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# *The Economics of Excise Taxation*

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## **I. Introduction**

Excise duties used to be called the orphans of tax policy, because they received relatively little attention in the tax literature. This has changed greatly in recent years, due to growing awareness of the detrimental health effects of smoking and excessive drinking, as well as the social costs associated with the phenomenal increase in traffic. Perhaps more importantly, the environmental problems caused by the burning of fossil fuels have led to a burgeoning literature on the use of ‘corrective’ excises to restrain harmful emissions. Attention has also been given to the use of higher-than-average taxes on goods and services regarded as items of luxury consumption in order to enhance the progressivity of the overall tax burden distribution.

As implied by these examples, excise systems can be defined to comprise all selective taxes or duties, related levies and charges on tobacco, alcohol, gambling, petroleum products, motor vehicles, and other specific goods, services and activities.<sup>1</sup> Broadly

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<sup>1</sup> In the terminology of the Organisation for Economic Co-operation and Development (OECD, 2009), excise systems therefore comprise all selective taxes on the production, sale, transfer, leasing and

speaking, the distinguishing features of excise taxation are selectivity in coverage, discrimination in intent, and often some form of quantitative measurement in determining the tax liability, along with the application of specific rates and physical controls over production for enforcement purposes.

This contrasts with general consumption taxes, such as value-added taxes (VATs) – sometimes referred to as goods and services taxes (GSTs) – whose bases are typically defined to include all goods and services (hereinafter called commodities) other than those specifically exempted. VATs, moreover, are levied primarily to raise revenue, while their liability (determined by imposing the statutory rate on the actual value of goods and services) is generally verified through checks on books of account and other documentary evidence, similar to business income taxes.

This paper reviews the economics of taxation.<sup>2</sup> It falls into three parts. The first part examines the rationale of excise taxation by reference to the non-revenue objectives that are pursued through the imposition of the various duties. The second part discusses the instruments that can be applied, i.e. duties, regulations and permits. The third part reviews some issues – discrimination, coordination and earmarking – that often arise in connection with excise taxation.

## **II. Rationale of Excise Taxation**

The economic analysis of excise taxation starts with Atkinson and Stiglitz (1976) prove that if the income tax schedule is chosen optimally, then under fairly reasonable conditions, social welfare cannot be improved by levying excise duties on commodities.<sup>3</sup> But if the income tax is not optimal, excises have a role to play,

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delivery of goods and the rendering of services (item 5120 in the OECD classification), as well as all selective taxes on the use of goods, or on the permission to use goods or perform activities (item 5200), other than general taxes on goods and services (item 5110). By this definition, import and export duties also can be considered excise-type levies, but they are not dealt with in this paper.

<sup>2</sup> For a wide-ranging review of the actual taxation of smoking, drinking, gambling, polluting and driving, see the contributions in Cnossen (2005) and (2008).

<sup>3</sup> Suppose that the utility function of each individual is a function of his consumption of leisure and a set of other commodities. Then as long as the marginal rate of substitution between any two commodities is independent of the amount of leisure, differential commodity taxation cannot improve

because they are relatively efficient sources of revenue, improve resource allocation by internalizing the external costs associated with the consumption or production of excisable products, discourage the consumption of products considered harmful, serve as a proxy for charging road users for the cost of government-provided services, or promote progressivity in taxation.

### **1. Revenue-raising efficiency aspects**

In practice, most excises have probably been enacted for revenue purposes, the main consideration being that they could be administered more easily than other taxes. Excise duties on tobacco, alcohol, petrol, and motor vehicles are good potential sources of revenue, because the products are easy to identify, the volume of sales is high, and the fact that there are few producers – wine excepted – simplifies collection. Also, there are few substitutes that consumers would find equally satisfactory, so that consumption, and by extension revenue, remain high despite excise-induced price rises. In the OECD area, excise receipts (item 5120 only) account for on average some 11 per cent of total tax revenue, defined to include social security contributions (OECD, 2009).<sup>4</sup>

The differentially higher taxation of excisable goods for revenue purposes also has an economic rationale. The absence of close substitutes for addictive or indispensable products, such as tobacco, alcohol and energy, implies that the demand for them is inelastic. In turn, this means that the potential for distortion of economic decisions by the imposition of excise duties is relatively small. In economic jargon, the nondistortionary income effect outweighs the distortionary substitution effect. More generally, Ramsey (1927) has shown that, under very restrictive conditions, the total excess burden or deadweight loss of product taxation can be minimized by setting tax

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social welfare in the presence of an optimal income tax. See Atkinson and Stiglitz (1976) and Salanié (2003).

<sup>4</sup> It is often asserted that excise receipts have declined in recent decades, but much of this decline should be attributed to the imposition of VAT on excise-inclusive product prices, whereas the turnover and other sales taxes levied previously generally were not imposed on excisable products. Accordingly, upon introduction of the VAT, excise duties were lowered to maintain the same total tax burden.

rates so that the percentage reduction in the quantity demanded of goods, which results from taxation, is the same (taking into account cross-price effects on demand).

The Ramsey rule can be reinterpreted in two ways depending upon one's assumption about utility functions. If it is assumed that demand is independent for each good (i.e. cross-elasticities are zero) and that each good represents a trivial fraction of expenditures (so that income effects can be ignored), the result is the so-called inverse elasticity rule. This rule states that the optimal tax rate on each good is proportional to the inverse of the price elasticity of demand for that good. The intuition is that the least distortionary tax system hits harder those goods for which demand is invariant to its own price.

Crawford, Keen and Smith (2010) point out that the implications of the inverse-elasticity rule can be dangerously misleading. For one thing, if the assumption that each good represents a trivial fraction of expenditures is relaxed (as it must be for tobacco, alcohol and energy), an increase in tax on that good has effects on the demand for other goods, particularly if related, such as beer vs. wine and spirits. By extension, there would be effects on distortions and revenue collections from other goods, while it would not be *a priori* clear whether or not the effects would be welfare improving.

On the other hand, if it is assumed that utility is weakly separable between consumption and leisure (so that changes in the relative prices of goods do not affect labor supply), then the optimal tax should impose the same tax rate on all goods. The intuition is that if changes in the overall price of aggregate consumption relative to the price of labor do not distort labor supplied, then a tax system that does not distort relative prices between products is optimal. Here, the implication is that broad-based, uniform-rate commodity taxes, e.g. VATs, are superior to the extent that labor supplied is invariant to changes in the price of consumption.<sup>5</sup>

<sup>5</sup> In line with this argument, Bovenberg and de Mooij (1994) have shown that revenue considerations should lead taxes on 'dirty' goods away from Pigouvian levels. As the overall level of taxation increases, the marginal excess burden of a Pigouvian tax rises relative to its external benefits. Hence, differential taxation of polluting goods should fall as the overall level of taxation rises.

Crawford, Keen and Smith (2010) firmly reject weak separability between market consumption of goods and time in paid work. Some goods are more complementary to leisure than are other goods. Accordingly, as Corlett and Hague (1953) have proved, the second-best situation in which leisure cannot be taxed, can be moved closer to the first-best situation in which leisure would be taxed, by taxing the complementary goods at a relatively high rate (or, conversely, subsidizing goods that are complementary to paid work). As a result, the consumption tax approximates a lump-sum tax without excess burden, i.e. there is no loss of welfare above and beyond the tax revenue collected.

To see which goods would be eligible for differential tax treatment, Crawford, Keen and Smith (2010) calculate estimates of commodity complementarities with leisure in the form of the impact of an additional hour worked on the budget (percentage) of a large number of commodity groups in household spending. Products found to be complements with leisure (in the sense of time not in paid work) and hence candidates for additional (excise) taxes include foodstuffs, domestic fuels, tobacco, children's clothing and public transport.

Complements with work, on the other hand, include alcoholic beverages, food eaten out, motor fuels and leisure items (perhaps reflecting the use of such items as substitutes for time in producing relaxation). Accordingly, these products are candidates for lower-than-average taxes (presumably lower-than-standard VAT rates) or, possibly, subsidies. A similar reasoning applies to the relatively low taxation of market supplies of goods and services, e.g. work in and around the home that are close substitutes for self-supply. Nevertheless, the effects on product demands of hours worked are small and, as the authors point out, consideration should also be given to the evident practical costs of implementing differential tax rate structures.

## **2. Externality-correcting issues**

Furthermore, excises are often rationalized as charges for the cost that consumers or producers of excisable products impose on others, but which is not reflected in price. This effect on the utility or production possibilities of some other consumer or producer is called a negative externality. It means that the marginal cost of an

individual consumer or producer's action is less than the marginal cost of his action to society and, as a result, the individual engages in more of the activity than is socially optimal. Charging consumers or producers<sup>6</sup> for external costs, which should induce them to reduce their activities to the socially optimal level, is known as the Pigouvian prescription (Pigou, 1920). The prescription is that efficient consumption or production can be achieved through the tax system by imposing an excise on the activity equal to the marginal cost of the damage caused to other people.<sup>7</sup>

The literature is replete with examples of smokers, boozers and polluters who impose financial, physical and psychological costs on others without being charged for them directly or indirectly (for example, through higher insurance premiums). Marginal costs are often difficult to identify and measure, however, because they depend on who does what, where, and under what circumstances. In practice, therefore, average external costs are estimated and a 'pooling' approach (akin to insurance) is adopted in charging for these costs. Perpetrators as a group meet the costs by paying a uniform excise calculated as the total external costs divided by, say, the number of packs of cigarettes, drinks consumed or liters of gasoline used.

This average-cost approach seems acceptable if damage – for example, through smoking or pollution – is approximately proportional to cost. But measurement problems come back in full force if there are threshold levels of consumption below which adverse effects are absent or attenuated – one or two glasses of wine per day are good for you. In this situation, ideally, Pigouvian taxes should be non-linear in the

<sup>6</sup> In the event, charging producers would not violate the Diamond-Mirrlees (1971) theorem, which holds that the pursuit of production efficiency (all firms face the same input and output prices) as a policy objective takes precedence over the pursuit of exchange efficiency (all consumers face the same product prices).

<sup>7</sup> Coase (1960) has pointed out that government intervention to deal with externalities would not be required if property rights to, say, air and water were established. But the application of this important finding is limited if resource owners cannot identify the source of damages to their property (and legally prevent the damages) or if the cost of bargaining deters the parties involved from finding their way to an efficient solution. (Even if these conditions were met, the assignment of property rights would still, of course, affect income distribution.)

level of consumption and become exceedingly complex to design. Nevertheless, as shown by Pogue and Sgontz (1989) and replicated in Box 1, even uniform taxation may still improve overall welfare if the reduction in external cost caused by heavy drinkers is greater than the loss in consumer welfare of moderate drinkers.<sup>8</sup>

**[Box 1 about here]**

Sandmo (1976) has shown that Ramsey and Pigouvian optimal taxes can be applied sequentially: the least distortionary tax is levied on each good according to the Ramsey rule and then additional Pigouvian taxes are imposed on those goods which generate negative externalities. In many instances, moreover, goods eligible for Ramsey and Pigouvian optimal taxes are the same, i.e. tobacco products, alcoholic beverages, gambling activities and petroleum products. There is a presumption, therefore, that the level of taxation on these goods should be rather high.

### **3. Information failure and internality-correcting arguments**

Information failures are other instances that justify government intervention, even in the absence of explicit external costs. If the young are not fully cognizant of the detrimental health effects of smoking and drinking, then the excise could be used to raise the price of tobacco and alcohol for them and thus reduce their consumption. Apparently, this approach can be successful since research has indicated that the price elasticity of demand for cigarettes and alcoholic beverages among the young is, on average, twice the price elasticity among adults (see, e.g., Chaloupka et al. 2000).<sup>9</sup> On the other hand, an increase in the excise to reduce consumption by the young would appear to be an unwarranted additional tax on habitual users. Alternatively, therefore, other instruments could be applied, e.g., better dissemination of information on the

<sup>8</sup> For a survey and evaluation of alcohol taxation in the European Union (EU), see Cnossen (2007).

<sup>9</sup> Using repeat cross-sections for the period from 1991 through 2005, Carpenter and Cook (2008) report that the large tobacco tax increases in U.S. States during the past 15 years were associated with significant reductions in smoking participation by youths. For a review of tobacco taxation in the EU, see Smith (2008).

health hazards of smoking and drinking, coupled perhaps with legislation restricting supply or (place of) consumption.

More generally, the public health or, more broadly, public goods model views the main role of excise duties as simply to discourage the consumption of these products in aggregate (Crooks, 1989). The less people smoke and drink, or, for that matter, gamble, pollute and drive, the argument goes, the better. And it is pointed out that a drop in the overall level of consumption also reduces the level of abusive consumption. The economic approach adopted in this paper takes a narrower view on the social costs of (excessive) consumption by focusing on the externalities rather than the total costs borne by society and the consumer himself.<sup>10</sup> The economic approach also pays more attention to the revenue-raising efficiency of excise taxation and its distributional consequences. Nevertheless, public health rather than economic considerations generally dominate the policy-making decision process.

Thus far, it has been widely accepted among economists that the irrationality of the young (information failures) and externalities are the only reasons for government intervention. Beyond this government intervention should be rejected as a form of paternalism. After all, the principle of consumer sovereignty implies that a rational person who weighs up all the costs and benefits of his actions should be free to smoke, drink, gamble and pollute as long as he is fully informed about the consequences of his choice and does not impose costs on other people. The classic reference is to the Becker-Murphy (1988) “rational addiction” model.

Recently, however, the assumptions of this model have been questioned by Gruber and Köszegi (2001) and others, who argue that rational and fully informed adults can still be time inconsistent in their behavior in the sense that they discount the short-term costs and benefits of their actions to a greater extent than the long-term effects.

<sup>10</sup> See Bird and Wallace (2006) who discuss the differences between the public health approach and the economic approach. As they say, if someone drinks too much and dies sooner than he or she otherwise would have done – for example, by crashing a motor vehicle while drunk – it may be a tragedy, but it is not an externality. If, however, the drunken driver kills a passer-by or a passenger, then it is both.

Instead of discounting the future exponentially, as in the Becker-Murphy model, Gruber and Köszegi argue that the discounted utility of a sophisticated hyperbolic consumer can rise if a tax is imposed.<sup>11</sup> The reason is that the tax serves as a self-commitment device, which the private sector cannot perfectly supply. Without the device, consumers miss the incentive to control their short-term desires for their own longer-term well-being.<sup>12</sup> Gruber (2008) suggests that the “internal” costs from smoking a pack of cigarettes are US\$ 35 per pack.

The rejection of the a priori assumption of 100-percent rationality has received support in the economics literature. O’Donoghue and Rabin (2003), for instance, express fear that paternalism will involve regulatory capture or transactions cost in implementation, but nevertheless recommend further policy analysis. As they write, economists should be more realistic about the nature of errors people make:

“The possibilities that 15-year-olds err in becoming tobacco addicts or that 25-year-olds err in borrowing heavily on their credit cards or that 35-year-olds err in too wildly playing the stock market with their retirement savings all strike us as profoundly plausible and of great policy relevance.”

In the same vein, Thaler and Sunstein (2003) stress that the anti-paternalistic fervor expressed by many economists falsely assumes that people always make decisions that are in their best interest. In addition, they point out that most economists wrongly believe that there are viable alternatives to paternalism or that paternalism always involves coercion. They believe that people have self-control problems and that the goal should be to devise policies that help some people who are making mistakes,

<sup>11</sup> By contrast, Khwaja, Sloan and Wang (2009) find no empirical support for hyperbolic discounting as an explanation for continued smoking. They find that people who smoke have a lower nonpecuniary internal cost of getting a major smoking-related disease than those who do not smoke. This weakens the case for intervention based on helping smokers internalize their internal costs.

<sup>12</sup> In support of this view, Gruber and Mullainathan (2005) provide evidence that higher cigarette taxes increase smokers’ self-reported happiness. However, Bernheim and Rangel (2005) provide an alternative model of partially rational addictive behaviour, which they call ‘characterization’ failure, in which taxation of addictive substances can never generate efficiency gains.

while minimizing the costs imposed on others. They dub this approach libertarian paternalism, which avoids random, arbitrary or harmful effects, and steers people in directions that will promote their welfare.<sup>13</sup>

#### **4. Benefit-charging features**

Road (and similar transport) services resemble goods produced in the private sector that are used optimally when their price, commonly referred to as the economic user charge, equals the total social costs of operating the road network. Accordingly, as outlined by Smith (2006), road user charges should contain charges for the following main categories of uncharged external costs, viz.:

- consumption of road infrastructure, in the form of marginal road damage costs, i.e. the physical wear and tear caused by vehicles using the road system;
- environmental costs, including global and local air pollution (greenhouse gases, nitrogen oxides which contribute to acid rain, and particulates which can cause health problems). Noise pollution and landscape degradation would also fall under this heading;
- congestion costs, i.e. the extra journey time which road users impose on each other; and
- accident costs, i.e. the costs of injuries and fatalities caused to pedestrians and other road users (Jones-Lee, 1990).

In the event, more than one tax and regulatory instrument will have to be used to address the various external costs.<sup>14</sup> Taxing instruments include excise duties on motor fuels differentiated by type of fuel (gasoline vs. diesel, leaded vs. unleaded fuel), vehicle license fees differentiated by type of vehicle (cars vs. trucks) and vehicle characteristics (weight, engine capacity), tolls and congestion charges, taxes on the purchase of new vehicles, and perhaps duties on insurance premiums to

<sup>13</sup> In addition to the “optimal paternalism” examined by O’Donoghue and Rabin (2003) and the “libertarian paternalism,” explored by Sunstein and Thaler (2003), earlier O’Donoghue and Rabin (2001) discussed “cautious paternalism,” while Choi et al. (2003) investigate “benign paternalism.” For a later treatment, see also O’Donoghue and Rabin (2006).

<sup>14</sup> For a full treatment, see Newbery (2005)

account for accident costs. Regulatory measures include compulsory checkups and catalytic converters.

Road user charges can be set to cover the total costs of operating the road network or the difference between the marginal social cost and the average private cost of road use. The duties, charges and regulatory provisions apply to consumers as well as producers. This does not violate the Diamond–Mirrlees (1971) theorem, which prescribes that, subject to certain general conditions, intermediate goods should not be subject to revenue-raising taxes (if they were, producers would incur excess burdens in trying to pass the tax on to consumers in addition to the tax itself). For example, the fuel excise imposed on production inputs is a proxy for the cost of government-provided road services and internalizes the pollution costs borne by other people. A charge, even if indirect, is therefore appropriate.

Box 2 illustrates the workings of road user charges.

**[Box 2 about here]**

## **5. Progressivity-enhancing aspects**

In addition to the four main rationales of excise taxation outlined above, excises (including higher-than-standard VAT rates) on (luxury) goods and services, whose income-elasticity of demand exceeds unity, have been justified as instruments to improve the progressivity of the tax system. For the promotion of progressivity to be appreciable, consumption by higher income classes should be significant. In addition, it should be possible to break income-elastic products down into sub-groups, permitting the application of graduated rates that differ on the basis of the price of taxable products, on the assumption that consumption patterns vary accordingly between rich and poor. On these grounds, passenger cars have been singled out for higher-than-average taxes in developing countries. It is widely agreed, however, that the case for the use of excise duties to enhance progressivity in taxation is weak if a government's administrative capacity is strong. In the event, other instruments, such

as the income tax and the benefit system would be better targeted to achieve distributional objectives.<sup>15</sup>

This does not mean, of course, that no attention should be paid to the distributional equity aspects of traditional and other excises. Indeed, excises on Ramsey-type products which are price inelastic are usually also income inelastic, i.e. disproportionately consumed by the poor.<sup>16</sup> In other words, the excises are regressive, that is, as a proportion of consumption or income, they bear more heavily on the poor than on the rich. However, note that the Gruber and Köszegi (2001) argument changes the perspective on the burden distribution of the traditional excise duties. Tobacco taxes, for instance, have often been vilified for falling much more heavily on the poor than on the rich. But in Gruber and Köszegi's view the goal of tax incidence is not only to measure who pays more of the tax, but rather who is "hurt" most by it. Those who are hurt most by the tax are also those who are most price sensitive to tobacco, meaning that their self-control value of taxation is larger. By this reasoning they find that tobacco taxes may actually be progressive. And much the same reasoning applies to alcohol taxes.

### III. Instruments of Excise Taxation

Excise duties differ from VATs, among others, because they are often imposed at specific rates, while VATs are levied at *ad valorem* rates. These rates differ in effect, depending on the market situation, revenue requirements and non-revenue objectives. The latter objectives can also be achieved through regulations, which can often be targeted more specifically than excise duties. Indeed, the search should be for an optimal combination of taxation and regulation.

<sup>15</sup> The case for and against levying excise taxes on luxury goods in developing countries is examined by Cnossen (2006).

<sup>16</sup> Strictly speaking, price inelasticity of demand need not imply income inelasticity (unless utility is additive), but it is usually assumed to be the case.

## 1. Specific vs. *ad valorem* duties <sup>17</sup>

In a perfectly competitive market for a homogeneous good, the choice between specific and *ad valorem* taxation is irrelevant: any specific tax could be replaced by its percentage equivalent with no effect on consumer and producer prices or on government revenue. However, in an imperfectly competitive market – a much more common phenomenon – quality levels between similar excisable products, such as cigarettes, differ widely: someone who smokes knows that there are large differences in quality between a Virginia and two sticks of sawdust. In such a market, a common specific tax rate reduces relative price differences between low-quality and high-quality brands, while a common *ad valorem* rate does not. Standard optimal tax considerations would therefore seem to argue for *ad valorem* taxation – relative prices would be unchanged, and consumers would continue to choose brand on the basis of cost rather than tax differences.<sup>18</sup>

These arguments apply to competitive markets in which the set of quality levels on offer is given exogenously. With imperfect competition, however, firms' incentives to raise price and to distort quality may be quite different under specific and *ad valorem* taxation. In the case of a monopolist, for example, specific taxation increases marginal costs by a fixed amount, whereas *ad valorem* taxation acts as a proportional tax on costs, together with a proportional (lump-sum) tax on monopoly profits. By taxing marginal revenue, *ad valorem* taxation,  $t_a$ , increases the firm's perceived demand elasticity by the multiplier  $1/(1-t_a)$  and so diminishes incentives for the firm to raise price above marginal cost. Thus one might expect consumer prices to be lower under *ad valorem* than under specific taxation. Indeed, it is possible to show, in the monopoly case, that replacing a specific tax,  $t_s$ , by its *ad valorem* equivalent,  $t_a=t_s/p$ , causes consumer prices to fall and tax revenue and monopoly profits to rise

<sup>17</sup> For a review of the theoretical arguments, see especially Keen (1998). This section has been adapted from Cnossen and Smart (2005).

<sup>18</sup> Of course, the tax would still have income effects that might induce consumers to choose lower-quality brands, but so would a non-distortionary lump-sum tax. The theory of optimal taxation implies that a uniform percentage tax on a subset of commodities is desirable only under restrictive conditions on preferences (Atkinson and Stiglitz, 1980), but in this context those restrictions seem plausible.

(Skeath and Trandel, 1994). So everyone gains from *ad valorem* taxation – except the public health advocate.<sup>19</sup>

Just as *ad valorem* taxation seems to induce firms to cut prices, it also creates a clear incentive to downgrade product quality (Barzel, 1976), because the multiplier effect of *ad valorem* taxation makes improvements in product quality more expensive for the firm. The cost of carbon filters, for example, which purify the tobacco of tar and other harmful substances, is subject to the multiplier effect. Likewise, *ad valorem* taxation reduces incentives to invest in advertising, promotion, and other demand-enhancing fixed costs of production. In contrast, specific taxation does not directly distort manufacturers' decisions to invest in product quality.<sup>20</sup>

In short, the choice between specific and *ad valorem* taxation depends on whether the primary aim of the policy is to discourage consumption or to raise revenue and on whether improvements in product quality are deemed desirable or not. Furthermore, if the goal of policy is to reduce consumption, there is some tension between the tendency of specific taxes to lead to higher consumer prices and the tendency of *ad valorem* taxes to discourage investments in quality that keep consumers 'hooked'. On the other hand, if the goal is to reduce consumption damage, *ad valorem* rates have the drawback that they discourage, say, expensive filters on cigarettes. On balance, the solution is likely to be *ad valorem* taxation at a higher equivalent rate to achieve the desired level of consumer prices, and with concomitant gains for government treasuries.

<sup>19</sup> In the Cournot model of an oligopoly industry, the story is largely the same: a shift to *ad valorem* taxation will reduce prices and increase government revenues. In this case, however, industry profits may fall, as competition among firms intensifies. A further, testable, implication of the theory is that the pass-through of tax increases to consumer prices should be greater under specific than under *ad valorem* taxation (Delipalla and Keen, 1992). Indeed, there is some evidence that specific taxes in the EU are more likely to be 'over-shifted' (consumer prices rise by more than the tax) than *ad valorem* taxes (Delipalla and O'Donnell, 2001).

<sup>20</sup> However, specific taxation may induce consumers to opt for higher-quality brands, if the degree of tax shifting is independent of product quality. In support of this view, Sobel and Garrett (1997) find that specific tax increases in US states are associated with significant declines in the market share of generic brands.

The Pigouvian perspective leads to a very different conclusion, however – the damage caused by smoking is, at any point in time, independent of the price at which cigarettes are sold, so that correction of externalities favors specific over *ad valorem* taxation.<sup>21</sup> Furthermore, other, more immediate, considerations might govern the choice of tax structure. Thus, a specific tax can be imposed at the manufacturer's or importer's stage where it is easiest to collect, whereas, under a system of free trade prices, an *ad valorem* levy must be collected at the retail stage if trade distortions and tax avoidance are to be avoided. In the EU, of course, most Member States circumvent this issue by determining the *ad valorem* excise by reference to agreed retail prices, making the excise a specific tax as long as cigarette producers do not negotiate new retail prices with the excise tax authorities.<sup>22</sup>

Where it is clear that the excise duty should be specific, further choices have to be made about the precise form of the duty. Thus, specific tobacco excises can be designed by reference to the weight of tobacco, the number of cigarettes, or their nicotine or tar content, while the specific alcohol excise can be based on volume, alcohol content, or some combination of these attributes – varying depending on the type of beverage.

## 2. Taxes and regulations

Excise duties, be it specific or *ad valorem*, are not the only and often not the best instrument to influence the behavior of smokers, drinkers, gamblers, polluters and drivers. Depending on circumstances, regulations are an appropriate alternative. High taxes on tobacco and drink reduce average and usually also excessive consumption. But a tobacco tax cannot deal in a cost-effective way with the effects of passive

<sup>21</sup> An economic counter-argument is that the share of specific in total taxation should be smaller when the marginal cost of public funds is higher and the importance of excise duties for generating revenue correspondingly greater.

<sup>22</sup> An incidental, if welcome, side effect of this practice is that it weakens the argument that the value of a specific excise erodes with inflation. After all, inflation would compel producers to approach the excise authorities with a proposal for a new retail price.

smoking; (inflexible) bans on smoking in public places are necessary to deal with this externality. Similarly, the alcohol excise is an inadequate instrument to restrain people from getting behind the wheel of their car after they have had a drink. Drink-driving breath tests are better targeted to deal with this situation. Yet another example is the regulation of the age at which people are allowed to gamble, or the circumstances under which the discharge of pollutants is permitted.

Whereas specific and *ad valorem* duties would be equivalent in a perfect market, tax and regulatory instruments would be equivalent under conditions of full information, costless implementation and certainty. But, as Christiansen and Smith (2009) point out, these conditions are not likely to be found in the real world. Poor targeting, imperfect differentiation (e.g. because the externalities are non-linear in consumption) and unintended side-effects of taxes constrain their efficiency. Asymmetric information and costly monitoring and enforcement are central factors behind this situation. They imply that there is a role for regulations alongside taxes in alleviating externalities. In fact, there is a range of situations in which the most optimal approach is a combination of taxes and regulations.<sup>23</sup>

Addressing the variations on the type of tax-regulatory combination that should be imposed, Christiansen and Smith (2009) draw the conclusion that where the externality-correcting tax cannot be adequately differentiated, the outcome can be improved by direct regulation of consumption generating the larger marginal cost. The optimal externality tax rate in this context takes the same form as the well-known weighted average formula derived by Diamond (1973). How it is affected by the addition of regulation will depend on how marginal external costs and price responsiveness of demand vary with consumption. Where the marginal external effect is increasing (non-decreasing) in consumption and regulations make demand no more (no less) price responsive, the effect of stricter regulation is to lower the tax rate.

<sup>23</sup> As the authors point out, regulations, like excises, can have two effects: they may reduce harmful consumption per se and they may induce changes in the circumstances of consumption. Drinking alcohol at home is less harmful than drinking alcohol outside the home. The excise duty would reduce overall consumption regardless where the drink is consumed (called the consumption response), while the prohibition on drink driving restrains the place of consumption (the abatement response).

In sum, imperfect and inadequate tax and regulatory instruments can and should be used in combination to achieve a superior result in discouraging behavior that gives rise to externalities. Accordingly, a review of excise taxation would be incomplete without an analysis of the efficacy and interaction with accompanying regulatory measures.

### **3. Pollution: an illustration**

The choice between duties and regulations (including permits) can be usefully illustrated with respect to environmental problems, where these instruments are considered alternative, often supplemental, although not necessarily equivalent, ways of achieving a given standard of environmental protection, or, alternatively, achieving a greater environmental impact for a given economic cost.

The case for the use of excise duties over conventional regulatory policies based on technology or emission standards is now well established. If firms are faced with different marginal costs of abatement, excise duties can achieve a given level of abatement at lower total abatement costs. And even if the available instruments can take account of differences in abatement costs, excise duties can sidestep the need for the regulatory authority to acquire detailed information on the abatements costs of individual sources. In addition, excise duties provide a continuing incentive for polluters to seek ways to reduce emissions, are more robust to negotiated erosion (“regulatory capture”) and insulate polluters from the risk that regulatory requirements might involve excessive abatement costs.

A drawback to environmental excise duties is that they cannot guarantee that a particular environmental impact will be achieved; polluters’ behavioral responses may be less, or more, than expected. By contrast, quantitative instruments guarantee a particular impact on pollution, but at uncertain abatement costs. In making the choice, the risk of environmental quality must be balanced against the risk of the costs of environmental policy. Environmental excise duties are likely to be particularly valuable where wide-ranging changes in behavior are needed across a large number of production and consumption activities. Source-by-source regulation, on the other

hand, may achieve a more efficient outcome if pollution damage varies depending on the source of the emissions. Another point worth making is that minor environmental duties may be ignored by business; hence, if enforcement is not problematical, environmental duties should be high or not imposed at all.

This leaves the choice between pollution duties and tradable pollution permits. In theory, duties and permits are very similar. After all, in an efficient, competitive auction market the market-determined price for each permit would be expected to equal the rate of environmental duty per unit of emissions that would otherwise achieve the same emissions reduction. However, excise duties and permits differ regarding the impact of uncertainty. A system of tradable permits guarantees the envisaged quantitative reduction in pollution but at an uncertain cost, while an environmental duty has an uncertain impact on the quantity of emissions but fixes the marginal cost of emission controls for polluters.

A drawback of pollution permits is that they tend to deter new firms from entering a market dominated by large firms that are able to buy up pollution licenses in excess of the firms' cost-minimizing requirements. An advantage is that pollution permits can be freely distributed to existing firms (grandfathered) and thus do not significantly increase the average financial burden on existing polluters. Grandfathering, however, forgoes the chance to raise revenue that can be recycled through cuts in the marginal rates of other more distortionary taxes.

#### **IV. Discrimination, Coordination, and Earmarking**

Unlike VATs, which are broad-based, excise duties can easily be designed to discriminate against imported products and between products within the same commodity group, e.g. wine vs. beer or spirits. Some coordination seems essential, particularly in common markets that purport to maintain equal competitive conditions. Furthermore, the acceptability of excise duties has often been promoted by earmarking them for designated expenditure programs.

## 1. Discrimination

In international trade, excise duties follow the destination principle, i.e. exports are freed of tax and imports are taxed on par with domestically produced commodities. Exceptionally, taxes on environmentally harmful emissions by production units should be levied on an origin basis, i.e. in the country where the emissions take place, although this may harm the competitive position of domestic energy-intensive industries if their foreign counterparts do not face the same levy.

Destination-based excise duties can discriminate by origin, while origin-based taxes can harm a country's competitive position. Discrimination by origin occurs when a country levies an excise on a product, which is mainly imported, higher than the excise on a similar domestically produced product. An example is the high excise on grain-based spirits which France used to levy while grape-based spirits were subject to a lower duty (Cnossen, 2007). More subtly, expensive imported tobaccos can be discriminated against by levying high *ad valorem* instead of specific excise duties on cigarettes. The *ad valorem* duty would favor cheap home-grown tobaccos (Cnossen and Smart, 2005).

Similar forms of discrimination are found within countries between various forms of tobacco, alcoholic beverages and petroleum products. Roll-your-own tobacco and cigars tend to be favored in the EU over cigarettes by a margin of one to three. As a result, low-taxed cigars are on sale that closely resemble high-taxed cigarettes. As another example, the excise on wine has been harmonized at zero percent and half of all EU Member States do not levy a wine excise. In terms of alcohol content – arguably the most appropriate index to account for externalities – the zero rate on wine discriminates against beer and spirits. By the same token, beer is very lowly taxed in beer producing countries, such as Germany, Austria and the Czech Republic. On the other hand, spirits are relatively lowly taxed in the UK, the world's leading exporter of spirits.

## 2. Coordination

Excises, import duties and VATs should be properly coordinated. The non-revenue function of import duties is to protect domestic industry, while excises are imposed to account for external costs. By contrast, the VAT's only function is to raise revenue.

Logically, in terms of coordination, the protective import duty should be imposed first on the c.i.f.-value of imports. This puts imports competitively on par with similar domestically produced goods if these need to be protected. Subsequently, externality-correcting excises should be levied on the import-duty inclusive value of goods. Again, this ensures equal treatment vis-à-vis domestically produced excisable goods. Finally, the VAT should be imposed on the import and excise duty inclusive value of goods to put these goods on par with other goods not subject to import and excise duties.

This prescription assumes, of course, that the protective import duty and the corrective excises reflect correctly determined external costs and as such should be subject to the VAT. If the amount of the excise duty exceeds external costs, there would be additional VAT on the excess of these excises over the corrective component, and that part of the total VAT should be considered to be part of the residual tax system rather than the VAT as such.

While the sequential application of import duties, excise taxes and VATs is well established, the level of excise taxation still differs widely between countries, even in the EU's internal market. In fact, more than 50 years after the Treaty of Rome was signed, excise harmonization is largely limited to common definitions of excisable products and agreement on minimum rates (generally the lowest common rate). Not only are the wide differences in duty rates between the Member States at variance with the Treaty's harmonization goal, they also violate exchange efficiency (under which all consumers face the same product prices) and increase incentives for bootlegging (the purchase of taxed products in a low-excise duty state for consumption in the higher-duty home state) and tax-base snatching (setting low excise duty rates to attract consumers from other high-duty states). Indeed, cross-border shopping incentives may harm incentives to cut costs and to compete.

### **3. Earmarking**

It is often asserted that excise revenues should be earmarked to finance health expenditure, projects that stimulate the production and consumption of clean energy or repair the degradation of the environment, or to pay for the building and maintenance of the road transport system.

Bird and Jun (2007) distinguish eight types of earmarking by the degree of specificity of the expenditures involved, the strength and nature of the linkage between the earmarked revenues and the expenditure, and whether or not there is an identifiable benefit rationale for the linkage. Tobacco or alcohol excise revenues might be used for instance to finance health expenditure for the treatment of the ailments which they cause or campaigns against smoking or abusive drinking, although the linkage would be quite loose. Similarly, fuel excises might be earmarked for road maintenance purposes, or environmental taxes to finance clean-up programs. They call these forms of earmarking symbolic earmarking, because the various revenue amounts finance only some of the expenditures, although there may be a loose benefit rationale. In economic terms, the earmarking is “irrelevant,” because the marginal expenditure decision remains firmly in the hands of the budgetary authorities.

Earmarking is particularly suspect in the case of tobacco and alcohol excise revenues. It would be difficult to isolate health expenditures on smoking-related diseases and finance them by tobacco duties. There is evidence, moreover, that tobacco tax revenues exceed the external cost associated with smoking, primarily because smokers tend to die earlier than non-smokers and hence may not attract age-related diseases which require expensive treatment (Cnossen and Smart, 2005). With alcohol the case for earmarking is just as dubious, because moderate drinkers would be asked to pay for the health and other social costs attributable to abusive drinkers.

The case is stronger for earmarking the proceeds from taxes on road transport for infrastructure purposes, as argued by Gwilliam and Shalizi (1999). Although overall fiscal control and allocational efficiency may suffer, operational efficiency might improve because with a stable source of revenue road infrastructure management can make better use of more-efficient private sector contracting arrangements for road maintenance. These authors also argue that a user-managed fund, financed from taxes that are reasonable proxies for benefits received, can properly reflect the interests of road users in better-quality services, while reducing the interests of non-users who have little interest in the service. Although the case for road funds is somewhat stronger therefore, a lock-in effect remains because past arrangements weigh heavily on current realities, which may indicate that it would be better to shift resources to

alternative modes of transportation, such as public transport. In conclusion, the case of earmarking, even if the benefit rationale is quite strong, remains tenuous at best.

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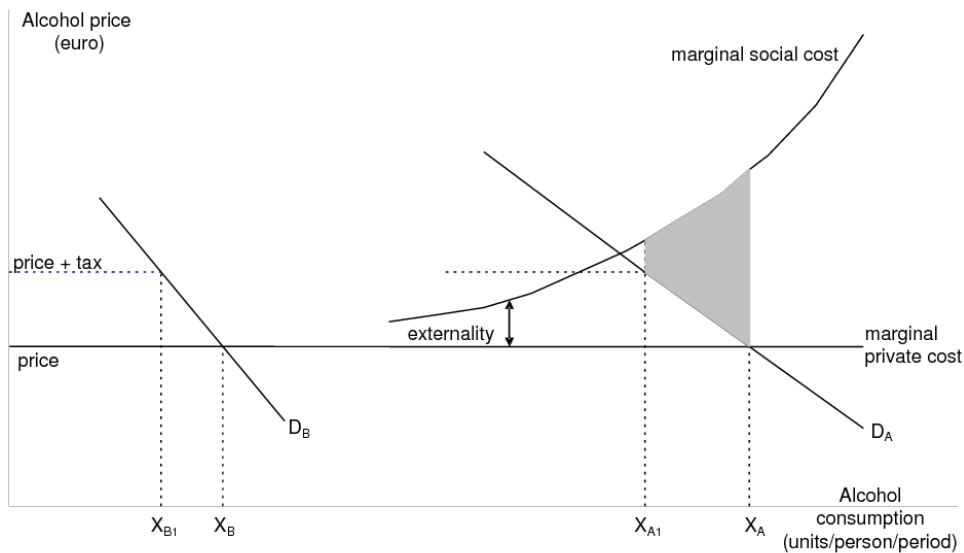
**Box 1. Taxing to control external costs**

The external cost of consuming an extra unit of alcohol varies from consumer to consumer. A person who consumes two glasses of wine at home may not impose costs on others. An inebriated person who consumes a glass of beer in a public bar and then gets behind the wheel of his car may impose significant additional external costs. Excise duties on wine and beer do not distinguish between cases where the marginal external cost is high and cases where it is low.

Nevertheless, overall welfare may still improve if the reduction in the external cost caused by the high-risk person is greater than the loss in consumer welfare of the low-risk drinker. This is illustrated in the chart shown below. Curve  $D_A$  reflects the demand for alcohol from a high-risk drinker (who imposes increasing costs on others per unit of drink), while curve  $D_B$  reflects the demand from a low-risk drinker, where the external costs are minimal.

Imposing an excise on alcohol reduces the demand in both markets (from  $X_A$  to  $X_{A1}$ , and from  $X_B$  to  $X_{B1}$ ). This would reduce the satisfaction of the high-risk drinker (area c), but this may be less than the reduction in harm caused to others (area a + c), in which case society as a whole benefits from the reduction in high-risk consumption. However, the duty would also reduce the satisfaction of those whose consumption is low-risk (area b), reducing the benefit from the duty. Accordingly, the net welfare gain is c minus b. Much depends, of course, on the (relative) elasticity of demand for alcohol, which tends to be greater for low-risk than for high-risk drinkers.

**Chart 1. Dilemmas in taxing alcohol to control external cost**



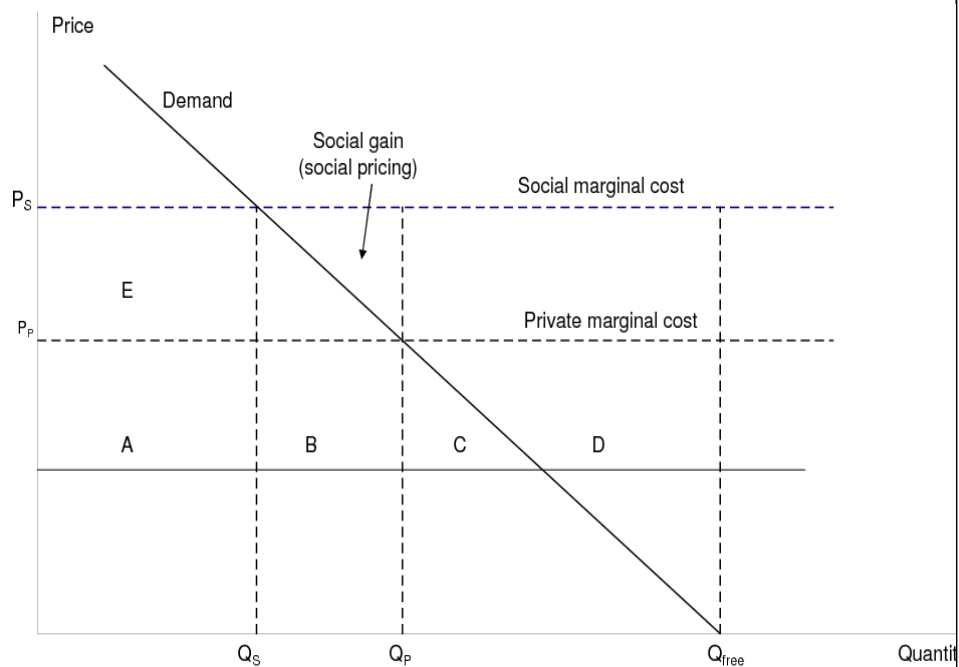
**Source:** Pogue and Sgontz (1989) and *Australia's future tax system – Consultation Paper* (2008).

## Box 2. Charging for government-provided road services

Chart 2 illustrates the workings of a road user charge to improve efficiency in resource allocation. If government provides road services free of charge, demand equals  $Q_{free}$  and the government must find revenue of  $A+B+C+D$  to meet the cost of providing the road. Moving from free provision to market pricing ( $P_p$ ) would see revenue of  $A+B$  flowing to government, which would cover the cost of provision, and a social gain ( $D$ ) in terms of improved resource allocation.

If there were no external cost associated with the consumption of road services, but the government chose to charge  $P_s$ , area  $E$  would be considered a tax, while  $A$  would be a user charge. Government fees therefore have both tax and user charge components. However, where there is an external cost associated with the use of the good, the market price ( $P_p$ ) would allow too much consumption. In this case consumers do not take sufficient account of the cost they impose on others. The government could therefore charge a higher and more efficient price ( $P_s$ ), at which there is a further social gain.

**Chart 2. Charging for government-provided road services**



**Source:** *Australia's future tax system – Consultation paper (2008).*