February, 2009

Taxation and Regulation of Smoking, Drinking and Gambling in the European Union

Sijbren Cnossen, editor

David Forrest

Stephen Smith

CPB Netherlands Bureau for Economic Policy Analysis
Van Stolkweg 14
P.O. Box 80510
2508 GM The Hague, the Netherlands

Telephone +31 70 338 33 80
Telefax +31 70 338 33 50
Internet www.cpb.nl

ISBN 978-90-5833-384-1

Abstract in English

Smoking is the single largest cause of avoidable death in the European Union accounting for over half a million deaths each year. One in ten of all 11-year olds have been drunk twice or more times, possibly causing lasting physical and mental harm. Electronic gaming machines are the crack cocaine of gambling. Consumer sovereignty, on the other hand, indicates that people should be allowed to smoke as long as they do not harm others. There is sound medical evidence, furthermore, that a drink each day keeps the doctor away, while recreational gambling can be an enjoyable form of entertainment for many people. These and other salient facts about the harmful and positive effects of smoking, drinking and gambling provide the background for a dispassionate economic analysis of the taxation and regulation of these activities. The main message the studies convey is that it would be unrealistic to rely solely on duty levels and differentiation to curb abusive use. Duty levels do have a clear impact in restraining consumption by children and young adults – an important priority for policy. But complementary policies – including direct regulation and provision of information – also have a meaningful role to play in each of the markets for tobacco, alcohol and gambling.

K*ey words: taxation, tobacco, alcohol, gambling, regulation, externalities, European Union*
JEL codes: H 2, H 8, H23, I 18, L 83

Abstract in Dutch

Roken is de belangrijkste oorzaak van vermijdbare sterfte in de Europese Unie, waaraan elk jaar een half miljoen doden kunnen worden toegeschreven. Een op de tien 11-jarige kinderen is al twee keer of vaker dronken geweest, mogelijkerwijs met blijvende lichamelijke en mentale schade. Elektronische gokmachines vormen de heroïne van de kansspelwereld. Daar staat tegenover dat het beginsel van de consumentensoevereiniteit aangeeft dat mensen zoveel mogen roken als zij willen als zij anderen geen schade toebrengen. Gezond medisch onderzoek toont ook aan dat een dagelijks drankje goed is voor hart en bloedvaten. En gematigd gokken kan een onderhoudende vorm van vrijetijdsbesteding zijn. Deze en andere saillante feiten over de schadelijke en positieve effecten van roken, drinken en gokken vormen de achtergrond voor een nuchtere economische analyse van de belasting en regulering van deze activiteiten. De hoofdboodschap van de studies is dat het niet realistisch zou zijn om uitsluitend op de hoogte en structuur van accijnsheffingen te vertrouwen om misbruik te beteugelen. Wel blijken hoge accijnzen effectief te zijn in het terugdringen van de consumptie van kinderen en jongeren – een belangrijke beleidsprioriteit. Maar complementair beleid – met inbegrip van directe regulering en informatieverschaffing – vervult een rol van betekenis in elk van de markten voor tabak, alcohol en kansspelen.

Steekwoorden: belastingen, tabak, alcohol, kansspelen, externe effecten, Europese Unie

Contents

List of figures

List of tables

List of boxes

Preface

The harmful effects of smoking, drinking and gambling are very much in the news these days. Smoking is the leading cause of death in the European Union; Europe consumes half of all alcohol produced in the world, although it accounts for merely 7% of the world's population; and the advance of internet gambling rapidly erodes government's grip on this activity. The effects of smoking, drinking and gambling have been thoroughly researched in recent years in studies commissioned by the European Commission. Tobacco or Health in the European Union: Past, Present and Future (The Aspect Consortium, 2004), Alcohol in Europe: A Public Health Perspective (Anderson and Baumberg, 2006), and Study of Gambling Services in the Internal Market of the European Union (Swiss Institute of Comparative Law, 2006) have done much to review, analyze and make people aware of the prevalence and social costs of smoking, drinking and gambling.

Less attention has been paid, however, to the use of tax and regulatory instruments to internalize the external effects of the abusive consumption of tobacco, alcohol and gambling and to restrain consumption by the young who are ill-informed about the dire consequences of their behaviour or discount the short-term effects more heavily than the long-term effects. The three studies in this volume attempt to fill this void. They provide a balanced judgment of the welfare effects of government intervention in smoking, drinking and gambling markets. Accordingly, the studies form a useful complement (and sometimes antidote!) to the cost-of-illness research conducted by public health experts.

The studies grew out of a symposium organized by Sijbren Cnossen under the auspices of the European Commission, CPB Netherlands Bureau for Economic Policy Analysis and Maastricht University. The symposium was attended by tax and health specialists from nearly all EU Member States, as well as by officials from the European Commission and representatives of various non-governmental organizations and industry. Thanks are due to the European Commission and the International Tax and Investment Center for making the symposium possible. Simone Pailer, Annemarie Spaans and Jeannette Verbruggen provided administrative support, which is gratefully acknowledged. Judith Payne did a splendid job in preparing the studies for publication. Last but not least, the editor wishes to thank the authors, discussants and outside referees for their unstinting cooperation.

Coen Teulings

Director CPB

Summary

The economic issues related to the taxation of tobacco, alcohol and gambling are among the most interesting issues to study, yet they receive relatively little attention in the professional literature. This contrasts sharply with the widely discussed research reports, published among others by the European Commission, on the harmful effects of smoking and drinking. These reports, however, do not draw a systematic economic link between the abusive consumption of tobacco and alcohol and their taxation and regulation. This is also true for gambling, which does not fall under the Commission's harmonization mandate.

The following three studies attempt to fill this void. Broadly, they identify four main economic policy issues in imposing excise duties on tobacco, alcohol and gambling: (1) the revenue-raising efficiency of such duties; (2) their potential role in correcting negative externalities; (3) their distributional incidence; and (4) the need for duty coordination in the European Union. Last but not least, the studies discuss the complementary role of regulatory measures in curtailing harmful consumption.

Most excise duties on tobacco, alcohol and gambling are low-cost sources of revenue, because the products are easy to identify, the volume of sales is high and the number of producers or marketing outlets is limited. At the same time, the studies note that the price elasticity of demand for the excisable products is not so low that, on efficiency grounds, they should be taxed in excess of the duty level that corresponds to the external costs attributable to their consumption. Beyond this level, an increase in the rate of the value added tax would seem indicated if more revenue is required. In short, the Ramsey rule has limited application.

Much discussion is devoted to the difficulties in designing (marginal) excise duties in line with the (marginal) external costs caused by harmful consumption. This is shown to be exceedingly complex, because the welfare gains from a reduction in socially costly consumption, induced by the higher duty, must be balanced against the welfare loss from a fall in moderate non-harmful consumption. Perhaps tobacco is an exception, since the relationship between marginal duty and external cost is largely linear. Interestingly, and in contrast to conventional Pigouvian analysis based on the rationality axiom, recent research indicates that 'sin taxes' can improve Pareto optimality, if it is assumed that some consumers may have self-control problems.

Generally, excise duties on tobacco, alcohol and gambling are distributed regressively when measured against income. It is also observed that the rich benefit from the gambling proclivity of the poor if the proceeds of the stakes are spent on income-elastic services, as they often are. Some recent publications posit that the poor, who as a group smoke more than the rich, tend to benefit most from an excise-induced cutback in smoking if they value the constraint on their behaviour. In that sense, the duty has a progressive incidence.

Coordination of excise duties, in the form of minimum duty levels, is important in the European Union if socially wasteful cross-border shopping activities, induced by high excise duty differentials, are to be reduced. In half of all Member States, for instance, there is no excise duty on wine. Minimum excise duties on other alcoholic beverages have not been adjusted since 1992. Tobacco excise duties in the United Kingdom are more than three times the level found in Spain. Recently, the European Commission has proposed increasing the agreed minimum tobacco duties, even though smuggling and counterfeiting activities are flourishing. Internet betting is an example of a rapidly eroding tax base.

Clearly, taxation and regulation must be viewed as complements. Indeed, where Pigouvian taxation runs into targeting problems, regulations aimed at specific problem groups can be used effectively to curb negative externalities. Bans on smoking in public places have done much to reduce passive smoking harm (unfortunately, not within the family), while minimum purchase ages, server legal liability and drunk-driving countermeasures have reduced, albeit not eliminated, the external costs of abusive alcohol consumption. Limitations on the access to electronic gaming machines – the 'crack cocaine of gambling' – lessen the incidence of non-rational behaviour.

The main message these studies convey is that it would be unrealistic to rely solely on duty levels and differentiation to curb abusive use. Duty levels do have a clear impact in restraining consumption by children and young adults – an important priority for policy. But complementary policies – including direct regulation and the provision of information – also have a meaningful role to play in each of the markets for tobacco, alcohol and gambling.

Nederlandse samenvatting (Dutch summary)

De economische vraagstukken die verband houden met de belasting van tabak, alcohol en kansspelen vormen interessante onderwerpen van studie, zij het dat zij betrekkelijk weinig aandacht krijgen in de wetenschappelijke literatuur. Dit staat in scherp contrast met de breed bediscussieerde onderzoeksrapporten, onder meer gepubliceerd door de Europese Commissie, over de schadelijke effecten van roken en drinken. Deze rapporten leggen echter geen systematisch verband tussen de excessieve consumptie van tabak en alcohol aan de ene kant, en de belasting en regulering daarvan aan de andere kant. Dit geldt ook voor kansspelen, die niet onder het harmonisatiemandaat van de Commissie vallen.

De volgende drie studies proberen in deze leemte te voorzien. Breed gezegd identificeren zij vier belangrijke economische beleidsissues inzake de heffing van accijnzen op tabak, alcohol en kansspelen: (1) de opbrengst-efficiency van de heffingen; (2) hun potentiële rol in het corrigeren van negatieve externe effecten; (3) de drukverdeling van de heffingen; en (4) de behoefte aan accijnscoördinatie in de Europese Unie. Last but not least, analyseren de studies de complementaire rol van regulering bij het beteugelen van schadelijke consumptie.

De meeste accijnzen op tabak, alcohol en kansspelen zijn ‘goedkope’ bronnen van overheidsinkomsten, omdat de producten gemakkelijk zijn te identificeren, de afzet groot is en het aantal producenten of verkooppunten gering. Daar staat tegenover dat de studies aangeven dat de prijselasticiteit van de vraag naar deze accijnsplichtige goederen niet zo laag is dat zij, op efficiency gronden, hoger zouden moeten worden belast dan overeenkomt met de externe kosten die aan hun consumptie zijn verbonden. Boven het niveau van de externe kosten lijkt een verhoging van het BTW-tarief geïndiceerd, indien de schatkist moet worden gespekt. Om kort te gaan, de Ramsey-regel is slechts beperkt toepasbaar.

Veel aandacht wordt besteed aan de problematiek van de vaststelling van het (marginale) accijnstarief dat overeenkomt met de (marginale) externe kosten van schadelijke consumptie. Dit blijkt een buitengewoon complex vraagstuk te zijn, omdat het welvaartsvoordeel van een vermindering van maatschappelijke kosten veroorzakende consumptie, teweeggebracht door de hogere accijns, moet worden afgewogen tegen het welvaartsverlies van een verlaging van gematigde, niet-schadelijke consumptie. Waarschijnlijk vormt tabak een uitzondering op deze regel, omdat het verband tussen het marginaal tarief en de externe kosten van roken grotendeels lineair is. Interessant is dat recent onderzoek – in tegenstelling tot de gebruikelijke Pigoviaanse analyse gebaseerd op het rationaliteitscriterium – aantoont dat ‘zondebelastingen’ de Pareto-optimaliteit kunnen verbeteren als wordt aangenomen dat sommige consumenten aan een gebrek aan zelfcontrole lijden.

In het algemeen is de drukverdeling van accijnzen op tabak, alcohol en kansspelen, naar inkomen gemeten, regressief: lagere inkomensgroepen betalen verhoudingsgewijs meer dan hogere inkomensklassen. Ook wordt opgemerkt dat welgestelden voordeel hebben van de goklust van arme mensen, indien de opbrengsten van kansspelen ten goede komen aan inkomenselastische diensten (musea, concerten, etc.), zoals vaak het geval is. Sommige recente publicaties wijzen erop dat arme mensen, die als groep meer roken dan rijke paffers, voordeel hebben bij een accijns-geïndiceerde vermindering van de tabaksconsumptie, indien zij de beteugeling van hun schadelijke gedrag positief waarderen. In die zin heeft de accijns een progressieve neerslag.

Coördinatie van de accijnzen, in de vorm van minimumtarieven, is in de Europese Unie van belang indien het gewenst is sociaal-verspillende grensoverschrijdende winkelactiviteiten, veroorzaakt door hoge accijnsverschillen, te verminderen. De helft van alle lidstaten, bijvoorbeeld, heffen geen accijns op wijn. Minimumaccijnzen op andere alcoholische dranken zijn sedert 1992 niet meer verhoogd. De tabaksaccijnzen in het Verenigd Koninkrijk zijn meer dan drie maal hoger dan het niveau in Spanje. Recentelijk heeft de Europese Commissie voorgesteld de overeengekomen minimum tabaksaccijnzen te verhogen, hoewel de contrabande welig tiert. Internet gokken is een voorbeeld van een snel eroderende heffingsgrondslag.

Belastingheffing en regulering zijn duidelijk complementaire instrumenten. Waar Pigoviaanse belastingheffing niet doeltreffend is, kan regelgeving voor specifieke probleemgroepen effectief worden gebruikt om negatieve externe effecten te beteugelen. Het verbod op roken in publieke ruimtes heeft veel gedaan om de schadelijke effecten van passief roken te verminderen (helaas, niet in gezinsverband), terwijl minimum koopleeftijden, wettelijke aansprakelijkheid van serveerders en verkopers, en maatregelen tegen rijden onder invloed de externe kosten van drankmisbruik hebben teruggedrongen, zij het niet geëlimineerd. Beperkingen op de toegang tot elektronische gokmachines – de heroïne van de gokwereld – verminderen het voorkomen van niet-rationeel gedrag.

De belangrijkste boodschap die de studies over het voetlicht brengen is dat het niet realistisch zou zijn om teveel vertrouwen te stellen in het niveau en de structuur van accijnzen bij het beteugelen van misbruik. Wel is het niveau van de accijns duidelijk van invloed op het terugdringen van de consumptie door kinderen en jongeren – een belangrijke beleidsprioriteit. Maar complementair beleid – met inbegrip van directe regulering en voorlichting – kan ook een rol van betekenis spelen in elk van de markten voor tabak, alcohol en kansspelen.

1 Restraining the golden weed: taxation and regulation of tobacco

Stephen Smith*

This paper considers the key economic considerations in tobacco tax policy and its interaction with regulation. How far are high taxes on cigarettes justified by the external costs of smoking, and what other considerations should inform policy decisions about the appropriate level and structure of tobacco taxation? The paper discusses the definition and measurement of the external costs of smoking, and the implications of these costs for tobacco taxation and regulation. Wider issues in tobacco taxation are then considered, including revenue-raising efficiency, the tax base, distributional aspects, and the international dimension to tobacco tax policy.

1.1 Introduction

Some European countries – the UK, Ireland and France – impose very high excise taxes on cigarettes, in excess of €3.00 per pack of 20 cigarettes (Table1.1). Since cigarettes are also subject to value added tax (VAT) at the standard rate, over three-quarters of the retail price of cigarettes in each of these countries consists of tax. Some other EU Member States have considerably lower taxes, though all levy some additional excise tax on cigarettes, over and above the standard rate of VAT. On average, Member States raise revenues of some €160 per head of population from the cigarette excise, a substantial revenue contribution from a tax on a single good, consumed – in nearly all Member States – by considerably less than one-third of the adult population. Although originally tobacco may have been taxed more heavily than other goods simply because high taxes on tobacco were cheap to collect and easy to enforce, the taxation of cigarettes and other tobacco products is increasingly being seen, alongside other regulatory instruments, as a way of reducing the harm done by smoking. This paper considers, from an economic perspective, the efficient use of tobacco taxes both as a source of revenue and as a regulatory instrument. How far are high taxes on cigarettes justified by the external costs of smoking, and what other considerations should inform policy decisions about the appropriate level and structure of tobacco taxation?

* The author is grateful for the comments made by the discussants, Anil Markandya and Markku Pekurinen, other participants at the seminar, Sijbren Cnossen and two anonymous referees.

Table 1.1 Taxation of cigarettes in EU Member States, July 2008

Member State[a]	Retail price per pack of 20 cigarettes, (MPPC[b])	Total excise tax per pack (excl. VAT), €	Total excise tax per pack (excl. VAT) (% of retail price)	Specific excise as % of total tax (incl. VAT)	Cigarette excise tax revenue in 2005, per capita, €
UK	8.12	5.00	62	52	179
Ireland	7.45	4.55	61	55	260
France	5.30	3.39	64	8	164
Germany	4.71	2.81	60	46	150
Netherlands	4.63	2.71	59	50	86
Sweden	5.17	2.70	52	18	79
Belgium	4.16	2.50	60	10	137
Finland	4.30	2.45	57	9	105
Denmark	4.29	2.29	53	54	166
Malta	3.61	2.20	61	12	151
Portugal	3.30	2.05	62	49	125
Italy	3.50	2.05	59	5	152
Austria	3.50	2.04	58	20	163
Luxembourg	3.20	1.83	57	14	1.064
Greece	3.00	1.72	57	5	203
Cyprus	2.82	1.66	59	20	187
Spain	2.40	1.53	64	9	143
Czech. Rep.	2.05	1.32	64	45	81
Slovenia	2.20	1.28	58	20	124
Hungary	2.14	1.22	57	39	67
Slovakia	1.55	1.20	78	57	54
Estonia	1.41	1.08	76	49	54
Poland	1.55	1.07	69	36	63
Romania	1.65	0.96	58	45	n.a.
Latvia	1.19	0.89	75	47	27
Bulgaria	1.27	0.82	65	37	n.a.
Lithuania	1.45	0.75	52	47	22
EU average (unweighted)	3.33	2.00	61	32	160

Source: European Commission Excise Duty Tables, ref. 1.024 (revenues) and ref. 1.027 (duty rates).

[a] Ranked in descending order of total excise tax per pack in euros.

[b] Most Popular Price Category.

For European Union members, this is an issue with an important EU policy dimension. National policies with regard to tobacco taxation and regulation are constrained by EU agreements on the level and structure of excises, and by EU rules governing the free movement of goods in the internal market. The rules on excises are briefly summarized in Box 1, and further discussion, including details of transitional provisions for countries that have recently joined the EU, can be found in Cnossen (2007). The openness of EU economies, and legal judgments that have reinforced rights to free movement, place considerable constraints on national excise tax policies, in some respects more severe than the competitive and legal constraints on state-level tobacco tax policies in the United States. The result is that EU policy towards tobacco taxes and

regulation plays an important role in determining the agenda of feasible policy action in Member States.

EU rules for excise duty on cigarettes

- All Member States are required to impose a duty on cigarettes, which should contain both price-related ('ad valorem') and quantity-related ('specific') components.
- In addition, Member States should impose VAT on cigarettes and other tobacco products at their standard rate (which EU rules require to be at least 15%). The VAT applies to the excise-duty-inclusive price.
- For the purposes of defining the excise duty rates and structure, a reference price is defined for the Most Popular Price Category (MPPC) in each Member State. This varies between Member States depending on market conditions, purchasing patterns, etc.
- The minimum total excise duty on cigarettes in the MPPC from 1 July 2006 should be €64.00 per thousand cigarettes (€1.28 per pack of 20).
- In addition, for Member States with excise duty below €101.00 per thousand cigarettes, there is a further requirement that for cigarettes in the MPPC the total excise duty should be at least 57% of the total tax-inclusive retail selling price.
- The balance between ad valorem and specific components in the cigarette excise should be such that the specific element is between 5% and 55% of the total tax (including VAT) levied on the MPPC.

In July 2008, the Commission proposed a directive (COM(2008)459/2) which would make various changes to these rules:

- Taxes would no longer be defined in relation to the MPPC but in relation to the Weighted Average Price (WAP) of cigarettes sold in each Member State.
- A phased increase in minimum duty levels and rates would take place over the period to January 2014, with the minimum excise duty rising from €64.00 to €90.00 per thousand by 2014 and the minimum percentage of duty in price rising from 57% to 63% (of the WAP).
- The required balance between specific and ad valorem elements would be shifted towards the specific excise, which should lie in the range 10–75% of total tax.

The paper draws on existing research from various sources, including earlier contributions on the economics of tobacco taxation [1], but does not aim to present a comprehensive survey of the very large literature on all aspects of smoking behaviour, regulation and social costs. Following this introduction, Section 1.2 discusses the definition and measurement of the external costs of smoking; Section 1.3 then discusses the implications of these costs for tobacco taxation and regulation. Section 1.4 considers wider issues of efficiency in tobacco taxation, including the potential contribution to revenue-raising efficiency and the efficient specification of the tax base. Section 1.5 then discusses distributional concerns about high tobacco taxes and Section

[1] Key contributions include Manning et al. (1989), Grossman et al. (1993), Viscusi (1995, 2006), O'Hagan (1998), Evans, Ringel and Stech (1999), Chaloupka et al. (2000), Gruber (2001), Cnossen and Smart (2005) and Cnossen (2006).

1.6 considers the international dimension to tobacco taxation – in particular, the consequences of the wide differences in taxes across the EU. Section 1.7 draws some conclusions.

1.2 The external costs of smoking: definition and measurement

The external costs associated with the consumption of goods such as tobacco and alcohol – in other words, costs that are borne by people other than the individual smoker or drinker – constitute the least-controversial justification for public policies, including tax policies, to regulate and restrict their consumption. For most goods, we may think that individual consumers are best placed to identify the pattern of consumption that best satisfies their needs, and to decide whether or not to purchase a particular good on the basis of whether the benefits of consuming it are sufficient to justify the price. However, for goods that impose costs on people other than the individual decision-maker, we cannot assume that individual decision-making will result in the socially optimal pattern of consumption. In the case of tobacco smoking, these external costs include direct effects on other people, such as the annoyance and health damage caused by passive smoking, and collectively borne costs such as the cost of publicly funded medical treatment for smoking-related conditions. The existence of these effects means that individual consumption decisions will not reflect the full social costs of consumption, because individual consumers do not bear the marginal costs of medical treatment or of direct externalities that follow from their smoking behaviour. Externality-correcting taxes or other forms of regulation will be needed to ensure that such costs are properly reflected in individual consumption decisions.

The costs that are relevant to this argument are those borne by people other than the individual smoker or by society collectively. Smoking involves various consequences – many of them adverse – that extend beyond the immediate pleasure of consumption to the individual consumer. Frequently, the discussion of whether smoking is socially harmful includes discussion of the consequences for the individual consumer's own health, employment prospects and so on. Such costs to the individual consumer are not, however, externalities. Arguments that they might warrant higher taxation to discourage consumption involve an element of paternalism, perhaps reflecting a concern that individuals may be poorly informed about some of the consequences for themselves of consumption. Unless there are grounds to believe that consumers are poorly informed about some of the consequences of consumption, there are no reasons to overrule their consumption choices in their own interests; and where people are poorly informed, a better first response might be to provide better information rather than to dictate consumption decisions. For these reasons, paternalist arguments for taxation generally meet with scepticism among economists.

Nevertheless, in the case of tobacco consumption, the case for discouraging consumption, in the individual's own interest, should not be dismissed too lightly. Some of the individual costs of

smoking arise as a result of the addictive nature of tobacco, and this adds a further dimension to the problem. Current consumption may increase the risk of future addiction. A well-informed and rational consumer would presumably be less willing to smoke than if there were no risk of future addiction (Becker and Murphy, 1988; Chaloupka, 1991). However, it is unrealistic to assume that all individuals are fully informed about the addictive risks associated with each unit of consumption (Orphanides and Zervos, 1995).

Nonrational behaviour has been emphasized by some authors – notably, Gruber (2001) and Gruber and Köszegi (2001, 2004) – as constituting grounds for tobacco taxation and regulation beyond what would be needed if individuals were fully-informed and rational decision-makers. It should be noted that this is not simply a matter of the addictive properties of cigarettes – indeed, Becker and Murphy (1988), Chaloupka (1991) and others have found that individual behaviour exhibits at least some of the properties that would be expected from a rational model of addiction (in other words, from individual choices about current consumption that take into account the consequences for future addiction and future welfare as well as current gratification). What is central to this literature is that individuals may behave in ways that – viewed over time, for example – appear inconsistent, and may value facing constraints on their current behaviour (Gruber and Mullainathan, 2005). Various ways have been suggested of thinking about this kind of behaviour: Gruber (2001) has developed the idea of an 'internality', while Viscusi (1995) discusses the concept of an 'externality to one's future self'.

1.2.1 The scale of smoking externalities

The consequences of smoking that are felt by individuals other than the smoker, and are unlikely to have been taken into account by the smoker when choosing how much to smoke, fall into three broad categories:

- *Direct externalities* experienced by other individuals, including the annoyance caused by passive smoking and the adverse health effects experienced by those exposed to environmental tobacco smoke. These people may include work colleagues and wholly unrelated individuals (for example, other patrons of a bar or restaurant), but a high proportion of them will be friends and family members.
- *Collectively borne costs*, such as the cost of publicly funded medical treatment for smoking-related conditions and other public expenditure costs.
- *Revenue externalities* arising through the tax system. Smoking may have consequences for the individual consumer's income and expenditure, especially through a higher rate of sickness absence. Even if these effects would be wholly internal in a 'first-best' world without distortionary taxes, the presence of income taxes and spending taxes means that the government partly shares in the benefits of additional income or spending. This gives rise to what is, in effect, a tax revenue externality, and, given the efficiency cost of raising public revenues through distortionary taxation, induced changes in revenues have a clear social value.

There is an extensive literature on the social costs of smoking. As Lightwood et al. (2000) note, studies of the healthcare costs and other costs of smoking may serve a number of purposes, including public expenditure planning and budget allocation, and the assessment of compensation in cases of litigation, as well as judgments about the benefits of policy interventions such as taxation. The appropriate methodology and cost definitions vary, depending on the issue that the studies aim to address. A considerable proportion of the literature on the social costs of smoking is not directly relevant to the externality case for taxation and regulation, because an insufficiently clear distinction is drawn between costs experienced and internalized by the individual consumer and external costs experienced by others.

The most widely quoted US estimates of tobacco consumption externalities, appropriately defined, are those of Manning et al. (1989). These estimates distinguish between the gross costs of smoking (higher costs of medical treatment etc. as a result of conditions caused by smoking) and the net costs, which offset against the gross costs a range of cost savings (mainly public expenditure effects) arising because of the premature death of smokers. Gross costs were estimated at 42 US cents per pack[2], discounting future costs at 5%, while net costs were 15 cents per pack, on the same basis. Adding amounts to reflect the costs of passive smoking and smoking-related fires raised the net costs to 38 cents per pack, very close to the 37 cents per pack average tax on cigarettes in the US at the time.

The estimates of Manning et al. were subsequently updated by Viscusi (1995), with adjustments to reflect the lower tar levels of cigarettes smoked by more recent generations of smokers (on the basis that their exposure to harm will have been lower than for the earlier generations whose health experience forms the basis of the cost estimates) and to reflect the lag profile with which this change in tar content feeds through into health effects after consumption. Table 1.2 summarizes some of the key components in the estimates presented by Viscusi, again with total external costs expressed in terms of the externality per pack. The effects of Viscusi's tar and lag adjustments in the example shown are relatively modest, but such adjustments have been controversial in the light of some evidence suggesting that smokers may smoke lower-tar cigarettes more intensively (Evans and Farrelly, 1998).

[2] Total costs are divided by the number of packs consumed to produce these figures. In the absence of evidence that marginal damage has a strongly nonlinear relationship with individual consumption, it is probably not unreasonable to assume that marginal external damage cost is constant across units consumed and that marginal external damage can then be approximated by average external damage in this way.

Table 1.2 Expected external costs per pack of cigarettes[a]

	External cost, raw data	External cost, tar adjustment based on 20-year moving average
Medical care before 65	0.326	0.302
Medical care after 65	0.172	0.153
Total medical care	0.498	0.455
Sick leave	0.012	0.011
Group life insurance	0.126	0.114
Nursing-home care	– 0.221	– 0.197
Retirement pension	– 1.099	– 1.000
Fires	0.016	0.016
Taxes on earnings	0.351	0.326
Total net external costs	– 0.317	– 0.274

Source: Viscusi, 1995.
[a] Estimation in US dollars, based on 3% discount rate.

Taking account of public expenditure offsets arising from the premature death of smokers has been controversial in public debate. It nevertheless seems wholly correct in estimating the external cost of smoking. If these items were private costs (for example, if individuals were responsible for paying actuarially differentiated private insurance premiums to cover future costs arising from their consumption decisions), then a rational consumer would experience the additional health costs and reduced future social care costs in the same way, and there is no reason to believe that the individual would treat the two insurance premiums differently. Since the purpose of externality taxation is to confront the individual decision-maker with the external costs of their decision, on the same basis as if these costs were private costs, consistency would require that both additional costs and cost reductions should be treated in the same way.

One reason that public expenditure offsets arising from premature mortality have been controversial is their size. On Viscusi's unadjusted figures, additional medical care costs for smokers are approximately 50 US cents per pack, while savings on nursing-home care and retirement pensions are equivalent to about $1.30 per pack. But there is even controversy about the sign of the healthcare cost component. In a study for the Netherlands, Barendregt, Bonneux and van der Maas (1997) found that the long-term effect of smoking cessation would be to increase healthcare costs. In the short term, they estimated healthcare costs would fall, as ex-smokers cease to suffer the illnesses caused by smoking, but this 'conventional' effect on the costs of treating smoking-related diseases would then be offset by longer-term costs, as ex-smokers survive long enough to suffer the very costly medical conditions of old age. By contrast, Rasmussen et al. (2005) address much the same question but find that the overall lifetime healthcare costs of smokers exceed those of nonsmokers.

The picture in Table 1.2 is clearly incomplete. No estimates are included for the direct externalities of passive smoking, either in terms of annoyance or in terms of the effects on the health of others, especially children and other family members. Evidence on these effects has been accumulating rapidly in recent years and is reviewed in Adams et al. (1999). Viscusi (1995) argues that passive smoking effects are insufficiently precisely determined to permit point estimates, but shows a range of possible values, leading to a bottom line that varies from a net saving to a larger net cost, among which he suggests the median estimate of zero net external costs may be regarded as a plausible upper bound.

Clear identification and measurement of the external costs of smoking is far from straightforward, and a number of areas of conceptual and practical difficulty can be identified.

1.2.2 Effects on family members

One controversial area is the treatment of costs borne by family members. Family members of a smoker may experience considerable costs, including ill-health, and pain and distress as a result of the illness and premature death of the smoker. Many of the consequences of smoking during pregnancy, including severe damage to the lifetime health of the child, also come under this heading. There are, in addition, further important costs for the healthcare system in treating these conditions. Whether, and to what extent, costs experienced by other family members should count as externalities has been controversial. As Viscusi (1995) notes, it turns, in principle, on whether the welfare of other members enters into the utility function of the smoker, and in other areas of policy it is often assumed that family members are assumed to care for each other's welfare to the extent that the welfare of the household can be considered as a single entity. In the case of smoking, however, this seems an extreme position, and at least some of the harm inflicted on family members and unborn children would seem best treated as externalities. The position adopted has substantial implications for the overall level of externality. If counted fully as an externality, Evans, Ringel and Stech (1999) estimate that the harm done to children by smoking during pregnancy would add some 42–72 US cents per pack (in 1994 prices) to the total external cost of smoking.

1.2.3 Healthcare finance and external costs

How far are the costs of medical treatment and healthcare internalized when tobacco consumption decisions are made, and how far should they be counted as an externality? In the case of publicly funded, tax-financed systems such as the UK National Health Service, the answer is straightforward: the treatment costs of illnesses resulting from individual consumption decisions are collectively financed. The same may largely be true of other collectively financed systems, such as employer-financed healthcare. By contrast, a system of private insurance capable of appropriate differentiation of insurance premiums might be able to internalize a large part of the healthcare costs associated with smoking.

This suggests that the classification of healthcare costs into internal and external is institution-dependent and will vary between countries depending on the institutional arrangements. In European welfare states, where healthcare costs are substantially funded out of direct taxation or quasi-tax social contributions, healthcare costs are an important part of the externality calculation, and, other things being equal, smoking externalities (and hence the optimal rate of cigarette taxation) may be higher in such countries than in countries where healthcare costs are largely individually borne. Nevertheless, it is clear that defining the precise boundary between collectively financed and individually borne healthcare costs will often be difficult, especially in systems that are neither wholly tax-financed nor individually financed.

1.2.4 Effects on wages and productivity

A large part of the total social cost of smoking estimated by Manning et al. (1989) and Viscusi (1995) consists of forgone tax revenues on earnings, due to the shorter and less-productive working lives of smokers. This seems fairly uncontroversial. Whether more of the income or output loss from sickness absence and other smoking-related productivity effects should be counted as an externality depends primarily on how far the effects of smoking on worker productivity are reflected in wages. The evidence shows that workers who are smokers earn less than equivalent nonsmokers. Levine, Gustafson and Valenchik (1997) find a wage differential of some 4–7%. In a study that also takes account of differences in drinking behaviour, van Ours (2004) finds that smoking reduces men's wages by about 10% but has no discernible impact on women's wages.

What is critical for assessing any externality arising through wage effects is the relationship between wage differentials and relative productivity. If workers are paid their actual marginal product, then there is no externality. Smokers who are less productive receive correspondingly lower wages. However, employers may not always be able to differentiate the wages paid to smokers and nonsmokers to reflect the different individual marginal products of their workforce. Employment protection and sick pay legislation may, for example, compel an employer to continue making payments to a worker who has fallen sick as a result of smoking. In this case, the lower productivity of smokers generates externalities of two forms. First, the employer paying a smoker wages that exceed the worker's marginal product will experience a real income externality. Second, since the overall marginal product has fallen and the employer is unable to differentiate the wages paid to different workers, both smokers and nonsmokers will receive lower wages as a result of the lower productivity of smokers.

Quite how far the productivity effect of individual smoking is reflected in individual wages, and how far it is collectively borne, is unclear. Even where there is no immediate impact on the smoker's wage (because of contractual provisions or collective bargaining), it is likely that smokers with poor sickness records will be less frequently promoted, and thereby suffer longer-term income losses.

1.3 Smoking externalities, taxation and regulation

The problems caused by externalities can be addressed either by pricing (using taxes) or by various forms of regulation. In principle, taxes set at a level equal to the marginal external cost[3] generated by each unit consumed should lead to an efficient resolution of the problems caused by externalities, without the risk of imposing excessively rigid constraints on individuals' behaviour. But relying on pricing alone to deal with smoking externalities encounters problems of two sorts.

First, there are problems to do with individual rationality and consistency in decision-making. Individuals may not always make well-informed choices; a considerable part of public policy towards smoking has been motivated by a concern that smokers – and perhaps young smokers in particular – may be poorly informed about the risks associated with smoking. Even where smokers are comprehensively informed about the consequences, and fully appreciate the risks they run, recent literature (for example, Gruber, 2001) suggests that they may make choices that discount future risks in a way that does not reflect their own longer-term interests.

Where this is the case, it may not be sufficient to set tobacco taxes based on the level of external costs. Taxes may need to be set higher and may need to be supplemented by other forms of regulation. Where taxes are used, the key consideration in determining the appropriate level of tax is no longer simply the level of external costs per unit consumed – since we no longer can assume that individuals will make the right choices even when faced with prices fully reflecting the external costs of smoking – but the effectiveness of cigarette taxes in modifying the behaviour of those least likely to make rational and fully informed choices. For this reason, the impact of cigarette taxes on the smoking behaviour of children and young adults becomes a major focus. The balance of evidence suggests that higher taxes are more effective in restraining consumption by this group than for the population in general (Lewit, Coate and Grossman, 1981; Lewit and Coate, 1982; Chaloupka and Wechsler, 1997), perhaps because younger smokers are less addicted and more influenced by peer effects which act to magnify the elasticity (Powell, Tauras and Ross, 2005).

Second, tobacco taxes, like many other practical instances of externality taxation, take the form of taxes levied on the production and sale of a commodity, and not specifically on the externality generated by its use. Sale of the commodity is effectively acting as a proxy for the level of the externality associated with its use, and its value as a proxy will depend on the stability of the relationship between the commodity and the externality (Sandmo, 1976). In the

[3] Strictly, efficient 'abatement' of an externality requires that the tax should be set equal to the marginal external damage per unit, assessed at the socially optimal level of consumption, rather than to the marginal external damage at the current level of consumption. The distinction, however, is unimportant where marginal external damage does not vary with the level of consumption. For cigarette smoking, it may be a reasonable approximation to assume constant marginal external damage.

case of tobacco taxes, it is clear that the relationship between commodity sale and the level of externality generated by consumption is not always precise. Individual consumption behaviour may affect the extent to which externalities are generated, so that the same commodity can generate different levels of externality depending on how it is consumed; this is particularly the case with passive smoking externalities. Nevertheless, if we try to reflect external costs in cigarette taxes, we are constrained to tax all consumption at the same rate, and cannot fully differentiate taxes according to the externalities generated by each unit consumed.

The limitations of tobacco taxes in achieving efficient control of smoking externalities indicate a clear role for various forms of regulation of smoking[4], in parallel with the use of taxes to reflect external costs.

Even though, as noted above, young people may be more responsive to price than older smokers, there may be a case for regulation directed at restricting smoking by young people, to the extent that they may be more likely than others in the population to misperceive risks or to make current choices that are at odds with their own longer-term interests. Some of the regulatory interventions used by European countries are targeted at this group, including age-based restrictions on sale, bans on sale through vending machines, and anti-smoking activities in schools. Other regulatory interventions aim to ensure provision of information more generally; in many European countries, these include advertising restrictions, marketing restrictions (such as the ban on referring to 'light' or 'mild' cigarettes), prominent health warnings on cigarette packets, and anti-smoking information and advertising campaigns.

Direct regulation of smoking may also play an important complementary role with taxation in restricting uses of cigarettes most liable to generate significant external costs. Because we cannot tax cigarettes at different rates depending on whether or not they will be consumed in ways that give rise to more or less external harm, we may want to supplement the uniform tax on cigarettes, set at the level of average external damage per unit, with regulations targeting consumption that causes above-average harm. This would suggest, in particular, that an important role for regulation would be to restrict consumption in circumstances that generate passive smoking externalities. The recent spate of legislation in many European countries to restrict or ban workplace smoking and smoking in bars, restaurants and other public places would seem a well-targeted complement to the general incentive established through cigarette taxes. The logic of these bans would thus be that they target the most damaging consumption; they may lead to some reduction in consumption overall, but also would play a useful role if they stimulate substitution to consumption in less damaging contexts. From this perspective, however, regulations need to be carefully judged and their impact thoroughly assessed. If one effect of limits on smoking in workplaces and public places is to encourage more smoking at

[4] See Goel and Nelson (2006) for a survey of smoking regulation and Christiansen and Smith (2008) for a discussion of the parallel use of externality taxes and direct regulation.

home, then there are risks of adverse effects on the health of those exposed to more second-hand smoke at home – especially young children – which need to be set against the benefits of ending exposure to passive smoke in public places (Adda and Cornaglia, 2006).

Since taxes and smoking regulation are complementary instruments directed at aspects of the same underlying problem – the external costs of smoking – the level of regulatory intervention will affect the efficient level of externality pricing measures through cigarette taxes. If cigarette taxes are set to reflect the average external cost per unit, and if regulation targeted at consumption generating above-average external costs is successful at reducing this consumption, then the efficient externality tax will fall. If the effect of regulations limiting smoking in public places is to reduce the number of places where passive smoking externalities can arise, this would imply that the efficient level of externality tax would be lower than where passive smoking was unchecked by regulation. For recent measures restricting smoking in public places, the appropriate adjustments in tax rates may, however, be small – even assuming that existing taxes had previously been set efficiently – since the cost of adult exposure to passive smoking is probably one of the smaller components of the overall level of external costs discussed in Section 1.2.

1.4 Tobacco tax policy

1.4.1 Revenue-raising efficiency

Even in the absence of externality arguments for higher taxes on goods such as cigarettes, there may be reasons to tax some goods more heavily than others, if doing so can reduce the overall distortionary costs of taxation.

The starting point for considering this issue is Ramsey's (1927) analysis. Where commodity taxes are the only taxes available, and where distributional considerations can be ignored, Ramsey demonstrates that the efficiency cost of raising revenues will be minimized by levying the commodity tax at non-uniform rates, with the tax rates for each commodity set so that there is an equal proportionate reduction in consumption of each commodity. The implications of this condition for the pattern of optimal tax rates are not straightforward, except in the special case where demand for each good is independent of the prices of other goods. In this case, the optimal tax rates will be inversely proportional to the elasticity of demand for each good. Goods with inelastic demand should therefore be taxed more heavily than average, and goods with price-elastic demand less heavily[5].

[5] It will be noted that since goods that have a low price elasticity will tend also to have a low income elasticity, the 'inverse-elasticity' policy rule would imply heavier taxation of necessities than of luxuries, a policy prescription which may run counter to concerns about equity (which would typically suggest that necessities should be taxed less heavily than other goods).

A different perspective on essentially the same problem is provided by Corlett and Hague (1953), who show that if goods differ in their degree of substitutability for or complementarity with leisure, nonuniform taxation will reduce the welfare cost of raising given revenues. The efficient pattern of commodity tax rates would levy higher taxes on goods that are more complementary with leisure and lower taxes on goods that are substitutes for leisure. The intuition behind this result is that leisure is a commodity that enters into individual utility but is untaxed in a system of commodity taxation. Taxing goods that are complements with leisure more heavily than other goods in effect acts as a proxy for the 'missing' tax on leisure.

Subsequent literature has shown that the circumstances in which differential commodity taxation may be warranted on efficiency grounds are likely to be somewhat restricted. Atkinson and Stiglitz (1976) and Deaton and Stern (1986) show that relaxing one of the key assumptions of the Ramsey analysis – that ruling out lump-sum transfers – can lead to a prescription for uniform commodity taxation in a reasonably broad set of circumstances (primarily those where labour supply and commodity demands are weakly separable, a condition that rules out the Corlett-and-Hague cases). The policy conclusion is frequently drawn that the case for differential commodity taxation is then rather weak, except in countries with poorly developed systems of income taxation and social assistance (which may not be capable of making the required lump-sum transfers). However, it should be noted that weak separability of leisure and commodity demands is not an innocuous and trivial restriction. The limited empirical evidence available rejects separability (Browning and Meghir, 1991; Crawford, Keen and Smith, 2008), suggesting a potential gain from differential commodity taxation – although of unclear magnitude – even in developed countries with sophisticated tax and transfer systems.

What evidence is there that tobacco might be a commodity for which above-average taxation might be appropriate under either the inverse-elasticity or Corlett-and-Hague leisure-complement policy rules?

The available evidence on tobacco demand elasticities comes from a range of sources – time-series studies at an aggregate level, cross-section studies exploiting the variation in tobacco taxes and smoking behaviour across jurisdictions (for example, US states), and cross-section or panel-data studies based on individual micro data (which can separately analyze the influence of prices and other factors on smoking participation, and on cigarette consumption by smokers). A review by Chaloupka and Warner (2000) observes that the range of price elasticities estimated using conventional methods is fairly wide, from –0.14 to –1.23, though most fall within the narrower range of –0.3 to –0.5. Viscusi (1992, 2006) reports that 31 studies of the price elasticity of cigarette demand in the US showed elasticities within the range –0.4 to –1.0, while the balance of evidence from nine studies for the UK would suggest an elasticity around –0.5 to –0.6, though the range of estimates is wider, from –0.1 to –1.0. There is a tendency for estimates of the long-run elasticity to be higher than the short-run elasticity, which is to be

expected in the case of a highly addictive commodity. While inelastic (i.e. elasticity between 0 and –1), Viscusi (2006) argues that tobacco demand is not unusually inelastic in comparison with many other commodities. It would appear therefore that the price elasticity of demand for cigarettes is not sufficiently low as to call for higher-than-average taxation on the basis of the inverse-elasticity rule.

It is unclear, a priori, whether cigarette consumption would be a complement with or a substitute for leisure. For some people, smoking may be associated more with leisure-time activity. However, smoking may help some people cope with the stresses and social interactions involved in working. The overall relationship between cigarette consumption and labour supply cannot be resolved on the basis of a priori reasoning. Systematic empirical evidence on the degree of complementarity with or substitutability for labour supply is sparse. Parry (2003) notes that, while some studies have suggested a slightly negative income elasticity of demand for cigarettes, it is difficult to infer much about complementarity with or substitutability for labour supply from this; he suggests that workplace smoking restrictions might be a reason to believe that smoking and working may not be complementary. A similar conclusion emerges from the results of Crawford, Keen and Smith (2008), who find that labour supply and tobacco spending are modest substitutes, with an effect that is statistically significant but relatively small. The evidence, however, is far from overwhelming, and its reliability is greatly compromised by the sharp socioeconomic differences in smoking patterns that have emerged in most countries in recent years. In the current state of knowledge, it is unlikely that cigarette consumption is sufficiently complementary with leisure to warrant high taxation on these grounds alone, though, as Parry (2003) finds, different values for the relative substitution between cigarettes and leisure, within a relatively moderate range, can make a considerable difference to the estimated optimal tax on cigarettes. This is an area where further work is clearly needed.

1.4.2 The relative taxation of different products

Unlike VAT, which simply taxes commodities in proportion to their selling price at one of a limited number of percentage tax rates, the separate excise for tobacco offers – in principle, at least – a wider menu of possibilities for the precise specification of the tax base. Cigarettes could, for example, be taxed per unit, by weight of tobacco or as a function of the tar and/or nicotine content, as well as at a percentage of the selling price. Current EU rules (Box 1) require Member States to impose a cigarette excise containing both price-related ('ad valorem') and quantity-related ('specific') components. The specific element, based on the number of cigarettes, is required to lie between 5% and 55% of the total tax (including VAT) levied on the Most Popular Price Category of cigarettes sold in the country concerned.

In the UK, for example, cigarettes bear a specific excise of £112 per thousand cigarettes (€3.20 per pack of 20) and an ad valorem excise of 22% of the retail selling price (plus the standard

17.5% VAT). The specific element in the UK cigarette excise is 52% of the total tax. A number of other Member States, including Ireland, Denmark, the Netherlands and Slovakia, impose cigarette excises with a similarly high ratio of specific to total tax, while there are also Member States at or close to the other end of the permitted range, including Italy, Greece, Finland, Spain and France (Table1.1).

As Cnossen (2006) observes, these sharp differences in the balance between specific and ad valorem elements have their origins in the commercial interests of national producers. Since ad valorem taxes tend to disadvantage high-cost, high-price producers relative to those selling cheaper products, Member States where the market is traditionally dominated by cheaper home-grown tobaccos have tended to employ predominantly ad valorem excises, which act as a barrier to imports of higher-priced international brands.

Issues arising in the choice between specific and ad valorem taxes are surveyed in Keen (1998). Ad valorem taxes have a distinctive 'multiplier effect', in the sense that actions that increase, or reduce, the producer price by a given amount will have a larger effect on the price charged to the consumer. As a result, ad valorem taxes will tend to discourage costly improvements in product quality and to promote more vigorous price competition between producers (Delipalla and Keen, 1992). Specific taxes, on the other hand, will tend to have an 'upgrading' effect on product quality. The overall implications for consumer welfare and tax revenue of the choice between specific and ad valorem taxation will vary, depending on the structure of preferences and on market structure. Delipalla and Keen (2006) show that, in competitive circumstances, the mix should be such as to have minimal effects on product quality, in the sense that, at an optimum, uniform intensification of both taxes would leave quality unchanged.

- Ad valorem taxation of goods will tend to be more attractive where producers exert a degree of monopoly power and where there is little product differentiation.
- Ad valorem taxation also has the potential distributional advantage that it retains more relatively low-price product variants in the market, while specific taxation tends to reduce the availability of cheaper brands.
- Ad valorem taxes maintain constant real revenues at times of inflation, while real revenues from specific taxes are eroded by inflation unless tax rates are regularly increased in line with changes in the consumer price index.
- Specific taxes would be preferred where there are reasons to want to maintain product quality.
- Specific taxes are also preferable where taxation is partly intended to affect an externality that is broadly related to the quantity of the product rather than to its value.
- Specific taxes are likely to be easier to administer than ad valorem taxes, since they require physical checks rather than valuation. Ad valorem taxes, such as the EU cigarette excise, where the tax is levied at the wholesale stage but based on the retail price, pose particular practical problems. They generally require the tax to be based on an estimate of the selling price, and this

will tend to constrain subsequent independent marketing decisions further down the supply chain, both by preventing sales at a higher price and by reducing the ability of retailers to cut prices.

The wide variation in cigarette prices within individual countries would appear to indicate that differences in product quality are significant and that product differentiation in this market is not simply a matter of branding. This would imply that cigarette taxes should contain a significant specific component. The need for any ad valorem element is less clear. It is true that the cigarette market is quite concentrated in a number of EU Member States, and ad valorem taxation would act to constrain the ability of producers with market power to raise prices. However, this argument for ad valorem taxation seems rather at odds with the general thrust of tobacco tax policy in the EU in recent years, which has been to raise prices in order to curb consumption.

There are a range of possibilities for defining the specific element of the tax base. Current EU rules require cigarettes to be taxed simply on the basis of the number of cigarettes, but a number of alternative bases might be considered. One – employed in the UK before it joined the EU – is to tax cigarettes on the basis of the weight of the tobacco content. This would have some attractions, in that it could form the basis of a consistent tax treatment of a range of tobacco products, including rolling tobacco and cigars as well as cigarettes. Current EU rules allow countries considerable freedom in defining tax bases for rolling tobacco and cigars; excises may be wholly ad valorem, wholly specific or, as with cigarettes, a mixture of ad valorem and specific, and the specific element can be based on weight of tobacco or alternatively, in the case of cigars, quantity[6]. Practice varies widely, but there is a general tendency for excises on rolling tobacco, in particular, to be lower than those on cigarettes. The effect in some markets has been to stimulate substitution towards roll-your-own cigarettes (a trend exacerbated in parts of the UK by extensive bootlegging and smuggling of rolling tobacco). Moving towards systematic taxation of tobacco products based on weight of tobacco would reduce the extent of tax-induced substitution between different tobacco products. However, it should be noted that it could involve radical change in competitive conditions in the market, similar in scale but opposite in direction to those seen when the UK shifted from tobacco weight to unit-based duties on cigarettes. Tobacco-weight-based taxes on cigarettes could see the re-emergence of a market segment supplying smaller, cheaper, cigarettes, since these would bear significantly less duty under a weight-based system.

Further possibilities for the specific tax base would include taxes differentiated according to tar and/or nicotine content, rather than based on quantity and price alone. This option is discussed in Harris (1980), who observes that the case depends on the underlying reason for high taxes on

[6] For further details and discussion, see Cnossen (2007).

cigarettes. If the reason for high excises on cigarettes is misperception of individual health risk, then a tax in proportion to tar content may encourage efficient responses. The advantage may, however, be qualified to the extent that there is some evidence of 'compensating' behaviour by smokers (Evans and Farrelly, 1998) – in other words, that smokers inhale more when smoking low-tar cigarettes. However, if the purpose of high taxes on cigarettes is partly to regulate direct externalities experienced by others in the form of exposure to passive smoking, then levying a tax in proportion to tar uptake (as measured in 'smoking machine' tests) may result in inappropriate differentiation, because some of the common methods used to reduce tar values, such as the use of more effective filters, have the effect of reducing tar uptake by the smoker while having less effect on exposure to environmental tobacco smoke.

1.5 Distributional aspects of tobacco taxation

There is an increasing tendency in many developed countries for smoking to be concentrated in poorer socioeconomic groups, a development which tends to imply that the distributional incidence of cigarette taxes will be increasingly regressive, with the tax burden higher as a percentage of income among poorer households than among the better off. In countries such as the UK where cigarette taxes are high, tax policy towards cigarettes can have an appreciable impact on the overall distributional incidence of the tax system. Some have argued that the regressive distributional incidence of cigarette taxes may be the strongest argument against using high taxation to reduce the social costs of smoking.

As a general rule, of course, the distributional incidence of individual components of the tax system should be of less concern than the overall distributional incidence of all taxes (or, indeed, all government fiscal interventions) taken together; a tax that bears disproportionately heavily on poorer households may be unimportant if it is counterbalanced by distributional progressivity in other taxes. Nevertheless, where, as with tobacco taxes, taxes are distributed extremely unevenly across households at similar income levels – due to differences in consumption behaviour – there may be reason to look at the separate distributional incidence of the tax, since any adjustment to other taxes can only offset on average the distributional impact of the excise tax on tobacco. The distributional incidence of taxation on heavy smokers will be more heavily influenced by the distributional characteristics of the tobacco tax; and for nonsmokers, the incidence of the tobacco tax will be an irrelevance.

A key issue in assessing the distributional incidence of excise taxes is the income definition used. A number of studies have highlighted the potentially misleading impression that can be obtained from assessing household living standards simply on the basis of the current year's income. Pechman (1985) showed that the assessment of the distributional incidence of taxation may be affected by the length of the accounting period used for the analysis. A tax that appears regressive when analyzed on the basis of household income in a single year might – and he

suggests would – appear less regressive when analyzed over a longer period. Subsequent research, including Poterba (1989), Congressional Budget Office (1990) and Lyon and Schwab (1995), has investigated this conjecture in more detail, comparing tax incidence analyzed with respect to both current income and longer-period income estimates or proxies.

One reason for the distributional incidence of indirect taxes to vary depending on the time frame of the analysis is consumption-smoothing across transitory income fluctuations. With access to savings or credit, the average-income household experiencing a temporary drop in income would not necessarily immediately reduce its consumption to that of the permanently poor, nor change the pattern of goods consumed to reflect the lifestyles of the permanently poor. Predictable life-cycle variations in income and consumption patterns may also affect distributional analyses. There are significant age-related variations in tobacco consumption, with young adults tending to smoke more heavily than those over 40. Since the lifetime incomes of young adults will typically be understated by current income, while lifetime and current income may be closer for those in their 50s, these age-related variations in smoking behaviour can give rise to significant differences between the distributional characteristics of tobacco taxes, measured on current-income and lifetime-income bases.

In the UK, as in the US, tobacco excises look substantially more regressive when analyzed on the basis of current income than when using measures, such as current nondurable spending, more consistent with life-cycle analysis (Table 1.3). Analyzed on the basis of current income, tobacco taxes would appear sharply regressive, because household tobacco spending as a percentage of income for the poorest income quintile is some four times that for the richest quintile. On the other hand, analyzed on the basis of household spending quintiles, the distributional impact of tobacco taxes is less clear-cut. Tobacco taxes still appear regressive, but less so: the average tobacco budget share for the lowest-spending quintile is roughly twice that for the highest-spending quintile.

Table 1.3 Income and expenditure shares of tobacco spending, UK, 2004

Quintile group	Current-income quintiles, and tobacco as % of total current income	Expenditure quintiles, and tobacco as % of total current expenditures
1=poorest	2.37	1.60
2	2.04	1.95
3	1.53	1.69
4	0.99	1.32
5=richest	0.56	0.92

Source: Crawford, Keen and Smith, 2008.

Distributional analysis of cigarette taxes typically concentrates only on the tax payments and does not consider the distributional impact of any potential benefits. For example, it seems likely that exposure to external costs would be higher among groups of the population with

higher smoking rates, and if high cigarette taxes reduce this exposure, the pattern of benefits may somewhat offset the regressive distributional impact of the tax payments. Nevertheless, given that passive smoking is a relatively small part of the overall external cost of cigarette smoking, it is unlikely that this effect would be sufficiently strong to overturn the basic regressivity of cigarette taxes. A more fundamental challenge to the distributional objection to high cigarette taxes is offered by Gruber and Köszegi (2004), who argue that because poorer income groups tend to be more responsive to cigarette taxes, the benefits to the individual smoker of stopping smoking will tend to be higher among lower-income groups. Where individuals make fully rational decisions about consumption, this observation has no significance for the analysis of the distributional impact of cigarette taxes. But where, as Gruber and Köszegi argue, individual choices are not welfare-maximizing in the conventional sense, individuals may value constraints on their own behaviour. The benefit they perceive from the constraint on their behaviour would then be an offset to the burden of the tax, and its value may be higher for those for whom the impact of the constraints is more significant.

1.6 International interactions and domestic tax policy

A growing tax policy issue in the UK and some other high-tax EU Member States is the revenue loss from legal cross-border shopping and from various forms of illegal tax evasion and smuggling. Both problems arise as a result of large tax-induced price differentials between Member States, especially between adjacent Member States. The problem of revenue losses from legal cross-border shopping by individuals has come into particular prominence as a result of the abolition of border controls between EU Member States from 1 January 1993. Prior to 1993, most Member States applied restrictive travellers' allowances on personal imports of tobacco products from other EU countries, as well as those from the rest of the world, and this kept legal cross-border shopping within tightly constrained bounds. As a result of the abolition of border controls, individuals can purchase goods in another Member State and bring them home without restriction or fiscal adjustment, so long as the goods are for their personal use and not for resale. Likewise, various forms of illegal commercial movement within the EU, including bootlegging and smuggling, have been made easier by the ending of frontier checks at the point of import (Hornsby and Hobbs, 2007).

The requirement that individual imports should be for personal use may be underpinned by 'indicative levels' of duty-paid imports, below which imports would normally be accepted as being for the individual's personal use and above which the claim of personal use might be challenged. The UK, for example, has operated a system of this sort, but with levels that are comparatively unrestrictive (initially 800 cigarettes, subsequently raised in 2002 to 3,200). Transitional arrangements have also been applied to imports from the new Member States, where duty rates, and consequently cigarette prices, are much lower than in those existing Member States with high cigarette taxes.

The scale of revenue losses from both legal and illegal cross-border movements of goods subject to excises is controversial. Estimates are published annually by the UK tax administration, HM Revenue and Customs, of VAT and excise revenue losses through fraud and evasion. For the fiscal year 2004/05, HMRC estimated that legal cross-border shopping (including duty-free[7]) accounted for 8% of UK cigarette consumption, while the various forms of illegal smuggling and bootlegging accounted for between 10% and 19% of consumption (HM Revenue and Customs, 2006, annex D). In terms of UK revenue forgone, these figures imply UK revenue losses of approximately £1 billion as a result of legal cross-border shopping and £1.2–2.5 billion through illicit sales of cigarettes, compared with actual revenues of £9.9 billion.

For individual Member States in this position, tobacco tax policy needs to take account of the potential revenue losses through legal and illegal cross-border activities. In the UK, some have argued that excise duties are now so high, and the UK so exposed to revenue losses through tax-induced cross-border shopping, that duties exceed the level at which revenue is maximized. (Setting tax rates to maximize tax revenues is, of course, unlikely to be an efficient taxation policy, but, aside from the control of external costs, there would be few reasons to want to set tax rates above the revenue-maximizing level.) Whether a reduction in duty rates would increase or reduce UK tax revenues depends on the relationship between the price elasticity of demand for the various goods subject to excises and the existing tax content in price. Duty rates will exceed the revenue-maximizing level if the reduction in revenues caused by the reduction in units purchased (which depends on the existing tax on each unit and the elasticity of demand) exceeds the additional revenue from the remaining units sold (Crawford and Tanner, 1995). For tobacco, which has a particularly high existing tax content in price (approximately 80% in the UK), the critical elasticity at which, for a given level of taxation, a rise in duty would reduce UK sales sufficiently to reduce UK overall revenues is relatively small, at –1.3 (or –1.6 if it is assumed that any diversion of spending away from tobacco would lead to additional UK sales of goods subject to standard-rate VAT), as shown in Table 1.4. Nevertheless, the critical elasticity is still substantially greater than the price elasticities discussed in Section 1.4, suggesting that the UK is still some way from setting taxes on tobacco that exceed the revenue-maximizing level.

[7] The EU abolished duty-free sales on intra-EU travel in 1999, although duty-free remains for travelers outside the EU. Even before 1999, the UK revenue forgone through duty-free sales is likely to have been small, as much of the tobacco, alcohol and other goods purchased duty-free would probably otherwise have been purchased duty-paid outside the UK. The main revenue losses as a result of duty-free sales were probably experienced by lower-tax countries (Christiansen and Smith, 2004).

Table 1.4 The relationship between demand elasticity and the revenue-maximizing tax rate: Crawford-and Tanner 'Critical Elasticities' at different tax rates

Total taxes as % of price	Critical elasticity assuming no general indirect taxation	Critical elasticity assuming 17.5% general VAT
20	– 5.0	– 40.0
30	– 3.3	– 8.0
40	– 2.5	– 4.4
50	– 2.0	– 3.1
60	– 1.7	– 2.4
70	– 1.4	– 1.9
80	– 1.3	– 1.6
90	– 1.1	– 1.4

Source: Crawford and Tanner, 1995.

Similar considerations would apply to tax policy in other EU countries with tax rates higher than those of neighbouring states. Other things being equal, the significance of revenue losses will be greater for smaller states, with the majority of their population close to borders. Larger Member States typically have greater freedom of manoeuvre in excise tax policy, because a smaller proportion of their tax base is derived from sales in border areas, which are more exposed to competitive pressure.

For the EU, the policy issue is whether there is a collective gain to be made from policies to reduce the duty differentials between Member States that give rise to cross-border shopping and smuggling. Lee, Pearson and Smith (1988) argue that fiscal externalities between Member States warrant some level of EU tax coordination. However, since these negative fiscal externalities primarily arise where Member States cut their rates to below those of neighbours, this would indicate an EU-wide floor to excise duty (and VAT) levels, but no corresponding need to place an upper limit on Member States' tax rates[8].

1.7 Conclusions

Two groups of arguments could be held to justify high taxes on cigarettes and other regulatory interventions to restrict smoking – the external costs imposed by smokers and the nonrational basis of individual choices about smoking. Typically, economic analysis has regarded the externality justification for high tobacco taxes as relatively clear-cut, while treating arguments in terms of nonrational behaviour with extreme suspicion. However, it seems likely that the external costs argument for high tobacco taxes may be less substantial than is often assumed, while nonrational behaviour may constitute more persuasive grounds for cigarette taxation and regulation.

[8] See also the formal analysis of this issue in Kanbur and Keen (1993).

The externality case for intervention rests on a number of considerations which are difficult to assess. There are two critical elements – the direct external costs imposed by passive smoking, and collectively borne costs, such as the cost of publicly funded medical treatment for smoking-related conditions and other public expenditure costs. The economic valuation of passive smoking externalities is uncertain, both because the magnitude of the effects is still subject to a wide range of imprecision and because it is not wholly clear how far some passive smoking effects, such as those experienced by family members and, especially, unborn children, are already reflected in smokers' behaviour. Overall, however, it seems likely that these costs should be regarded as substantial. By contrast, public expenditure costs of healthcare and other items may well be smaller, and possibly different in direction, than widely supposed. Although controversial, there are studies that suggest that even the health expenditure effects alone may be negative, as fewer smokers live long enough to incur the costly diseases of old age. If other public expenditures associated with the elderly (pensions, social care, etc.) are also included, the net public expenditure costs of smoking could well be negative. The net externality is then the sum of two possibly-large and – still – imprecise numbers, the costs of passive smoking and the (possibly negative) overall public expenditure effects of smoking.

Nonrational behaviour has been emphasized by some authors as constituting grounds for tobacco taxation and regulation beyond what would be needed if individuals were fully-informed and rational decision-makers. It should be noted that this is not simply a matter of the addictive properties of cigarettes – indeed, econometric work has found that individual behaviour exhibits at least some of the properties that would be expected from a rational model of addiction (in other words, from individual choices about current consumption that take into account the consequences for future addiction and future welfare as well as current gratification). What is central to this literature is that individuals may behave in ways that – viewed over time, for example – appear inconsistent, and may value facing constraints on their current behaviour.

To the extent that nonrational behaviour may undermine the case for setting tobacco taxes based on the level of externalities, the key consideration in public decision-making becomes the effectiveness of cigarette taxes in modifying the behaviour of those least likely to make rational and fully informed choices. For this reason, the impact of cigarette taxes and regulation on the smoking behaviour of children and young adults becomes a major focus. The balance of evidence suggests that higher taxes are more effective in restraining consumption by this group than for the population in general.

The high level of the cigarette excise in some countries, and the increasing tendency for smoking to be concentrated in poorer socioeconomic groups, raise significant concerns about the regressive distributional incidence of cigarette taxes. These cannot easily be addressed through other taxation adjustments, and probably constitute the main obstacle in principle to

higher cigarette taxation. Nevertheless, the force of this objection to higher cigarette taxation may well be reduced if the pattern of benefits from smoking control policies is considered: exposure to external costs may well be higher among groups of the population with higher smoking rates. The distributional objection is even more fundamentally weakened if individual smoking decisions are not wholly rational; from this perspective, poorer income groups may derive relatively high benefits from the constraint that cigarette taxes place on smoking, offsetting to some extent the regressivity of tax payments.

The existing structure of cigarette excises in the EU includes elements of both specific and ad valorem taxation. This is a market where there is appreciable product differentiation in the form of quality differences, and the balance between specific and ad valorem tax has significant implications for competition between products with different quality levels, and a fortiori significant implications for the competitive position of different producers. On competition grounds, there would be reasons to narrow the range of permitted variation in the specific / ad valorem mix, and the nature of the market and the role of cigarette excises in reflecting smoking externalities would both indicate that this should be done by increasing the required specific element. Recasting the specific element to reflect the tar and/or nicotine content of cigarettes has some superficial appeal, but carries an appreciable risk that it would worsen the targeting of the tax towards passive smoking externalities.

Narrowing differences in tobacco taxes between EU Member States would reduce the economic and fiscal costs associated with legal cross-border shopping and with the various forms of illegal smuggling and tax evasion that are encouraged by significant tax differences between Member States. These activities undermine the public health protection afforded by high cigarette taxation, and the current scale of illegal trading in cigarettes in some Member States risks fuelling a wider illegal economy. The most appropriate form for such EU fiscal coordination to take would be through significant increases in the agreed EU-wide floors to tobacco taxes, and there is no obvious Community-wide reason to prevent individual Member States setting higher duty levels than those elsewhere. However, raising the minimum level of cigarette taxes would involve significant increases in the EU's 'new' Member States in eastern Europe (once the transitional provisions for these countries come to an end). A large step-change in cigarette taxes in these countries will be difficult for a number of reasons, including the distributional impact in countries with a relatively low standard of living, the difficulty of preventing evasion where incomes are low and enforcement capacity is weak, the risk of smuggling from neighbouring countries outside the EU with even lower cigarette taxes, and the difficulty of building a sufficient political consensus for the required legislation. For all these reasons, the scope for implementing major cigarette tax increases across the EU will be limited, and regulation may well provide a more rapid route to controlling the social costs of smoking.

The recent proposals from the Commission (COM(2008)459/2 of July 2008) envisage changes broadly as described above, albeit quite gradual, with the minimum excise duty rising from €64.00 to €90.00 per thousand by 2014 and the minimum percentage of duty in price rising from 57% to 63%. There would also be a modest shift towards the specific element in the excise, which should lie in the range 10–75% of total tax. In addition, Community rules on cigarette taxation would no longer be defined in relation to the taxation of cigarettes in the 'Most Popular Price Category' (MPPC) – an outdated concept which has created the risk of arbitrary and inconsistent application of the rules in different Member States depending on how the MPPC was defined – but simply in relation to the Weighted Average Price (WAP) of cigarettes sold in each Member State. While none of these proposals will radically alter the taxation of cigarettes within the EU, they reflect the difficulty of defining a meaningful common policy while there remains such a wide disparity in incomes and price levels across the EU, especially between 'old' and 'new' Member States.

Discussion

Anil Markandya*

I agree with much of the lucid analysis presented by Professor Smith. There are some differences, however, in the conclusions I draw from the material. Let me divide my comments along the same lines as in his paper – the theoretical framework, the data on social costs of smoking, the relative taxation of different products and the international dimensions of the taxation of tobacco.

On theoretical grounds, Smith lays out the arguments clearly. There is an efficiency case for taxing price-inelastic commodities more highly than others and there is a case for looking to tax commodities that are complementary to leisure more highly than others. As far as tobacco is concerned, the second argument is unlikely to prevail – we have no real evidence to suggest that tobacco consumption is indeed complementary to leisure. In this, I agree with the paper.

On the first argument, Smith states that tobacco is not particularly price-inelastic and that in any case in countries where lump-sum transfers can be made effectively this reason for higher taxation of tobacco disappears. I am not so convinced. Tobacco appears to be price-inelastic in most studies and more so than several commodities. Furthermore, making lump-sum transfers is not only a problem in developing countries. The kinds of lump-sum transfers needed to rule out the case for optimal taxation are very restrictive and I am not sure we can meet them anywhere. In the UK, the Thatcher Government tried to introduce a lump-sum tax (a 'poll' tax), with disastrous results. So a small case for tobacco taxation may be made on efficiency grounds for

* Anil Markandya, University of Bath, Bath, BA2 7AY,UK. And Basque Centre for Climate Change, Bilbao, hssam@bath.ac.uk

price-inelastic products, although a similar case can also be made for other products where it would not be politically acceptable.

Furthermore, this rationale is countered to a significant extent on distributional grounds because the consumption of tobacco is regressive – the poor spend a larger share of their income on it than the rich. Smith makes the valid point that the degree of regressivity is smaller when we look at permanent income than when we look at actual income, but it is nevertheless there and is significant. I would also make the point that intra-family allocations of consumption may be affected by high tobacco taxes. In other words, an increase in the tax on tobacco reduces consumption of food and other important commodities to all, including children. This effect is likely to be greater in poorer households, adding to the social impacts of higher taxation.

The second broad justification for taxing tobacco is based on externalities. This is, in my opinion, quite weak. The effects of passive smoking are not well estimated; furthermore, we are facing increasing restrictions on where we can smoke. It must be the case that such effects are getting smaller. Furthermore, the case on the grounds of the health costs imposed on society has never been persuasive. One obvious problem here is that smoking kills you off at a relatively young age and relatively quickly, saving the health service the costs of looking after you in your old age and saving the social security system the paying of pensions. The logic of treating these costs as externalities would imply we should subsidize smoking on these grounds, which is patently absurd. There is also a wider difficulty in treating the costs to the health service of social activities and food consumption as externalities. By the same argument, we should tax (or subsidize, depending on the calculations) foods that cause obesity, modes of transport that increase your risk of accidents and many others. Where do we stop? It is probably better not to start down this road.

What about the arguments based on irrational consumption (due to addiction) and lack of information? As Smith notes, there is evidence that some smokers are aware of the risks of addiction and that they do behave as if they take this into account when deciding on how much to smoke at different periods of their lives. I also wrote something along the same lines some ten years ago (Markandya, 1999). In the light of all the information that is now made available, it is very difficult to argue that smokers are not aware of the risks. Indeed, some surveys that ask them what the risks of cancer are from smoking reveal much higher probabilities than are actually the case.

How good then is the case for special taxation of tobacco? Perhaps the one argument that does carry some conviction is on the grounds of addiction, where high taxes discourage younger smokers, who are probably not making rational smoking decisions and are likely to be strongly influenced by their slightly older peers. More generally, I would argue, there is some validity to the paternalistic argument that we want to reduce tobacco consumption simply because it is not

good for you. This does not sit well with basic economic philosophy of free individual choice, but then there are areas where this philosophy is not appropriate.

The final section of the paper addresses issues of relative taxation across Europe. It is difficult to find good reasons why tax levels should vary so much across countries. The evidence on the health, distributional and other external effects of tobacco consumption in Italy is not that different from that in the UK, so why are the rates of tax so different? Prima facie, the case for some degree of harmonization is strong and the European Commission should seek to move in that direction. We should also note that in setting any harmonized rate, there is no good case to go for the revenue-maximizing level. I am not aware of any theoretical arguments favouring such a level, although, as Smith rightly notes, you are very unlikely to want to set the rate above such a level.

So, to conclude, governments tax tobacco at a higher rate than the general level of commodity taxes, partly to raise revenue and partly to discourage smoking. Both arguments have some merit, but the second is probably more defensible than the first.

2 Do drinkers pay their way in the European Union?

Sijbren Cnossen*

Fifty-eight million people – approximately the population of the UK – 'drink too much' in the European Union. Heavy drinking may lead to violent behaviour, causes accidents and impairs health. The external costs of harmful alcohol use exceed alcohol excise duty collections by a wide margin. In considering an increase in alcohol duty, however, the welfare gains from a reduction in socially costly heavy drinking must be balanced against the welfare loss from a fall in moderate drinking. This suggests that complementary regulatory measures, which focus on specific problem groups, should be an important element of the policy package.

2.1 Introduction

The European Union produces and consumes a quarter of the world's alcohol – 50% more than either China or the US – although it accounts for merely 7% of the world's population[9]. Adults in the EU drink two-and-a-half times the average for the rest of the world (WHO, 2004). If abstainers are excluded, the consumption per drinker reaches 15 liters of pure alcohol per year. This is equivalent to 600 half-liter bottles of beer, 167 bottles of wine or 54 bottles of spirits.

While one or two drinks per day seems to keep the doctor away, heavy drinking leads to violent behaviour, causes accidents and has harmful effects on health. The World Health Organization (WHO, 2005) has estimated that harmful consumption of alcoholic drink is responsible for approximately 11% of the total disease burden in the EU. Following the WHO's methodology, Anderson and Baumberg (2006) estimate the total tangible costs (crime, healthcare, lost output) of alcohol to EU society in 2003 to be €125 billion, equivalent to 1.3% of GDP and four times the combined alcohol excise duty collections.

The WHO views alcohol consumption, not just alcoholism, as a problem or illness. Public health experts compute the tangible and intangible costs of harmful alcohol use, which they call social costs, as everything that happens that would not happen in a world without alcohol. This view contrasts sharply with the economic approach, adopted in this paper, which holds that alcohol is an ordinary commodity whose benefits should be considered along with its costs. Essentially, a rational, fully informed consumer should be allowed to drink whatever and as

* This paper is a substantially reworked and updated version of the author's Alcohol Taxation and Regulation in the European Union, published in International Tax and Public Finance (2007). The author is grateful to Vidar Christiansen, Peter Kooiman, Ruud de Mooij, Esa Österberg, Judith Payne, Stephen Smith, Daniel van Vuuren and two anonymous referees for their comments on earlier versions of this paper.

[9] Alcohol concerns ethyl alcohol, also known as ethanol, the type of alcohol found in drinks intended for human consumption. Throughout this paper, the term 'alcohol' covers all forms of alcoholic drink, including beer, wine and spirits.

much as he likes as long as he does not bother other people[10,11], Under the consumer sovereignty principle, only the costs imposed on others, i.e. external costs, are relevant for policy analysis, not the private or internal costs borne by the drinker himself and presumably taken into account in the drinking decision[12].

Under the economic approach, the purpose of the alcohol excise duty is to ensure that, at the margin, each drinker takes all external costs into account when making his drinking decision. In setting the optimal tax rate, the challenge is that moderate drinking does not generate external costs but heavy drinking does. Accordingly, there is a need to balance the reduction in harmful consumption through excise taxation against the loss in welfare of moderate or low-risk consumption. This means that calculating the optimal alcohol tax involves tradeoffs not encountered in a more standard case, such as a pollution tax (Pogue and Sgontz, 1989, Kenkel, 1996).

Against this background, this paper attempts to find an answer to the question of whether drinkers pay their way in the EU. The paper makes a distinction between the situation in the old Member States (EU-15) and that in the new accession countries (EU-10)[13], which do not yet comply fully with the *EU's acquis communautaire*[14], Section 2.2 sets the stage for the discussion by reviewing alcohol drinking levels and patterns, as well as the effects of harmful alcohol use. Whether alcohol is taxed too lowly or too highly would seem to depend on the level of and variation in the external costs of harmful alcohol use across Member States. In Section 2.3, estimates from various cost-of-illness (COI) studies are used to infer the external costs in 11 EU-15 Member States and four non-EU countries.

At least two instruments are available to internalize the external costs of harmful alcohol use, i.e. taxation and regulation. Accordingly, Section 2.4 reviews the current alcohol excise duties in the various Member States, dwells on the properties of the optimal duty and discusses EU coordination measures. Section 2.5 then examines the complementary role of regulations, which have a 'duty-equivalent' effect in restraining harmful alcohol consumption. Section 2.6

[10] The male pronoun is used advisedly since males are much more likely to engage in heavy drinking.

[11] Admittedly, the rationality condition ceases to apply if drinkers are ill-informed about the consequences of drinking (young people), act myopically in choosing to consume an addictive substance (Peck et al., 2000) or behave in a dynamically inconsistent fashion (Gruber and Koszegi, 2001) by discounting costs and benefits in the near future to a greater extent than those in the long term.

[12] This having been said, the a priori assumption of 100%-rationality is not very realistic; certainly it should not be used as a pretext for the blanket rejection of paternalism. For a brief interesting discussion, see O'Donoghue and Rabin (2003), who plead for 'policy analysis that incorporates the substantive insights and methodological rigors of economics, while being more realistic about the nature of errors people make …'.

[13] For lack of adequate data, Bulgaria and Romania have not been included in the analysis.

[14] A French term that essentially means 'the EU as it is' – in other words, the rights and obligations that EU Member States share. The 'acquis' includes all the EU's treaties and laws, declarations and resolutions, international agreements on EU affairs, and the judgments handed down by the European Court of Justice.

concludes with a brief summary of the implications of the analysis for alcohol excise duty and regulatory policies for the Member States and the EU[15].

The paper aims to contribute to the debate initiated by the European Commission about the effects of harmful alcohol use (COM(2006) 625), which has led to the establishment of a European Alcohol and Health Forum and the funding of various studies on harmful alcohol use (Anderson and Baumberg, 2006), the economic impact of alcohol policies (Horlings and Scoggins, 2006), and of the collection of various country reports (Österberg and Karlsson, 2003). Thus far, however, little attention has been paid to the role of excise duties and their relation to regulatory policies.

2.2 Alcohol use and effects

To understand the nature and size of the social and external costs of harmful alcohol use, it is useful to review briefly the pattern, prevalence and effects of alcohol consumption[16].

2.2.1 Drinking patterns

As Table 2.1 indicates, in 2003, EU adults (aged 15+) drank on average 12.6 liters of alcohol per year – with EU-10 adults (excluding Malta) drinking nearly 2½ liters more than those in the EU-15. If adjusted for the number of adults who abstain from alcohol, annual consumption reaches 15 liters. Although consumption levels have converged in the EU, there are still substantial differences between the two ends of the drinking spectrum, Hungary (17.9 liters per capita) and Malta (6.3 liters). By far the greatest proportion and level of expenditure on alcohol is found in Ireland, where households spent on average €1,942 (5.5% of household expenditures) on alcohol in 2001 (Strategic Task Force on Alcohol, 2004). This is three times the level in any other country and over ten times as much as in Greece (Anderson and Baumberg, 2006).

[15] The paper does not discuss the distributional impact of alcohol excise duties, because any undesirable tax burden effects can be offset by other tax (and expenditure) policies. The externality issues are what make alcohol excises of special interest.

[16] Most of the studies on the use of alcohol and its impact on individuals and society are ably synthesized and reviewed by Anderson and Baumberg (2006). This paper draws on their report in sketching the wider effects and implications of harmful alcohol use.

Table 2.1 Alcohol drinking prevalence in the European Union in 2003

Member State[a]	Consumption of pure alcohol (liters per adult, ages 15+)[b]	Drinking prevalence			
		Abstainers (% of adults)[c]	Heavy drinkers (% among drinkers)[d]	Alcohol dependent drinkers (% among drinkers)[e]	Youth drinking (% of 15-years-olds)[f]
EU-15	**12.0**				
Ireland	14.7	12.5	26.0	.	17.4
UK	13.8	12.0	11.3	4.7	52.0
Denmark	13.7	3.2	11.7	3.7	46.5
Germany	13.0	5.1	11.2	3.8	39.3
Luxembourg	12.8	2.5	.	.	.
Spain	12.7	37.8	2.6	.	28.3
France	12.4	6.7	12.2	8.7	16.9
Portugal	12.4	15.5	.	.	15.5
Austria	12.3	23.0	18.3	5.0	34.5
Finland	11.7	7.4	4.6	4.0	16.8
Belgium	11.4	18.9	.	7.0	39.2
Greece	11.2	8.3	3.6	.	27.5
Netherlands	10.2	15.8	14.2	5.5	51.4
Italy	9.5	15.9	5.8	1.7	37.1
Sweden	8.0	11.3	6.5	.	20.1
EU-10	**13.6**				
Hungary	17.9	6.4	12.4	.	24.4
Lithuania	17.2	20.0	1.9	.	12.5
Latvia	16.6	9.4	2.2	.	16.7
Slovak Rep.	15.4	7.7	8.8	4.8	27.0
Czech Rep.	14.0	11.9	19.1	.	28.9
Estonia	12.8	7.5	1.7	1.4	23.7
Cyprus	12.4	8.3	.	.	21.0
Slovenia	12.3	14.5	13.0	11.0	34.3
Poland	11.2	18.7	7.9	2.6	19.2
Malta	6.3	.	.	.	47.3
EU average	**12.6**				

Sources: Consumption – recorded: World Drink Trends (2004).Unrecorded consumption and drinking prevalence: WHO, Country Profiles (2004), downloaded from www.eurocare.org/btg/countryreports/index.html.

Notes:

[a] Ranked in descending order of per-adult alcohol consumption.

[b] Including unrecorded consumption (alcohol that comes from smuggling, home production and cross-border shopping as well as failing to adjust for drinks bought by tourists rather than residents): Malta – 0.3 liter; Belgium, Netherlands – 0.5 liter; Austria, Cyprus, Czech Republic, France, Germany, Ireland, Portugal, Spain – 1 liter; Slovenia – 1.3 liters; Italy – 1.5 liters; Denmark, Greece, Sweden, UK – 2 liters; Finland – 2.1 liters; Poland – 3 liters; Hungary – 4 liters; Lithuania – 4.9 liters; Estonia, Slovak Republic – 5 liters; Latvia – 7 liters. Luxembourg's unrecorded consumption is –1 liter due to tourist shopping.

[c] Generally, abstainers are defined as adults who had not been drinking in the year before the survey, but other definitions are used in Austria and Ireland. In Latvia, Malta and Spain, only lifetime abstainers are included.

[d] Generally, heavy drinking is defined as average consumption of 40–60g of pure alcohol per day for men and 20–40g or more for women (30g and 20g respectively in Sweden), but different definitions are used in Denmark, Greece, Ireland, Lithuania, the Netherlands, Poland and Slovakia.

[e] Generally, alcohol dependence is defined as average consumption of 60g or more of pure alcohol per day for men and more than 40g for women, but many countries use other criteria.

[f] Youth drinking is generally defined as the proportion of 15-year-olds who report drinking beer, wine or spirits at least weekly. Cyprus defines it as lifetime use of 40 times or more.

Alcohol has its abstainers, connoisseurs and harmful users. About 53 million adults across the EU – some 14% of the adult population – abstain from alcohol, generally defined as not having had a drink in the past year. As shown in Table 2.1, abstention rates differ widely in the EU, partly due perhaps to the different measuring methodologies that were used. The large number of abstainers in Spain is noteworthy, as well as the fact that nearly every adult drinks in Denmark, Germany and Luxembourg.

Seven in ten people in the EU (263 million in all) are moderate or low-risk drinkers. They consume up to four drinks per man per day and two per woman (still twice the level that is regarded as not interfering with a healthy lifestyle). For them, the use of alcohol brings with it various psychological benefits, such as stress reduction, mood elevation, increased sociability and relaxation (Peele and Brodsky, 2000). Moderate alcohol use (at 20g of alcohol, or two drinks, per day), moreover, decreases the risk of coronary heart disease by up to 80% from the level of non-drinkers (Corrao et al., 2000). In the EU, the death of some 160,000 people is believed to be delayed due to the beneficial effects of moderate drinking (Anderson and Baumberg, 2006).

Approximately 58 million EU adults (16%, about the same number as the population of the UK) 'drink too much', generally defined as more than 40g of pure alcohol (more than four drinks) per day for men and more than 20g (more than two drinks) for women (Babor et al., 2003)[17]. Of this number, 36 million people are heavy drinkers and 22 million alcohol-dependent drinkers (5% of men, 1% of women). Heavy and alcohol-dependent drinking is particularly prevalent (more than 20% of drinkers) in Austria, France, Ireland and Slovenia. (No doubt most EU-10 Member States should be added to this list if reliable information were available.) Alcohol dependence among the EU population, measured as having four positive CAGE[18] answers, is 5% or higher in Austria, Belgium, France, the Netherlands and Slovenia. Alcohol dependence is particularly common amongst young adults (Caetano and Cunradi, 2002)[19].

The foundations for harmful alcohol use are laid in childhood and adolescence. In 17 Member States, the proportion of 15-year-olds who report drinking beer, wine or spirits at least weekly is 20% or higher (Table 2.1). In Denmark, Malta, the Netherlands and the UK, approximately half

[17] It is well known that social surveys consistently under-record consumption of alcohol, because individual respondents consciously or unconsciously underestimate how much alcohol they consume (sometimes by as much as 40–60% – Institute of Alcohol Studies (2003)) and because respondents reside primarily within private households and, hence, students and homeless people are excluded.

[18] According to the CAGE (Cut, Annoyed, Guilty, Eye-opener) test, an individual is considered a problem drinker if he or she answers positively to one or more of the following questions: (a) Have you ever felt you ought to cut down on your drinking? (b) Have people ever annoyed you by criticizing your drinking? (c) Have you ever felt bad or guilty about your drinking? (d) Have you ever had a drink first thing in the morning to steady your nerves or get rid of a hangover (an 'eye opener')? Similar questions are raised under the Alcohol Use Disorders Identification Test (Audit) and the Severity of Alcohol Dependence Questionnaire (SAD-Q). See UK Cabinet Office (2003) for further definitions.

[19] Some studies have suggested that the proportion of heritability of alcohol dependence is between 50% and 60% (Cook and Gurling, 2001).

of 15-year-olds drink weekly. Over one in eight (13%) of 15- to 16-year-old students have been drunk more than 20 times in their life, and more than one in six (18%) have binged (5+ drinks on a single occasion) three or more times in the last month (Hibell et al., 2004)[20]. Frequent drinking at age 14–15 years predicts alcohol dependence at age 20–21 years (Bonomo et al., 2004). But the habit starts at a much younger age. In most Member States, more than 50% of 11-year-olds have already tried alcohol at least once (Settertobulte, Jensen and Hurrelman, 2001) and 12% of this age group report having been drunk twice or more times.

As Cook and Moore (2002) point out, teenagers and young adults are of special concern for at least three reasons. First, youths exhibit relatively high rates (compared with elders) of binge drinking and involvement in violent crime and motor vehicle accidents[21]. Second, to the extent that drinking is habit-forming, youthful drinking sets the patterns for future consumption. Third, drinking behaviour during the transition from adolescence to adulthood may have deleterious consequences for human capital and family formation.

2.2.2 Consequences of harmful alcohol use

The (predictable) consequences of harmful alcohol use show up in statistics on alcohol-related fetal damage and child abuse, marital harm, road traffic accidents, crime and violence, increased mortality and some 60 alcohol-related diseases and conditions. The following is a synopsis of the main findings on the effects of harmful alcohol use.

- Alcohol consumption by pregnant women is responsible for 1–2% of low-weight births (60,000) each year in the EU, of which nearly half in the EU-10 (WHO, 2004). Alcohol is estimated to be a causal factor in 16% of child abuse and neglect cases (English et al., 1995; Ridolfo and Stevenson, 2001). Between 4.7 million and 9.1 million children (6–12%) live in families adversely affected by alcohol (Anderson and Baumberg, 2006, based on Callingham (2002)).
- Nearly 10,000 pedestrians, passengers or nondrinking drivers are killed each year due to other people who drink and drive (WHO, 2004). There is a drinking driver in 2–3% of all journeys in the EU-15, and nine out of ten alcohol-related road fatalities are caused by young male drivers (European Transport Safety Council, 2003).
- Over 2,000 homicides (four in ten of all murders) and around 10,000 suicides (one in six of all suicides) are attributable to alcohol each year (WHO, 2004). In the UK and Ireland, one-third of domestic or intimate partner violence occurs when the perpetrator is under the influence of alcohol (Mirrlees-Black, 1999; Watson and Parsons, 2005).

[20] Generally, binge drinking is defined as drinking to intoxication by downing 2.8 liters of beer, a bottle of wine or five shots of spirits on a single occasion.

[21] Matthews and Richardson (2005) report that in the UK, 24% of all violent offenses are committed by 18- to 24-year-old binge drinkers, compared with 16% by other regular drinkers and 5% by occasional drinkers or nondrinkers of the same age.

- Alcohol is the third-leading risk factor (out of 26 risk factors for ill health) for death and disability in the EU, behind tobacco and high blood pressure and ahead of obesity/overweight (Rehn, Room and Edwards, 2001). Alcohol causes nearly 260,000 deaths each year, equivalent to 6% of all male deaths and 2.5% of all female deaths (idem).
  Although it should be emphasized that 'related' does not necessarily imply 'causality', clearly harmful alcohol use has dire effects on people's well-being in the EU, particularly the well-being of people other than the drinkers themselves.

2.3 Social and external costs of harmful alcohol use

The social (private plus external) costs of harmful alcohol use have been estimated for several Member States, but there are no studies for the EU that focus exclusively on the external costs. Accordingly, an attempt is made to infer the size of these costs from the social cost studies.

2.3.1 Social costs in various Member States

In recent years, various individual EU Member States, at the instigation of the World Health Organization, have published comprehensive estimates of the costs of alcohol-attributable output losses, criminal offences and hospitalizations. Anderson and Baumberg (2006) use these and other existing Member-State-level studies – 21 in all (with a further nine international studies used for sensitivity analyses) – to estimate the social costs of harmful alcohol use for the EU as whole. The authors make a distinction between tangible (economic) costs and intangible (pain and loss-of-healthy-life) costs. Tangible costs are subdivided into (a) direct costs – healthcare, crime and traffic accidents damage – and (b) productivity losses (including premature mortality). The intangible costs represent the value people place on pain, suffering and loss of healthy life that occur because of the criminal, social and health harms caused by alcohol. Table 2.2 shows the details.

Table 2.2 Social costs of alcohol use in Europe in 2003 (average estimates)

	Billion euros	
A. Tangible costs	125	
1. Direct costs	66	
Healthcare	22	€17 bn: treatment of alcohol-related ill health
		€5 bn treatment and prevention of harmful alcohol use and alcohol dependence
Crime	33	€15 bn : police, courts and prisons
		€12 bn: crime prevention expenditure (burglar alarms) and insurance administration
		€6 bn: property damage
Traffic accidents	10	Property damage due to drink-driving
2. Productivity losses	59	
Productivity	23	€9 bn: lost productivity due to alcohol-attributable absenteeism
		€14 bn: lost productivity due to alcohol-attributable unemployment
Premature mortality	36	Lost productive potential (including traffic deaths) excluding health benefits
B. Intangible costs	328	
Psychosocial and Behavioural effects	68	
Crime	12	Victims' suffering
Loss of healthy life	258	Not including victims of crime

Source: Anderson and Baumberg, 2006.

Applying strict methodological standards, Anderson and Baumberg (2006) estimate the total tangible cost of alcohol to EU society in 2003 to be €125 billion (based on minimum and maximum estimates ranging from €79 billion to €220 billion), equivalent to 1.3% of GDP. Actual spending on alcohol-related problems, i.e. direct costs, accounts for €66 billion of the total tangible costs. The remaining €59 billion represents productivity losses. The intangible costs are estimated to be €270 billion (range: €150–€760 billion) in 2003. As the authors point out, this estimate is subject to a wide range of error, as found for all COI studies[22]. Ninety-five percent of the intangible costs represents the value of the loss of healthy life – calculated on the basis of Disability-Adjusted Life Years (DALYs) – which mainly lies with the drinker[23].

[22] As Single and Easton (2001) sum up succinctly, the social cost studies of harmful alcohol use are plagued by a lack of consensus regarding the appropriate methodology to be used, the lack of (reliable) information, the use of a layering of multiple assumptions, and changes in the epidemiological database and what we know about the effects of alcohol use. Similarly, Maynard, Godfrey and Hardman (1994, page 10) note: 'When policy makers are given such studies, they should be aware that they come with a government health warning: naive use of such data can damage the Nation's health!'.

[23] Except, perhaps, for the intangible costs of alcohol dependence to family members and victims of crime. Intra-family effects are sometimes left out of consideration because it is assumed that the welfare of the family enters the utility function of the alcohol consumer. In the case of alcohol abuse, this seems implausible, however, and the costs of domestic violence and injuries, particularly if inflicted on young and unborn children, would seem best treated as externalities (Smith, 2005).

2.3.2 Problems with COI Studies

From an economic point of view, the problem with the COI studies is that they use a framework that draws an insufficiently clear distinction between private and external costs[24]. Particularly contentious are the high estimates for the loss of healthy life, the emotional impact costs for victims of crime, and various other psychosocial and behavioural effects. These estimates are a multiple of the direct tangible costs and are sensitive to the rate of discount that has been used in converting lifetime costs into present costs. Importantly for external cost studies, these estimates do not distinguish between the loss of healthy life of the drinker (private costs) and that of the victim (external cost). Furthermore, cost savings (premature death of nonworking people[25], healthcare costs of other more costly diseases) are not considered.

From an external cost point of view, doubts can also be raised about the value of the loss of output due to reduced employment. As Smith (2005) points out, quite how far the productivity effect of employees' harmful alcohol use is reflected in individual wages (no externality) and how far it is collectively borne (payments of social benefits) is unclear. Neither are tax revenue externalities taken into account. After all, the loss in taxed wages is partly shared by society and hence is not a matter of social indifference.

Evidence in the US context shows that the direct effect of drinking on productivity is small – in fact, self-reported abstainers earn less, on average, than drinkers (Cook and Moore, 2002). Indeed, MacDonald and Shields (2001) report an inverse U-shaped relationship between drinking intensity and mean hourly wages (see also van Ours (2004)). The turning points for the inverted U-shaped curve are in the ranges 21–36 units per month for men and 14–28 units for women[26]. Furthermore, if harmful alcohol use results in unemployment or early death, the basic underlying assumption of the COI studies is that the loss of output is irreplaceable by other people without jobs. When a Danish study (Sundhedsministeriet, 1999) assumed that the unemployed would be replaced after three months, it concluded, on this basis, that the figure for loss of output was 100 times lower than the corresponding COI study's estimate.

2.3.3 External costs in various Member States

Mindful of these caveats, this paper examines Anderson and Baumberg's (2006) review of COI studies for individual Member States to see whether there is some minimum for external costs which can be compared with the amount of excise duty collections. Clearly, nearly all of the direct tangible costs (healthcare, crime, traffic accidents) would qualify as external costs. In all

[24] The key issue – whether the costs are internal or external – cuts across the so-called tangible and intangible cost categories. For a review and critique of social cost studies and some differences with external cost studies, see Maynard, Godfrey and Hardman (1994).

[25] Obviously, this does not mean that death is an economically desirable event. Rather, as Warner et al. (1995) point out, it simply means that as long as early death reduces the extra social costs in the form of social benefits and pensions, drinkers, like smokers, should receive a 'credit' for the associated savings.

[26] Cook and Moore (2002) note, however, that there is persuasive evidence that heavy drinking has an indirect effect on productivity by interfering with schooling and family formation, both of which affect subsequent productivity and earnings.

likelihood, these direct costs are lower than the actual external cost, because they do not include the value of the life of nondrinkers lost in alcohol-related crime and traffic accidents, nor various social benefit payments. With some justification, therefore, the direct costs can be considered the lower bound of the external costs. The upper bound includes tangible costs (productivity losses) on account of absenteeism, unemployment and premature mortality, although, arguably, not all of these costs should be considered external costs (while other items, such as social benefits, should be added). Intangible costs are left out of consideration entirely, although, again, not all of these costs are private costs.

Table 2.3 External costs of harmful alcohol use in 11 EU-15 Member States and four other countries

		Costs as % of GDP		Costs(€) per adult (aged 15+)		Costs(€) per liter of pure alcohol		Excise duty collections	Collections per adult (aged 15+)	Effective duty per liter of pure alcohol
Country	Year	High	Low	High	Low	High	Low	€ billion	€	€
EU-11		1.2	0.7	385	217[b]	31	17	23.0	107	10.3
Belgium	1999	2.4	1.7	758	533	66	47	0.6	65	6.
Ireland	2003	1.6	0.8	690	354	47	24	1.0	318	23.2
UK & Wales	2001	1.6	0.9	526	296	38	21	9.7	125	19.0
Denmark	1996	0.9	0.7	325	247	24	18	0.5	106	9.1
France	1997	1.3	0.7	411	224	33	19	3.0	59	5.2
Finland	1990	1.5	0.7	518	221	44	19	1.4	318	33.1
Germany	1998	1.1	0.7	339	201	26	15	3.7	52	4.3
Netherlands	2000	0.7	0.5	241	158	24	16	0.8	64	6.6
Italy	1994	0.7	0.4	198	127	21	12	0.9	19	2.4
Spain	1998	0.7	0.6	153	123	12	10	1.2	32	2.7
Portugal	1995	0.5	0.4	75	60	6	5	0.2	24	2.1
Other										
Australia	1998/99	1.0	0.9	290	261	28	26	.	.	.
US	1998	2.1	0.6	882	252	93	27	11.6	50	5.2
New Zealand	1991	1.9	1.1	384	222	36	21	0.8	260	25.5
Canada	1992	1.1	0.7	327	195	35	21	.	.	.

Sources

Author's calculations based on table 3.3 in Anderson and Baumberg (2006), which surveys the following individual country studies: Australia – Collins and Lapsley (2002); Belgium – Pacolet, Degreef and Bouten (2003); Canada – Single, Robson and Xie (1996); Denmark – Sundhedsministeriet (1999); England & Wales – UK Cabinet Office (2003); Finland – Salomaa (1995); France – Fenoglio, Parel and Kopp (2003); Germany – Bergmann and Horch (2002); Ireland – Byrne (2005); Italy – Collicelli (1996); Netherlands – KPMG (2001); New Zealand – Devlin, Scuffham and Bunt (1997); Portugal – Lima and Esquedro (2003); Spain – Garcia-Sempere and Portella (2002); and US – Harwood, Fountain and Livermore (1999). GDP cost percentages have been applied to 2003 GDPs to calculate the external costs per adult and per liter of pure alcohol. Low cost estimates exclude costs (if shown in the individual Member State studies) attributable to lost productivity from lost life, absenteeism and unemployment. Sweden, an extreme outlier, has been omitted.

GDPs for 2003 and exchange rates: OECD (2006).

Alcohol consumption: Table 2.1. Unrecorded consumption per annum is 0.5 liter per adult for New Zealand and assumed to be 1 liter per adult for Australia, Canada and the US.

[a] Ranked in descending order of lower-bound external costs per adult.

[b] Excluding the outliers Belgium and Portugal.

On this basis, Table 2.3 presents the external costs of harmful alcohol use in 11 EU-15 Member States, as well as in four other countries with drinking patterns and problems similar to those in northern Europe. The table indicates that the lower bound of the external costs of harmful alcohol use – on average, about 0.7% of GDP – is remarkably similar across the Member States, although external costs in northern Member States tend to be somewhat higher than those in southern Member States. Furthermore, the average lower bound of the external costs (excluding the outliers Portugal and Belgium) is €217 per adult, ranging from €123 in Spain to €354 in Ireland. Similarly, the average lower bound of the external costs per liter of pure alcohol is €17 (€10 in Spain to €24 in Ireland).

These figures can be compared with the alcohol excise duty collections per adult and the effective duty per liter of pure alcohol. As shown in Table 2.3, in 2003, alcohol duty collections per adult ranged from a low of €19 in Italy to the extraordinarily high amount of €318 in Finland and Ireland. Four Member States collected more than €100 per adult. While alcohol excise collections are significant in northern EU Member States, they are of negligible proportions in southern states. A similar picture emerges from a calculation of the absolute duty amounts that are paid per liter of recorded consumption of pure alcohol across Member States. While Finns have to pay €33 per liter of pure alcohol, the Portuguese excise authorities are content with just over €2 per liter.

The comparison indicates that Finland is the only Member State in which collections and the effective duty exceed the lower bound of the external costs shown in Table 2.3. Ireland comes close to this benchmark (and England & Wales to the effective duty criterion), but in all other Member States the external costs per adult and per liter of pure alcohol exceed the corresponding excise collections and effective duty rates, respectively, by a wide margin. Table 2.3 also shows the external costs of harmful alcohol use in the US, Canada, Australia and New Zealand. The lower bounds of the cost estimates are in line with those calculated for northern EU Member States. Furthermore, collections per adult and the effective duty per liter of pure alcohol exceed the lower bound of external costs in New Zealand, but in the US they are much lower than the external costs.

A tentative conclusion from these results is that the alcohol excise collections do not pay for the (lower-bound) external costs of harmful alcohol use, i.e. healthcare, treatment/prevention, criminal justice system, property damage and traffic accidents damage. This finding appears to accord with the results of various US studies, which explicitly calculate the external costs of harmful alcohol use. In a pioneering study, Manning et al. (1989) estimated the net external costs in the mid-1980s at about US$0.48 per ounce of ethanol, double the average state and federal tax per ounce that was then in place. A similar result was reported by Pogue and Sgontz (1989). Much of the external costs were borne by victims of drunk drivers. The costs would have been higher still had nonfatal highway injuries (on which, see Miller and Blincoe (1994))

and intra-family effects been taken into account. Furthermore, Kenkel (1996) estimated that the duty rate should be about equal to the pre-tax alcohol price, while Saffer and Chaloupka (1994) calculated the weighted average optimal US tax on alcohol at 2.3 times the 1991 level. Recently, Parry and West (2007) have put the optimized alcohol duty at anything from three to ten times the currently prevailing duty.

These findings justify a closer look at alcohol taxation and regulation policies.

2.4 Excise duty structures

Generally, little or no attention has been paid in the EU to the use of the excise duty as a proxy for the external costs of harmful alcohol use. The main focus has been revenue[27]. Following a review of existing duty structures, this section discusses the level of the optimal alcohol excise duty and the EU-wide agreement on minimum duties.

2.4.1 Duty structures in Member States

As shown in Table 2.4, there are significant duty differentials between Member States for all types of alcoholic drink[28]. Beer, wine and spirits are particularly heavily taxed in Sweden, Ireland, the UK and Finland, but very lightly taxed in Luxembourg, Austria and the Mediterranean states as well as in most new Member States. All alcohol excise duties are specific, although the precise specification of the tax base differs between beer, wine and spirits[29].

[27] The relatively higher taxation of alcohol (compared with other goods) has been defended by reference to Ramsey's inverse-elasticity rule, which holds that other things being equal, efficiency losses from taxation are lower for goods with lower price elasticities of demand than for goods with higher price elasticities of demand. Smith (2005), however, concludes that the reported price elasticities of alcohol demand are not so low that the inverse-elasticity rule would seem to justify significantly higher-than-average taxation of alcohol.

[28] There is no common definition in the EU of 'alcoholic drink' in terms of units of alcohol or % alcohol by volume (abv). Legal definitions vary from 0.1% abv in Italy to 2.8% abv in Finland (WHO, 2004); the EU average is 1.2% abv. The equivalence of different alcoholic drinks is measured in terms of units of alcohol. One unit is equal to approximately 10g of pure alcohol, often considered as one drink, since it is available from one shot glass of spirits (30ml), one rummer of wine (120ml) or one bottle of beer (285ml).

[29] Standard VAT rates that are applied to the excise-duty-inclusive prices of alcoholic drinks range from 15% (Cyprus, Luxembourg) to 25% (Denmark, Sweden); the EU average is 19.4%. In this paper, VAT has been left out of consideration because the alcohol excise duty may be assumed to reflect the external cost of drinking. The imposition of VAT, therefore, does not affect the price of alcoholic drinks relative to other goods.

Table 2.4 Alcohol excise duties in the European Union in 2008

Member State	Excise duties(€)			Relative excise duties by alcohol content		
	Beer per 0.5 liter[b]	Still wine per 75 cl	Spirits per 70 cl	Beer, 5%	Still wine, 12%	Spirits, 40%
EU-15	0.35	0.61	5.50	53	22	100
Sweden	0.90*	1.76	15.27	66	36	100
Ireland	0.99*	2.05	10.99	101	58	100
Finland	1.07*	1.75	9.10	132	60	100
UK	1.07*	2.09	8.57	140	76	100
Denmark[c]	0.34*	0.62	5.63	68	34	100
Belgium	0.09	0.35	4.91	20	22	100
Netherlands	0.13	0.51	4.21	33	38	100
France	0.13*	0.03	4.06	36	2	100
Germany	0.04	0.00	3.65	12	0	100
Greece	0.06	0.00	3.05	21	0	100
Luxembourg[d]	0.04	0.00	2.92	15	0	100
Austria	0.10	0.00	2.80	40	0	100
Portugal	0.08	0.00	2.74	35	0	100
Spain	0.05	0.00	2.32	22	0	100
Italy	0.12	0.00	2.24	59	0	100
EU-10	0.14	0.15	2.93	32	15	100
Malta	0.04	0.00	6.44	6	0	100
Poland	0.09	0.27	3.38	30	25	100
Lithuania	0.11*	0.39	3.11	40	39	100
Czech Republic	0.04	0.00	2.69	18	0	100
Hungary	0.11	0.00	2.63	39	0	100
Estonia	0.25*	0.50	2.61	76	43	100
Latvia	0.09*	0.32	2.51	41	40	100
Slovak Republic	0.07	0.00	2.34	35	0	100
Slovenia	0.34*	0.00	1.95	20	0	100
Cyprus	0.24*	0.00	1.67	16	0	100
EU-25	0.26	0.43	4.47	45	19	100

Source: Author's calculations on the basis of European Commission (2008).

Notes:

[a] Ranked in descending order of duty on spirits.

[b] An asterisk (*) indicates that the beer excise is levied per hl/degree of alcohol by volume (abv), instead of per hl/degree of Plato of finished product.

[c] Denmark levies an additional excise duty on 'mixed' alcoholic drinks, also called 'alcopops', of €1.09 (≤10% alcohol content) or €1.98 (>10%) per liter. The additional duty on mixed spirit drinks is €0.39 per liter.

[d] Luxembourg levies an additional excise duty on 'alcopops' of €6 per liter.

Specifically, the excise duty on beer ranges from merely 4 cents per half liter in the Czech Republic, Germany, Luxembourg and Malta to around €1 in Finland, Ireland and the UK. Thirteen Member States do not levy an excise on still wine, but in Ireland and the UK the excise duty is more than €2 per 75cl bottle. Typically, sparkling wine is taxed at higher rates (not shown in the table) than still wine. The excise duties on spirits differ most widely in absolute amounts, ranging from €1.67 in Cyprus to €15.27 in Sweden per 70cl bottle.

The right-hand side of Table 2.4 shows the relative excise duties on beer, wine and spirits calculated on the basis of alcohol content. As indicated, on average, spirits are taxed twice as heavily as beer per unit of alcohol and five times more heavily than wine. As is well known, however, the medical profession measures the damage caused by harmful alcohol consumption in cubic centimeters of pure alcohol. A large volume of weak drink is just as harmful as a smaller volume of strong drink (Crooks, 1989). On externality grounds, therefore, there appears to be a case for increasing the wine and beer duties relative to the spirits duty (Saffer and Chaloupka, 1994)[30].

2.4.2 Setting the level of the alcohol excise duty

No doubt, an increase in excise duty would reduce alcohol consumption, including, most likely, harmful use. But applying an average duty means that the external costs generated by harmful users are compensated at the cost of reducing the consumer satisfaction of nonharmful users that is not regained as excise revenue. Accordingly, the search should be for an increase in the marginal duty per drink and per drinker. But the nonlinearity of the relationship between alcohol consumption and external costs makes the marginal duty exceedingly difficult to compute, let alone implement[31].

While information for calculating the optimal excise duty is not available, it should be possible to make an approximate assessment of the balance between the gain from an excise-induced reduction in total external costs and the loss in consumption benefits that is not regained as excise revenue. As Pogue and Sgontz (1989) argue, this assessment can be made on the basis of information on drinking prevalence, the level and pattern of the external costs, and the price responsiveness of drinkers.

As regards drinking prevalence and external cost patterns, Section 2.3 has shown that the externalities of alcohol consumption are dominated by harm from binge drinking, also called

[30] Imposing the same duty per unit of pure alcohol would not seem appropriate, however, to the extent spirits are cheaper to produce than beer or wine.

[31] It should be noted that in a second-best world, the optimal excise on an externality-generating good does not exactly equal the marginal external costs. After all, the Sandmo (1976) formula applies in which the optimal tax equals the Ramsey term (which increases in the marginal cost function) and the Pigouvian term (which decreases). Nevertheless, a large number of exceptions are possible, as indicated by the double-dividend literature (Bovenberg and de Mooij, 1994). On balance, therefore, the Pigouvian approach seems an acceptable first approximation.

acute consumption. In the EU, the top 10% of the drinking population drinks between a third and a half of all alcohol (Lemmens, 2001) and is responsible for most of the external costs of drinking[32]. Apparently, the volume of alcohol consumption, the frequency of drinking, and the frequency and volume of binge drinking all independently increase the risk of harm and violence (Wells et al., 2005).

Furthermore, the relative price elasticities of demand for heavy and moderate drinking are of interest for the effects of alcohol excise duties. Not surprisingly, Manning, Blumberg and Moulton (1995) found that heavy drinking is less price-elastic than moderate drinking. Indeed, among the heaviest drinkers (the top 5%), who consume 36% of all alcohol, demand was not significantly different from perfectly price-inelastic. At the 80th percentile, however, drinkers were still significantly responsive to price, with a price elasticity of –0.74 (compared with an estimated price elasticity of the median drinker of –1.19). Also important is the positive price responsiveness of light and moderate drinkers, who account for nearly half of all alcohol-related accidents. Furthermore, in a more recent study, Farrell, Manning and Finch (2003) argue that higher duties would reduce alcohol dependence and abuse, estimating a high price elasticity of –1.487[33].

Generally, in estimating the marginal optimal alcohol duty, the focus is on units of alcohol consumed by a particular individual: the more he consumes, the higher the external costs and the higher the marginal duty should be. But it is not unlikely that differences in external costs arise from differences between individuals rather than between units of alcohol consumed by a particular individual. This provides some support, as Smith (2005) argues, for regarding the average external costs as a rough-and-ready indicator of the optimal externality duty[34]. However, if it is 'the one drink that makes you drunk' that causes all the problems, then the appropriate externality tax would be considerably higher.

On balance, these findings seem to indicate that raising the average excise duty is a second-best tool to curtail harmful alcohol use. Whatever is done, for harmful users of alcohol (almost one in five of all drinkers), the excise revenue collected will generally be less than the externalities they impose. However, the harmful users will have a heavier weighting in the optimal uniform

[32] In the US, the top 2.5% of drinkers consume around a quarter of the total consumption, and the top 30% of drinkers account for nearly all (85–90%) of the alcohol drunk (Greenfield and Rogers, 1999). See also Cook and Moore (2002), who report that heavy and alcohol-dependent drinkers in the US (i.e. those in the top decile of the drinking distribution) consume more than half of all alcohol sold and are responsible for most of the external costs associated with harmful alcohol use.

[33] In the US, information on price elasticities of demand for alcohol and the variation in excises across US states has created a veritable cottage industry of research devoted to relating differences in taxes on alcoholic drinks to a wide variety of changes in social conditions. Cnossen (2007) provides a sample of these studies. They invariably report substantial reductions in alcohol-related external costs from (excise-induced) increases in the price of alcohol.

[34] Smith bases his argument on Diamond (1973), who shows that in the case where there is separability between the externality and consumption, the tax should simply be the weighted average of the marginal contributions to the externality across different individuals, where the weights are given by the sensitivities of demand for the good that generates the externality.

duty, because they have a higher initial consumption. Accordingly, given the same elasticity, the excise-induced change in their absolute consumption will be greater than the change in the absolute consumption of moderate drinkers. The reverse is true for moderate drinkers: the excise duty collected from them will exceed the externality, if any, they impose.

Another argument for not dismissing the excise duty instrument too lightly is that excise-induced price increases seem to be more effective in reducing the alcohol intake of young people than of older people[35]. Young people are particularly vulnerable to harmful alcohol use, which often starts with 'alcopops' (alcoholic drinks mixed with non-alcoholic beverages), which can contribute both to heavier drinking and to a younger age of onset of drinking. To discourage the consumption of alcopops, Denmark and Luxembourg have introduced special excise duties on them (see Notes to Table 2.4). By contrast, Germany (and France) abolished the special duties, although the German Ministry of Finance (Bundesministerium der Finanzen, 2005) reported that they greatly reduced the consumption of alcopops by the young without a noticeable substitution of other drinks.

Finally, it should not be forgotten that there appears to be a relationship between the overall per-adult alcohol consumption and the number of individuals in a population with alcohol-use disorders. Rose and Day (2001), for instance, report a very high correlation between mean consumption and the prevalence of heavy drinking across 35 countries[36]. An explanation may be that people are affected by the drinking behaviour of people around them, so that drinking levels 'spread like waves in water' through a society (Skog, 2001), a hypothesis that goes by the name of the theory of collective consumption.

The overall picture is clearly complex, but these observations seem to suggest that there is scope for (increases in) alcohol excise taxation to improve social welfare.

2.4.3 Alcohol excise duty coordination

The wide variation in alcohol excise duties means that the alcohol policies of high-excise-duty Member States are constrained by cross-border shopping and smuggling within the EU. Cross-border shopping is prevalent when there are large price differentials across small distances, such as the Öresund region (beer in Denmark costs merely 40% of the price in Sweden) and Helsinki-Talinn (spirits in Estonia cost a quarter of the price in Finland) (Karlsson and Tigerstedt, 2005). Overall, at least one in six tourists in the EU returns from trips abroad with alcoholic drinks, carrying an average of over 2 liters of pure alcohol per person in several

[35] Grossman, Chaloupka and Sirtalan (1998) have estimated the demand among individuals between the ages of 17 and 29 – the age group in which the prevalence of alcohol dependence and harmful use is highest. They report significant and numerically large linkages among past, present and future consumption. Also, the long-run elasticity of alcohol demand of –0.65 is 60% higher than the comparable short-run elasticity.

[36] When looking at the average drinker (the median) rather than the average of all drinkers (the mean), there is a reduced but still very strong relationship ($r > 0.7$) between average and heavy drinkers (Colhoun et al., 1997).

countries (Leifman, 2001). In the UK, in 1998, cross-border shopping involved a revenue loss of 5% of total alcohol duty revenues (HM Customs and Excise, 2004)[37].

Similarly, smuggling is a serious problem in the EU (European Commission, 2004). For the EU-15, a High Level Group on Fraud in the Tobacco and Alcohol Sectors (1998) estimated that €1.5 billion of revenue was lost to fraud in 1996, equivalent to about 8% of total alcohol excise duty collections at that time[38]. In the UK, smuggling is estimated to have deprived the Treasury of some 4% of total alcohol excise duty collections in 2001 (HM Customs and Excise, 2004). Wells, Gerrard and Hubbard (2005) believe that most of the illicit trade in alcohol occurs when drinks are illegally diverted from their (low-tax) claimed destination to a new (high-tax) one.

Presently, agreed minimum duties in the EU (see box below) are so low as to be ineffective in restraining economically wasteful cross-border shopping. The minimum rates, moreover, have not been adjusted since 1992, implying a reduction in their real value of some 30%[39]. Approximation of duty rates in combination with the maintenance of an approximate alcohol-duty relationship between wine, beer and spirits[40] is difficult in view of the zero duty on wine in 13 Member States. Also, agreement is unlikely to be promoted by the Commission's proposal to further liberalize intra-EU alcohol transfers by allowing consumers to buy noncommercially at distance (COM(2004) 227).

[37] See Christiansen and Smith (2008) and Crawford, Smith and Tanner (1999) for general treatments of duty-free cross-border shopping issues. Obviously, the incentives and effects of differential cross-border alcohol excise duties do not differ from those of duty-free shopping.

[38] It is unclear, however, how the estimate was derived.

[39] On 8 September 2006, the European Commission (IP/06/1165) proposed increasing the minimum excise duties on beer to €0.0612 per half liter at 5% by volume (or 12.5o Plato), on intermediate products to €0.413 per 70cl and on spirits to €2.017 per 70cl at 40%. The proposal has not yet been acted upon. No change was proposed in the zero duty on wine.

[40] The alcohol-duty relationship between wine, beer and spirits was prescribed by the European Court of Justice (ECJ) in the late 1970s and early 1980s when a number of discriminatory practices were forbidden, such as the tax-favoured treatment of grape-based spirits (e.g. cognac) over grain-based spirits (e.g. whisky) by France and Italy, the relatively heavier taxation by alcohol content of wine over beer in the UK, and the lower excise duty on aquavit relative to foreign spirits in Denmark. More recently, the Commission has taken Sweden to court over the higher excise duty on wine over beer of identical alcohol content (IP/04/1280), but the ECJ (Press Release 23/08) dismissed the Commission's action. Furthermore, the ECJ has ruled that off-premise government-run alcohol monopolies are allowable but that exclusive import rights are not.

Acquis communautaire for alcohol in the European Union

Council Directive 92/84/EEC of 19 October 1992 prescribes the following minimum excise duties on alcohol:

- The minimum excise duty on beer is €0.748 per hl/degree Plato of finished product or €1.87 per hl/degree of alcohol by volume (abv). Accordingly, as a minimum, nearly 5 cents has to be paid in respect of half a liter of beer with an abv of 5% (equivalent to 12.5o Plato). Reduced rates apply to 'independent small breweries' and to 'low alcohol' beer (not exceeding 2.8%).
- The harmonized excise duty on still and sparkling wine is €0 per hectoliter of product and so is the duty on fermented beverages other than wine and beer.
- On intermediate products, such as fortified wines and liqueur wines (below 22% abv and not belonging to the groups of wines or beer), the duty is €45 per hectoliter (34 cents per 75cl bottle); reduced rates apply to intermediate products not exceeding 15% by volume.
- The minimum excise duty on spirits (ethyl alcohol) is €550 or €1,000 (applicable to Member States whose duty rate exceeded €1,000 in 1992) per hectoliter of pure alcohol. In other words, the price of a 70cl bottle of spirits with an alcohol content of 40% includes excise duty of €1.54 or €2.80. Lower rates apply to 'small distilleries.
- All alcoholic beverages are subject to the standard VAT rate, which cannot be less than 15%.
- Indicative intra-EU duty-paid cross-border shopping allowances are 110 liters of beer, 90 liters of wine (but 60 liters of sparkling wine), 10 liters of spirits and 20 liters of intermediate products.
- The Council of Ministers has placed restrictions on the advertising of alcohol on television (Directive 89/552/EEC) and encouraged Member States to address the problems caused by harmful alcohol use among young people (Recommendation 2001/458/EC).

2.5 Alcohol regulation

Invariably, excise taxation goes hand in hand with regulation, which extends to rules on the physical availability of alcohol, drink-driving countermeasures, altering the drinking context, treatment and early intervention, regulating alcohol promotion, and education and persuasion programs. These (complementary) regulations are aimed at reducing the externalities associated with alcohol consumption and have a 'duty-equivalent' effect which, in theory, should be deducted from the Pigouvian tax that would be set in the absence of the regulatory policies.

Nearly all Member States have minimum legal purchase ages (MPAs) of 16 years (southern EU) or 18 years (northern EU) regarding the sale of beer, wine and spirits in bars and shops. Minimum-drinking-age laws can have substantial effects on youth drinking and alcohol-related harm, particularly road traffic accidents (Wagenaar and Toomey, 2000)[41]. Random breath testing (RBT) is common throughout the EU, but important exceptions are Germany and Malta. Only five Member States (Austria, Latvia, Netherlands, Slovenia, Spain) prescribe lowered blood alcohol concentration (BAC) limits for young drivers, although reviews have found that they reduce fatal crashes by between 9% and 24% (Shults et al., 2001). Half of all Member

[41] For the US, Kenkel (1993) has shown that MPAs reduce the highway fatality rate for the affected age groups by about 7%.

States have legal sale restrictions on the places of sale of alcoholic drinks, but few on the hours and days of sale (WHO, 2006). Finland and Sweden operate off-premise retail alcohol monopolies (upheld by the ECJ), which tend to reduce outlet density and thus alcohol sales (Her et al., 1999). These measures, however, reduce the welfare of risk-free drinkers, which is not even offset by any excise revenues.

Table 2.5, reproduced from Babor et al. (2003), shows how effective these and other strategies or interventions are in reducing alcohol harm, regardless of the cost of implementing them and the reduction in welfare of moderate drinkers. Targeted measures, such as regulations on the physical availability of alcohol and drink-driving countermeasures[42], prove to be highly effective. Interestingly, the effectiveness of designated drivers[43], voluntary codes of bar practice, advertising bans and various forms of education and persuasion is low.

Regulatory measures carry a monetary cost, however, which differs from one measure to the next. Indeed, it is the cost-effectiveness of the various strategies that is of greatest interest from an economic point of view. In a recent study, Chisholm et al. (2004) calculate that in countries with high levels of hazardous consumption (more than 5% of all drinkers), such as the UK and other northern EU Member States (see Table 2.1), both individual interventions by doctors and population-wide interventions such as alcohol excises can have significant impact on harmful alcohol consumption at the population level. Individual interventions by doctors are especially effective when targeted at the top 25% of the at-risk population in a primary-care setting, and the impact of alcohol excises on consumption is felt even after allowing for an estimated 10–15% increase in illicit production or smuggling.

Overall, individual approaches to prevention are shown to have a much smaller effect on drinking patterns and problems than do population-based approaches that affect the drinking environment and the price and availability of alcoholic drinks. Like other methodologies used in public health studies, however, the DALY approach fails to make the distinction between internal and external costs. Even if taxation and regulation are effective, it does not necessarily follow that the benefits of taxation are greater than the costs.

[42] Alcohol locks on cars are one of the newest measures to curtail drink-driving (Mathijssen, 2005). In the Netherlands, a target group of DWI (Driving While Intoxicated) offenders has been selected for a trial run of alcolocks. Based on an estimated 65% reduced crash rate for alcolock users, the estimated benefit of the program is an annual reduction of four or five fatalities at an annual program cost of €0.9 million (€2,200 per lock).

[43] Promoting the idea of designated drivers – e.g. BOB, the nondrinking driver in Belgium and the Netherlands – may even be harmful by suggesting that everyone in the car can be stone-drunk as long as the driver is sober. Harding et al. (2001) find that the average BAC of drinkers when they used a free safe ride was significantly greater than the average over all occasions when they drank outside their homes.

Table 2.5 Effectiveness of restraining harmful alcohol use through regulatory measures

Strategy of intervention	Effectiveness:+++=highest; 0=not effective;?=unknown
Regulating physical availability	
Minimum legal purchase age	+++
Government monopoly of retail sales	+++
Server legal liability	+++
Restrictions on density of outlets	++
Hours- and days-of-sale restrictions	++
Drink-driving countermeasures	
Random breath testing (RBT)	+++
Lowered BAC[a] limits	+++
Low BAC[a] for young drivers ('zero tolerance')	+++
Administrative license suspension	++
Designated drivers and ride services	0
Altering the drinking context	+++
Outlet policy to not serve intoxicated persons	++
Enforcement of on-premise regulations	+
Training bas staff to manage aggression	0
Voluntary codes of bar practice	0
Promoting alcohol-free activities	
Treatment and early intervention	
Brief intervention with at-risk drinkers	++
Alcohol problems treatment	+
Mutual help/self-help attendance	+
Mandatory treatment of repeat drinking-drivers	+
Regulating alcohol promotion	
Advertising bans	+
Advertising content controls	?
Education and persuasion	
Alcohol education in schools	0
College student education	0
Public services messages	0
Warning labels	0

Source: Based on Babor et al. (2003), downloaded from www.ias.org.uk (IAS Fact Sheet, 'Alcohol Policies', 21 July 2005).

[a] Blood alcohol content.

2.6 Implications for the EU's alcohol tax policy

Harmful alcohol use is an important health and safety issue in the EU. European adults on average drink twice as much as might accord with a healthy lifestyle. Much domestic violence, many accidents and a large part of crime are alcohol-related. Drinking is a habit that starts at an ever-younger age, although there is a clear public stake in keeping minors away from alcohol and in preventing alcohol-induced child abuse and neglect, and fatal damage.

Economic theory prescribes that the external costs of harmful alcohol use should be internalized in price, among others through excise taxation. The external costs of harmful alcohol use – caused by the 10% heaviest drinkers, who consume one-third to one-half of all alcohol – exceed alcohol excise duty collections by a wide margin. An increase in alcohol taxation would reduce the alcohol intake of most drinkers, even heavy drinkers. Most certainly, higher excises would reduce consumption by the young. Clearly, more can be done to align the excise duties on beer, wine and spirits in line with alcohol content. Differentially higher excise duties on 'alcopops' appear to reduce youth drinking.

It is often argued that the output, income and employment generated by the alcohol industry (1.2 million employees; 0.4% of EU-25 GDP – see Horlings and Scoggins (2006)) must be viewed as benefits to the community at large. But this proposition rests on the unlikely assumption that, if drinking were reduced, the money previously spent on alcohol would not be spent on other products and that the resources used in producing and distributing alcohol would have no alternative uses. This having been said, short-run adjustment costs from industry downsizing would arise, of course.

The paper has pointed out that the alcohol excise duty is a fairly blunt instrument, causing welfare losses to nonharmful users while at the same time not adequately controlling the drinking of harmful users. The use of the excise duty instrument in reducing external costs should be complemented, therefore, by regulatory measures aimed at specific problem groups, such as young drinkers and heavy drinkers. To the extent that this can be done, it reduces the need for externality taxation. Cost-effective measures that will have a noticeable impact on harmful alcohol use include reduced physical availability and drink-driving countermeasures. A strong case can be made for narrowing differences in alcohol duties between EU Member States by significantly increasing the agreed EU-wide floors to alcohol duties, including a positive duty on wine. This would reduce the economic and fiscal costs associated with (legitimate) cross-border shopping, which, like other tax-avoidance activities, involves a deadweight resource cost, incurred in the pursuit of a transfer payment, the tax saving.

In conclusion, the economic approach (in contrast to the COI philosophy), with its fundamental notion that tradeoffs have to be made, offers a useful, if difficult, guide for the design of an alcohol policy. The central insight is that the EU is never going 'to solve the alcohol problem', but it can probably craft better policies by recognizing the tradeoffs.

Discussion

Vidar Christiansen*

Addressing government intervention to affect the use of alcohol, we can distinguish three topics: the justification for, the extent of and the forms of intervention. Intervention may be justified on three grounds. The one that most easily comes to an economist's mind is the externality argument: excessive drinking harms people other than the drinkers themselves. Second, interventionist politicians may think that the drinkers should be discouraged from drinking because they do not know what is in their best self-interest. Third, people themselves may realize that they are inclined to drink too much. Most of us do things that we regret, we do succumb to temptation and we are too short-sighted. Acknowledging these facts, people may be in favour of a restrictive policy towards consumption of alcohol. Perhaps paradoxically, people vote for the paternal guidance of the government because they do indeed know what is in their best self-interest but realize that on their own they will not be able to act according to their own good intentions.

The desirable extent and forms of intervention are governed by the various arguments for intervention and how serious the various alcohol-induced problems are, as surveyed in Sijbren Cnossen's paper. His contribution is an impressively broad review of alcohol-related problems, of various approaches to alleviate the problems and of the current situation in Europe.

When trying to give policy advice on how to alleviate alcohol-related problems, we face a wide range of challenges. As observed above, already the rationale for intervention poses problems. Even taking a narrow externality perspective, it is hard to draw the line between effects that are genuinely external and those that are being internalized. Externalities take very tangible forms in terms of injuries and crime but also cause emotional reactions, insecurity and social instability, all of which are hard to measure. Ideally, one would like to deal with all these externalities by implementing widely differentiated policies. Faced with this huge list of tasks and problems, I find the approach taken by Cnossen to be a sensible one. It is characterized by a sound mixture of loyalty to economic principles, extensive use of available data and a reasonable dose of pragmatism without which one might easily find the problems overwhelming. Below, I will discuss further some selected issues.

* Vidar Christiansen, Department of Economics, University of Oslo, P.O. Box 1095, Blindern, NO-0317 Oslo, Norway, vidar.christiansen@econ.uio.no.

A central question is 'What should the tax base be for a Pigouvian tax on alcohol?'. The straightforward answer would seem to be the content of pure alcohol, but that would be on the presumption that a liter of pure alcohol causes the same problem irrespective of who consumes it. As emphasized in the paper, externalities will vary across consumers and conceivably along other dimensions. The implication is that Pigouvian taxes may be better targeted by varying taxes across types of beverages and differentiating, say, between sales of bottles in shops and drinks served in bars.

A related issue is whether alcoholic beverages should be taxed on grounds other than externalities. Modern commodity tax theory, rather than appealing to Ramsey arguments, would ask whether the consumption of alcohol is leisure-related or work-related, where the former case would be one in favour of taxes to alleviate distortions. I should remark that work-related does not normally mean drinking at work. Even if people only drink in their spare time, those who are work-active may still drink more as a way to relax or because one mostly drinks when seeing colleagues after work.

An important question is whether the tax revenue from alcohol taxes should amount to the external costs of drinking. According to standard Pigouvian arguments, for a homogeneous population, the tax should reflect the marginal external cost. The immediate implication is that where the marginal external cost is increasing in consumption, the tax should exceed the average external cost per liter. Where consumers are heterogeneous, some causing externalities and others not, an ideal tax on the former would exceed the average cost generated by that group but not necessarily exceed the cost per liter for the whole population. However, as the tax will have to be uniform, it should not fully reflect the marginal cost of the heavy drinkers as one will have to trade off the wish to internalize those externalities against the distortionary effects of what is de facto a non-Pigouvian tax on the moderate drinkers.

Besides taxes, most countries impose various restrictions on access to alcohol and other alcohol-targeted regulations. This coexistence of instruments raises questions concerning the optimal policy mix. As drinking a liter of alcohol causes very different external effects conditional on who is drinking it and presumably the context in which it is being consumed, the choice between taxes and regulation will depend on the scope for targeting various groups of consumers and tailoring policy to variations in circumstances. Even if there are opportunities for differentiating taxes, I believe that there is wider scope for using discretionary regulation, which may often give the latter instrument the edge over taxes. If drunkenness at sporting events is a major problem, drinking at these events could be banned. If late-night alcohol-induced disorder in the streets is a concern, the opening hours of bars could be restricted.

Another question is the effect of direct regulation on the size of taxes. According to Cnossen, regulations have a duty-equivalent effect which should be deducted from the Pigouvian tax that

would be set in the absence of the regulatory policies. I have some problems with the exact meaning of this statement. Suppose that the effect of a regulation is to add a real resource cost to the price paid when acquiring alcohol. It may be sold in places that are awkward to get to and that involve waiting in a queue to be served. Ideally, the gross marginal benefit from a unit of alcohol should equal the real social marginal cost, which is the production cost plus the real acquisition cost plus the external cost. Where the pre-tax price reflects the production cost and the real cost of acquisition is borne directly by the consumer, a tax equal to the external cost must be imposed in order to induce the consumer to set his gross marginal benefit equal to the total real marginal cost. Where the marginal external cost is increasing in consumption, the external cost to be reflected by the Pigouvian tax will, of course, be smaller where regulation depresses demand. However, the Pigouvian tax will still reflect the full (marginal) external cost at that point.

Let me now turn to some broader aspects of the approach taken. One problem with the approach is that it may be too static or myopic. At a particular time, there are drinkers belonging to different categories (moderate drinkers, heavy drinkers, etc.), each being characterized by distinctive demand responses. We can base our optimal taxes on this instant picture of society. However, taking a longer time perspective can make a difference. Over time, people are recruited to the various categories and there may be transitions from one to another. The dichotomy between harmless, moderate drinkers and heavy drinkers may be too crude. We may need to ask whether making moderate drinkers even more moderate can reduce the probability of transition to heavy drinking. Taxes that are not immediately justified on externality grounds may be in a longer term where future effects are allowed for.

I started by praising Cnossen's down-to-earth analysis. That being said, I think there is a need to discuss whether conventional economics deals in an adequate way with such goods as alcohol that are often consumed in a social context. After all, society is more than a collection of hermits. As repeatedly emphasized by alcohol researchers, people affect and are affected by the drinking of people around them. This research should not be lightly dismissed, but the implications are not obvious. A possible implication coming to an economist's mind is that if people enjoy their drinks more if others drink, there is conceivably a positive externality, and positive externalities may be a case for a subsidy. I will not draw that conclusion simply because I believe these effects are being internalized through social signals and culture. It may even be that very moderate drinkers are exposed to inappropriate social pressure to drink more than they would like.

A potentially important implication of the social perspective is that a tax on moderate drinkers can have an impact by moderating the drinking of the heavier drinkers or by inducing more people to remain moderate consumers. This will strengthen the tax argument, as a tax on

moderate drinkers is no longer purely distortionary but will actually alleviate the externality problem or help those who are otherwise tempted to drink too much.

This takes me back to the problems of those who struggle to limit their consumption of alcohol and the conceivable case for a paternalistic policy on their behalf. I believe there are valid arguments for taxes and regulations along these lines. But economics should not be based on beliefs. There is a strong need for empirical evidence on the social aspects of alcohol consumption and the extent to which people do indeed wish to be constrained as consumers of alcohol. The good news is that much relevant research is already under way within experimental economics, psychology and other fields.

3 Gambling policy in the European Union: too many losers?

David Forrest

The paper reviews the case for special taxes on gambling services from a traditional public finance perspective. Evidence suggests that high taxes are likely to hurt recreational consumers badly while not necessarily mitigating problem play. Taxes on gambling are also shown to be regressive, particularly when considered in combination with alcohol and tobacco duties. Finally, the paper discusses the feasibility of taxing gambling when there is ready access to extraterritorial supply.

3.1 Introduction

The gambling industry is increasingly the focus of policy debate within the European Union. Policies in Member States have long reflected social concerns over the legitimacy of gambling as a leisure activity by limiting the number of modes of gambling that can be offered within their jurisdictions and by maintaining high prices to consumers either through excise taxes or through the operation of state monopolies in the provision of gambling services. This status quo now faces challenge on several fronts. There is increasing social acceptance of gambling worldwide, as evidenced by legalization of casinos in a large number of jurisdictions from North America to Asia, and Europeans do not appear to be immune from an increased desire to be free to choose whether to gamble. Further, technological change is globalizing the market and EU residents can access remote gambling opportunities, undermining the ability of national governments to continue to dictate what modes of gambling their citizens can access and at what price. Within Europe, providers in the private sector have sought to exercise their rights to sell services to residents in other Member States; and this has generated several cases at the European Court of Justice, where a growing body of case law threatens the viability of national governments maintaining state monopolies even of land-based gaming. State-owned monopolies are at further risk from application of antitrust provisions in European competition law.

Against this turbulent background, the European Commission commissioned a major study of gambling industries in Europe from the Swiss Institute of Comparative Law. Its comprehensive report, published in 2006, includes important literature surveys of key issues in the gambling market and, for the first time, gathers together detailed information on law and practice and on the size and composition of the market in each Member State. The availability of detailed data will illuminate the policy debate on how EU members should tax and regulate gambling services.

Taxation and regulation cannot, of course, be treated entirely separately. For example, it is almost universal to restrict the number of locations at which consumers can play casino games. This is typically justified by reference to social concern over the possibility of 'excessive' play by vulnerable individuals; but a practical effect from supply restriction is to create a stream of monopoly profit that can be captured by the state either through ownership of the casino or through the auctioning of licenses or through ongoing taxation of casino profits. Regulation then has the same qualitative effects as would the imposition of a sales tax in a free market: government claims revenue and consumers face high prices and therefore reduce their use of gambling facilities. Any policy towards gambling, then, needs to be evaluated as a fiscal and regulatory package since regulation offers an alternative route to achieving the same goals as taxation.

Gambling may be viewed as either a financial investment (where the asset procured offers a possible positive return but with high risk) or a consumer good (where the activity is an entertainment competing for leisure time and expenditure with alternative diversions such as cinema or nightclubbing) or, of course, some combination of the two. Almost certainly, different participants will have different motivations. But the approach taken here is just to treat gambling as a leisure good. For it to be purchased primarily as an investment would require consumers to be risk-loving; but the success of basing predictions of behaviour in other areas of economic life on an assumption of risk-averse utility functions suggests that this would introduce implausibility into the analysis. Of course, Friedman and Savage (1948) famously rationalized the simultaneous purchase of insurance and lottery tickets by hypothesizing a utility of wealth function with concave and convex segments such that individuals were indeed risk-averse at current wealth levels but lottery wins offered the possibility of propelling them to a risk-loving segment of the utility of wealth function. This approach does not, however, account for typical purchases of other gaming products where both stakes and payouts are small and therefore the possible wealth outcomes from losing or winning are so close to current wealth that the utility of wealth function would be imperceptibly different from linear over the relevant range. Thus it is assumed here that the decision to gamble, which is very common (for example, 68% of British adults gamble according to the British Gambling Prevalence Survey 2007), is not one to be explained by risk preferences but rather represents a consumer choice in favour of a good that provides excitement and diversion.

Given the perspective that gambling may be treated as a consumer good, though one of course that carries dangers of addiction, it becomes natural to review fiscal and regulatory policy towards it employing the traditional tools of public finance. Accordingly, the goal of this paper is to review and evaluate gambling policy in Europe through the lens of public finance. Section 3.2 notes similarities and differences between the analysis of taxation of gambling and taxation of other potentially dangerous consumer goods (alcohol and tobacco). Section 3.3 provides information on current tax policies in the EU. Sections 3.4 and 3 5 attempt to illuminate the

questions of whether high-tax policies satisfy efficiency and equity criteria. And Section 3.6 discusses the possibility that high-tax policies may in any case become infeasible for EU Member States as technological developments make it possible for consumers to choose remote gambling opportunities supplied from alternative low- or no-tax jurisdictions.

3.2 Similarities and differences in the analysis of gambling and other subjects of excise taxation

Any discussion of what comprises an appropriate fiscal and regulatory regime for the gambling sector raises themes familiar from analysis of policy towards drinking and smoking, two other activities popular amongst Europeans but with dangers of long-run harm to the user and perhaps others. For example, as with alcohol, measures to force up price by taxation or by restrictions on supply will make 'responsible' consumers worse off; their loss can in principle be measured in terms of consumer surplus and this then weighed against not only revenue gained by government but also any benefit that will result if 'problem' users end up inflicting less harm on themselves or others. Again, gamblers, like smokers, bear much of the negative results of their indulgence themselves. Whether the negative effects should be treated as social costs, to be corrected for by taxation, depends on whether one accepts consumer sovereignty or alternatively treats the very act of consumption of these products as evidence of irrationality on the part of individuals.

But, while the general themes are similar, there are distinct features of gambling that need to be taken into account in analysis. The most important is that there is no natural unit of consumption equivalent to a unit of alcohol or a single cigarette. For example, counting the number of bets placed in a period has little meaning if some wagers are for €1 and others for €100. It is conventional therefore to identify quantity with turnover or amount staked, a money rather than a physical measure.

Price is also conceptually difficult to define. A gambling activity provides excitement or diversion in return for which a player is willing to lose a certain amount of money. But the amount he loses will vary from occasion to occasion (sometimes, indeed, he will be a winner) and can be known only ex post. Behaviour therefore has to be related to expected loss from a unit wager, which can be identified with the takeout rate of the gaming operator. It is this that is typically measured on the vertical axis of the economist's price–quantity diagram.

The product of the chosen measures of quantity and price gives the amount won per period by the operator from his clients and this is known as gross gaming revenue (GGR). It is of interest that any harm from gambling will be related to the size of GGR rather than quantity as measured on the horizontal axis: although excessive time spent on gambling may be the source of some social problems associated with dysfunctional play, most harms in fact result from

financial pressure on the households concerned, in contrast to drinking and smoking where effects are primarily related to levels of physical consumption. This implies that any argument for taxation that reflects social cost should be based on the impact on player expenditure rather than on quantity. The difference called for in analytical approach is reflected in discussion below.

According to the Swiss Institute of Comparative Law (2006), the amount lost in gambling (GGR) in the EU in 2003 was €51.5 billion or 0.52% of gross domestic product (GDP). This level of activity was of a similar order of magnitude to that recorded for the US (0.65% of GDP). However, the composition of spending was markedly different between the two areas. The relative importance of lotteries was greater in Europe (45% compared with 24%) and that of the casino sector less (15% compared with 58%). The contrast reflects the failure of a modern casino sector to develop in Europe as it has, not only in America, but also in Asia and Australasia.

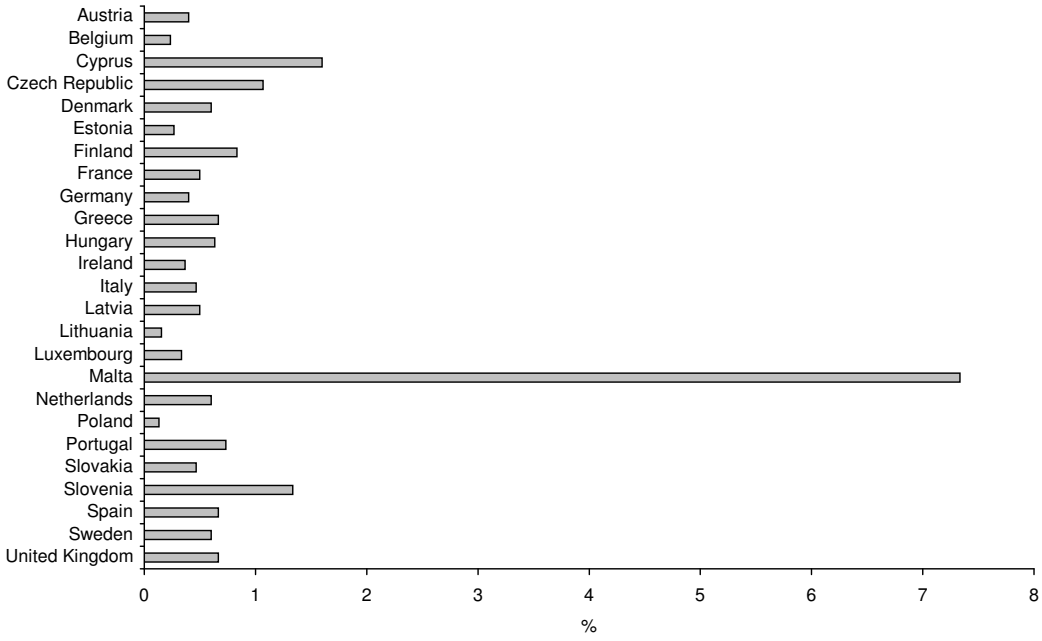
While the size of the gambling sector is impressive in the EU, as in the US, it appears small relative to that observed in some other developed regions. Figure 1 shows GGR as a percentage of GDP for each member of the EU in 2003. In only three states did this exceed 1% and in two of these the high figure was explained by the jurisdiction selling to nonresidents either as an internet gaming center (Malta[44]) or as a gambling tourism destination (Slovenia[45]). By contrast, GGR accounted for 1.93% of GDP in Australia, 1.45% in New Zealand and 1.11% in Canada. In Australia, New Zealand and Canada, expenditure levels have increased from approximately those currently observed in the EU only since their legislators or regulators first permitted ready access to electronic gaming machines (EGMs) or video lottery terminals; for example, a very dense network of arcades with 100–200 high-prize casino-style machines is now available across hotels and clubs located throughout Victoria and New South Wales. EGMs are known as the ‘crack cocaine of gambling’ – a term first coined in the important report of the US National Gambling Impact Study Commission (1999) – and 10% of users are problem gamblers (Australian Productivity Commission (APC), 1999). It is therefore unsurprising that the substantial increase in the problem gambling rate in those Australian states that have legalized EGMs (Australia now has the highest problem gambling rate in the world) has paralleled the

[44] Malta is a major center for provision of betting services offered internationally; but it is an explicit condition of licenses that operators do not sell to Maltese residents.

[45] Ten of the 12 casinos in Slovenia are located in border settlements close to either the Austrian or Italian border. The bulk of revenue is accounted for by foreigners.

spread of EGMs (Dodgson, Maunders and Chesters, 2004). An implication is that regulation of what forms of gaming are permitted and with what degree of accessibility may be as important as, or more important than, levels of taxation in determining the extent of social problems associated with gambling.

Figure 3.1 Gross gaming revenues as a percentage of GDP, 2003



3.3 Levels of taxation in the EU

A distinctive feature of gambling is that, in many jurisdictions, services are provided by state-owned enterprises or other state-sanctioned monopolies. For example, Svenska Spel controls all forms of gambling (except on-track horse betting) in Sweden and Holland Casinos has the exclusive right to operate casinos in the Netherlands. These are state-owned companies. In France, horse betting, which is popular, can be offered legally only by Pari Mutuel Urbain (PMU), an entity owned by the racing industry, with profits devoted to subsidizing the equine sector. These state or para-state organizations are commonly protected from foreign competition. For example, UK bookmakers have thus far been frustrated in their desire to establish a retail presence in Sweden; Dutch internet service providers are prohibited from allowing access to foreign gaming websites; and all sports betting is illegal in France. In such protected markets, regarding some of which legal challenges to the status quo are currently before the European Court of Justice, consumers face high prices; but the explicit rate of taxation on gambling may be low or even zero. The state is instead claiming its share of the economic rents associated with restrictions on supply in the form of 'profits of state-owned enterprises'. It would, however, be misleading to characterize such situations as low-tax regimes compared with countries where the takeout on gambling is the same or lower but where

the amount accruing to the state is recorded under the heading of 'taxation'. Following Clotfelter (2005), I regard profits of state-owned gaming companies as revenue from 'implicit taxation' since the impacts on consumers, on consumption and on government revenue are the same regardless of how the revenue is categorized in national accounts.

As noted above, lotteries account for nearly half of all losses by gamblers in the EU. And most of their losses accrue to the state (or to 'good causes' funds nominated by the state) whether through explicit or implicit taxation. London Economics (2006) collected information on gross tax rates of lotteries across the EU and these data are shown in Table 3.1. Some of the apparent variation across countries is accounted for by different product mixes being offered by different lottery agencies (with tax rates higher in jurisdictions reliant on long-odds lotto games, where consumer willingness to pay is higher). Almost everywhere, though, tax rates are high, with a mean, weighted by turnover, of 33%. Nevertheless, percentages quoted are considerably understated because they are calculated relative to stakes rather than relative to player expenditure (GGR). Consider the UK, for example. The franchise holder for the National Lottery sells tickets for a variety of games for £1. Of this, 50 pence (on average across games) is allocated to prizes, implying that players in the aggregate lose 50 pence per ticket. But of this 50 pence loss, no less than 40 or 41 pence (depending on the turnover the operator achieves) is earmarked for general and hypothecated taxes. The gross tax rate is therefore 40% or 41% of stakes; but tax accounts for 80% or 82% of player expenditure. Smith (2008) notes that this is an even higher excise rate than those imposed on cigarettes (76%), petrol (67%), liquor (63%), wine (53%) and beer (49%). It resulted in government revenue of £2 billion in fiscal year 2005/06, more than the yield from all other gambling taxes combined. However, the revenue remains much lower than that from petrol and cigarette taxes (£23.4 billion and £7.5 billion respectively) and has fallen in real terms as interest in the Lottery has waned. The UK government has also had to tolerate a reduction in real revenue from betting taxation as rates have been lowered in response to consumers wagering with operators based offshore. The rate of betting tax in the UK is now only 15% of GGR.

Table 3.1 Gross tax rates, EU lotteries

Country	Rate (%)
Austria	32
Belgium	28
Cyprus	37
Czech. Rep.	18
Denmark	29
Estonia	12
Finland	40
France	27
Germany	39
Greece	16
Hungary	33
Ireland	33
Latvia	20
Lithuania	13
Luxembourg	19
Netherlands	39
Poland	50
Portugal	33
Slovakia	22
Slovenia	21
Spain	28
Sweden	24
UK	40
EU-25 (excluding Italy and Malta)	33

Source: London Economics, 2006.

The UK is typical of EU and other jurisdictions in levying a much higher tax rate on lotteries compared with betting. Much of this paper is about what levels of taxation of gambling products would be appropriate when assessed using conventional economic theory. The public finance literature justifies exceptionally high tax rates, such as that imposed on lottery players, where goods are very price-inelastic, where their consumption is time-intensive (the Corlett–Hague rule) or where they generate significant negative externalities. The consensus from the demand modelling literature on lotteries (Forrest (2003) provides a survey) is that elasticity is about –1; the process of purchasing a lottery ticket and checking the results involves minimal input of time; and lotteries, in contrast to betting, appear to generate almost no problem gambling behaviour[46] because of the lack of opportunity for repeat and continuous play. It is difficult to conclude other than that current taxation policy is based on levying what the market will bear rather than reflecting an attempt to employ taxation to constrain activity to a socially appropriate level[47].

[46] For example, Griffiths (1999, page 143) concluded that lotteries 'do not tend to be addictive for adults'.

[47] It is also striking that many state-owned enterprises spend heavily on product promotion notwithstanding that their governments attempt to justify state monopoly in gambling by reference to a need to constrain demand for social reasons.

Table 3.2 Maximum tax rates on casino GGR, 2004

Country	Rate (%)
Austria	80% tables, 48% EGMs
Belgium	44% tables, 50% EGMs
Cyprus	No casinos
Czech. Rep.	31% tables, 20% EGMs
Denmark	75
Estonia	60
Finland	All profits to state
France	80
Germany	92
Greece	33
Hungary	34.5
Ireland	No casinos
Italy	72
Latvia	25
Lithuania	Unit tax per gaming device
Malta	40
Netherlands	33
Poland	50
Portugal	50
Slovakia	27
Slovenia	50
Spain	61
Sweden	All profits to state
UK	40

Source: Swiss Institute of Comparative Law, 2006.

Apart from lotteries, casino gaming is the other mode of gambling subject to tax rates similar to or greater than those imposed on smokers and drinkers. Table 3.2 provides information on rates of tax levied on casino GGR in EU Member States. Tax treatment of casinos appears much harsher than in the US where, according to Kearney (2005), maximum rates ranged from 6.25% in Nevada to 35% in Illinois. European jurisdictions levy tax at, in some cases, more than double the rate charged by Illinois.

High tax rates on house win could be argued not to impact on consumers to the extent that short-run profit-maximizing price (takeout) for a casino remains the same (a tax on GGR is akin to a profits tax). However, in the long run, if competition is permitted, taxes will reduce the rate of return on capital investment, inhibiting new entry and permitting high takeouts to be maintained. Of course, in states where there is a monopoly franchise, high takeout is made feasible by the limitation on supply rather than being directly attributable to any tax on GGR. In this case, government may capture economic rents associated with supply restrictions either through tax or through public ownership or by, for example, auctioning licenses. In that case, the decision to supply through a monopoly transfers surplus first from consumers to the operator (with an additional deadweight loss) and then from the operator to government.

Again it is clear that taxation and regulation of gambling cannot be considered in isolation from one another. Governments typically seek to extract revenue from the gambling sector (over and above what they would claim from routine business taxes). Whether they gain this revenue from overt taxation or by imposing restrictions on supply, the qualitative effects in terms of impact on price and on consumption will be similar. Whether it is in fact welfare-enhancing to impose gambling privilege taxes (i.e. extra taxes not borne by other industries) or otherwise inhibit consumption through regulation is discussed below.

3.4 Efficiency of gambling taxes

3.4.1 Consumer surplus from gambling products

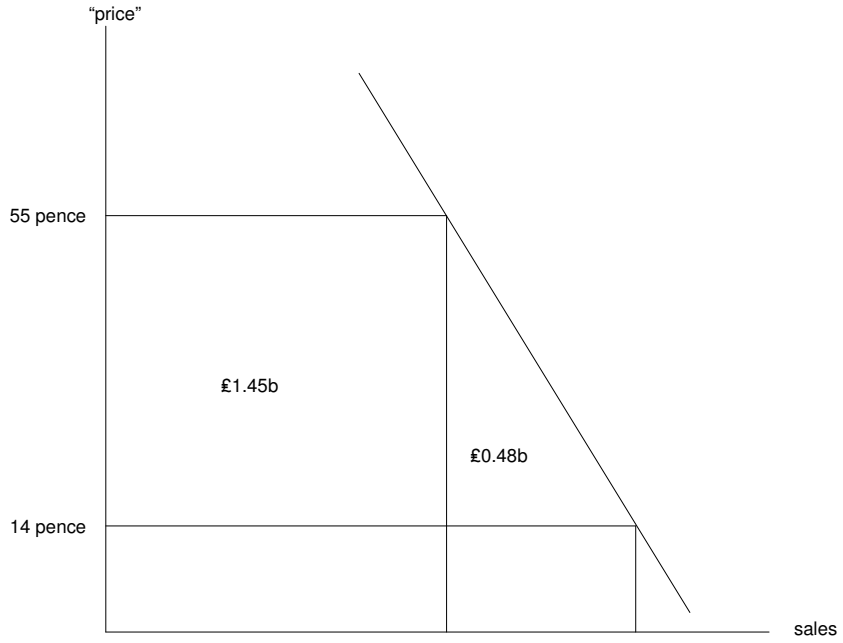
Eadington (1999) draws attention to the extent to which gamblers are treated as 'second-class citizens'. The most obvious benefit of permitting gambling is that consumers gain entertainment value from the products. The most obvious objection to high taxes is that they lead to consumers enjoying less of the products. But, in contrast to most areas of the economy, debate on public policy towards gambling almost never focuses on consumer welfare. The interests of gamblers themselves are given little weight or are ignored. For example, advocates of legalizing casinos commonly emphasize only potential gains in terms of economic development or job creation and the academic literature on demand modelling of the lottery market has (since Gulley and Scott (1993)) focused on whether current takeouts maximize revenue for the state. The application of standard welfare economics would, of course, change the basis on which such policy discussion took place. In evaluating whether new casinos should be introduced, consumer surplus would be counted as a primary benefit of the policy. In assessing whether current lottery taxes were set at appropriate levels, the loss of consumer surplus would be compared with the gain in government revenue.

A rare example of the application of conventional analysis was Farrell and Walker (1999). Their focus was on the lotto game offered by the UK National Lottery. First, they inferred the shape of the demand curve by observing how draw-by-draw sales responded to variations in value-for-money associated with rollovers and special promotional draws. Then, in contrast to other authors, who have adopted a purely governmental perspective and used such estimated demand curves to address the question of whether tax revenue was being maximized, they calculated the loss of potential consumer surplus associated with the lottery tax.

The takeout in a standard UK Lotto draw is 55 pence per ticket (i.e. 45 pence is paid into the prize fund). Of this, 41 pence is general or hypothecated tax. As illustrated in Figure 2 (a stylized representation of their findings), Farrell and Walker estimated that the loss in consumer surplus from imposition of the tax, without which takeout could otherwise be 14 pence, was

£1.93 billion per year[48]. Of this, £1.45 billion was claimed in tax revenue but the remaining £0.48 billion was a pure 'deadweight loss' to society. This may be interpreted as the difference between the value of the satisfaction consumers would have obtained (from the extra tickets they would have purchased had the value-for-money offered by the game not been lowered by the tax) and the amount of government revenue.

Figure 3.2 Loss of consumer surplus from a tax on UK Lotto



Unless introduced to correct for an externality, taxation of any good or service invariably creates such a loss; but, in this specific case, Farrell and Walker argued that it appeared to be particularly high – £0.34 per £1 of revenue raised[49]. It is therefore questionable whether the lottery tax may be judged 'efficient' on the basis of the standard criteria of welfare economics.

The approach of Farrell and Walker is illustrative of how recognition of the entertainment value of gambling and acceptance of the legitimacy of identifying it with consumer surplus may lead to questioning of current policy. But employment of consumer surplus techniques should not be accepted uncritically. They involve measuring benefits to players with respect to a self-evaluation, the willingness to pay (a proxy for expected utility) of each individual consumer. And use of that self-evaluation is legitimate only if it is based on rational, informed spending

[48] Strictly, consumer surplus should be evaluated relative to the 'compensated' demand curve but this will differ only very slightly from the 'ordinary' demand curve where the proportion of consumer income allocated to the good is low. According to UK household expenditure data, few players spend more than a few pounds per week on lotto games. Generally in gambling, 'ordinary' demand curves will be adequate for calculation of consumer surplus calculations if only demand by 'nonproblem gamblers' is considered since then spending per head is typically low.

[49] Farrell and Walker did not, however, offer comparisons with other potential taxes on just how 'inefficient' this is. Another caveat is that the demand elasticity they estimated was somewhat greater than that found in subsequent studies (for a discussion of reasons, see Forrest (2003)). If one accepts that elasticity was in fact overestimated by Farrell and Walker, the value of the deadweight loss they report should be reduced somewhat.

decisions. It is hard to object to Farrell and Walker's estimates of welfare losses from the lotto tax because there is a consensus that compulsive behaviour is rare amongst lottery players and it can therefore be presumed, as readily as in other fields, that individuals know best what serves their own interests and where they can gain utility. However, many forms of gambling, especially perhaps EGMs, are associated with a relatively high incidence of problem or pathological behaviour and, while the majority of individuals playing machines in casinos are likely to be fully in control of their decision-taking, a large proportion of spending may be accounted for by problem gamblers. Demand curves are the basis for calculation of consumer surplus but, if their position and shape are driven by the decisions of those who appear irrational and self-harming, any resulting estimates would lose legitimacy and credibility and Farrell and Walker could not be used as a template for evaluating gambling taxes generally.

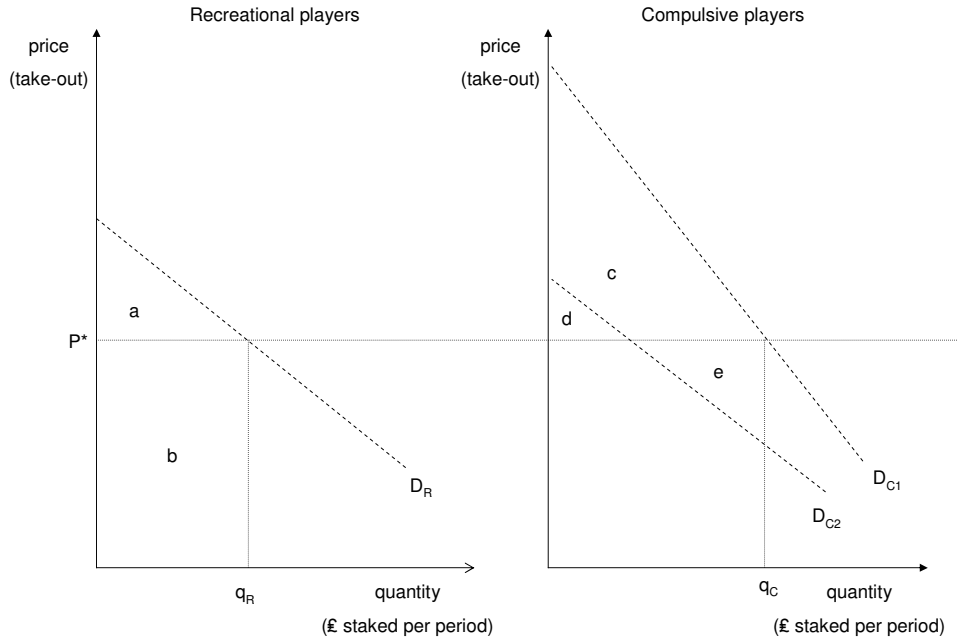
The report on gambling by the Australian Productivity Commission (APC) (1999) confronted this problem with detailed argument. The possible approaches it described would yield a range of estimates for the consumer surplus associated with a gaming product depending on whether the problem were ignored (all players assumed rational) or whether spending of problem gamblers were removed from the demand curve (apparent consumer surplus of problem gamblers set aside) or whether spending of problem gamblers were treated more subtly (the report's preferred consumer surplus figures assumed problem gamblers gain consumer surplus up to the level of play of median players but generate negative surplus for themselves beyond this point).

Figure 3.3 illustrates this preferred APC approach to calculation of consumer surplus. The demand curve is disaggregated into two sectors, comprised of recreational and compulsive players. In the left panel, a is consumer surplus for recreational players and is a component in the amount of consumer surplus as it would normally be calculated. In the right panel, there are two demand curves. DC1 is the demand curve for compulsive players (c+d is their evident consumer surplus but this is an illegitimate measure of benefit because their compulsion leads them to 'excessive' play). DC2 is the demand curve that would characterize this subgroup if they played only to 'reasonable' levels, defined by reference to the level of play of a median player. With respect to this 'legitimate' level of play, the group gains consumer surplus of d. But its actual level of play is higher and this excess play is deemed to generate negative consumer surplus: median players not behaving compulsively would recognize that the enjoyment to be had on these excess gambles was not actually worth the cost incurred. Thus APC represented consumer surplus across all gamblers as a+d–e.

There is a certain logic to the APC's line of reasoning but the division of problem gamblers' play into normal and excess units could be regarded as contrived. In some sense, the problem gambler's first plays of the machine in the evening are the product of compulsion as much as those plays made after the APC's 'median' players have gone home. Following the APC in

equating consumer surplus with a+d–e would lead to considerable scepticism of the scientific basis for estimation of consumer surplus.

Figure 3.3 Consumer surplus of compulsive or recreational players



In attempting to forecast consumer surplus from new casinos in the UK, Crane (2006) therefore chose to focus on area a in Figure 3.3, a measure of the benefit to recreational gamblers from giving them access to the new product represented by the casinos. Based on extrapolating from the degree of popularity of machine gaming in Victoria, assuming a similar tax regime to that in Victoria and calculating the consumer surplus only in respect of the 70% of expenditure that she estimated would come from non-compulsive gamblers, she forecast consumer surplus gains in Britain from new casinos to be approximately £3.2 billion (€4.7 billion) per year. Similarly, very large values for consumer surplus had been computed for several modes of gambling in Australia in Australian Productivity Commission (1999).

Such (still rare) exercises illustrate that consumer benefits of recreational players from their gambling are very high. One question to be answered in evaluating tax policy or regulation is how much this is eroded as takeout is forced up. This depends, of course, on elasticity.

Swiss Institute of Comparative Law (2006) included an exhaustive survey of peer-reviewed literature on the economics of gambling. In the section on elasticities, it reported a strong consensus that players are highly sensitive to value-for-money. For example, it tabulated results from 15 articles evaluating elasticity of demand for either bookmaker or pari-mutuel betting; all but one of these found demand to be elastic, with most estimates in the range –1.6 to –2.2. Ten lottery studies yielded estimates between –0.8 and –3.21, with most near –1. A study of casino

slot-machine gaming found elasticity varying over time between –0.8 and –3.2. The evidence is therefore consistent that demand tends to be elastic rather than inelastic[50]. Consequently, the potential consumer surplus loss from high taxes is large and the conditions suggested by the Ramsey (1927) pricing rule for imposing above-average taxes on a product – namely, inelastic demand – are absent.

Another potential rationale for high taxation of particular goods is provided by the Corlett–Hague rule, which proposes that the inefficiency inherent in not taxing leisure should be offset by taxing goods complementary to leisure, i.e. time-intensive goods. This consideration does not seem to explain the pattern of gambling taxes actually adopted by governments to the extent that lottery draws appear to be the least time-intensive mode of gambling but are often the most highly taxed. Nevertheless, the entertainment offered by some modes of gambling, such as casinos, can involve lengthy visits and casino gaming is therefore a potential candidate for Corlett–Hague excise taxation. However, it is impossible to know whether excise taxation on gaming would improve efficiency in the overall allocation of resources. It would help correct the distortion in the consumer's choice between work and leisure hours but, in the absence of excise taxation of alternative time-intensive leisure pursuits such as cinema or sport, it would introduce distortions into the choice between alternative entertainments. There is insufficient knowledge of cross-elasticities to make even an informed guess of whether special taxes on casinos would move the economy towards a 'second-best' solution.

3.4.2 Social costs of gambling

There remains the final possibility that optimal gambling taxes would be high because this would lessen the social cost associated with problem or pathological play. The issue is central to debate on policy since problem gambling remains 'the Achilles heel of legal gambling' (Eadington, 1999). Two questions arise. The first is 'What is the current cost of problem gambling?'. The second is 'Do high taxes make this significantly different from what it would otherwise be?'.

Essentially, one is asking here whether there is a case for a Pigouvian tax on gambling, i.e. a charge to reflect costs that are not taken into account in the decision on whether and how much to gamble. The obstacles to constructing even a rough estimate of an optimal tax are formidable. One would need estimates of marginal social costs of gambling, whereas even attempts to quantify total social costs to particular modes of gambling in particular jurisdictions have yielded wildly varying estimates: the Australian Productivity Commission (1999) demonstrates the strong sensitivity of findings to variation amongst plausible sets of

[50] It is suggested above that it is safe to focus only on the consumer surplus of recreational (nonproblem) players. No published study on elasticity separates the demand of this group. To the extent that problem gamblers may exhibit lower demand elasticity than mainstream players, the conclusion that high taxes probably cause serious loss of 'recreational' benefits applies a fortiori.

assumptions, as does Crane's (2006) work for the UK; her estimates of annual social cost from new casinos in Britain cover the extraordinarily wide range of £23 million to £1.8 billion (€34 million to €2.7 billion), depending on assumptions[51].

The failure to achieve a consensus on how to quantify social cost is attributable to a number of points where authors disagree. First is whose costs should be counted. Negative consequences from pathological gambling may fall on the gambler himself (who might suffer illness induced by financial pressures or lose his job because he spends too much time on gambling), on his family and household (who may experience emotional distress or become homeless or victims of domestic violence, for example) or on other members of the community (who may suffer theft by gamblers who steal to fund their debts or financial loss when gamblers become bankrupt).

In conventional economic analysis, costs that fall on the gambler himself would not be counted as a social cost because a rational agent's willingness to pay would already reflect both the personal rewards and the financial and other dangers of the activity. This would be valid for gambling if behaviour were as modelled by the rational (rather than myopic) version of the Becker–Murphy (1988) addiction model. While there is in fact some empirical support for the notion of rational addiction in the context of gambling (Mobilia, 1993), professionals in the treatment of problem gambling are sceptical over the extent to which patients had understood the risks they were facing. Similarly, while it is undoubtedly true that much of the harm inflicted by problem gamblers falls on their families, it is an open question whether these costs are internalized by the decision-taker who opts to place household wealth at risk. Authors who count these two categories of cost, personal and household, as 'social cost' inevitably produce much higher estimates of the harm that gambling causes than those who confine their attention to externalities. It cannot be said that they are wrong, only that their analysis is not on a similar basis to when welfare economics is applied in most other areas of the economy[52].

Even in the estimation of purely external costs, there is controversy over what should be included. Walker and Barnett (1999) provide a critique of earlier studies that were 'generous' in their estimation of external costs. To take just one example, the value of goods alleged to be stolen each year as a result of gambling problems has often been included, whereas Walker and Barnett argue that only associated police and judicial costs should be counted: stolen goods are not lost to society and their value therefore represents a transfer rather than a social cost.

[51] Note, however, that in both APC and Crane, even the highest estimates of annual social cost were much lower than corresponding estimates of annual consumer surplus.

[52] A framework to justify treating gambling differently and regarding 'internalities' as social costs would be that of Gruber and Koszegi (2002), who developed the notion of 'time-inconsistent preferences' in the context of smoking behaviour. Similarly, O'Donoghue and Rabin (2006) proposed that 'sin taxes' on goods such as fatty foods may be an efficient response to the presence in the population of people who lack self-control in the sense of finding it difficult to adapt current behaviour to future health consequences. Such analyses in effect offer validation of traditionally paternalistic attitudes that underpin many restrictions and taxes on stigmatized goods.

A final reason for the lack of a consensus on how to measure social cost is that it is not even clear whether crime, domestic violence and other antisocial behaviour committed by problem gamblers, or their difficulty in holding down a job, should be attributed to gambling at all. This is the issue of comorbidity: the majority of those afflicted by pathological gambling have been noted to suffer also from other behavioural and psychological disorders. Petry, Stinson and Grant (2005) estimate that 73% of American pathological gamblers have alcohol problems, 50% have mood disorders, 41% have anxiety disorders and 31% experience drug problems during their lifetimes[53]. The implication is that excessive gambling is only a manifestation of a disordered personality that would commonly, even in the absence of gambling opportunities, lead to problems such as unemployment, crime and domestic violence. A high, but unknown, proportion of costs customarily attributed to problem and pathological gambling would then need to be discounted[54].

It is evident that, while gambling by some players appears to be harmful, there is no early prospect of agreement amongst researchers on how to value total, average or marginal social cost. A precisely calculated Pigouvian tax cannot therefore be evaluated. This does not itself rule out attempts by governments to use taxation to reduce harm from gambling if their political judgment is that this would be appropriate notwithstanding the negative impact on the majority, those who gamble responsibly for entertainment and diversion. However, for the policy to be justified, it would have to be clear that taxation reduced the incidence of problems associated with gambling. This is in fact unclear. If the price of gambling were increased, it is a fair expectation that the quantity of gambling by 'problem gamblers' would fall. But it is the amount spent (i.e. lost) rather than the amount gambled that is the source of pressure that leads problem gamblers to violence (including to themselves, i.e. suicide[55]), crime, homelessness and so on. Whether this will increase or decrease depends on whether demand by problem gamblers as a group is elastic or inelastic.

Unfortunately, there is no empirical work to provide guidance on this point. Peirson (2007) takes demand as inelastic and this was also the guess of the majority of the economists in the gambling field to whom I put the question in a straw poll. In this case, taxation or restriction on supply that forced takeout up would increase the per-period size of losses suffered by problem gamblers. One would then forecast that the incidence of problems associated with pathological gaming would increase rather than decrease.

An alternative assumption would be that the addict will always devote all his discretionary income to his 'weakness'. In this case, his demand would be unit-elastic. Following an increase in takeout induced by an excise tax or restriction on supply, his per-period losses would be as

[53] They also find that correlations are robust to controlling for demographic and socioeconomic characteristics.

[54] Even if agreement on what constitutes social cost were reached, there would still remain the problem of how to express intangible effects, such as distress for families, in money terms.

[55] Rosenthal and Fong (2004) note that the suicide rate associated with gambling is higher than that for any of the other 'addictions'.

before and one might then anticipate little or no effect on his propensity to engage in harmful behaviour related to gambling.

We have no firm evidence on how problem gambling behaviour responds to price signals. Demand, even for an addictive good, may be elastic in the long run (Becker and Murphy, 1988), notwithstanding the speculation of economists in the gambling field; and, if it were elastic amongst those prone to pathological behaviour, this would be an argument for gambling taxes or other mechanisms that gave players reduced value-for-money. However, we do not in fact know elasticity for the group of problem gamblers. Nor, therefore, do we know whether or how much price policies can be effective in mitigating harm from gambling.

On the other hand, evidence (above) is strong that responsible gamblers gain recreational benefit from the activity that is high in absolute terms when measured in terms of money equivalent. Further, demand elasticity is found to be high in the large majority of published studies, indicating substantial loss of this consumer surplus as price is forced up. This points to significant welfare loss from punitive taxation of gambling services.

Given this, and given that impacts on problem gambling cannot even be signed, it may be prudent to explore alternative policies to tax to mitigate the harm gambling can cause to a minority of users. These policies may include not only education and problem gambling treatment programs and limitations on advertising but also framing of detailed rules for the operation of gambling.

Detailed regulation of the gaming industry appears likely to have some capacity for successfully addressing problem gambling issues. Examples of policy include the following:

a. *Accessibility*. EGMs in readily accessible locations present the strongest risk of problem gaming. For example, 75% of those seeking help from problem gambling services in Finland played machines (Swiss Institute of Comparative Law, 2006), 10% of users in Australia could be classified as problem gamblers (Australian Productivity Commission, 1999) and 25% of video lottery players surveyed in Nova Scotia acknowledged current or past problems with their level of play (Focal Research, 1998). Yet where such machines are confined to destination casinos rather than permitted in neighbourhoods, problem gambling rates are much lower (Livingstone, Woolley and Borrell, 2006). The implication is that negative consequences could be mitigated by regulation that reduced the convenience of playing machines.

b. *Pace of machines*. Machines are designed to encourage repeat play by visual and aural stimulation, by ensuring a high frequency of ‘near misses’ and by offering immediate opportunity to wager again. Regulatory authorities can impose restrictions on such design features, for example by reducing the pace of play to make the activity less dangerous.

c. *Smoking bans*. Jurisdictions that introduce prohibition of smoking on the gaming floor typically experience a 20–30% reduction in GGR (for formal econometric analysis, see, for example, Pakko (2008) and Thalheimer and Ali (2008)) and in New Zealand a smoking ban was reported to be followed by a 30% fall in calls to a problem gambling hotline. While a subject for future research would be the extent to which loss of business is associated with a fall in spending per visit rather than the number of admissions, it is at least plausible to speculate in the mean time that much of the impact comes because patrons are given an incentive to take a break from their session. Because a gaming machine may be to an extent mesmerizing, the introduction of a reason to leave the hall may curtail excessive play since the player may even decide then not to return inside at all.

These are illustrations of policies that regulatory agencies may introduce to limit harm from gambling. They would likely have a real effect on problem and potential problem gamblers. However, there is a trade-off because the majority of measures will also lower benefit to those whose consumption is purely recreational. Locating facilities far from their homes will deter them from playing and/or impose travel costs that are not only personal but also environmental. Lower (recreational) consumer surplus will be derived as a result of restrictions on machine specification where demand is driven by the excitement of noisy and fast play. Many players may find smoking and gaming complementary activities.

It is in fact difficult to formulate rules that affect problem play without also having an impact on consumers for whom gambling is a safe and enjoyable pastime. Research on gambling issues should focus on both sides of the trade-off notwithstanding that funding is more readily available for projects focusing only on problem gambling. National monopolies have the capacity for providing relevant data to test by experimentation in what is permitted at different gaming locations within their gaming estate.

3.5 Equity considerations

Assessment of individual taxes customarily takes into account not only impacts on allocative efficiency but also the extent to which they satisfy equity criteria. In this section, both the vertical and horizontal equity of gambling taxes are considered. As before, the effect of forcing up consumer price is the focus whether this is achieved through taxation or restriction on supply.

Vertical equity refers to the relative amounts of a particular tax that are paid by different groups defined by position in the income distribution. Clotfelter (2005, table 4.10) reviews the findings of 22 studies, employing data from dates varying between 1984 and 1999. Mostly they relate to lotteries, but work on bingo, gaming machines and gambling in the aggregate is also sampled. In every single case, the incidence of the tax was regressive because, while the amount spent on

gambling tends to increase with income, it does so very slowly. As a result, poorer households spend a greater proportion of income on gambling services and therefore pay a greater proportion of their income on gambling taxes borne by the consumer.

More recent evidence – for example, from Kearney (2005) and Smith (2008) – confirms earlier findings. Smith, for example, analyzed data from the UK Food and Expenditure Survey 2004–05 and found that the share of income allocated to the National Lottery declined almost monotonically across income deciles, from 1.67% for the poorest to 0.58% for the richest. The Suits index (Suits, 1977) is a summary measure of regressivity, derived from tax Lorenz curves, based on household expenditure data as employed by both Kearney and Smith. It can vary from –1 to +1, with a negative number indicating a regressive tax and a positive number a progressive tax. Clotfelter and Cook (1989) calculated indices that were between –0.32 and –0.48 for US state lotteries, compared with –0.38 for tobacco, –0.21 for alcohol (and +0.20 for the federal income tax). The lottery tax was therefore about as regressive as that on tobacco and more regressive than that on alcohol. As is often the case with expenditure taxes, all these excise taxes contrast with the progressive structure of income tax.

Smith's summary findings from her recent UK data are strikingly similar. She reports Suits indices of –0.35 for the Lottery, –0.36 for other gambling, –0.38 for tobacco and –0.14 for alcohol. Of course, the Lottery generates far more tax revenue than any other mode of gambling, so it is the size of the lottery tax that is of most concern in the context of any evaluation of whether gambling taxes are collected in inverse proportion to 'ability to pay'. It is common for lottery tax revenue to be hypothecated to particular purposes – for example, education and student scholarships in many American states and 'good causes' such as sport and cultural projects in the UK. Borg and Stranahan (2004) for America and Feehan and Forrest (2007) for the UK are amongst authors who have shown empirically that spending from the lottery tax is also regressive, aggravating the consensual finding that the lottery tax is 'unfair' in its relative impact on poor and rich families. This arises primarily because funding tends to be earmarked for activities, such as attending university and using sports clubs, for which participation rises steeply with income.

Horizontal equity refers to the extent to which households with the same income pay similar or dissimilar amounts of tax. By definition, an excise tax is inequitable because only those households with a taste for the good pay the tax. However, Forrest and Gulley (2008) point out that a system of excise taxes will be more inequitable than any excise tax considered individually if expenditure proves to be positively correlated across goods singled out for special duties (levied over and above the normal sales tax). They use data from the UK Family Expenditure Survey 2000–01 to examine correlation between participation and level of spending (conditional on participation) across seven modes of gambling and alcohol and tobacco. Some correlations related to their findings are summarized in Tables 3.3 and 3.4. The

strong relationship between alcohol and the full range of gambling activities is perhaps suggestive that drinkers tend to have a taste for gambling per se, whereas the more restricted set of positive correlations for tobacco suggests that smokers buy National Lottery tickets more readily for transactions cost reasons (Lotto and scratch cards being sold, typically, at cigarette counters). In any case, drinking and smoking behaviours are good predictors of participation and spending on the Lottery, economically as well as statistically significant. To an extent, therefore, the households that pay most lottery tax are also those that pay most in alcohol and tobacco taxation.

Table 3.3 Participation in modes of gambling and other 'Vices': correlation coefficients (p-values in parentheses)

	Lotto	Pools	Other lottery	Bingo	Scratch cards	Book-maker	Irish Lottery	Tobacco	Alcohol
Lotto	1								
Pools	0.095	1							
	(0.000)								
Other lottery	0.046	0.022	1						
	(0.000)	(0.070)							
Bingo	0.109	0.060	0.034	1					
	(0.000)	(0.000)	(0.006)						
Scratch cards	0.137	0.018	0.011	0.049	1				
	(0.000)	(0.136)	(0.374)	(0.000)					
Book- maker	0.152	0.110	0.080	0.166	0.058	1			
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)				
Irish Lottery	0.070	0.039	0.072	0.076	0.041	0.052	1		
	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)			
Tobacco	0.102	0.001	– 0.001	0.017	0.093	0.011	0.018	1	
	(0.000)	(0.915)	(0.963)	(0.175)	(0.000)	(0.409)	(0.141)		
Alcohol	0.137	0.032	0.042	0.001	0.040	0.121	0.022	0.066	1
	(0.000)	(0.000)	(0.001)	(0.917)	(0.001)	(0.000)	(0.078)	(0.000)	

Source: Calculated from data from the Family Expenditure Survey, 2000–01.

Table 3.4 Levels of spending on modes of gambling and other 'Vices': correlation coefficients (conditional on spending a positive amount on each product within each pair) (p-values in parentheses)

	Lotto	Pools	Other lottery	Bingo	Scratch cards	Book-maker	Irish Lottery	Tobacco	Alcohol
Lotto	1								
Pools	0.238	1							
	(0.004)								
Other lottery	0.023	0.577	1						
	(0.789)	(0.103)							
Bingo	0.325	– 0.033	– 0.165	1					
	(0.000)	(0.883)	(0.514)						
Scratch cards	0.234	0.061	0.100	– 0.106	1				
	(0.000)	(0.829)	(0.723)	(0.533)					
Book- maker	0.143	0.002	0.063	0.233	0.111	1			
	(0.000)	(0.988)	(0.617)	(0.006)	(0.272)				
Irish Lottery	0.209	– 0.031	– 0.100	0.721	0.434	0.187	1		
	(0.065)	(0.948)	(0.757)	(0.001)	(0.139)	(0.331)			
Tobacco	0.207	0.454	– 0.090	0.113	0.110	0.050	– 0.221	1	
	(0.000)	(0.000)	(0.476)	(0.218)	(0.117)	(0.336)	(0.195)		
Alcohol	0.137	0.250	0.023	0.143	0.128	0.140	0.085	0.123	1
	(0.000)	(0.000)	(0.773)	(0.031)	(0.024)	(0.000)	(0.448)	(0.000)	

Source: Calculated from data from the Family Expenditure Survey, 2000–01.

Smith (2008) confirms that this horizontal inequity adds also to vertical inequity. She calculates the share of income devoted by each income decile to lotteries, other gambling, alcohol and tobacco. It declines strongly with income, from 14.90% for the poorest to 5.63% for the richest decile. Those in the lowest income decile who indulge in all four product groups spend on average 30.75% of their income on 'vices' subject to excise taxation. They plainly suffer heavily from the punitive tax treatment of 'vices'.

The literature reviewed has the weakness of being confined mainly to findings from Britain and the US. But the evidence is virtually unanimous that gambling taxes add to the unfairness of the tax system and there is no reason to suppose that this finding is not applicable more widely. However, because gambling spending is usually lower than spending on alcohol and tobacco, gambling taxes are not such important contributors to inequity as duties on drinking and smoking.

3.6 Limitations on capacity to tax gambling

Gambling has traditionally been operated in highly protected markets whose very existence was dependent on government toleration of the activity and from which government could choose to extract economic rents through either high taxes or high profits from state-owned enterprises. The only constraint was that excessive taxation might induce customers to purchase services from the illegal sector instead. But this was often a minor constraint to the extent that illegal operators could not safely offer the very large prizes of state lotteries, nor would all consumers entrust their wagers to entities that could not be taken to law in the event of default on paying out winnings.

The discussion so far has related to such a world. It has focused on whether it is in the wider public interest that governments choose to use their power to exploit consumers through high taxation or restriction on supply. But such a debate may in future become less relevant. Governments may see the capacity of the gambling sector to bear traditionally high excise taxes wither away in the face of current international trends in the gaming sector. Two developments are discussed here, first the increasing geographical spread of destination casinos and second the explosion in the remote gambling sector.

3.6.1 The rise of the resort casino

Following the phenomenal success of Las Vegas, many jurisdictions around the world have aspired to, and indeed have delivered, modern resort-style casinos with an emphasis on machine gaming but with a range of other leisure facilities that make them appeal to a mass market. Atlantic City, Cape Town, Macao, Melbourne and Singapore are amongst the cities that have chosen to ape Las Vegas in building large modern-style casinos, often as a perceived catalyst to economic development or as a means of capturing leisure spending that would otherwise be diverted to another jurisdiction.

Europe has no casinos on this model. In their absence, such casinos as exist in Europe – small-scale, focused on table games and with very limited complementary leisure facilities – attract much lower visitor numbers and visitor spending than the casino sectors in America or Australasia. There have, however, been proposals for ‘super casinos’, in Manchester and Maastricht for example, and it is reasonable to suppose that, increasingly, states in the European Union will consider and aspire to host modern casino facilities to meet growing international demand (including that from their own citizens who might otherwise travel to other jurisdictions to enjoy gaming in a resort-style setting).

If European states want to host a modern casino sector, it is unlikely that they can continue to levy tax rates such as those imposed on existing casinos (Table 3.2). Basic gaming facilities, such as we observe in the EU, require limited capital investment and, in restricted numbers, are

capable of generating economic rents that can be captured by government; but Eadington and Christiansen (2003) document that resort-style casinos on the international model are highly capital-intensive and are unlikely to be feasible for developers unless tax rates are low and expected to remain so. The implication is that the marginal private return on capital employed in upgrading from basic to resort casino facilities is insufficient to support pre-existing tax rates. They provide evidence that only American states with relatively low tax rates on GGR have succeeded in attracting the sort of large-scale casinos that promote economic development as opposed merely to creating a revenue stream for government. Decisions on casino policy in Europe that would make the gambling sector more similar to that in other developed regions of the world may prove incompatible with tax rates of the magnitude imposed in the past. Of course, once one European state offered a tax regime that allowed it to host a modern casino on the international model, it is likely that it would attract visitors from nearby countries, which would then be pressured to retain spending at home by themselves offering tax concessions to permit development.

3.6.2 The rise of remote gambling

An even more striking trend in worldwide gambling than the rise of the resort casino is the growth in remote gambling, delivered through the technologies of interactive television, mobile phones or, especially, the internet. The last offers opportunities to gamble from home in all traditional modes (such as betting and lottery games) while also promoting forms of gambling, such as poker, that are seldom easily available in the land-based gambling industry. Data on the extent of internet gambling activity are still limited; but the Swiss Institute of Comparative Law (2006) quotes estimates from surveys that, for example, 1 million British residents and 25,000 Belgians used online casinos each month (2003) even though the countries did not host casino websites. This underlines that, without restraints, consumers can readily access gambling facilities worldwide. This poses a direct threat to the ability of European governments to extract tax revenue from gambling (or indeed to impose regulation to alleviate problem gambling). An illustration was that, in 2001, the UK government felt compelled to reform betting taxation, and considerably lower its effective level, in response to major UK bookmakers moving telephone and internet operations to offshore jurisdictions where there was a very low or zero tax rate[56].Remote gambling had proved a sufficiently close substitute to its land-based counterpart (the betting shop) that substantial amounts previously wagered in the UK had migrated to jurisdictions such as Gibraltar and this made the UK's traditional excise tax nonsustainable in the long run.

It may safely be predicted that availability of zero-tax gambling opportunities through the internet will lower the revenue-maximizing tax rate applicable to any given land-based national

[56] The UK changed not only the level of taxation but also the tax base. It replaced a high tax on stakes with a low tax on GGR. Paton, Siegel and Vaughan Williams (2002) demonstrate that the latter is a more efficient type of tax in the sense that it generates lower deadweight loss for given tax revenue.

gambling industry. Just how much it will be lowered depends on how close a substitute playing on the internet proves to be for playing in a traditional location. For the serious high-stakes horse or sports bettor focused on financial return, it may be a perfect substitute. For the sports fan keen to bet as an adjunct to viewing an event on television, it may even be a superior opportunity. But for those who enjoy the camaraderie of the bingo hall or the glitter of a casino, it may be a highly imperfect substitute. Similarly, as free access to television drama has not eliminated the cinema industry, so some types of gambling, such as bingo halls and casinos, will survive in land locations and subject to a positive tax that can be levied because of greater willingness to pay for gambling in a social environment.

But, in general, governments face the problem that access at minimal cost to tax-free gaming via the internet will erode or, in the limit, for some modes, eliminate its capacity to impose excise taxation on gamblers. The problem is likely to become more acute as suppliers devise new designs to make internet play more appealing or exciting than its land-based counterpart.

All this supposes that EU residents are, and will continue to be, free to access remote gambling facilities provided from other Member States or other jurisdictions with lower-tax regimes for gambling. In fact, several EU members have sought to protect their (explicit or implicit) tax revenue streams from gambling by preventing their citizens from using remote gambling opportunities provided from abroad. Thus, for example, Greece and Hungary prohibit gambling on foreign sites; France has prosecuted Austrian and British bookmakers for marketing betting services to its residents; the state-owned De Lotto sued the UK bookmaker Ladbrokes for selling to Netherlands customers without a Dutch license; and Denmark, in its 2001 policy paper ‘National Internet Gambling Strategy’ (cited by the Swiss Institute of Comparative Law (2006, page 1176)), proposed regulation in the banking sector to block payments to foreign gambling enterprises (a mechanism adopted in recent American legislation to enforce prohibition of internet gaming).

Such restrictive policies are open to legal challenge in regard to whether they are consistent with commitment to the single European market and the services directive or, in a wider international context, with obligations under the World Trade Agreement. As in the Gambelli case or the recent case of Antigua v. The United States of America, courts with transnational jurisdiction may view such measures as protectionist and unlawful. But, in any case, it is not clear that obstacles to individuals making use of the internet are either technically practicable or politically acceptable in the long run. The existence of remote gaming opportunities remains likely to force down levels of taxation on gambling as time goes on, much as the arrival of new gaming opportunities has compelled lottery agencies in the US to accept reduced takeouts (Kearney, 2005).

One policy response, adopted by Malta and, through its 2005 Gambling Act, by the UK, has been actively to promote a country as a location for international gaming providers. Jurisdictions that construct a sound regulatory framework, where bettors can be confident in the probity of operators and safe from malpractice, such as use of subliminal advertising, may be an attractive base for internet gaming given the right package of business and gambling taxes. The notion is that some tax can be levied because bettors are willing to pay something extra for high-quality jurisdictional services. This is plausible but the amount consumers are willing to pay may in fact be quite low. Further, there are states throughout the world, such as Singapore and New Zealand, that enjoy a good reputation for effective policing of financial services and that could similarly enter the market, driving down the long-run price any jurisdiction could charge for hosting international firms.

Of course, similar constraints on the ability of states to tax arise also from the possibilities for cross-border trade in alcohol and cigarettes. But the problem is potentially more acute in the case of gambling services because transport costs are essentially zero. Further, it is more feasible to block, for example, supplies of cigarettes sent through the mail from China than it is to police internet transactions conducted with gaming firms domiciled in the Caribbean. Thus the internet will provide real constraints because of availability of supply from jurisdictions outside the EU.

Within the EU, attempts have been made to limit tax competition between states by agreeing minimum rates of duty on tobacco products. These may be justified by the real resource cost generated when people and goods move around Europe in response to differences in rates of excise tax. Such an agreement would be hard to reach for gambling products because of widespread state ownership that makes comparison of effective tax rates difficult across jurisdictions. But the argument for harmonization in gambling is weaker anyway because consumers shopping around for improved value-for-money use minimal real resources where transactions are electronic. European governments should perhaps be content to reach agreement on minimum levels of protection for problem gamblers, to be specified within their national frameworks of regulation of internet gaming.

It may be concluded that governments' ability to force gamblers to accept poor value-for-money through excise taxes or restrictions on supply will weaken over time. Given the relatively low dependence of national governments on tax revenue from gambling (compared with alcohol and tobacco taxation), this is perhaps not too serious a policy issue. Indeed, given that special gambling taxes, as argued above, appear hard to justify when evaluated in terms of standard efficiency and equity criteria, the changes ahead may in fact be welfare-enhancing.

Discussion

Lisa Farrell*

If the control of problem gambling through taxation is inefficient and inequitable then the obvious next question to ask is 'How should we deal with problem gambling?'. The answer seems to lie in the education of the players (a public health promotion response) and the regulation of the industry and products it provides (an industrial policy response). Given that the consumer surplus accrued by recreational players is large, regulation and policies targeted at problem gamblers offer an alternative to blanket taxation. This discussion will focus on suggestions and examples of such policies that have been / could be adopted.

Gamblers often state that they were not aware of the risks of becoming addicted when they first started gambling, and the obvious response to this is to run public awareness campaigns such as those implemented by most governments for drink-driving and the health risks of smoking. The available evidence from these campaigns suggests that this kind of public health initiative is effective in terms of altering behaviour. It is also possible for governments to regulate advertising. Alcohol and tobacco advertising are heavily regulated but gambling products such as lotto are commonly advertised. It seems that, given the potentially addictive nature of gambling, there are grounds to apply special controls on the advertising of gambling products, especially in terms of the information they provide to players about the odds of winning. Importantly, whilst the regulation regarding the advertising of gambling products varies widely across products and between countries, there are very few studies that have looked at the impact of advertising on gambling behaviour.

Another frequent comment from problem gamblers is that they experience a 'loss of control', and so one might seek policy instruments that address this aspect of behaviour. Many players of electronic gaming machines in Australia have loyalty cards. These cards are used by venues to encourage players to play in their venue, as opposed to competitors' venues, by offering loyalty bonuses of various kinds. Since these cards record information about an individual's transactions, it would be possible for them to be used periodically to provide a player with his transaction history for his current spell of play. Equally, it is possible for telephone bettors or internet bettors to be provided with transaction histories periodically within any spell of participation. In this way, players would be reminded of their expenditure that period and be less likely to get 'carried away'. Whilst the technology is in existence, we know of no jurisdictions that currently compel providers to deliver transaction histories to players.

* Lisa Farrell, Geary Institute, University College Dublin, Belfield, Dublin 4, Ireland; lisafarrell@ucd.ie

It is also possible for governments to regulate the gambling environment. Accessibility is important in terms of the potential to become addicted. Opening hours and the frequency of events such as horse race meets are all within the control of governments and are effective tools in controlling the frequency with which players can participate (an issue associated with problem gambling). Access to credit, ATMs and check-cashing can also be regulated, as can the provision of clocks and daylight in gaming venues to prevent players losing track of the length of time they have been gambling. The provision of alcohol and allowing smoking in gaming venues are also environmental factors that governments can regulate and control. There is also a spectrum of venue policies that governments could utilize in order to control problem gamblers. Interestingly, it is illegal to sell alcohol to someone who is intoxicated but there are no such requirements for venues to withdraw gambling services from players suffering from addiction. Of course, such a policy would rely on an operator's ability to identify problem gamblers. A more feasible approach might be to offer self-exclusion options. New South Wales in Australia, for example, allows self-identified problem gamblers to enter into a written contract with a gambling provider that they may not enter the venue (with the gambler being liable for any violations of the contract). Employees are made aware of self-excluders and the venues make reasonable attempts to enforce the exclusion contract. Indeed, it might even be possible for courts of law to use exclusion contracts as sentences for people committing crimes and using gambling addiction as a defence. Finally, careful regulation of the forms of gambling available could be successful in preventing problem gambling. There is a vast literature noting characteristics of games that have the potential to lead to addiction and it is important in an industry at the forefront of technology that new products are monitored and regulated in the players' (and society's) best interests.

In summary, it seems that given the economic arguments against the high taxation of gambling products based on inefficiency and inequity, regulation and public health approaches may be more effective policy instruments for controlling problem gambling. Moreover, the level of technology within the industry offers innovative ways to regulate this industry in the interests of player protection.

References

Adams, E.K., C. Melvin, R. Merritt and B. Worrall, 1999, The Costs of Environmental Tobacco Smoke (ETS): An International Review, background paper prepared for the World Health Organization Framework Convention on Tobacco Control (FCTC), International Consultation on Environmental Tobacco Smoke (ETS) and Child Health. Available at http://www.who.int/tobacco /framework /consultation/ets2/en/, accessed 4 September 2007.

Adda, J. and F. Cornaglia, 2006, The Effect of Taxes and Bans on Passive Smoking, IZA Discussion Paper 2191, Institute for the Study of Labour, Bonn.

Anderson, P. and P. Baumberg, 2006, Alcohol in Europe, Institute of Alcohol Studies, London.

Atkinson, A.B. and J.E. Stiglitz, 1976, The Design of Tax Structure: Direct versus Indirect Taxation, *Journal of Public Economics*, vol. 6, pp. 55-75.

Australian Productivity Commission, 1999, Australia's Gambling Industries, Report 10, AusInfo, Canberra

Babor, T.F., R. Caetano, S.Casswell, G.Edwards, N.Giesbrecht, K.Graham, J.Grube, P. Gruenewald, L. Hill, H. Holder, R. Homel, E. Österberg, E.J. Rehm, and I. Rossow, 2003, Alcohol: No Ordinary Commodity – Research and Public Policy, Oxford University Press, Oxford.

Barendregt, J.J., L. Bonneux and P.J. van der Maas, 1997, The Health Care Costs of Smoking, New England, *Journal of Medicine*, vol. 337, pp. 1052-1057.

Becker, G.S. and K.M. Murphy, 1988, A Theory of Rational Addiction, *Journal of Political Economy*, vol. 96, pp. 675-700.

Bergmann, E. and K. Horch, 2002, Kosten Alkoholassozierter Krankheiten: Schätzung für Deutschland, Robert Koch Institut, Berlin.

Bonomo, Y.A., G. Bowes, C., Coffey, J.B. Carlin, and G.C. Patton, 2004, Teenage Drinking and the Onset of Alcohol Dependence: A Cohort Study over Seven Years, Addiction 99, 1520-1528.

Borg, M. and H. Stranahan, 2004, Some Futures are Brighter than Others: The Net Benefits Received by Florida Bright Futures Recipients, *Public Finance Review*, vol. 32, pp. 105-126.

Bovenberg, A.L. and R.A. de Mooij, 1994, Environmental Levies and Distortionary Taxation, *American Economic Review*, vol. 84, pp. 1085-1089.

Browning, M. and C. Meghir, 1991, The Effects of Male and Female Labour Supply on Commodity Demands, *Econometrica*, vol. 59, pp. 925-951.

Bundesministerium der Finanzen, 2005, Bericht der Bundesregierung über die Auswirkungen des Alkopopsteuergesetzes auf den Alkoholkonsum von Jugendlichen unter 18 Jahren sowie die Marktentwicklung von Alkopops und vergleichbaren Getränken, www.bmg.bund.de /nn_604822/SharedDocs/Download/DE/Presse/Pressemitteilungen/Presse-Drogenbeauftragte-2005/pdf-Alkopopsteuerbericht-pdf,templateId=raw,property=publicationFile.pdf/pdf-Alkopopsteuerbericht-pdf.pdf.

Byrne, S., 2005, The Cost of Alcohol-Related Problems in Ireland, Institute of Technology, Dublin.

Caetano, R. and C. Cunradi, 2002, Alcohol Dependence: A Public Health Perspective, *Addiction*, vol. 97(6), pp. 633-645.

Callingham, M., 2002, National Association for Children of Alcoholics (NACOA) Survey: Initial Findings, www.nacoa.org.uk/pdf/Summary_of_Callingham_research.pdf.

Chaloupka, F.J., 1991, Rational Addictive Behaviour and Cigarette Smoking, *Journal of Political Economy*, vol. 99, pp. 722-742.

Chaloupka, F.J., T-W. Hu, K.E. Warner, R. Jacobs and A. Yurekli, 2000, The Taxation of Tobacco Products, in: P. Jha and F.J. Chaloupka (eds.), Tobacco Control in Developing Countries, Oxford University Press, Oxford, pp. 237-272.

Chaloupka, F.J. and K.E. Warner, 2000, The Economics of Smoking, in: A.J. Culver and J.P. Newhouse (eds.), *Handbook of Health Economics*, volume.1B, Elsevier, New York, pp. 1539-1627.

Chaloupka, F.J. and H. Wechsler, 1997, Price, Tobacco Control Policies and Smoking among Young Adults, *Journal of Health Economics,* vol. 16, pp. 359-373.

Chisholm, D., J. Rehm, M van Ommeren, and M. Monteiro, 2004, Reducing the Global Burden of Hazardous Alcohol Use: A Comparative Cost-Effectiveness Analysis, *Journal of Studies in Alcohol*, vol. 65, pp. 782-793.

Christiansen, V. and S. Smith, 2004, National Policy Interests in the Duty-Free Market, CESifo Economic Studies 50, pp. 351-375.

Christiansen, V. and S. Smith, 2008, Optimal Commodity Taxation with Duty-Free Shopping, *International Tax and Public Finance*, vol. 15, pp. 274-296.

Christiansen, V. and S. Smith, 2008, Taxation and Regulation, paper presented at the IIPF conference, Maastricht, August.

Clotfelter, C.T., 2005, Gambling Taxes, in: S. Cnossen (ed.), *Theory and Practice of Excise Taxation*, Oxford University Press, Oxford, pp. 84-119.

Clotfelter, C.T. and P.J. Cook, 1989, Selling Hope: State Lotteries in America, Harvard University Press, Cambridge MA.

Cnossen, S., 2006, Tobacco Taxation in the European Union, *FinanzArchiv*, vol. 62, pp. 305-322.

Cnossen, S., 2007, Alcohol Taxation and Regulation in the European Union, *International Tax and Public Finance*, vol. 14, pp. 699-732.

Cnossen, S., 2007, Tobacco Taxation in the EU: Increasing Simplicity and Economic Rationality, *Tax Notes International*, vol. 48, pp. 397-407.

Cnossen, S., and M. Smart, 2005, Taxation of Tobacco, in: S. Cnossen (ed.), Theory and Practice of Excise Taxation: Smoking, Drinking, Gambling, Polluting and Driving, Oxford University Press, Oxford, pp. 20-55.

Colhoun, H., Y. Ben-Shlomo, W. Dong, L. Bost and M. Marmot, 1997, Ecological Analysis of Collectivity of Alcohol Consumption in England: Importance of Average Drinker, *British Medical Journal*, vol. 314(7088), pp. 1164-1168, bmj.bmjjournals.com/cgi/content/full/314/7088/1164.

Collicelli, C., 1996, Income from Alcohol and the Costs of Alcoholism, *Alcologia*, vol. 8, pp. 135-143.

Collins, D. and H. Lapsley, 2002, Counting the Cost: Estimates of the Social Costs of Drug Abuse in Australia in 1998–9, Australian Government Printing Service, Canberra.

Congressional Budget Office, 1990, Federal Taxation of Tobacco, Alcoholic Beverages and Motor Fuels, US Government Printing Office, Washington DC.

Cook, C.H. and H.D. Gurling, 2001, Genetic Predisposition to Alcohol Dependence and Problems, in: N. Heather, T.J. Peters and T. Stockwell (eds*.), International Handbook of Alcohol Problems and Dependence*, Wiley, New York, pp. 257-279.

Cook, P.J. and M.J. Moore, 2002, The Economics of Alcohol Abuse and Alcohol-Control Policies, *Health Affairs*, vol. 21, pp. 120-133.

Corlett, W.J. and D.C. Hague, 1953, Complementarity and the Excess Burden of Taxation, *Review of Economic Studies*, vol. 21, pp. 21-30.

Corrao, G., R. Luca, V. Bagnardi, A. Zambon and K. Poikolainen, 2000, Alcohol and Coronary Heart Disease: A Meta-Analysis, *Addiction*, vol. 95, pp. 1505-1523.

Crane, Y., 2006, New Casinos in the United Kingdom: Costs, Benefits and Other Considerations, Ph.D. thesis, University of Salford.

Crawford, I., M. Keen and S. Smith, 2008, VAT and Excises, paper prepared for the Mirrlees Review, Reforming the Tax System for the 21st Century, Institute for Fiscal Studies, London.

Crawford, I. and S. Tanner,1995, Bringing It All Back Home: Alcohol Taxation and Cross-Border Shopping, *Fiscal Studies*, vol. 16(2), pp. 94-114.

Crawford, I., Z. Smith and S. Tanner, 1999, Alcohol Taxes, Tax Revenues and the Single European Market, *Fiscal Studies*, vol. 20, pp. 287-304.

Crooks, E., 1989, Alcohol Consumption and Taxation, Report 34, Institute for Fiscal Studies, London.

Deaton, A., and N. Stern, 1986, Optimally Uniform Commodity Taxes, Taste Differences and Lump Sum Grants, *Economics Letters*, vol. 20, pp. 263-266.

Delipalla, S. and M. Keen, 1992, The Comparison between Ad Valorem and Specific Taxation under Imperfect Competition, *Journal of Public Economics*, vol. 49, pp.351-367.

Delipalla, S. and M. Keen, 2006, Product Quality and the Optimal Structure of Commodity Taxes, *Journal of Public Economic Theory*, vol. 8, pp.547-554.

Devlin, N.J., P.A. Scuffham and L.J. Bunt, 1997, The Social Costs of Alcohol Abuse in New Zealand, *Addiction*, vol. 92, pp. 1491-1505.

Diamond, P., 1973, Consumption Externalities and Imperfect Corrective Pricing, *Bell Journal of Economics*, vol. 4(2), pp. 526-538.

Dodgson, J., S. Maunders and N. Chesters, 2004, Regional Casinos and Problem Gambling, National Economic Research Associates, London.

Eadington, W.R., 1999, The Economics of Casino Gambling, *Journal of Economic Perspectives*, vol. 13, pp. 173-192.

Eadington, W.R. and E.M. Christiansen, 2003, The Future of the Casino Industry: Strategic Considerations in Light of Changing Market Conditions, paper presented at the 12th International Conference on Gambling and Risk-Taking, Vancouver BC.

English, D.R., C.D. Holman, E. Milne, M.J. Winter, G.K. Hulse, G. Codde, C.I. Bower, B. Cortu, N. de Klerk, G.F. Lewin, M. Knuiman, J.J. Kurinczuk and G.A. Ryan, 1995, The Quantification of Drug Caused Morbidity and Mortality in Australia, Commonwealth Department of Human Services and Health, Canberra.

European Commission, 2004, Report from the Commission to the Council, the European Parliament and the European Economic and Social Committee on the Rate of Excise Duty Applied on Alcohol and Alcoholic Beverages, COM(2004) 223 final, Brussels.

European Commission, 2006, Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions: An EU Strategy to Support Member States in Reducing Alcohol Related Harm, COM(2006) 625 final, Brussels.

European Commission, 2008, Excise Duty Tables, Part I – Alcoholic Beverages, July.

European Transport Safety Council, 2003, Cost-Effective EU Transport Safety Measures, Brussels, www.etsc.be/documents/costeff.pdf.

Evans, W.N. and C. Farrelly, 1998, The Compensating Behaviour of Smokers: Taxes, Tar, and Nicotine, *RAND Journal of Economics*, vol. 29, pp. 578-595.

Evans, W.N., J.S. Ringel and D. Stech, 1999, Tobacco Taxes and Public Policy to Discourage Smoking, *Tax Policy and the Economy*, vol. 13, pp. 1-56.

Farrell, L. and I. Walker, 1999, The Welfare Effects of Lotto: Evidence from the UK, *Journal of Public Economics*, vol. 72, pp. 99-120.

Farrell, S., W.G. Manning and M.D. Finch, 2003, Alcohol Dependence and the Price of Alcoholic Beverages, *Journal of Health Economics*, vol. 22, pp. 117-147.

Feehan, P. and D. Forrest, 2007, The Distribution of UK Lottery Grants across Local Authority Areas, *Applied Economics Letters*, vol. 14, pp. 361-365.

Focal Research, 1998, Nova Scotia Video Lottery Players Survey 1997–9, Nova Scotia Department of Health, Problem Gambling Services, Halifax NS.

Forrest, D., 2003, Time Series Modelling of the Demand for Lotteries, in: L. Vaughan Williams (ed.), *The Economics of Betting*, Routledge, London, pp. 182-203.

Forrest, D. and O.D. Gulley, 2008, Participation and Level of Play in the UK National Lottery and Correlation with Spending on Other Modes of Gambling, International Gambling Studies, International Gambling Studies.

Friedman, M. and L. Savage, 1948, The Utility Analysis of Choices Involving Risk, *Journal of Political Economy*, vol. 56, pp. 279-304.

Fenoglio, P., V. Parel and P. Kopp, 2003, The Social Cost of Alcohol, Tobacco and Illicit Drugs in France, 1997, *European Addiction Research*, vol. 9, pp. 18-28.

Garcia-Sempere, A. and E. Portella, 2002, Los estudios del coste del alcoholismo: marco conceptual, limitaciones y resultados en España, *Addiciones*, vol. 14, pp. 141-153.

Greenfield, T.K. and J.D. Rogers, 1999, Who Drinks Most of the Alcohol in the U.S.? The Policy Implications, *Journal of Studies on Alcohol*, vol. 60, pp. 78-89.

Griffiths, M. 1999, Some Comments on 'Health-Related Correlates of Gambling on the British National Lottery' by Reid et al., *Psychological Reports*, vol. 85, pp. 143-144.

Goel, R.K., and Nelson, M.A., 2006, The Effectiveness of Anti-Smoking Legislation: A Review, *Journal of Economic Surveys*, vol. 20, pp. 325-355.

Grossman, M., J.L. Sindelar, J. Mullahy and R. Anderson, 1993, Policy Watch: Alcohol and Cigarette Taxes, *Journal of Economic Perspectives*, vol. 7(4), pp. 211-221.

Grossman, M., F. Chaloupka and I. Sirtalan, 1998, An Empirical Analysis of Alcohol Addiction: Results from the Monitoring the Future Panels, *Economic Inquiry*, vol. 36, pp. 39-48.

Gruber, J., 2001, Tobacco at the Crossroads: The Past and Future of Smoking Regulation in the United States, *Journal of Economic Perspectives*, vol. 15(2), pp. 193-212.

Gruber, J. and B. Koszegi, 2001, Is Addiction 'Rational'? Theory and Evidence, *Quarterly Journal of Economics*, vol. 116, pp. 1261-1303.

Gruber, J. and B. Koszegi, 2002, A Theory of Government Regulation of Addictive Bads: Optimal Levels and Tax Incidence for Cigarette Excise Taxation, Working Paper 8777, National Bureau of Economic Research, Cambridge MA.

Gruber, J., and B. Köszegi, 2004, Tax Incidence when Individuals Are Time-Inconsistent: The Case of Cigarette Excise Taxes, *Journal of Public Economics*, vol. 88, pp.1959-1987.

Gruber, J. and S. Mullainathan, 2005, Do Cigarette Taxes Make Smokers Happy? Advances in Economic Analysis and Policy, vol. 5, pp. 1-43.

Gulley, O.D. and F.A. Scott, 1993, The Demand for Wagering on State-Operated Lottery Games, *National Tax Journal*, vol. 45, pp. 13-22.

Harding, W.M., B.D. Caudill, B.A. Moore and K.C. Frissell, 2001, Do Drivers Drink More When They Use a Safe Ride?, *Journal of Substance Abuse*, vol. 13, pp. 283-290.

Harris, J.E., 1980, Taxing Tar and Nicotine, *American Economic Review*, vol. 70, pp. 300-311.

Harwood, H., D. Fountain and G. Livermore, 1999, Cost Estimates for Alcohol and Drug Abuse, *Addiction*, vol. 94, pp. 631-634.

Her, M., N. Giesbrecht, R. Room and J. Rehm, 1999, Privatizing Alcohol Sales and Alcohol Consumption: Evidence and Implications, *Addiction*, vol. 94, pp. 1125-1139.

Hibell, B., B. Andersson, T. Bjarnason, S. Ahlström, O. Balakireva, A. Kokkevi and M. Morgan, 2004, The ESPAD Report 2003: Alcohol and Other Drug Use among Students in 35 European Countries, Swedish Council for Information on Alcohol and Other Drugs (CAN) and the Pompidou Group at the Council of Europe, Stockholm, www.espad.org.

High Level Group on Fraud in the Tobacco and Alcohol Sectors, 1998, Report to Directors General for Customs and Indirect Taxation, ec.europa.eu/taxation_customs/ resources / documents/taxation/excise_duties/circulation_control/studies_reports/Tobacco_and_alcohol_fraud_report_en.pdf.

HM Customs and Excise, 2004, Measuring and Tackling Indirect Tax Losses – 2004, HMSO, London, customs.hmrc.gov.uk/channelsPortalWebApp/channelsPortalWebApp.portal?_nfpb=true&_pageLabel=pageVAT_ShowContent&propertyType=document&columns=1&id=HMCE_PROD_011582.

HM Revenue and Customs, 2006, Measuring Indirect Tax Losses – 2006. Available at http://customs.hmrc.gov.uk/channelsPortalWebApp/downloadFile?contentID=HMCE_PROD1_026423, accessed 4 September 2007.

Horlings, E. and A. Scoggins, 2006, An Ex Ante Assessment of the Economic Impacts of EU Alcohol Policies, RAND Europe, Cambridge, UK.

Hornsby, R. and D. Hobbs, 2007, A Zone of Ambiguity: The Political Economy of Cigarette Bootlegging, *British Journal of Criminology*, vol. 47, pp. 551-571.

Institute of Alcohol Studies, 2003, Economic Costs and Benefits, IAS Fact Sheet, 14 November.

Kanbur, R., and M. Keen, 1993, Jeux sans Frontières: Tax Competition and Tax Coordination when Countries Differ in Size, *American Economic Review*, vol. 83, pp. 877-892.

Karlsson, T. and C. Tigerstedt, 2005, Alcohol Policy: Changing Climate and Changing Structures in the Nordic Countries, presentation at Alcohol – Use, Harms and Policy, a research-based Nordic-Baltic Seminar, Riga, 3 October.

Kearney, M.S., 2005, The Economic Winners and Losers of Legalised Gambling, *National Tax Journal*, vol. 58, pp. 281-302.

Keen, M., 1998, The Balance between Specific and Ad Valorem Taxation, *Fiscal Studies*, vol. 19, pp. 1-37.

Kenkel, D.S., 1993, Drinking, Driving and Deterrence: The Effectiveness and Social Cost of Alternative Policies, *Journal of Law and Economics*, vol. 26, pp. 877-913.

Kenkel, D.S., 1996, New Estimates of the Optimal Tax on Alcohol, *Economic Inquiry*, vol. 34, pp. 296-319.

KPMG, 2001, Excessive Alcohol Consumption in the Netherlands: Trends and Social Costs, KPMG Economic Consulting, Hoofddorp, the Netherlands.

Lee, C., Pearson, M., and S. Smith, 1988, Fiscal Harmonisation: An Analysis of the Commission's Proposals, Report Series 28, Institute for Fiscal Studies, London.

Leifman, H., 2001, Estimations of Unrecorded Alcohol Consumption Levels and Trends in 14 European Countries, *Nordisk Alkohol- & Narkotikatidskrift*, vol. 18, pp. 54-70.

Lemmens, P., 2001, Relationship of Alcohol Consumption and Alcohol Problems at the Population Level, in: N. Heather, T.J. Peters, and T. Stockwell (eds.), *International Handbook of Alcohol Dependence and Problems*, Wiley, New York, pp. 395-411.

Levine, P.B., T.A. Gustafson and A.D. Valenchik, 1997, More Bad News for Smokers? The Effects of Cigarette Smoking on Wages, *Industrial and Labour Relations Review*, vol. 50, pp. 493-509.

Lewit, E.M., and D. Coate, 1982, The Potential for Using Excise Taxes to Reduce Smoking, *Journal of Health Economics*, vol. 1, pp. 121-145.

Lewit, E.M., D. Coate and M. Grossman, 1981, The Effects of Government Regulation on Teenage Smoking, *Journal of Law and Economics*, vol. 24, pp. 545-569.

Lightwood, J., D. Collins, H. Lapsley and T.E. Novotny, 2000, Estimating the Costs of Tobacco Use, in: P. Jha and F.J. Chaloupka (eds.), Tobacco Control in Developing Countries, Oxford University Press, Oxford, pp. 63-103.

Lima, E. and T. Esquedro, 2003, The Economic Costs of Alcohol Misuse in Portugal, Working Paper 24, Nucleo de Investigaçao em Microeconomica Alicada, Universidade do Minho.

Livingstone, C., R. Woolley and J. Borrell, 2006, The Changing Electronic Gaming Machine (EGM) Industry and Technology, Office of Gaming and Racing, Victorian Government Department of Justice, Melbourne.

London Economics, 2006, The Case for State Lotteries, Report for the State Lottery and Toto Association, London Economics, London.

Lyon, A.B. and R.M. Schwab, 1995, Consumption Taxes in a Life-Cycle Framework: Are Sin Taxes Regressive?, *Review of Economics and Statistics*, vol. 77, pp. 389-406.

MacDonald, Z. and M.A. Shields, 2001, The Impact of Alcohol Consumption on Occupational Attainment in England, *Economica*, vol. 68, pp. 427-453.

Manning, W.G., L. Blumberg, and L.H. Moulton, 1995, The Demand for Alcohol: The Differential Response to Price, *Journal of Health Economics*, vol. 14, pp. 123-148.

Manning, W.G., E.B. Keeler, J.P. Newhouse, E.M. Sloss and J. Wasserman, 1989, The Taxes of Sin: Do Smokers and Drinkers Pay Their Way?, *Journal of the American Medical Association*, vol. 261, pp. 1604-1609.

Markandya, A., 1999, Risk Rationality and the Consumption of Tobacco, in: C. Jeanrenaud and N. Soguel (eds.), *The Social Costs of Tobacco Consumption*, Kluwer Academic Publishers, Dordrecht, pp. 171-187.

Mathijssen, R., 2005, An Alcohol Interlock Program, Traffic Injury Research Foundation, Ottawa.

Matthews, S, and A. Richardson, 2005, Findings from the 2003 Offending, Crime and Justice Survey: Alcohol-Related Crime and Disorder, Home Office Findings 261, London, www.homeoffice.gov.uk/rds/pdfs05/r261.pdf.

Maynard, A., C. Godfrey and G. Hardman, 1994, Conceptual Issues in Estimating the Social Costs of Alcohol, paper prepared for an international symposium on the Economic Costs of Substance Abuse, Banff, Canada, 11–13 May, www.ccsa.ca/pdf/ccsa-005409-1994.pdf.

Miller, T.R. and L.J. Blincoe, 1994, Incidence and Costs of Alcohol-Involved Crashes in the United States, *Accident Analysis and Prevention*, vol. 26(5), pp. 583-592.

Mirrlees-Black, C., 1999, Domestic Violence: Findings from a New British Crime Survey Self-Completion Questionnaire, Home Office Research Study 191, Home Office, London.

Mobilia, P., 1993, Gambling as a Rational Addiction, Journal of Gambling Studies 9, 121-151. National Gambling Impact Study Commission (1999), Final Report, National Gambling Impact Commission, Washington DC.

O'Donoghue, T. and M. Rabin, 2003, Studying Optimal Paternalism, Illustrated by a Model of Sin Taxes, *American Economic Review*, vol.93(2), pp. 186-191.

O'Donoghue, T. and M. Rabin, 2006, Optimal Sin Taxes, *Journal of Public Economics*, vol. 90, pp. 1825-1849.

OECD, 2006, Revenue Statistics 1965–2005, Organization for Economic Cooperation and Development, Paris.

O'Hagan, J., 1998, The Taxation of Tobacco, in Sandford, C. (ed.), Further Key Issues in Tax Reform, Fiscal Publications, Bath, pp. 27-43.

Orphanides, A., and D. Zervos, 1995, Rational Addiction with Learning and Regret, *Journal of Political Economy*, vol. 103, pp. 739-758.

Österberg, E. and T. Karlsson, 2003, Alcohol Policies in EU Member States and Norway: A Collection of Country Reports, available on the European Commission's public health website.

Pacolet, J., T. Degreef and R. Bouten, 2003, Sociale kosten-batenanalyse van alcoholgebruik en -misbruik in België, KUL, Hoger instituut voor de arbeid, Leuven.

Pakko, M.R., 2008, No Smoking at the Slot Machines: The Effect of a Smoke-Free Law on Delaware Gaming Revenues, *Applied Economics*, vol. 40, pp. 1769-1774.

Parry, I.W.H., 2003, On the Costs of Excise Taxes and Income Taxes in the UK, *International Tax and Public Finance*, vol. 10, pp. 281-304.

Parry, I.W.H. and S.E. West, 2007, Fiscal and Externality Rationales for Alcohol Policies, paper presented at the 63rd Congress of the International Institute of Public Finance, Warwick, UK, August.

Paton, D., D.S. Siegel and L. Vaughan Williams, 2002, A Policy Response to the E-Commerce Revolution: The Case of Betting Taxation in the UK, *Economic Journal*, vol. 112, pp. 296-314.

Pechman, J.A., 1985, Who Paid the Taxes, 1966–85, Brookings Institution, Washington DC.

Peck, R., F.J. Chaloupka, P. Jha and J. Lightwood, 2000, A Welfare Analysis of Tobacco Use, in: P. Jha and F. Chaloupka (eds.), *Tobacco Control in Developing Countries*, Oxford University Press on behalf of the World Bank and the World Health Organization, Oxford, pp. 131-151.

Peele, S. and A. Brodsky, 2000, Exploring Psychological Benefits associated with Moderate Alcohol Use, *Drug and Alcohol Dependence*, vol. 60, pp. 221-247.

Peirson, J., 2007, An Economic Analysis of Problem Gambling, Working Paper, University of Kent at Canterbury, Canterbury.

Petry, N., F. Stinson and B. Grant, 2005, Comorbidity of DSM-IV Pathological Gambling and Other Psychiatric Disorders: Results from the National Epidemiologic Survey on Alcohol and Related Conditions, *Journal of Clinical Psychiatry*, vol. 66, pp. 564-574.

Pogue, T.F. and L.G. Sgontz, 1989, Taxing to Control Social Costs: The Case of Alcohol, *American Economic Review*, vol. 79, pp. 235-243.

Poterba, J.M., 1989, Lifetime Incidence and the Distributional Burden of Excise Taxes, *American Economic Review*, vol. 79, pp. 325-330.

Powell, L.M., J.A. Tauras and H. Ross, 2005, The Importance of Peer Effects, Cigarette Prices and Tobacco Control Policies for Youth Smoking Behaviour, *Journal of Health Economics*, vol. 24, pp. 950-968.

Ramsey, F., 1927, A Contribution to the Theory of Taxation, *Economic Journal*, vol. 37, pp. 47-61.

Rasmussen, S.R., E. Prescott, T.I.A. Sørensen and J. Søgaard, 2005, The Total Lifetime Health Cost Savings of Smoking Cessation to Society, *European Journal of Public Health*, vol. 15, pp. 601-606.

Rehn, N., R. Room and G. Edwards, 2001, Alcohol in the European Region: Consumption, Harm and Policies, WHO Regional Office for Europe, Copenhagen.

Ridolfo, B. and C. Stevenson, 2001, The Quantification of Drug-Caused Mortality and Morbidity in Australia, 1998, Australian Institute of Health and Welfare, Canberra.

Rose, G. and S. Day, 2001, The Mean Population Predicts the Number of Deviant Individuals, *British Medical Journal*, vol. 301, pp. 1031-1034.

Rosenthal, R. and T. Fong, 2004, The Etiology of Pathological Gambling, Report to the California Office of Problem Gambling, Sacramento CA.

Saffer, H. and F.J. Chaloupka, 1994, Alcohol Tax Equalization and Social Costs, *Eastern Economic Review*, vol. 20, pp. 33-43.

Salomaa, J., 1995, The Costs of the Detrimental Effects of Alcohol Abuse Have Grown Faster than Alcohol Consumption in Finland, *Addiction*, vol. 90, pp. 525-537.

Sandmo, A., 1976, Direct versus Indirect Pigouvian Taxation, *European Economic Review*, vol. 7, pp. 337-349.

Settertobulte, W., B.B. Jensen and K. Hurrelman, 2001, Drinking among Young Europeans, WHO Regional Office for Europe, Copenhagen.

Shults, R.A., R.W. Elder, D.A. Sleet, J.L. Nicholas, M.O. Alao, V.G. Carande-Kulis, S. Zaza, D.M. Sosin, R.S. Thompson and the Task Force on Community Preventive Services, 2001, Reviews of Evidence Regarding Interventions to Reduce Alcohol-Impaired Driving, *American Journal of Preventive Medicine*, vol. 21, pp. 66-88.

Single, E., and B. Easton, 2001, Estimating the Economic Costs of Alcohol Misuse: Why We Should Do It even though We Shouldn't Pay Too Much Attention to the Bottom-Line Results, paper presented at Kettil Bruun Society for Social and Epidemiological Research on Alcohol, Toronto, Canada, May, www.eastonbh.ac.nz/article107.html.

Single, E., L. Robson and X. Xie, 1996, The Costs of Substance Abuse in Canada: A Cost Estimation Study, Canadian Centre on Substance Abuse, Ottawa.

Skog, O.-J., 2001, Commentary on Gmel and Rehm's Interpretation of the Theory of Collectivity of Drinking Culture, *Drug and Alcohol Review*, vol. 20, pp. 325-331.

Smith, S., 2005, Economic Issues in Alcohol Taxation, in: S. Cnossen (ed.), *Theory and Practice of Excise Taxation: Smoking, Drinking, Gambling, Polluting, and Driving*, Oxford University Press, Oxford, pp. 56-83.

Smith, S., 2008, Lotteries as a Source of Revenue, in: M. Viren (ed.), *Lotteries in a Changing Market Environment*, Palgrave Macmillan, Basingstoke, pp. 99-125.

Strategic Task Force on Alcohol, 2004, Interim Report, Department of Health and Children, Dublin.

Suits, D., 1977, Measurement of Tax Progressivity, *American Economic Review*, vol. 67, pp. 747-752.

Sundhedsministeriet, 1999, De samfundsøkonomiske konsekvenser af alkoholforbrug, 2nd edition, Ministry of Health, Copenhagen, www.im.dk/publikationer/alkoholrapport/index.htm.

Swiss Institute of Comparative Law, 2006, Study of Gambling Services in the Internal Market of the European Union, Swiss Institute of Comparative Law, Lausanne.

Thalheimer, R. and M. Ali, 2008, The Demand for Casino Gaming with Special Reference to a Smoking Ban, *Economic Inquiry*, vol. 46, pp. 273-282.

UK Cabinet Office, 2003, Alcohol Misuse: How Much Does It Cost?, Strategy Unit, London, www.cabinetoffice.gov.uk/upload/assets/www.cabinetoffice.gov.uk/strategy/econ.pdf.

Van Ours, J., 2004, A Pint a Day Raises a Man's Pay; but Smoking Blows that Gain Away, *Journal of Health Economics*, vol. 23, pp. 863-886.

Viscusi, W.K., 1992, Smoking: Making the Risky Decision, Oxford University Press, New York.

Viscusi, W.K., 1995, Cigarette Taxation and the Social Consequences of Smoking, *Tax Policy and the Economy*, vol. 9, pp. 51-101.

Viscusi, W.K., 2006, Principles of Cigarette Taxation, in: Cnossen, S. (ed.), *Excise Tax Policy and Administration in Southern African Countries*, UNISA Press, Pretoria, pp. 61-88.

Wagenaar, A.C. and T.L. Toomey, 2000, Alcohol Policy: Gaps between Legislative Action and Current Research, *Contemporary Drug Problems*, vol. 27, pp. 681-733.

Walker, D.M. and A.H. Barnett, 1999, The Social Costs of Gambling: An Economic Perspective, *Journal of Gambling Studies*, vol. 15, pp. 181-212.

Warner, K.E., F.J. Chaloupka, P.J. Cook, W.C. Manning, J.P. Newhouse, T.E. Novotny, T.C Schelling and J. Townsend, 1995, Criteria for Determining an Optimal Cigarette Tax: *The Economist's Perspective, Tobacco Control*, vol. 4, pp. 380-386.

Watson, D. and J. Parsons, 2005, Domestic Abuse of Women and Men in Ireland: Report on the National Study of Domestic Abuse, Stationery Office, Dublin.

Wells, M., P. Gerrard and D. Hubbard, 2005, Oral Evidence to the Treasury (Sub-) Committee on Excise Duty Fraud, 17 November 2004, in: House of Commons Treasury Committee, Excise Duty Fraud: Fourth Report of Session 2004–05, The Stationery Office, London, pp. Ev1-Ev12.

Wells, S., K. Graham, M. Speechley and J.J. Koval, 2005, Drinking Patterns, Drinking Contexts and Alcohol-Related Aggression among Late Adolescent and Young Adult Drinkers, *Addiction*, vol. 100, pp. 933-944.

WHO, 2004, Global Status Report on Alcohol 2004, Department of Mental Health and Substance Abuse, World Health Organization, Geneva, www.who.int/substance_abuse/publications/global_status_report_2004_overview.pdf.

WHO, 2005, Alcohol Policy in the WHO European Region: Current Status and the Way Forward, Regional Office for Europe, World Health Organization, Copenhagen and Bucharest.

WHO, 2006, Global Alcohol Database, World Health Organization www3.who.int/whosis/alcohol/alcohol_about_us.cfm?path=whosis,alcohol,alcohol_about&language=english.

World Drink Trends, 2004, NTC Publications, Henley on Thames.

Notes on contributors

Vidar Christiansen is Professor of Economics, University of Oslo. Member of The Norwegian Academy of Science and Letters and The Royal Norwegian Society of Sciences and Letters. Associate Editor Journal of Public Economics. Previously, Associate Editor European Economic Review and International Tax and Public Finance. Chairman of the Scientific Committee of the 2006 Congress of the International Institute of Public Finance. Chair and member of several government-appointed committees in Norway. Publications in Review of Economic Studies, International Economic Review, Journal of Public Economics, International Tax and Public Finance, National Tax Journal, Economica, Scandinavian Journal of Economics, and other international and Norwegian scientific journals.

Sijbren Cnossen is Advisor, CPB Netherlands Bureau for Economic Policy Analysis. Professor Emeritus of Erasmus University Rotterdam and University of Maastricht. Held appointments at Harvard University, New York University, and College of Europe, Bruges. Served previously at the International Monetary Fund. Started his career as inspector with the Dutch tax service. Has been consultant to the IMF, OECD, World Bank, European Commission, US-AID, HIID, and GTZ, in which capacity he advised some 30 countries on the design and implementation of their tax systems. Past editor of De Economist and International Tax and Public Finance. Published numerous books and articles on tax policy and comparative tax systems.

Lisa Farrell is based at the Geary Institute and the School of Economics, University College Dublin. Work spans both the theoretical and micro-econometric aspects of policy relevant issues in the lotteries and gambling sector. Publications in American Economic Review, Journal of Public Economics, Journal of Business, Economics and Statistics, and Oxford Bulletin of Economics and Statistics. Acted as consultant to the UK government, the Victoria State government (Australia), and the Irish Greyhound Board on issues pertaining to licensing and regulation in the betting and gaming sector. Editorial board, Journal of Gambling Business and Economics.

David Forrest is Professor of Economics in the Centre for the Study of Gambling, University of Salford, UK, and Visiting Professor, Macao Polytechnic Institute. Recent publications in European Journal of Finance, Economic Inquiry, and Southern Economic Journal. Member of the editorial boards of the Journal of Sports Economics and International Gambling Studies. Joint author of a recent report on sport- and betting-related corruption. Ongoing research contracts with the National Lottery Commission (UK).

Anil Markandya is Professor of Economics at the University of Bath, UK, and Director of the Basque Centre for Climate Change in the Basque Country, Spain. Has acted as consultant to a number of national and international organizations, and recently served as Lead Economist at

the World Bank. Published widely in the areas of climate change, environmental valuation, environmental policy, energy and environment, green accounting, macroeconomics and trade. Works include Blueprint for a Green Economy, Green Accounting in Europe, Reconciling Trade and Development, and Cleaning the Ganges. Held academic positions at the universities of Princeton, Berkeley and Harvard in the US, and University College London. Lead author for Chapters of the 3rd and 4th IPCC Assessment Reports on Climate Change, which were awarded a share of the Nobel Peace in 2007. Nominated by Cambridge University as one of the top 50 contributors to thinking on sustainability in the world.

Stephen Smith is Professor and Dean, Faculty of Social and Historical Sciences at University College London (UCL). Previously, Deputy Director, Institute for Fiscal Studies, a London-based independent research institute specializing in the economic analysis of taxation and public finance. Started his career as a civil servant, working for eight years at the Department of Trade and Industry as a member of the Government Economic Service. Worked extensively on the economics of tax policy and on the use of market-based instruments in environmental policy. Acted as a consultant on these issues to a number of government departments and international organizations including Her Majesty's Treasury, the Department of Environment, Food and Rural Affairs (DEFRA), the OECD, the European Commission, and the IMF.