprehended and penalized if caught. The higher the price difference between two areas the greater the incentive to smuggle. However, the cost of smuggling is also relevant. The higher the cost of smuggling the smaller the inducement to smuggle.

Because tobacco taxes account for a large share of price and because tobacco products are relatively light-weight, the potential monetary gains from smuggling can be quite large. It is estimated that a single truckload of smuggled cigarettes can evade US$1.2 million of taxes in the European Union (Joossens, 1998, p. 150).

Tobacco smugglers may choose between occupation in legal endeavors and illegality. Compared to shipping of legal commodities, smuggling of tobacco offers potentially high revenues. However, smuggling usually requires evasive action to avoid detection. Smugglers may be required to travel by slower, less scrutinized routes, to expend resources to camouflage their illegal cargo, and to bribe border guards and customs officials. As a result, smugglers' costs are likely to be greater than those engaged in transporting a similar weight and volume of legal goods.

In addition to higher transport costs, potential smugglers face the risk of detection and monetary fine, jail, or other punishment. If the potential benefits from smuggling are very great, or the potential rewards from legal occupations are very small, many people will choose to smuggle. As the relative rewards for smuggling are reduced the number of people choosing to smuggle and the quantity of tobacco smuggled will be reduced. Policy actions to reduce smuggling must either lower the returns to smuggling or raise the return to legal occupations.

V. What Happens when Policies and Actions are Implemented

Types of Policies

Policies to combat smuggling fall into four general categories.

1. Reduce incentives for smuggling by harmonizing tax and pricing policies.
2. Reduce the supply of smuggled tobacco by regulating transport and retail sales.
3. Reduce demand for smuggled tobacco by influencing consumers not to purchase smuggled products.
4. Increase the certainty and severity of punishment through enhanced law enforcement and prosecution.

Policies in the first category are quite effective but difficult to implement. As indicated in the previous chapter, there are several reasons for retail price differentials. One important cause is multinational tobacco producers pricing-to-market by setting prices in accordance with differing demand conditions. Such differential pricing provides incentives to smuggle tobacco from low- to high-priced countries (in this case, evading taxation may be only one factor motivating smugglers). Multinational tobacco companies can reduce smuggling of their products by using uniform pricing policies within a region. Therefore, policies discouraging monopoly power within the tobacco manufacturing and retailing industry can also discourage differential pricing.

A second cause of price differentials is differential taxation of similar products in nearby countries. Regional agreements harmonizing tax rates can reduce smuggling. The European Union recently took steps in this direction as part of a broader policy of tax

harmonization. Even when neighboring countries cannot agree on tax rates, they may cooperate on measures to make tax evasion more difficult.

The most important step for government to reduce smuggling is to incorporate a simple and effective tobacco tax administration.

Policies in the second category are designed to minimize tobacco smuggling even in the presence of price differentials. Smuggling is reduced if it is very difficult to acquire and distribute tobacco products without paying appropriate taxes. Therefore the single most important element governments can do to reduce tobacco smuggling is to put in place a simple and effective system of tobacco tax administration.[14] Government personnel should be carefully trained and anti-corruption regulations should be fully explained and enforced.

Using a system of prominent but difficult to counterfeit tax stamps makes enforcement of anti-tobacco smuggling laws easier. Other labeling requirements, such as unique serial numbers, can further discourage smugglers (see Joossens *et al* 2000; Canadian Cancer Society *et al* 1999). Much tobacco is diverted by smugglers during an "in-transit" regime prior to tax payment. Diversion can be discouraged by requiring documentation of a clear chain-of-custody for all tobacco products transported into the country.

Policies in the third category include "mass media campaigns and other efforts...to raise public awareness concerning the problems associated with...[tobacco] smuggling, something that is often viewed as a 'victimless crime'" (Joossens *et al* 2000). The United Kingdom recently announced it would undertake exactly this kind of public relations campaign (HM Treasury 2000). Enactment and enforcement of sanctions for possession of smuggled tobacco can also discourage purchase of such products.

Policies in the fourth category are the most straightforward and sometimes the most effective way of discouraging tobacco smuggling. Increasing and mobilizing law enforcement resources to intercept smugglers increases seizures. The United Kingdom recently announced a major clampdown on tobacco smugglers with the addition of nearly 1,000 additional customs officers, additional x-ray equipment, and increased investigators and intelligence staff. Additional sanctions and penalties have also been put in place (HM Treasury 2000). Prosecutors and court systems should be given sufficient resources to process additional cases that develop because of increased enforcement activities.

Models for Smuggled Tobacco

In order to measure and develop effective policy responses to tobacco smuggling, it is necessary to have a clear understanding of how smuggled tobacco affects the market for tobacco products. Here,

[14] Refer to Tool 4 for a discussion of tobacco taxes. For further information on tobacco tax administration, see British American Tobacco (1994).

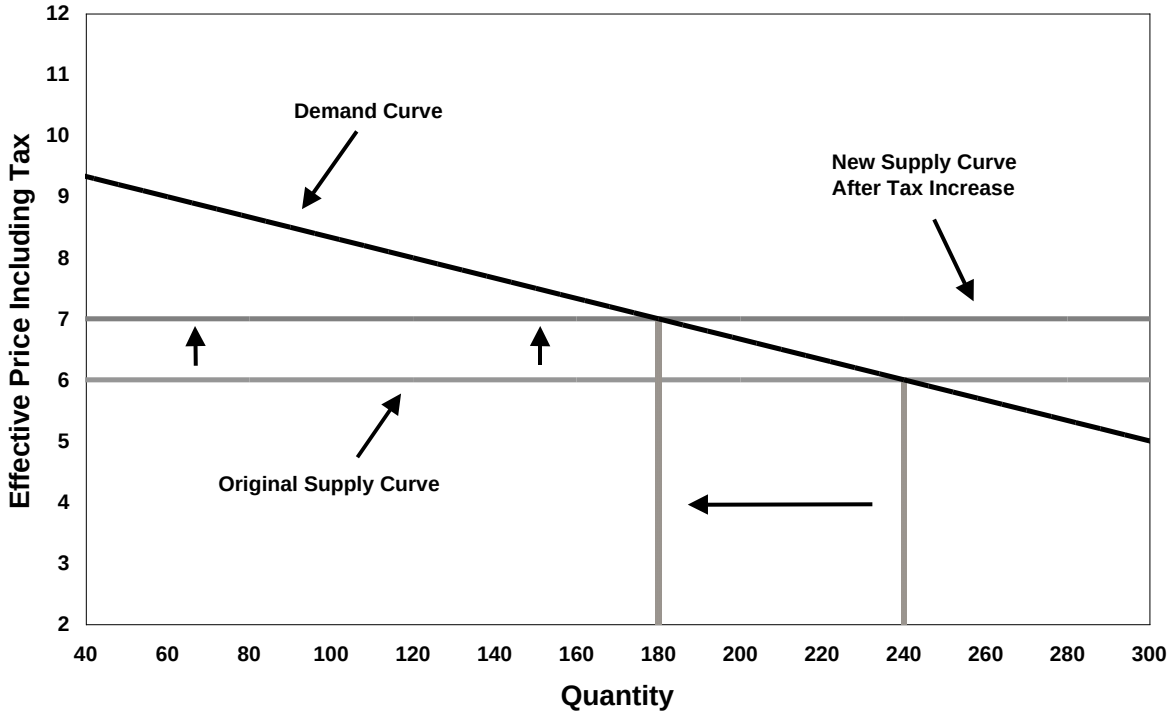
economic models show how smuggled tobacco products are substituted for legal tobacco products and how this can affect the market price and consumption. A simple supply and demand model is first presented. Once the implications of this model are explored and understood, more complex cases in which the supply of legal cigarettes is not purely competitive will be introduced. A number of other issues closely related to smuggling will be considered but not modeled.

Simple Supply and Demand Model

A very simple demand and supply model for legal (tax paid) cigarettes is shown in Figure 7.2. Although the basic theory presented here is applicable to all tobacco products, the discussion is simplified by focusing only on cigarettes. This model depicts legal suppliers competing with each other and acting independently of smugglers.

The quantity of cigarettes demanded depends on many factors including consumers' knowledge of the health effects of smoking, regulations on the sale of tobacco products, advertising, types of brands available, and many cultural factors. A large number of studies have demonstrated that, despite the addictive nature of

Figure 7.2
Effect of a Tax Increase on the Equilibrium Price and Quantity of Cigarettes with Pure Competition and No Smuggling



tobacco, its price is also an important determinant of demand. In this case, quantity demanded is inversely related to price—the demand curve for cigarettes is therefore depicted as downward sloping. This is important because it suggests that any policy that raises the price of cigarettes will lower consumption.

The quantity of cigarettes supplied depends on the amount of profit the producer obtains in return. International tobacco companies, which sell their product in many countries, have an incentive to ship cigarettes to countries in which they can obtain the highest return. As more cigarettes are shipped to a country a higher percentage of demanders obtain them, and the price additional cigarettes can be sold for declines. Profit-maximizing producers increase the quantity of cigarettes shipped to a country until additional cigarettes bring the same return as those shipped to alternative countries; this rate of return becomes the international norm. The return the cigarette producer receives for a product tend to the international norm in all countries (otherwise the producer would ship a higher share of cigarettes to countries in which there is a higher return). Any country that offers a higher than average return to the producer immediately gets a large increase in supply, which pushes the return back to the international norm. Any country in which the producer obtains a lower than average return experiences a fall in supply until the return rises to the international norm.

Suppose that the international norm for a cigarette price is designated as P and is equal to 5. In the absence of tobacco taxes the producer's gross return will be equal to the price of a cigarette. If tobacco taxes are levied, the price of cigarettes must be sufficiently high that, after paying the tax, the producer get a net return equal to P. Suppose that the tax in a particular country is initially $t_1 = 1$. The producer will supply only as many cigarettes as can be sold at a price $P_1 = P + t_1 = 6$. This situation is depicted in Figure 7.2 by showing the supply of cigarettes as a horizontal line at the price level of 6.

If there were no smuggled cigarettes, the quantity of cigarettes sold in this market would be just equal to the quantity of cigarettes demanded when the price is 6. In Figure 7.2, this occurs at a quantity of $Q_1 = 240$.

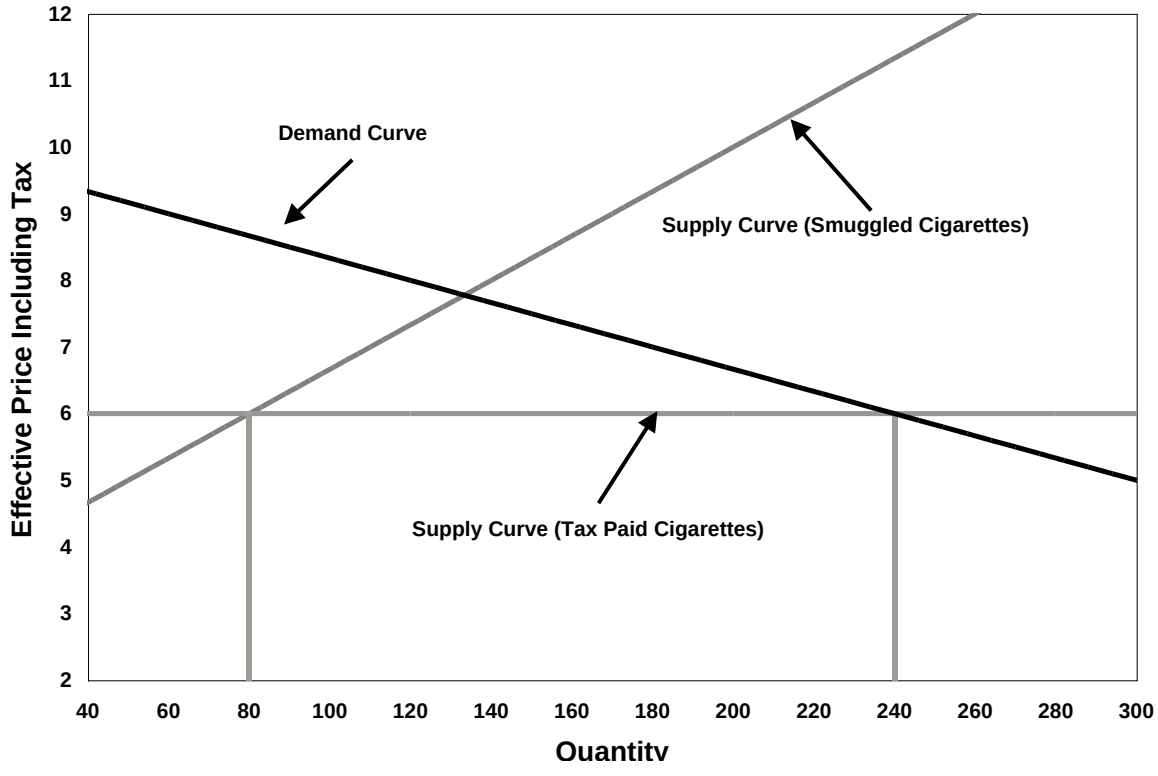
In the absence of smuggling, an increase in the cigarette tax (from say, $t_1 = 1$ to $t_2 = 2$) shifts the horizontal supply curve upward,[15] and the new equilibrium occurs along the new supply curve and the original demand curve. In the scenario, the new equilibrium price increases from 6 to 7 and consumption falls from 240 to 180.

[15] Equivalently, we could view the tax as causing the demand curve to shift down (lower quantity demanded at each price) with no impact on the supply curve. The two approaches yield equivalent equilibrium prices, quantities, and distribution burdens. See Rosen p. 78–293.

Model with Smuggled Cigarettes

Unfortunately, cigarette taxes present an opportunity for bootleggers and large-scale smugglers. Figure 7.3 introduces smuggled cigarettes into the earlier supply and demand model. The greater the difference between smugglers' cost of obtaining cigarettes and the price at which the cigarettes can be sold, the greater is the incentive to smuggle. Since smugglers usually have limited alternatives for selling their cigarettes, the supply curve for smuggled cigarettes is upward sloping. All else constant, the higher the price, the more cigarettes smugglers will supply. The total quantity supplied, at any price, is the sum of the amount supplied by smugglers and the amount supplied by legal suppliers. In Figure 7.3, smugglers supply a quantity of 80 when the market price is 6. The total demand at a market price of 6 remains at 240 (as in Figure 7.2), so legal suppliers provide 160 = 240 – 80 units. Note that, in this model, smuggling has no effect on equilibrium price or consumption.[16]

Figure 7.3
Irrelevance of Smuggling on the Equilibrium Quantity and Price of Cigarettes with Pure Competition in Legal Supply



[16]A recent United Kingdom government report on smuggling (HM Customs and Excise 2000) implicitly adopts this model when they assume that "100 per cent of smuggled tobacco replaces UK purchases" (p. 7). This appears to be at variance with the report's claim that "the effect of duty increases in discouraging cigarette consumption is considerably less than it would otherwise be" (p. 6) because of increases in cigarette smuggling.

This result may puzzle some readers and provoke the objection that smugglers are observed to offer cigarettes at a lower price than those sold in the tax paid (legal) market. In order to evaluate this objection it is important to clarify what is meant by the "price" of cigarettes. The price that consumers pay for cigarettes (or any other good or service) should be divided into two parts:

- The first part of price, which economists call the "transaction price," is the amount of money the buyer pays to the seller in exchange for the product. This is also called the "sale price."
- The second part of price is called the "inconvenience price." This is the time and discomfort consumers incur in order to engage in a transaction. A shop that is centrally located and which many consumers pass in the course of their daily affairs has a low inconvenience price. A shop located in a dark corner of the city and which requires a special trip to visit has a high inconvenience price. Purchasers may also face potential legal sanctions and other risks that go along with participating in a black market. Although the inconvenience price does not require a monetary transaction, it is none-the-less quite real.

The sum of the transaction price and inconvenience price is called the "effective" price. It is the effective price that consumers consider when deciding whether to make a purchase. In general, the higher the effective price, the lower the quantity of cigarettes demanded.

It is true that smugglers often charge a lower transaction (or sales) price than in the tax paid (legal) market. The explanation for this is that, in many cases, consumers who purchase smuggled cigarettes pay a high inconvenience price. The location of the street sellers who deal in smuggled cigarettes can be undependable, or there can be uncertainty about the authenticity of brand markings on the cigarettes. Consumers may even fear embarrassment or legal penalties if they are detected buying smuggled cigarettes.

There is some empirical evidence suggesting consumers are unwilling to pay as high a transaction price for smuggled cigarettes as they would pay for legal cigarettes. One study in the United Kingdom found that 17 percent of adult smokers prefer to buy cigarettes from recognized outlets rather than individuals even if the transaction price of the cigarettes sold by the individuals was £1.00 lower (quoted in DTZ Pieda Consulting 2000.)

In the scenario presented in Figure 7.3, the presence of cigarette smuggling does not lessen the health benefits from cigarette tax increases. Imagine that, beginning from the equilibrium, the tax is increased from $t_1 = 1$ to $t_2 = 2$ (as in Figure 7.2). The supply curve for tax paid cigarettes shifts up and becomes a horizontal line at a price of 7 (this is not shown in the figure). The new equilibrium quantity occurs at the intersection of this new supply curve and the original demand curve—180 units—exactly as in Figure 7.2. The sale of smuggled cigarettes increases, however. With the increased tax,

smuggled cigarette sales is determined by the supply of smuggled cigarettes (about 110) at a price of 7. Thus, smuggled sales increase and tax paid sales fall more than consumption as a result of the tax increase.

The emerging conclusion is that smuggling has no effect on equilibrium price or consumption and does not lessen the health benefits of cigarette tax increases. This conclusion does not imply that cigarette smuggling does no harm and can be safely ignored. On the contrary, cigarette smuggling deprives the government of tax revenues that could be used to educate the public about the health effects of smoking. Furthermore, smuggling can breed corruption and disrespect for law enforcement officials. Finally, smuggling can make it difficult to obtain political support for future tobacco control efforts.

Model with Increasing Total Supply

As discussed in earlier sections, in many countries the market for cigarettes is controlled by a few sellers and may not be purely competitive. There is vast literature on how sellers set prices and quantities in markets when they have few competitors. While many outcomes are possible, consider the case in which the total market supply for legal cigarettes is upward sloping—the higher the equilibrium price the greater the quantity of cigarettes supplied.

This case is illustrated in Figure 7.4. The demand and supply curves for smuggled cigarettes remain as they were in the previous figures. However, because the supply curve of legal cigarettes is upward sloping, total cigarette supply (e.g., the sum of smuggled and legal cigarette supply) is greater than the legal supply at each price. Thus the total supply curve intersects the demand curve at a lower price and a higher quantity than the legal supply curve. In this model, equilibrium price is lower and consumption is higher than they would be if smuggling were eliminated.

However, the increase in consumption resulting from smuggling is likely to be much less than the total quantity of cigarettes smuggled. The total quantity of smuggled cigarettes is determined by the intersection of the smuggling supply curve and the equilibrium price. The increase in consumption as a result of smuggling is determined by

1. the difference between the quantity at which the supply of legal cigarettes intersects the demand curve (240 units)
2. the quantity at which the total (legal plus smuggled) supply curve intersects the demand curve (slightly more than 260 units)

In general, this difference is less than the total quantity of smuggled cigarettes because smuggled cigarettes to some extent substitute for legal sales. In this example, equilibrium smuggled sales are nearly 70

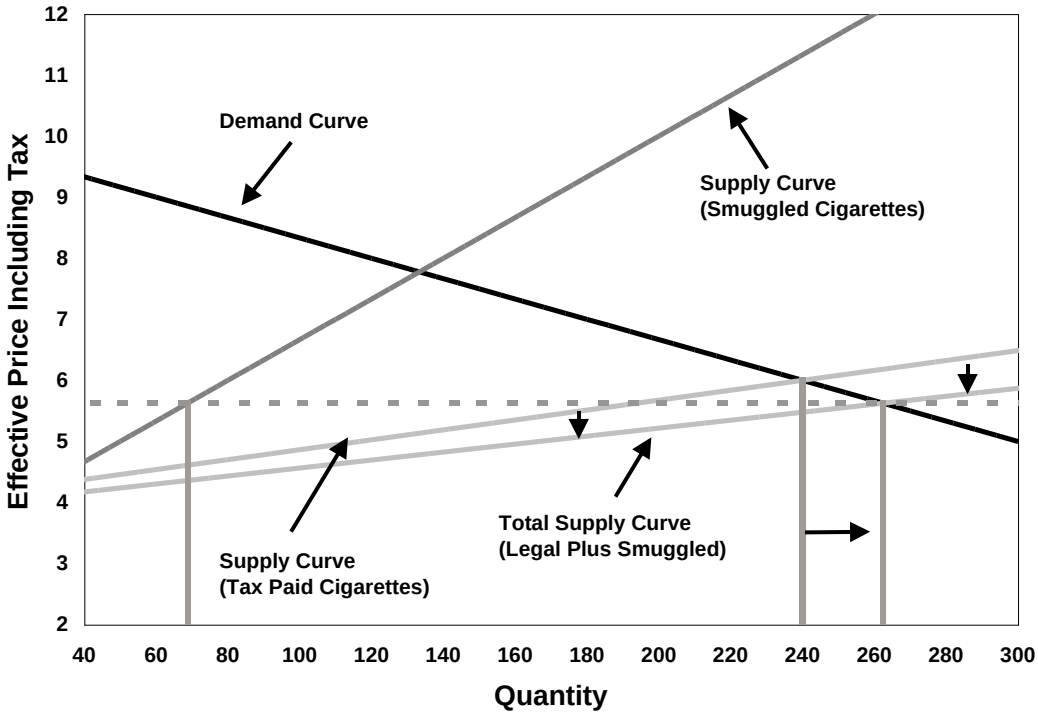
units but the presence of smuggling increases total sales by only about 20 units.

Furthermore, the main conclusions about tax increases discussed with respect to Figure 7.3, continue to hold in Figure 7.4. Even when the legal supply curve is upward sloping and smuggling is possible; increases in cigarette taxes reduce cigarette consumption. Increased cigarette taxes can result in increased smuggling unless counter measures are taken, but the increase in smuggling is less than the decline in legal consumption.[17]

Four further issues related to this model can be discussed.

- For simplicity, Figures 7.2 through 7.4 illustrate the supply and demand curve for a single type or brand of cigarette. In general, introducing multiple brands complicates the diagrams without altering the fundamental result. However, smuggling can provide an avenue of market entry for producers of prohibited brands. It is alleged that in some

Figure 7.4
Effect of Smuggling on the Equilibrium Quantity and Price of Cigarettes with Upward Sloping Legal Supply



[17] Xu, Hu and Keeler (no date) present a more complete and sophisticated model of cigarette smuggling in imperfectly competitive markets that obtains similar results. They find that even in models with imperfect competition and smuggling, the tax rate increases the equilibrium price and therefore decreases total consumption.

cases, producers of prohibited brands use smuggling to gain access to prohibited markets. After penetrating the market with smuggled cigarettes, producers then use customer loyalty as a political wedge to lobby for legal access to the market.

- The three models presented assume that the quantity demanded depends only on current price. However, because cigarette smoking is addictive, demand also depends on consumption in prior periods. For this reason, cigarette sellers can obtain long-term benefits (e.g., an increase in the demand for their product) from reductions in current price. As shown in Figure 7.4, smuggling can reduce current price, but the effect is likely to be quite small. Thus, smuggling is unlikely to significantly increase long-term consumption by increasing the addicted population.
- The direct resource costs of smuggling should not be ignored. As noted in Bhagwati and Hansen (1974), smugglers incur high transport costs because of the need to avoid detection. If smuggling markets are competitive profits are driven to zero. This implies that, in the long run, the cigarette tax revenue the government loses to smugglers is entirely consumed by excess travel costs incurred by smugglers. This is a wasteful use of society's scarce resources.
- Although not done so here, these three models can be easily adapted to show the revenue raised from a cigarette tax with and without smuggling. As is made clear in the figures, the key parameters necessary to estimate revenue changes when taxes are altered include: (a) the slope of the demand curve, (b) the slope of the legal supply curve, and (c) the slope of the smuggled supply curve.

Conducting a Simulation Analysis

Often the key motivation for conducting studies of tobacco smuggling is to analyze recently enacted or proposed changes in policy. Econometric simulations of policy changes can be a useful tool for understanding the impact of smuggling, and can play an important role in public policy debates.

Assumptions and Requirements

A basic principle of simulation analysis is that it compares the state of the world *with* a certain policy to the state of the world *without* a certain policy. One of the most common errors made by aspiring policy analysts is confusing this *with/without* comparison with a *before/after* comparison. That is, many analysts compare the state of world prior to implementation of a policy with the state of the world

after the policy was put in place. Differences in the state of the world are considered attributable to the policy. Yet such an analysis can falsely attribute changes in smuggling to policy changes when, in fact, it is variables other than policy (such as changes in economic conditions) that are responsible for changes in smuggling.

An example of a with/without policy simulation is contained in Merriman *et al* (2000). They use their econometric results (see Table 7.5) to simulate the changes in tax revenue resulting from changes in tax rates, taking into account both changes in consumption and changes in bootlegging. Two types of policy changes are simulated. The first policy, a multilateral tax increase, is a 10 percent tax increase undertaken jointly by all countries in Europe. The second policy, a unilateral tax increase, is a 10 percent tax increase undertaken independently by each country in Europe.

A 10 percent tax increase alters three of their independent variables. Assuming that tax increases are passed on to consumers in the form of higher prices, the price of tobacco is altered by the tax increase. Tax increases also change the *relative* price (home country price divided by neighbor country price) of cigarettes. In turn, this change alters the incentive for bootlegged imports and exports. For each country, the increase in relative price is greater with a unilateral tax increase than with a multilateral tax increase. In fact, with a multilateral tax increase, the relative price falls in some countries.

Tax revenue is simply the product of the tax per pack and the number of packs of tax paid sales. Merriman *et al* (2000) use their estimation results to simulate tax paid sales with original (observed) and new (higher tax rate) independent variables (see Table 7.5). Simulated tax revenues are calculated in each case and the results are presented in tabular form.[18]

Simulated results are subject to sampling variation. It is technically possible to construct confidence intervals for simulation results based on econometric estimates, but this can be quite laborious. Technical details of the necessary calculations are presented in Theil (1971, p. 134). In general, if the coefficients of the econometric model are estimated precisely (e.g., the standard errors are small relative to the coefficients), confidence intervals around the simulated results are also relatively small. Poorly fitting econometric models lead to wide confidence intervals around simulated policy changes. It may not always be feasible to construct formal estimates of the statistical variability of simulation estimates. However, analysts should be aware that their estimates are subject to statistical variability and should interpret their results accordingly.

Step-by-Step Process

The mechanics of conducting a simulation analysis vary depending upon the exact relationships that are estimated and the exact policy

[18] See Table 15.6 of Merriman *et al* (2000) for more detailed information.

change that is to be simulated. Follow these necessary steps to conduct a simulation analysis:

1. Specify a relationship between outcome variables and policies. This relationship may be estimated econometrically or may be based on analyses conducted by others.
2. Predict outcomes with initial (observed) policies.
3. Predict outcomes with new (hypothesized) policies.
4. Compare initial and new value of outcome variables to determine the impact of the policy change.

VI. Review of Literature on Tobacco Smuggling

Tobacco smuggling is clearly a significant political issue. It figures largely in the debate about tobacco control. It is a contentious issue between tobacco producers and tobacco control advocates. Tobacco smuggling is also a significant legal issue for both the government and the tobacco industry. Is tobacco smuggling a quantitatively important issue? How large a share of tobacco is smuggled?

There are currently no definitive answers or resolutions to these concerns and questions. The methods and pervasiveness of tobacco smuggling vary from country to country and from time to time. Reliable estimates of tobacco smuggling in particular countries require detailed study and focus on the country or countries in question. Perhaps even more important, sound evaluation of the relationship between a country's tobacco control policies and *changes* in smuggling require knowledge about the particular situation in that country, good data, and sound methodological techniques.

This chapter briefly reviews some of the estimates of tobacco smuggling in various areas around the world. These examples provide some idea of the variety of methods and results currently in use. For more specific discussion on conducting some of these methods, refer to the earlier **How to Measure Smuggling** chapter.

Estimates of Cigarette Smuggling in the United States and Canada

Merriman *et al* (2000) review academic estimates of cigarette smuggling in the United States and Canada.[19] Table 7.6 summarizes their review.

[19] No literature is available on the smuggling of tobacco other than cigarettes in the United States.

Table 7.6
Econometric Studies of Cigarette Smuggling

Study	Geography & Period	Results	Notes
Baltagi and Levin (1992)	46 U.S. states, 1963–88	10% price increase in neighboring state causes 0.8% increase in taxed sales of home state.	Results largely confirm Baltagi and Levin (1986).
Saba, Beard, Ekelund and Ressler (1995)	48 continental U.S. states and D.C., 1960–86	Excluding DC, no state lost more than 2% of sales as a result of purchases in neighboring states in 1986.	In many states cross-border sales declined between 1960 and 1986.
Thursby and Thursby(2000)	40 U.S. states, 1972–1990	0.69% to 7.8% of consumption is smuggled.	In most years smuggling is 3% to 5% of total sales.
Galbraith and Kaiserman (1997)	Total Canadian monthly consumption, 1980–1994	Total consumption is less responsive to price increases (short-run elasticity of –0.40) than taxed consumption (short-run elasticity of –1.01).	Canada's 1991 cigarette tax increase was rolled back in 1994 due to belief that high taxes encouraged smuggling.

Source: Based on Table 15.1 of Merriman *et al* (2000).

Baltagi and Levin (1992 and 1986) studied cigarette bootlegging and legal cross-border shopping between U.S. states. They find that cigarette sales varied inversely with price, and higher prices in neighboring states *increase* cigarette sales in the state of residence. They reason that such price increases reduce the incentive for consumers to cross into neighboring states to make purchases. In their 1992 paper, Baltagi and Levin find that each 10 percent increase in a neighboring state's price causes an increase of 0.8 percent in home state sales.

Saba *et al* (1995) also find significant evidence of citizens crossing U.S. state borders to purchase lower-priced cigarettes. Where many citizens reside in high-tax jurisdictions in close proximity to low-tax jurisdictions (most importantly, the District of Columbia and New Hampshire), border crossing accounts for a substantial portion of sales. However, in most states border crossing accounts for less than two percent of sales.

A sophisticated study by Thursby and Thursby (2000) allows for wholesale smuggling as well as bootlegging and cross-border shopping. Using data from 39 U.S. states and the District of Columbia from 1972 to 1990, they find that in most years between three and five percent of U.S. consumption results from cross-border shopping or smuggling.

Galbraith and Kaiserman (1997) study smuggling in Canada. They note that "virtually all cigarettes smuggled into Canada...were previously exported from Canada" (pp.288–89). Using this insight they measure the responsiveness of smuggling to changes in taxes. Beginning in the early 1980s, Canada steadily increased its cigarette taxes so that, by 1991, there is a large price differential between U.S.

and Canadian cigarettes. In 1994, Canada subsequently reduced cigarette taxes due to a perception that smuggling increased. Galbraith and Kaiserman find there was a large increase in untaxed sales following the increase in Canadian taxes. They estimate a unitary elasticity of taxed cigarette consumption with respect to price: each one percent increase in Canadian taxes causes taxed sales to fall by about one percent. However, they also find that total consumption (taxed plus smuggled sales) fell by only 0.4 percent, with smuggled sales increasing by 0.6 percent. Gailbraith and Kaiserman's estimates suggest that, despite the increase in smuggling, total Canadian tax revenues are not diminished by the tax rate increase, and that total consumption is reduced.

There is evidence that the high level of smuggling into Canada is facilitated by the tobacco industry. There is a distinct taste difference between Canadian and U.S. cigarettes and there is little demand for Canadian cigarettes among U.S. smokers. Despite the lack of demand for their product, Canadian tobacco firms significantly increased exports to the United States in the early 1990s, greatly aiding smugglers. Canadian tobacco taxes were avoided by shipping the cigarettes to the U.S. These untaxed cigarettes provide a source of product that can be smuggled back into Canada. Further details are provided in Canadian Cancer Society *et al* (1999).

In summary, existing evidence suggests that in the United States interstate smuggling is, in most cases, a relatively minor annoyance rather than a major barrier to cigarette taxation. In Canada cigarette smuggling can be a larger impediment. This difference may stem from the relatively small inter-state price differentials induced by U.S. cigarette taxation compared to the relatively large price differentials brought about by increases in Canadian taxation.

Estimates of Tobacco Smuggling Outside of North America

Merriman *et al* (2000) also provide their own original estimates of bootlegging in Europe using a method similar to that employed in earlier academic studies of bootlegging in the U.S. and smuggling between Canada and the United States. Using data from 1989 to 1995, they estimate the demand for cigarettes in 17 European countries. Cigarette demand is allowed to be a function of home country price, income, and other variables. Cross-border shopping and bootlegged imports and exports are allowed to depend upon the price in neighboring countries and the frequency of travel between those countries. This method represents a significant advance over earlier studies using simple geographic proximity to identify origins and destinations of smuggled cigarettes. Merriman *et al's* empirical findings are quite consistent with studies of cross-border shopping and bootlegging in the U.S. They estimate that about three percent of total European consumption during this period is due to cross-border

shopping, tourist shopping, duty free sales, and bootlegging. Germany is estimated to have significantly greater imports from these sources (about 15 percent in 1995) because of the high price of German cigarettes relative to its neighbors and the high frequency of travel between Germany and other countries.

The British Government recently produced its own estimates of cigarette smuggling in the U.K. (HMCE 2000). This method, described in more detail in the **How to Measure Smuggling** chapter, compares official estimates of tax paid sales with survey respondents reports of cigarette consumption. The government estimates the market share of smuggled cigarettes in the United Kingdom rose from about 3 percent in 1996–97 to about 18 percent by 1999–2000. This rapid rise in smuggling is attributed to large annual increases in duties since May 1997 that have increased the price of legal tobacco by about 25 percent.

In addition to estimates for specific countries in Europe, Merriman *et al* (2000) provide two sets of estimates of total smuggling worldwide as a share of consumption. Their first method builds on earlier work by Joossens (1998) and compares worldwide recorded exports of tobacco with worldwide recorded imports. Tobacco products diverted during "in-transit" status are normally recorded as exports from the country of origin. However, because these tobacco products are surreptitiously transported into the country in which they are consumed they do not appear as imports. Thus, smuggling from in-transit regimes creates a total excess of exports. Worldwide data show that, in recent years, recorded tobacco exports exceed recorded imports by more than one-third of exports. This is consistent with more than one-third of the international trade in tobacco products being diverted by smugglers. Since about 18 percent of total tobacco production is exported, Merriman *et al* (2000) estimate that approximately one-third, or 6 percent of total tobacco production, is smuggled worldwide through diversion of untaxed exports. These figures do not include bootlegging, cross-border shopping, and similar activities where tobacco taxes are paid in the country of origin.

Merriman *et al* (2000) also use a second method to estimate worldwide cigarette smuggling. They gathered estimates of the share of smuggled cigarettes in specific countries published by Market Tracking International in its series of publications called *Marketfile*, which gives detailed descriptions of the tobacco market in many countries around the world. The primary users of this publication are tobacco industry analysts. Each country description contains an estimate of the share of smuggled cigarettes. Although a uniform method is not used to produce these estimates, experts familiar with the country are consulted, as are media and police reports. Estimates from more than 30 countries are gathered, and supplemented with expert estimates on a number of European countries for a total of more than 40 countries. The population-weighted average of experts' estimates of smuggling in these countries is 8.5 percent. This result is

remarkably consistent with the result obtained using the completely independent method of calculating the excess of exports over imports.

Preliminary results from several studies provide evidence about tobacco smuggling in developing countries. Tal (2000) focuses on cigarette smuggling in Estonia, and estimates that nearly half of the cigarettes legally sold in Estonia go to foreign visitors. She attributes a large share of these sales to visitors from neighboring Finland, where cigarette prices are much higher. She further estimates that illegal Estonian consumption (sale without payment of applicable Estonian taxes) accounts for 10–20 percent of the cigarette market in the late 1990s.

Hu and Mao (2000) perform a case study of China, and note that China has long-standing legal prohibitions on the importation of foreign cigarettes. However, "[i]t is quite obvious for visitors in urban China to observe numerous foreign brands of cigarettes are readily available at retail stores and vendors." (p.12) The authors estimate that "most likely, 8 to 9 percent of domestic [cigarette] consumption came from illegal sources: smuggling" (p.13).

In summary, published estimates suggest that worldwide cigarette smuggling accounts for approximately six to nine percent of consumption. Estimates from the U.S. and Europe suggest that cross-border shopping, tourist shopping, duty free sales, and bootlegged cigarettes can account for about three percent of consumption. However, there is considerable evidence that the level of cigarette smuggling varies dramatically from country to country and from time to time. More detailed studies of cigarette smuggling in individual countries are essential to the development of sound tobacco control policy.

VII. Conclusion and Summary

A Final Word of Caution and Encouragement

Tobacco smuggling problems vary a great deal from country to country. The tobacco use habits, marketing practices, design of taxes, regional context, and any other information relevant to the country of study should all be considered during the research design phase. The techniques described in this tool should be adapted to the particular situation and relevant policy issues in the country of interest.

Study of tobacco smuggling is especially difficult because of the illegal nature of the activity. Further, adding to this difficulty is the scarcity of studies of tobacco smuggling in less developed countries. Although this lack of experience is a handicap to those wishing to conduct research, it increases the significance of their contribution. Each study of tobacco smuggling, especially those in developing countries, enables everybody to better understand this phenomena. As studies of individual countries are circulated and analyzed, measurement techniques can be refined and tobacco smuggling can be better understood. Ultimately, this research will lead to improved tobacco control policies.

Key Ideas to Remember

This tool is intended to provide background and a roadmap for those wishing to understand, measure, and develop policies to combat tobacco smuggling in their own countries. It is not feasible to provide a complete summary of every point made in this tool. Rather, key ideas from each chapter of this work are highlighted.

How to Measure Smuggling

Five broad approaches can be used to obtain quantitative estimates of tobacco smuggling, including (1) asking the experts, (2) observing smokers and their habits, (3) monitoring tobacco trade, and comparing tobacco sales against consumption via (4) surveys and (5)

econometric analyses. Step-by-step instructions for the use of each approach are presented.

Background Information on Tobacco Smuggling

Tax differentials are only one factor making smuggling potentially profitable. Regional price differentials also exist because sellers price to market and because the quality and brand composition of tobacco consumption differs.

Legal circumvention of taxes is a relatively insignificant problem in most areas. Illegal circumvention of taxes, either because of bootlegging or wholesale smuggling, is generally a more significant problem.

What Happens when Policies and Actions are Implemented

Policies to combat smuggling include those that

1. reduce incentives for smuggling by harmonizing tax and pricing policies
2. reduce the supply of smuggled tobacco by regulating transport and retail sales
3. reduce demand for smuggled tobacco by influencing consumers not to purchase smuggled products
4. increase the certainty and severity of punishment through enhanced law enforcement and prosecution

Theoretical models suggest that, in most cases, smuggling has little effect on equilibrium tobacco price and consumption. **The models imply that the presence of tobacco smuggling does not lessen the health benefits from tobacco tax increases.**

Review of Literature on Tobacco Smuggling

Estimates suggest that worldwide cigarette smuggling accounts for approximately six to nine percent of consumption. Estimates from the United States and Europe suggest that bootlegged cigarettes, one component of worldwide smuggling, account for about three percent of consumption. However, there is considerable evidence that the level of tobacco smuggling may vary dramatically from country to country and from time to time.

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