

Cnossen, Sijbren

Working Paper

Alcohol taxation and regulation in the European Union

CESifo Working Paper, No. 1821

Provided in Cooperation with:

Ifo Institute – Leibniz Institute for Economic Research at the University of Munich

Suggested Citation: Cnossen, Sijbren (2006) : Alcohol taxation and regulation in the European Union, CESifo Working Paper, No. 1821, Center for Economic Studies and ifo Institute (CESifo), Munich

This Version is available at:

<https://hdl.handle.net/10419/25866>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

ALCOHOL TAXATION AND REGULATION IN THE EUROPEAN UNION

SIJBREN CNOSSEN

CESIFO WORKING PAPER NO. 1821

CATEGORY 1: PUBLIC FINANCE

OCTOBER 2006

PRESENTED AT CESIFO AREA CONFERENCE ON
PUBLIC SECTOR ECONOMICS, APRIL 2006

An electronic version of the paper may be downloaded

- *from the SSRN website:* www.SSRN.com
- *from the RePEc website:* www.RePEc.org
- *from the CESifo website:* www.CESifo-group.de

ALCOHOL TAXATION AND REGULATION IN THE EUROPEAN UNION

Abstract

This paper estimates the external costs of harmful alcohol use in the European Union (EU) and confronts them with the alcohol excise duty collections per adult and per litre of pure alcohol in the various Member States. In all but one Member State, drinkers do not appear to pay their way. This reflects the EU's acquiescence in a formidable alcohol problem. Fifteen per cent of adults 'drink too much', while the extent of youth drinking has reached alarming proportions. The external costs should be internalised in price through an appropriate optimal alcohol excise duty, supplemented by regulatory measures aimed at specific problem groups. Further, a coordinated alcohol tax policy seems called for, which would, among others, raise the minimum duties on wine, beer and spirits, preferably in line with their relative alcohol content. A drawback of these measures is that they would reduce the welfare of moderate drinkers.

JEL Code: H2, H8.

Keywords: alcohol taxation, European Union, external costs, social costs.

Sjibren Cnossen
Maastricht University
CPB Netherlands Bureau for Economic Policy Analysis
Tapijtweg 7
2597 KG The Hague
The Netherlands
cnossen@few.eur.nl

October 2006

The author is grateful to Vidar Christiansen, Peter Kooiman, and Stephen Smith for their comments on a preliminary version of this paper, which was presented at the CESifo conference on public economics held in Munich, 21–23 April 2006. The penultimate version of the paper was discussed at the 62nd Congress of the International Institute of Public Finance held in Paphos, Cyprus, 28–31 August 2006. Subsequently, helpful comments were received from Ruud de Mooij and Daniël van Vuuren at CPB. Judith Payne applied the finishing touch.

1. Introduction

Alcohol truly permeates every aspect of European culture – it is used before, during and after meals, to celebrate birth and mourn death, to socialize, as a relaxant, a deliriant and simply as a means of getting drunk.¹ Adults in the European Union (EU) drink on average almost 13 litres of pure alcohol per year – two-and-a-half times the average for the rest of the world (WHO 2004).² If abstainers are excluded, the consumption per drinker reaches 15 litres per year. This is equivalent to 600 bottles of beer (50cl, 5%), 167 bottles of wine (75cl, 12%) or 54 bottles of spirits (70cl, 40%) – twice the level of at most two drinks per day suggested by the evidence as not necessarily interfering with a healthy lifestyle.

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 (organ damage, birth defects). The World Health Organization (WHO 2005) has estimated that harmful consumption of alcoholic drink is responsible for approximately 10.8% of the total disease burden in the EU. Anderson and Baumberg (2006) estimate the total tangible costs (criminal justice system, health care, 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 intangible costs in the form of pain, suffering and lost life are estimated to be more than twice the tangible costs.

In calculating these costs, Anderson and Baumberg, in line with the WHO's approach, basically view the tangible and intangible costs of harmful alcohol use, called social costs, as everything that happens that would not happen in a world without alcohol. In other words, social costs are the costs drinkers impose on society plus the costs borne by the drinkers themselves. This philosophy, more broadly, forms the core of the WHO's 'health intervention policy', defined by the International Epidemiological Association as 'the science and art of preventing disease, prolonging life and promoting health through the organized efforts of society'. The main aim of the WHO's 'new public health movement' is 'to limit the harm caused by alcohol consumption, by reducing (or at least preventing from rising) the overall consumption per person' (Crooks 1989). Purportedly, this aim is to be achieved through taxes, regulations, subsidies, service provision and the dissemination of information.

The WHO's philosophy contrasts with the economic approach, adopted in this paper, which proceeds from the principle of consumer sovereignty. A rational,

¹ 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.

² Although the EU accounts for merely 7% of the world's population, it is the source of a quarter of the world's alcohol production – 50% more than either China or the US. France, Italy and Spain together produce half of the world's wine and Germany 7.5% of the world's beer, while the UK is the world's leading producer of whisky and gin, and Poland of vodka.

fully informed consumer should be allowed to drink whatever and as much as he likes as long as he does not bother other people.^{3,4} In this view, 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.⁵ Moreover, the welfare costs of alcohol taxation and regulation imposed on moderate drinkers who do not cause externalities should be considered, while cost savings (e.g. in the form of reduced social benefits through early death) should be netted out.⁶ The economic approach has an impressive pedigree that goes back to John Stuart Mill's harm principle which he formulated in 1869 in his essay on paternalism, 'On Liberty'. Mill believed that the government should repress a man's acts only if they harm others. Harm to himself alone was not a good enough reason for the government to limit his freedom.⁷

Under the economic approach, the purpose of the alcohol excise duty is to ensure that each drinker takes all external costs into account when making his drinking decision. This should induce him to drink his socially optimal quantity of alcohol. Whether alcohol is taxed too lowly or too highly in the EU – the central issue in this paper – would then seem to depend on the level of and variation in the external costs of harmful alcohol use across Member States. Section 2 sets the stage for the discussion by reviewing the current alcohol excise duties and collections in the various Member States. Section 3 proceeds to examine alcohol consumption levels and patterns, as well as the effects of harmful alcohol use. Next, section 4 surveys the evidence on the social and external costs of harmful alcohol use. Subsequently, section 5 attempts to draw inferences from the consumption patterns and the external costs about the properties of the optimal alcohol excise duty to see whether the current excise duties should be re-evaluated. Beyond taxation, alcohol regulation has a 'duty-equivalent' effect, so section 6 examines the complementary role of regulations

³ Throughout this paper, 'he' and 'his' are used in place of the cumbersome 'he or she' and 'his or her'.

⁴ 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. In the main, however, the rationality hypothesis continues to be the cornerstone of economic analysis.

⁵ See Bird and Wallace (2006), who discuss the differences between the public health approach and the economic approach. As the authors put it, if someone drinks too much and dies sooner than he or she otherwise would have done – for example, by crashing a motor vehicle while drunk – it may be a tragedy, but it is not an externality. If, however, the drunken driver kills a passer-by or a passenger, then it is both. In short, external costs (benefits) = social costs (benefits) – private costs (benefits).

⁶ 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 should receive a 'credit' for the associated savings.

⁷ Mill (1869) had this to say on governmental paternalism: 'If gambling, or drunkenness, or incontinence, or idleness, or uncleanness, are as injurious to happiness ... as many or most of the acts prohibited by law, why (it may be asked) should not law ... endeavour to repress these also?'

in restraining harmful alcohol consumption. Section 7 concludes with a summary of the implications of the analysis for alcohol tax and regulatory policies in the EU.

The numerous studies on the use of alcohol, its impact on individuals and society, and the design and effectiveness of alcohol policies would easily fill an entire library. Most of these studies are ably synthesized and reviewed in a formidable 432-page report by Anderson and Baumberg (2006), requested and financed by the European Commission. Drawing on this report, this paper sketches the wider effects and implications of harmful alcohol use as the background to a discussion of the tax and regulatory aspects of drinking. The paper does not dwell on the distributional impact of alcohol excise duties, in the belief that externality issues take priority over tax burden considerations.

2. Excise Duty Structures and Collections

Excise duties on alcohol differ widely between EU Member States. Harmonization measures have mostly been confined to product definitions (Directive 92/83/EEC)⁸ and agreement on minimum duties (with the target rates reduced to a non-binding note in the minutes). Excise duty collections from alcohol, per adult and per litre of pure alcohol, differ as widely between Member States as the duties.

2.1. *Acquis communautaire*⁹

The *acquis communautaire* for the principal alcoholic drinks, last agreed in 1992 (Directive 92/84/EEC),¹⁰ is the following.

- The minimum excise duty on beer is €0.748 per hl/degree Plato of finished product or €1.87 per hl/% of alcohol by volume (abv). Accordingly, as a minimum, nearly 5 cents has to be paid in respect of half a litre of beer with an abv of 5% (equivalent to 12.5° Plato) or more. Reduced rates apply to

⁸ 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 10 grams 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).

⁹ 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.

¹⁰ On 8 September 2006, the European Commission (IP/06/1165) proposed increasing the minimum excise duties on beer to €0.0612 per half litre at 5% by volume (or 12.5° Plato), on intermediate products to €0.413 per 70cl and on spirits to €2.017 per 70cl at 40%. The harmonized duty on wine remains zero.

- ‘independent small breweries’ and to ‘low alcohol’ beer (not exceeding 2.8%).
- The harmonized excise duty on still and sparkling wine is €0 per hectolitre 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 hectolitre (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 per hectolitre of pure alcohol.¹¹ 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 litres of beer, 90 litres of wine (but 60 litres of sparkling wine), 10 litres of spirits and 20 litres 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).

Of further interest are the rulings of the European Court of Justice (ECJ) on the non-discriminatory tax treatment of alcohol. The basic rule is that while Member States have flexibility in setting the relative excise duties on alcoholic drinks, they cannot favour a domestic drink over a similar foreign drink. In the late 1970s and early 1980s, 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). Furthermore, the ECJ has ruled that off-premise government-run alcohol monopolies are allowable but that exclusive import rights are not.

It should be noted that although the EU seems to be greatly concerned about the harmful use of alcohol, the production of wine is subsidized through the Common Agricultural Policy (CAP) at the rate of more than €1.5 billion each year in the EU-15. This protectionist policy has created a wine reservoir of almost 36 billion litres (1999–2000) in the EU-15 – twice the size of the total annual production (Elinder et al. 2003).

¹¹ The higher rate applies to Member States whose duty rate exceeded €1,000 in 1992.

2.2. Duty structures in Member States

The *acquis communautaire* leaves considerable scope for significant tax differentials between Member States for all types of alcoholic drink. As shown in table 1, 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 most new Member States.

Table 1. Alcohol Excise Duties in the European Union in 2006

Member State ^a	Excise duties (€)			VAT (%)	Relative excise duties by alcohol content		
	Beer per 0.5 litre ^b	Still wine per 75cl	Spirits per 70cl, 40%		Beer 5%	Still wine 12%	Spirits 40%
EU-15	0.33	0.58	5.36	19.8	53	21	100
Sweden	0.79*	1.78	15.08	25	59	37	100
Ireland	0.99*	2.05	10.99	21	101	58	100
UK	0.95*	1.90	8.05	17.5	136	73	100
Finland	0.97	1.59	7.91	22	138	63	100
Denmark ^c	0.34*	0.62	5.63	25	68	34	100
Belgium	0.09	0.35	4.91	21	20	22	100
Netherlands	0.13	0.44	4.21	19	33	33	100
France ^d	0.13*	0.03	4.06	19.6	36	2	100
Germany ^e	0.04	0.00	3.65	16	12	0	100
Greece	0.06	0.00	3.05	19	21	0	100
Luxembourg ^f	0.04	0.00	2.92	15	15	0	100
Austria	0.10	0.00	2.80	20	40	0	100
Portugal	0.08	0.00	2.62	21	35	0	100
Spain	0.05	0.00	2.32	16	22	0	100
Italy	0.12	0.00	2.24	20	59	0	100
EU-10	0.13	0.14	2.83	18.7	33	16	100
Malta	0.04	0.00	6.52	18	6	0	100
Poland	0.09	0.26	3.25	22	30	25	100
Estonia	0.19*	0.50	2.72	18	76	57	100
Lithuania	0.10*	0.33	2.59	18	44	39	100
Latvia	0.09*	0.32	2.53	18	41	40	100
Czech Republic	0.04	0.00	2.51	19	18	0	100
Hungary	0.10	0.00	2.46	20	46	0	100
Slovak Republic	0.06	0.00	2.04	19	35	0	100
Slovenia	0.34*	0.00	1.95	20	20	0	100
Cyprus	0.24*	0.00	1.71	15	16	0	100
EU-25	0.25	0.41	4.35	19.4	45	19	100

Sources

Excise duties and VAT rates: European Commission, Excise Duty Tables, July 2006.

Notes

^a Ranked in descending order of duty on spirits.

^b An asterisk (*) indicates that the beer excise is levied per hl/% of alcohol by volume (abv).

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

^d France levies an additional excise duty on 'alcopops' of €10 per litre of pure alcohol (equivalent to €3.85 per 70cl of 5%).

^e Germany levies an additional excise duty on 'alcopops' of €5.50 per litre of pure alcohol (equivalent to €1.94 per 70cl of 5%).

^f Luxembourg levies an additional excise duty on 'alcopops' of €6 per litre.

All alcohol excise duties are specific,¹² although the precise specification of the tax base differs between beer, wine and spirits. In most Member States, the excise on beer is proportional to alcohol content, but the Netherlands and Portugal graduate the duty, with higher rates of duty per hectolitre/degree Plato on stronger beer. The duty on spirits is defined uniformly throughout the EU in terms of an absolute amount per hectolitre of pure alcohol. By contrast, wine is taxed per unit volume, although in Denmark and Luxembourg the excise is banded according to the alcohol strength of the product.

Specifically, the excise duty on beer ranges from merely 4 cents per half litre in the Czech Republic, Germany, Luxembourg and Malta to almost €1 in Finland, Ireland and the UK. Thirteen Member States do not levy an excise on still wine, but in Ireland, Sweden and the UK, the excise duty is close to €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 €1.71 in Cyprus to €15.08 in Sweden per 70cl bottle.

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, the VAT is left out of consideration because the alcohol excise duty may be assumed to reflect the external cost of drinking. The imposition of VAT does not affect the price of alcoholic drinks relative to other goods.¹³

The right-hand side of table 1 shows the relative excise duties on beer, wine and spirits calculated on the basis of alcohol content. As is well known, the medical profession measures the damage caused by harmful alcohol consumption in cubic centimetres 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 appear to be good reasons to base the excises on alcohol content, but as table 1 shows, on average, spirits are taxed twice as highly as beer per unit of alcohol and five times more heavily than wine.

In general, little if any excise duty harmonization can be discerned in the EU. The agreed minimum rates have not been adjusted since 1992, implying a reduction in their real value of almost 30%. In its last review of alcohol excise duty policies, the European Commission (2004) focused on the proper functioning of the internal market in view of the wide divergences in duty levels, the competition between different categories of alcoholic drinks and the real value of the duty rates, and it paid lip-service to the wider objectives of the Treaty, i.e. underlying health, social and agricultural policies. Important

¹² The specific duties are in line with the Pigouvian notion (Pigou 1918) that the damage caused by harmful alcohol use is, at any point in time, independent of the price at which alcoholic beverages are sold, so that correction of externalities favours specific over *ad valorem* taxation.

¹³ As Cnossen and Smart (2005) point out, this may not be the case with cigarettes if and to the extent that tobacco excise duty collections exceed the cost of smoking.

practical issues, such as the extent of cross-border shopping and illicit production of spirits, were not touched upon. Basically, no action was taken.

2.3. Excise duty collections

As a percentage of total tax revenue, alcohol excise duty collections (table 2) range from 0.2% in Italy to 2.5% in Poland and Ireland, a hard-drinking country (see table 3) with high alcohol excise duties. Generally, alcohol excise duties are not a major source of revenue for the EU Member States, except in Finland, Ireland, Poland and the UK. Alcohol excise duty collections are predominantly, although not exclusively, related to the level of the duties (see table 1). On the other hand, there is no apparent correlation between the revenue from alcohol excise duties (as a percentage of government revenue or GDP) and per-adult consumption (see table 3).

Table 2. Alcohol Excise Duty Collections in the European Union in 2003

Member State ^a	Collections (€billion)	Collections as % of total tax revenue	Collections (€) per adult (aged 15+)	Effective duty (€) per litre of pure alcohol consumed
EU-15	25.9	0.8	101	10.4
Finland	1.4	2.1	318	33.1
Ireland	1.0	2.5	318	23.2
Sweden	1.2	0.9	163	27.2
UK	10.9	1.9	125	19.0
Denmark	0.5	0.6	106	9.1
Luxembourg	–	0.3	91	6.6
Belgium	0.6	0.5	65	6.0
Netherlands	0.8	0.5	64	6.6
France	3.0	0.4	59	5.2
Germany	3.7	0.5	52	4.3
Austria	0.3	0.4	51	4.5
Greece	0.3	0.6	33	3.6
Spain	1.2	0.5	32	2.7
Portugal	0.2	0.5	24	2.1
Italy	0.9	0.2	19	2.4
EU-10	.	.	35	3.3
Malta	.	.	.	.
Poland	1.6	2.5	51	6.2
Estonia	.	.	.	.
Lithuania	.	.	.	.
Czech Republic	0.3	1.0	34	2.7
Latvia	.	.	.	.
Hungary	0.2	0.8	29	2.1
Slovenia	.	.	.	.
Slovak Republic	0.2	0.7	24	2.3
Cyprus	.	.	.	.
EU-25	.	.	.	.

Sources

Excise duties and total tax revenues (excluding custom duties): OECD (2005) except for Spain and Portugal – European Commission, Excise Duty Tables, December 2003.

Number of adults: Eurostat (people by age classes).

Consumption: table 3 (recorded).

Note

^a Ranked in descending order of excise duty collections per adult.

As shown in table 2, in 2003, alcohol duty collections per adult ranged from a low of €9 in Italy to the extraordinarily high amount of €18 in Finland and Ireland. Five Member States collected more than €100 per adult.¹⁴ While alcohol excise collections are significant in northern EU Member States, they are of negligible proportions in southern states. The same picture emerges from a calculation of the absolute duty amounts that are paid per litre of recorded consumption of pure alcohol across Member States. While Finns have to pay €33 per litre of pure alcohol, the Portuguese excise authorities are content with just over €2 per litre.

Particularly in high-duty Member States, alcohol excise duty collections are affected by the extent of cross-border shopping and smuggling. 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 1 in 6 tourists in the EU returns from trips abroad with alcoholic drinks, carrying an average of over 2 litres of pure alcohol per person in several 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).¹⁵

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 revenue was lost to fraud in 1996, equivalent to about 8% of total alcohol excise duty collections at that time.¹⁶ 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).¹⁷ 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.

Finally, it should be noted that, early on, the relatively higher taxation of alcohol (compared with other goods) has been defended by reference to the inverse elasticity rule (Ramsey 1927), which holds that other things being equal, efficiency losses from taxation are lower for goods with lower price elasticities of demand than for other goods with higher price elasticities of demand. Smith (2005), however, concludes that the reported price elasticities of

¹⁴ Clearly, per-adult alcohol excise duty collections are much lower than per-adult tobacco excise duty collections. For a comparison, see Crossen (2006).

¹⁵ For general treatments of cross-border shopping issues, see Christiansen and Smith (2001) and Crawford, Smith and Tanner (1999). Obviously, the incentives and effects of differential cross-border alcohol excise duties do not differ from those of duty-free shopping.

¹⁶ It is unclear, however, how the estimate was derived.

¹⁷ Interestingly, Huang (2003) calculates that the spirits duties in the UK could be raised by 40% before the maximum revenue is achieved, after allowing for the effect of cross-border shopping and smuggling.

alcohol demand are not so low that the inverse elasticity rule would seem to justify significantly higher-than-average taxation of alcohol.

3. Alcohol Use and Effects

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

3.1. Consumption patterns

As table 3 indicates, in 2003, EU adults (aged 15+) drank on average 12.6 litres of alcohol per year – with EU-10 adults (excluding Malta) drinking nearly 2½ litres more than those in the EU-15. If adjusted for the number of adults (15%) who abstain from alcohol, annual consumption reaches 15 litres. Although consumption levels have converged in the EU, there are still substantial differences between the two ends of the drinking spectrum. The Hungarians, for instance, drink 17.9 litres per adult per year, nearly three times as much as the Maltese. In recent years, recorded levels of consumption have declined or stabilized, perhaps on account of ageing populations and the increase in abstaining Muslims.

Just under half of all alcohol is consumed in the form of beer (44%), with the rest divided between wine (33%) and spirits (23%). Although drink choices, like drink levels, are converging, typically beer is still the beverage of choice in northern Europe and wine in the Mediterranean states, while spirits consumption is heavily concentrated in central and eastern European countries. In addition to imbibing other forms of alcohol, the Czechs excel in beer drinking, downing 377 bottles (50cl, 5%) per adult every year, whereas the French win the wine contest with 93 bottles (75cl, 12%) and the Latvians the hard liquor drive with 25 bottles (70cl, 40%) per adult (*World Drink Trends 2004*). By far the greatest proportion and level of expenditure on alcohol is found in Ireland, with each household spending €1,942 (5.5% of household expenditures) on alcohol in 2001 (Strategic Task Force on Alcohol 2004). This is three times the level of any other country and over 10 times as much as Greece (Anderson and Baumberg 2006).

3.2. Prevalence of alcohol use

Alcohol has its abstainers, connoisseurs, harmful consumers and addictive users. Surveys on drinking habits tend to focus on particular problem groups so that policy measures can be tailored accordingly. Table 4 shows the amount of drink (in grams of pure alcohol per person per day) by which each group is

Table 3. Alcohol Drinking Patterns in the European Union in 2003

Member State ^a	Consumption of pure alcohol (litres per adult, aged 15+) ^b	Abstainers (% of adults) ^c	Drinking prevalence		Youth drinking (% of 15-year-olds) ^f
			Heavy drinkers (% among drinkers) ^d	Alcohol-dependent drinkers (% among drinkers) ^e	
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 prevalences: WHO, Country Profiles (2004), downloaded from www.eurocare.org/btg/countryreports/index.html (6 August 2006).

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 litre; Belgium, Netherlands – 0.5 litre; Austria, Cyprus, Czech Republic, France, Germany, Ireland, Portugal, Spain – 1litre; Slovenia – 1.3 litres; Italy – 1.5 litres; Denmark, Greece, Sweden, UK – 2 litres; Finland – 2.1 litres; Poland – 3 litres; Hungary – 4 litres; Lithuania – 4.9 litres; Estonia, Slovak Republic – 5 litres; Latvia – 7 litres. Luxembourg's unrecorded consumption is –1 litre 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.

defined (distinguishing between men and women) and the number of people in the EU estimated to belong to the various groups.¹⁸

Table 4. Drinking Levels in the European Union, 2001 Estimates

Drinking levels	Description	Definition (g alcohol/day)		Adults (16+)
		Men	Women	EU-25 (million)
Abstinent		0	0	53
Level I	Moderate or low-risk drinkers	>0 – 40g	>0 – 20g	263
Level II	Heavy, hazardous or excessive drinkers	>40 – 60g	>20 – 40g	36
Level III	Alcohol-dependent or addictive drinkers	>60g	>40g	22

Source

Anderson and Baumberg, 2006. The classification is based on Rehm et al. (2004).

About 53 million adults across the EU – some 15% of the adult population – abstain from alcohol, generally defined as not having had a drink in the past year. As shown in table 3, abstinence 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, Luxembourg and Germany. Interestingly, there is no correlation between total consumption and abstinence rates, suggesting that drinkers and abstainers have little in common.

Seven in ten people in the EU are moderate or low-risk drinkers.¹⁹ 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).²⁰ Drinking in middle age appears to extend life expectancy overall (NIAAA 2000), but the effect is particularly pronounced for women who die after the age of 70 (White, Altmann and Nanchahal 2002). Also, alcohol seems to reduce the risk of type II diabetes and gallstones.

Approximately 58 million EU adults (15%, 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) for men and more than 20g (more than two drinks) for women (Babor et al. 2003). Of this number, 36 million people are heavy drinkers and 22 million alcohol-dependent drinkers (5% of men, 1% of

¹⁸ Anderson and Baumberg (2006) note 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% – IAS (2003)) and because respondents reside primarily within private households and, hence, students and homeless people are excluded.

¹⁹ Note that moderate drinking is defined as up to four drinks per man per day and up to two per woman per day – twice the level that is regarded as not interfering with a healthy lifestyle.

²⁰ 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). However, for a view that one drink a day won’t keep the doctor away, particularly in European drinking cultures, see Lieber (2003). And for a view that the beneficial health effects of moderate drinking can more easily be obtained through other means, see Barker (2002).

women). Heavy and alcohol-dependent drinking is particularly prevalent (more than 20% of drinkers) in Austria, France, Ireland, and Slovenia (table 3).²¹ No doubt most EU-10 Member States would be added to this list if reliable information were available.

Various researchers have assumed harmful alcohol use to coincide with binge drinking, i.e. drinking to intoxication by downing 2.8 litres of beer, a bottle of wine or five shots of spirits on a single occasion. Across the EU-15, adults report getting drunk five times per year on average but binge-drinking 17 times (Eurobarometer 2003). The same source reports 40 million EU-15 citizens 'drinking too much' and 100 million (more than 1 in 4) binge-drinking at least once per month.

Alcohol dependence among the EU population, measured as having four positive CAGE²² answers, is 5% or higher in Austria, Belgium, France, the Netherlands and Slovenia (table 3). Some studies have suggested that the proportion of heritability of alcohol dependence is between 50% and 60% (Cook and Gurling 2001). Alcohol dependence is particularly common amongst young adults (Caetano and Cunradi 2002).

3.3. Youth drinking

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 3). In Denmark, Malta, the Netherlands and the UK, approximately half of 15-year-olds drink weekly. Over 1 in 8 (13%) of 15- to 16-year-old students have been drunk more than 20 times in their life, and more than 1 in 6 (18%) have binged (5+ drinks on a single occasion) three or more times in the last month (Hibell et al. 2004). 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 (Setttertobulte, Jensen and Hurrelman 2001) and 12% of this age-group reports having been drunk twice or more.

²¹ The Czech Republic and the Netherlands come close to the 20% level. According to Rehn et al. (2001), the figures on heavy drinking that stand out most clearly from the WHO statistics are the number of women (21%) in Ireland drinking more than 140g of alcohol per week, the number of men (29%) in Austria exceeding 420g per week and the number of men in the Czech Republic (16%) exceeding 550g per week. As noted above, 10g of alcohol represents one drink.

²² According to the CAGE (Cut, Annoyed, Guilty, Eye-opener) test, an individual is considered a problem drinker if he or she answers positive 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 criticising 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 ('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.

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.²³ 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.

Table 5. Studies on the Costs of Harmful Alcohol Use in the European Union

Author(s)	Year	Content of study findings
A. Harm to children		
WHO	2004	Alcohol consumption by pregnant women is responsible for 1–2% of low-weight births (60,000) each year in the EU, nearly half in the EU-10
Hibell et al.	2004	More than 6% of 15- to 16-year-old students report suffering problems with their parents due to their drinking, equivalent to over 700,000 young people
Anderson & Baumberg	2006	4.7m–9.1m children (6–12%) live in families adversely affected by alcohol (based on Callingham (2002))
English et al. + Ridolfo & Stevenson	1995 2001	Alcohol is estimated to be a causal factor in 16% of child abuse and neglect cases (Australia)
B. Drink-driving		
WHO	2004	Nearly 10,000 pedestrians, passengers or non-drinking drivers are killed each year due to other people who drink and drive
WHO	2004	17,000 deaths are attributable to drink-driving each year (1 in 3 of the total) and 27,000 accidental deaths are attributable to alcohol
ETSC	2003	2–3% of all journeys in the EU-15 have a drinking driver; 9 out of 10 alcohol-related road fatalities are caused by young male drivers
C. Crime and violence		
Rossow, Pernanen & Rehm	2001	Alcohol is associated with crime (ranging from 20% in Belgium to 47% in Finland) and especially violent crime; 7 million adults report getting in fights when drinking
WHO	2004	Over 2,000 homicides (4 in 10 of all murders) and around 10,000 suicides (1 in 6 of all suicides) are attributable to alcohol each year
Anderson & Baumberg	2006	16% (Portugal) to 53% (England & Wales) of domestic or intimate partner violence has been linked to alcohol
Mirrlees-Black + Watson & Parsons	1999 2005	In the UK and Ireland, one-third of intimate partner violence occurs when the perpetrator is under the influence of alcohol
D. Mortality and health		
Rehn, Room & Edwards	2001	Alcohol is the third-leading risk factor (out of 26 risk factors for ill health) for death and disability in the EU, ahead of obesity/overweight and nearly four times that of illicit drugs
Rehn, Room & Edwards	2001	Alcohol causes nearly 260,000 deaths each year, equivalent to 6% of all male deaths and 2.5% of all female mortality
WHO	2004	Cancers are the largest single cause of alcohol-attributable deaths, accounting for 50,000 deaths each year, followed by 45,000 deaths through cirrhosis of the liver and 17,000 deaths due to neuropsychiatric conditions
E. Work		
Ramstedt & Hope	2003	Across seven EU-15 Member States, nearly 5% of drinking men and 2% of drinking women reported a negative impact of alcohol on their work or studies

²³ Matthews and Richardson (2005) report that in the UK, 24% of all violent offences are committed by 18- to 24-year-old binge drinkers, compared with 16% by other regular drinkers and 5% by occasional drinkers or non-drinkers of the same age.

3.4. Consequences of harmful alcohol use

The (predictable) consequences of harmful alcohol use show up in statistics on alcohol-related foetal damage and child abuse, marital harm, road traffic accidents, crime and violence, increased mortality and some 60 alcohol-related diseases and conditions. Table 5 provides a synopsis of the conclusions of various recent studies on the effects of harmful alcohol use. 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 people other than the drinkers themselves.

4. 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, the size of these costs must be inferred from the social cost studies.

4.1. Social costs of harmful alcohol use in Europe

In recent years, various 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.²⁴ 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 in the EU.²⁵ The authors make a distinction between tangible (economic) costs and intangible (pain and loss-of-life) costs. Tangible costs are subdivided into direct costs (police, health care, traffic accidents) and productivity losses (absenteeism, unemployment, mortality).

As shown in figure 1, 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, which is roughly the same as that found recently for tobacco (Aspect Consortium 2004).²⁶ Actual spending on alcohol-related

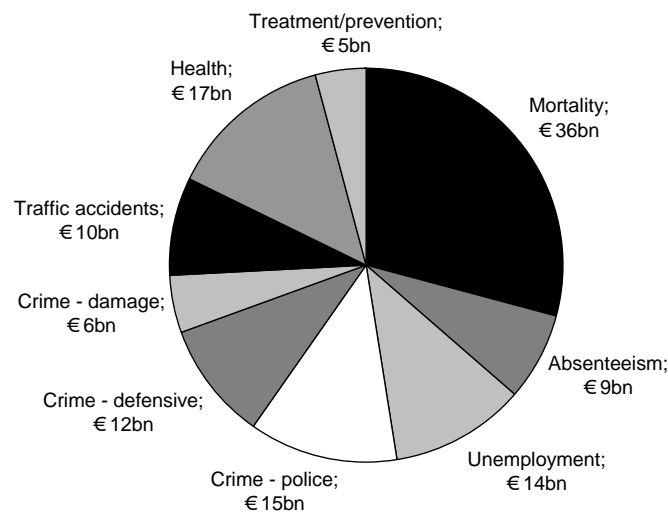
²⁴ The studies utilize the 'cost-of-illness' (COI) methodology to assess the overall negative impact of harmful alcohol use on society, relative to a counterfactual scenario in which there is no harmful alcohol use.

²⁵ Anderson and Baumberg's (2006) review applies strict methodological standards – for several cost components, only a small number of studies passed the methodological standards – largely based upon the WHO Guidelines on Estimating the Costs of Substance Abuse (Single et al. 2003).

²⁶ Generally, much of the external cost of alcohol misuse is borne by victims of intoxicated consumers. By way of contrast, most smoking-related costs, including morbidity and early death, are borne by the smokers themselves.

problems (health care, treatment/prevention, criminal justice system, traffic accidents) accounts for €66 billion of the total tangible costs. This figure – more than twice the amount of excise duty collections – can be considered the lower bound of the external costs. The upper bound is found by adding the remaining €9 billion representing the potential production not realized due to absenteeism, unemployment and premature mortality.

Figure 1. Tangible Social Costs of Alcohol in the European Union in 2003



Source

Anderson and Baumberg, 2006

The intangible costs (not included in figure 1) represent the value people place on pain, suffering and lost life that occur because of the criminal, social and health harms caused by alcohol. Anderson and Baumberg (2006) estimated these costs to be €70 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 cost-of-illness (COI) studies.²⁷ Most of the intangible costs represent the value of lost life, which mainly but not exclusively lies with the drinker. Accordingly, these costs should not be considered as external costs.²⁸

²⁷ 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.

²⁸ Except, perhaps, for the intangible costs of alcohol dependence to family members and victims of crime, which are reported to be 25% of the total. 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).

4.2. External costs in individual Member States

From an economic point of view, the problem with the social cost studies is that they use a cost-of-illness framework, which draws an insufficiently clear distinction between private and external costs. The value of the loss of output due to reduced employment is often one of the most important cost items, but 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.²⁹

Evidence in the US context, moreover, 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. 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.³⁰ 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.

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, cost savings (premature death of non-working people, health-care costs of other more costly diseases³¹) are not considered. Nor are the external costs of harmful alcohol use confronted with the social benefits of moderate drinking.

To gauge the size of the external costs of harmful alcohol use, this paper leaves intangible costs out of consideration. Furthermore, the direct tangible costs (health care, criminal justice system, traffic accidents) are taken to represent the lower bound of the external costs. The upper bound includes tangible costs (production losses) on account of absenteeism, unemployment and premature mortality, although, arguably, not all of these costs should be considered

²⁹ 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. See Smith (2005).

³⁰ 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.

³¹ Interestingly, these costs are much smaller than in the case of smoking, although still present.

Table 6. External Costs of Harmful Alcohol Use in 11 EU-15 Member States and Four Other Countries in 2003

Country ^a and year of cost		Publication		Costs as % of GDP		Costs (€) per adult (aged 15+)		Costs (€) per litre of pure alcohol	
Country	Year	Author(s)	Year	High	Low	High	Low	High	Low
EU-15									
Finland	1990	Salomaa	1995	1.5	0.7	518	221	44	19
Ireland	2003	Byrne	2005	1.6	0.8	690	354	47	24
England & Wales	2001	UK Cabinet Office	2003	1.6	0.9	526	296	38	21
Denmark	1996	Sundhedsministeriet	1999	0.9	0.7	325	247	24	18
Belgium	1999	Pacolet, Degreef & Bouten	2003	2.4	1.7	758	533	66	47
Netherlands	2000	KPMG	2001	0.7	0.5	241	158	24	16
France	1997	Fenoglio, Parel & Kopp	2003	1.3	0.7	411	224	33	19
Germany	1995	Bergmann & Horch	2002	1.1	0.7	339	201	26	15
Spain	1998	Garcia-Sempere & Portella	2002	0.7	0.6	153	123	12	10
Portugal	1995	Lima & Esquedro	2003	0.5	0.4	75	60	6	5
Italy	1994	Collicelli	1996	0.7	0.4	198	127	21	12
Other countries									
US	1998	Harwood	2000	2.1	0.6	882	252	93	27
Canada	1992	Single, Robson & Xie	1996	1.1	0.7	327	195	35	21
Australia	1998/99	Collins & Lapsley	2002	1.0	0.9	290	261	28	26
New Zealand	1991	Devlin, Scuffham & Bunt	1997	1.9	1.1	384	222	36	21

Sources

Author's calculations based on table 3.3 in Anderson and Baumberg (2006). Sweden, an extreme outlier, has been omitted. Low cost estimates exclude costs (if shown in the individual Member State studies) attributable to lost productivity from lost life, absenteeism and unemployment.

GDPs for 2003 and exchange rates: OECD (2005).

Number of adults and alcohol consumption: see tables 2 and 3. Unrecorded consumption for 'Other countries' has been estimated at 1 litre per adult per annum.

Note

^a Same ranking as in table 2, i.e. in descending order of alcohol excise duty collections per adult.

external costs. On this basis, table 6 presents the external costs of harmful alcohol use in 11 EU-15 Member States, as well as four other countries with drinking patterns and problems similar to those in northern Europe.

Table 6 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 €17 per adult, ranging from €123 in Spain to €354 in Ireland. Similarly, the average lower bound of the external costs per litre of pure alcohol is €7 (€10 in Spain to €24 in Ireland). These figures can be confronted with the alcohol excise duty collections per adult and the effective duty per litre of pure alcohol shown in table 2. The comparison indicates that Finland is the only Member State in which the collections and the effective duty exceed the lower bounds of the external costs shown in table 6. 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 litre of pure alcohol exceed the excise collections and the effective duty rate, respectively, by a wide margin.

Table 6 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.³²

4.3. UK Cabinet Office Study

To appreciate the intricacies and complexities of social (and external) cost studies, it seems useful to look more closely at a sophisticated recent UK COI study (UK Cabinet Office 2003), which provides estimates of prevalence-based alcohol misuse in England and Wales in 2001 over a range of alcohol-dependent drinkers (7.9% of the English population aged 16 and over) and heavy drinkers (5.4% of the population).³³ Table 7 shows the cost estimates under three broad headings: direct tangible costs (crime, health care), tangible

³² In the US, a pioneering study by 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 cost was borne by victims of drunk drivers. The costs would have been higher still had non-fatal highway injuries (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.

³³ These figures differ from those in table 3 mainly due to the use of different definitions. Incidentally, the UK government's sensible drinking message is 3-4 units per day for men and 2-3 for women. By this measure, 39% of men and 21% of women exceeded the weekly recommended levels in 2000–01. For the sensible drinking message, see www.dh.gov.uk/PolicyAndGuidance/HealthAndSocialCareTopics/AlcoholMisuse/AlcoholMisuseGeneralInformation/AlcoholMisuseGeneralArticle/fs/en?CONTENT_ID=4062199&chk=J782BY

costs in the form of loss of productive output, and intangible costs (pain, suffering, premature death).³⁴

Table 7. Social Costs of Harmful Alcohol Use in England and Wales in 2001

Category of cost	€million (£1 = €1.47)	% of pre-excise alcohol expenditure
A. Tangible costs – direct	11,075	28.7
<i>Alcohol-related and alcohol-specific crime</i>	8,609	22.3
Criminal justice system costs	2,565	
Property/health and victim services	3,695	
Costs in anticipation of crime (alarms, etc.)	2,190	
Drink-driving offences	159	
(Criminal justice system costs)	113	
(Medical and ambulance)	46	
<i>Health care</i>	2,466	6.4
Hospital in-patient visits	771	
Hospital out-patient visits	653	
Accident and emergency visits	447	
Ambulance services	300	
Nurse and GP consultations	100	
Specialist treatment services	141	
Other health-care costs	54	
B. Tangible costs – lost output	7,281	18.9
<i>Drinkers</i>	5,773	15.0
Absenteeism	2,617	
Reduced employment	3,156	
Reduced employment efficiency	.	
<i>Third parties</i>	1,508	3.9
Victims of crime	1,421	
Victims of drink-driving	87	
C. Intangible costs	11,017	28.6
Emotional impact costs for victims of crime	6,857	
Human costs of drink-driving	523	
Premature death of drinkers (lost output)	3,637	
D. Total including lost output and intangible costs	29,373	76.2
E. Total excluding intangible costs	18,356	47.6
F. Total excluding lost output and intangible costs	11,075	28.7
G. Pre-excise expenditure on alcoholic drinks	38,569	
Excise duties	8,984	23.3
[VAT	8,879]	

Sources

Social costs: UK Cabinet Office (2003), Second Estimate.

Expenditure on alcoholic drinks: IAS (2003).

Excise duty and VAT collections: OECD (2005).

Figures on expenditure and tax collections were adjusted for England and Wales on a population basis.

Almost two-fifths of the total social costs are accounted for by the valuation of alcohol-related crime and health care. Following Brand and Price (2000), the study distinguishes three categories of alcohol-related crime costs: (a) costs

³⁴ The figures have been rearranged into tangible and intangible costs to fit the approach adopted in this paper. A similar study was done for Scotland (Scottish Executive Health Department 2003), but the results are not directly comparable and therefore have not been added.

incurred in anticipation of crime (excluding insurance premiums, which are not an opportunity cost, although the cost of insurance administration is); (b) costs incurred as a consequence of crime (cost of property damaged or stolen, victim support);³⁵ and (c) costs incurred in response to crime (costs to the criminal justice system). The costs of drink-driving offences are shown separately. In 2000, 6% of all road accidents and 16% of road deaths in England and Wales were caused when someone was driving over the legal limit for alcohol.

The health-care costs of harmful alcohol use were estimated through the use of 'attribution fractions' based on previously established research findings. In most EU Member States, health-care costs are largely financed through quasi-tax contributions. Accordingly, health-care costs are an important part of external costs, and, other things being equal, the optimal rate of alcohol taxation should be higher in these Member States than in countries, such as the US, where health insurance premiums are effectively differentiated to reflect individual risks.³⁶

The costs of harmful alcohol use associated with the workplace and the wider economy are extremely difficult to estimate. The UK Cabinet Office (2003) focuses on two types of costs related to reduced output: (a) employee absenteeism (alcohol misuse increases the average number of days of sickness); and (b) unemployment and lower activity rates through a 'discouraged worker' effect (MacDonald and Shields 2001). This paper adds the figures for the valuation of the lost output for the victims of crime and drink-driving. As table 7 indicates, social costs under this heading represent close to a quarter of total costs. These costs should not be considered external costs to the extent that they are reflected in lower wages or the affected employees are replaced (although the associated social benefits should be included under external costs).

The UK Cabinet Office (2003) also estimates the value of emotional impact costs for victims of crime, the human costs of drink-driving and the lost output due to premature mortality as a result of harmful alcohol use. As table 7 shows, these intangible costs are as large as the direct tangible costs. The human costs of alcohol-related social and physical harm are also discussed, but no attempt is made to quantify them, although the study makes clear that harmful alcohol use has dire effects on family life (children are often the main victims).

The UK Cabinet Office's study (2003) repeatedly points out that the social costs of harmful alcohol use are difficult to conceptualize and quantify, if only

³⁵ In addition, Brand and Price (2000) and UK Cabinet Office (2003) also classify the loss of productive output of the direct victim and the emotional impact costs under the heading 'alcohol-related and alcohol-specific crime', but this paper puts these costs under the heading 'tangible costs – lost output' and 'intangible costs' respectively.

³⁶ Although premiums might not be formally charged at different rates to harmful alcohol users, the fact that premiums are partly experience rated (those who claim more face higher premiums in future years), combined with the fact that a significant part of alcohol damage is short term and more immediate, will together have the effect of making harmful users bear a fair proportion of their health-care costs through higher premiums.

because of the uncertainty regarding the causality between harmful alcohol use and its negative consequences. This is especially true for the value of lost output and the intangible costs. Although these two categories of social costs should not be dismissed too lightly, for expository purposes table 7 makes a distinction between the social costs with and without these costs. On this basis, the total social costs of harmful alcohol use (including lost output and intangible costs) amount to three-quarters of pre-tax expenditure on alcoholic beverages or more than three times total excise duty collections. If intangible costs are excluded, the social costs are nearly half of pre-tax expenditure on alcoholic drinks or twice the amount of excise duty revenues. As above, this may be called the upper bound of the external costs. The lower bound is found by also excluding the value of lost output. As can be seen, excise duty collections still fall short of external costs. Even in a high-alcohol-excise country, such as the UK, therefore, there seems to be room for further alcohol duty increases to cover external costs.

5. Optimal Alcohol Excise Duty

Since drinkers have different demand or cost functions, different optimal duties should be imposed on them. Obviously, this cannot be done at acceptable cost, and the optimal uniform Pigouvian alcohol excise duty, therefore, would have to be a weighted average of each drinker's non-uniform optimal duty – the weights being each drinker's standardized price derivative of demand.³⁷ Again, information for calculating this uniform optimal excise duty is not available, but, as Pogue and Sgontz (1989) as well as Barker (2002) note, the appropriate level of the duty can be inferred from information on drinking patterns (section 3), the level and pattern of the external costs (section 4), the shape of the damage function of alcohol consumption and the price responsiveness of drinkers. This should permit a rough-and-ready assessment of the balance between the gain from a reduction in total external costs and the loss in consumption benefits that is not regained as excise revenue.

5.1 Shape of the alcohol damage function

As shown in section 3, the externalities of alcohol consumption are dominated by harm from binge drinking, also called 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.³⁸

³⁷ The price derivative takes into account both the (uncompensated) price responsiveness of each consumer and his consumption level. Standardizing the price derivative makes the excise duty dependent on the relative price responsiveness of the consumer and his relative initial consumption.

³⁸ 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.

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). In short, acute consumption gives rise to significant external costs.

Indeed, 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 (Academy of Medical Sciences 2004). Rose and Day (2001) report a very high correlation between mean consumption and the prevalence of heavy drinking across 32 countries.³⁹ An explanation may be that people affect and are affected by the drinking behaviour of people around them, so that drinking levels ‘spread like waves in water’ through a society (Skog 2001). This hypothesis goes by the name of the theory of collective consumption.

The long-term externalities of chronic alcohol use – small in comparison with the costs of acute consumption – consist mainly of health costs and should be calculated net of the long-term beneficial effects of moderate alcohol use. The relationship between chronic alcohol consumption and health damage has been depicted by a J-shaped curve: no drink is not very healthy, up to two drinks per day keeps the doctor away, but more than two drinks entails sharply diminishing health prospects. It seems that this J-shaped curve can also be drawn for the population as a whole if, as seems plausible, it is assumed that the risks of harmful alcohol use increase with average consumption.⁴⁰

5.2. Price elasticities of demand

Would an increase in alcohol excise duty induce harmful users of alcohol to reduce their consumption? Apparently, the answer is ‘yes’. Smith (2005) reviews various US studies that capitalize on the variation of tax-price differentials between states to estimate demand elasticities. One of the most widely cited studies, by Leung and Phelps (1993), concludes that the price elasticities of alcohol demand are -0.3 for beer, -1.0 for wine and -1.5 for spirits. Clements, Yang and Zheng (1997) report price elasticities for seven countries (including three EU Member States, i.e. Finland, Sweden and the UK), covering the period from the mid-1950s to the mid-1980s. They find elasticities of -0.35 for beer, -0.68 for wine and -0.98 for spirits, which are in line with those found for the US.

³⁹ 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).

⁴⁰ However, Johansen et al. (2005) have produced evidence that the relationship between alcohol use and health is linear if abstainers are excluded from the analysis, suggesting that, on average, abstainers are not as healthy as moderate drinkers.

The relatively high price elasticities imply that if alcohol prices go up, consumption goes down (not only of the volume, but also of ethanol), and if prices go down, consumption goes up (Babor et al. 2003).⁴¹ Indeed, extensive studies demonstrate that excise-induced price increases are related to reductions in alcohol consumption and harm. According to Anderson and Baumberg (2006), if alcohol taxes were used to raise the price of alcohol in the EU-15 by 10%, over 9,000 deaths from a wide range of alcohol-related causes would be prevented per year (while €13 billion extra revenue would be collected). Interestingly, the price elasticities for different Member States indicate that demand for alcoholic drinks is more easily controllable by excise taxes in northern states (where external costs seem to be higher too) than in southern states, where demand appears least sensitive to prices.⁴²

As expected, the long-run price elasticity of alcohol demand is significantly higher than the short-run elasticity. Further, moderate drinkers are more price responsive than heavy drinkers. Manning, Blumberg and Moulton (1995) found that the median drinker had a price elasticity of -1.19 , whereas light and heavy drinkers' price elasticities were around -0.5 . The price elasticity of the heaviest drinkers (those in the 95th quintile) was found to be not significantly different from zero. Overall, these findings suggest that drinkers, even heavy drinkers who consume most of the alcohol sold, do respond to excise-induced price changes.⁴³ Also important for this study is that Kenkel (1993) found a high price elasticity for the number of 'heavy-drinking days' reported by individuals, of around -0.9 over all age-groups and -2.24 for youths aged 18–21.

More generally, excise-induced price increases are more effective in reducing the alcohol intake of young people than of older people.⁴⁴ 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. Apparently, the additional excise duties on 'alcopops' in Denmark, France,

⁴¹ Of course, changes in alcohol consumption are determined not only by changes in price but also by changes in income as expressed by income or expenditure elasticities. Leppänen, Sullström and Suoniemi (2001) estimate the income elasticities (adjusted for purchasing power) of alcohol demand for 14 EU Member States. The income elasticities, which range from 0.4 in Denmark to 1.2 in Sweden, indicate that consumers view alcoholic drinks as normal goods, not luxuries.

⁴² On the other hand, alcohol consumption and harmful drinking patterns are high in the Nordic countries, where alcohol excise duties have traditionally been high. In other words, taxation does not seem to have been an effective policy measure (Österberg and Karlsson 2001).

⁴³ Cook and Moore (2002) cite evidence that higher excise duties do have an impact on frequent and heavier drinkers, while Farrell, Manning and Finch (2003) argue that higher duties would reduce alcohol dependence.

⁴⁴ 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. The long-run elasticity of alcohol demand of -0.65 is 60% higher than the comparable short-run elasticity.

Germany and Luxembourg (see table 1) have greatly reduced their consumption by the young without a noticeable substitution of other drinks (Bundesministerium der Finanzen 2005). ‘Alcopop’ taxes are also being considered in the Netherlands and Sweden.

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. Table 8 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.

Table 8. Effects of Changes in Alcohol Excise Duties in the United States, Various Years

Author(s)	Year	Content of study findings
A. Harm to children		
Markowitz & Grossman	1999	A 10% increase in the beer excise duty would reduce severe domestic violence against children by 2.2%
Grossman et al.	1994	Raising the beer excise to the alcohol-equivalent excise on distilled spirits would reduce the drinking of under-age drinkers who drink frequently by 32%
B. Drink-driving		
Ruhm	1996	A 78% increase in the beer excise (restoring the real rate to its 1975 level) would reduce highway fatalities by 7–8%
Kenkel	1993	A 10% increase in the price of alcohol would decrease drunk-driving by 7.4% for men and 8.1% for women; the impact on under-age drinkers would be larger
Chaloupka, Saffer & Grossman	1993	A policy adjusting the US beer excise for the inflation rate since 1951 to the mid-1980s would have reduced total road traffic fatalities by 11.5% and fatalities among 18- to 20-year-olds by 32.1%
C. Crime and violence		
Markovitz	1999	A 1% increase in the price of alcohol decreases the rate of wife abuse by 3.1–3.5% but has no effect on abuse of husbands
Cook & Moore	1993	A 10% increase in the beer excise would reduce rape by 1.32%, robbery by 0.9%, murder by 0.3% and assaults by 0.3%
Markovitz	2000	A 10% increase in the number of outlets that sell alcohol increases the probability of rape by almost 20%
D. Mortality and health		
Williams, Chaloupka & Wechsler	2002	College students faced with a US\$1.00 increase in the average real price of a drink would be 33% less likely to make the transition from being a moderate drinker to a binge drinker
Harrison & Kessler	2000	A US\$0.20 per six-pack increase in the beer excise would reduce the overall gonorrhoea rate by 8.9%
Grossman et al.	1994	A 10% increase in the price of beer reduces the number of high-school students who engage in binge drinking by 2–5%

5.3. Duty rate considerations

As a first approximation, the average Pigouvian duty can be calculated as the total net external costs of harmful alcohol use divided by the number of litres of pure alcohol consumed (subsequently, appropriately divided over beer, wine

and spirits). Unfortunately, the marginal duty is much more difficult to compute, because the relationship between alcohol consumption and external costs seems far from linear.⁴⁵ The marginal duty rate would be considerably higher than the average duty rate if the external damage caused by alcohol consumption varied across units consumed by each individual. Applying an average tax rate, therefore, means that the external costs generated by harmful users are compensated at the cost of reducing the consumer satisfaction of non-harmful users that is not regained as excise revenue (Pogue and Sgontz 1989).

As noted above, however, nearly all external costs are caused by 10% of the drinking population who consume one-third to one-half of all alcohol sold. Perhaps this suggests 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 Diamond (1973) argues, for regarding the average external costs as a rough-and-ready indicator of the optimal externality duty. Admittedly, for harmful users of alcohol (almost 1 in 5 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 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. The loss of consumer surplus that they suffer will be large if their elasticity of demand is large. On the other hand, the distributional effect will be small, because moderate drinkers are large in number, while they regain the excise payments in the form of, say, a reduction in other perhaps more distortionary taxes.

These considerations suggest that the alcohol excise duty collections should be at least as high as the level of the external costs and that the optimal alcohol excise duty may be calculated by dividing the external costs by the number of litres of pure alcohol consumed. If so, the evidence from the social and external cost studies (see above) then indicates that, on average, alcohol is taxed too lowly in the EU. Of course, the implications for alcohol taxation will differ between Member States depending on the variation in the current levels of taxation and external costs. But, as noted above, even in a high-alcohol-excise country, such as the UK, a case can still be made for an increase in the alcohol duties. Incidentally, it should be emphasized that these considerations do not take account of the tangible and intangible costs of alcohol regulations (e.g. regarding the physical availability of alcohol), which, as noted below, have a duty-equivalent effect and hence should be deducted from the optimal alcohol excise duty.

⁴⁵ By contrast, the external costs of tobacco consumption may be more uniformly proportional to consumption (Cnossen and Smart 2005).

Apart from implications for the level of the duty on alcohol, there are also consequences for the pattern of duties on various kinds of alcohol. As table 1 indicates, on average, spirits are taxed twice as heavily as beer per unit of alcohol and five times more heavily than wine. Prima facie, this suggests that there is a case for increasing the wine and beer duties relative to the spirits duty. On the other hand, average relative (excise-inclusive) prices of beer, wine and spirits indicate that one obtains the best value (i.e. the largest amount of pure alcohol for a given amount of money) when purchasing spirits, followed by wine and, lastly, beer, because production costs per litre of pure alcohol are higher for making wine and beer than for making spirits (WHO 2004).⁴⁶ So, if consumption damage control is the objective and assuming that harmful users of alcohol go after the cheapest source of pure alcohol, raising the price on the cheapest alcohol is the best way to target the tax penalty on harmful users. Alcohol excise duties would then be used to offset pre-tax price differences, so that the after-tax price per unit of alcohol would be the same for all drinks. Although this rule has some odd properties if implemented using an average price for categories of drinks,⁴⁷ it prompts the thought that a ‘floor price’ for alcohol might be a useful policy measure, making it illegal to sell brands that offer a very cheap way of getting drunk, while having negligible impact on the welfare of non-harmful users.

6. Alcohol Regulation

Invariably, excise taxation goes hand in hand with regulation. In the case of tobacco, the regulations are straightforward – no smoking in public places, no advertisements – but in the area of alcoholic drinking, a more multifaceted approach is common. Besides taxation and pricing, the approach includes regulating the physical availability of alcohol, drink-driving counter-measures, altering the drinking context, treatment and early intervention, regulating alcohol promotion, and education and persuasion programmes. 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. Kenkel (1993) has shown that MPAs reduce the

⁴⁶ The author has calculated these differences by reducing the excise-inclusive prices found in <http://data.euro.who.int/alcohol/Default.aspx?TabID=2422> (downloaded 8 August 2006) by the rates shown in table 1. Incidentally, the large differences in pre-tax prices suggest that alcohol product competition still has some way to go in the EU.

⁴⁷ For example, the average price of wine reflects the influence of very expensive vintage wines, while there is no real counterpart for beer. In any case, taxation on the basis of alcohol content would be difficult for wine because the (small-scale) production process gives the producer and the excise authorities less control over alcohol content. I owe these points to Stephen Smith.

highway fatality rate for the affected age-groups by about 7%. Half of all Member States also 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. Random breath testing (RBT) and lowered blood alcohol concentration (BAC) limits for young drivers (typically, 40–50mg% but 0mg% in the Czech Republic, Hungary and the Slovak Republic) are also common. Furthermore, most states have partial to complete mandatory or voluntary restrictions on advertising, sponsorship or brand identification. School- and work-based programmes tend to be poorly or only moderately developed.

Table 9, 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. Taxation and pricing is the preferred overall measure to reduce the external costs of harmful drinking. More targeted measures, such as regulations on the physical availability of alcohol and drink-driving counter-measures, also prove to be highly effective. Twenty-three studies of random and selective breath testing found a decline of 22% (range 13–36%) in fatal car crashes (Shults et al. 2001). Furthermore, a review of 46 studies on licence suspension in the US showed that suspension was followed by an average reduction of 5% in alcohol-related accidents and a reduction of 26% in fatal accidents (Zobeck and Williams 1994).⁴⁸ By contrast, the effectiveness of designated drivers, voluntary codes of bar practice and various forms of education and persuasion is low. Advertising bans are not very effective, although there is some evidence that alcohol advertising is influential in positively shaping young people's attitudes and perceptions about alcohol (Fleming, Thorson and Atkin 2004).

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, measured for instance in terms of the number of Disability-Adjusted Life Years (DALYs) averted each year, that is of greatest interest from an economic point of view. In a sophisticated 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 3), both individual interventions by doctors (especially if targeted at 25% of the at-risk population in a primary-care setting⁴⁹) and population-wide interventions such as alcohol excises (even after allowing for an estimated 10–15% increase

⁴⁸ 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 programme is an annual reduction of four or five fatalities at an annual programme cost of €0.9 million (€2,200 per lock).

⁴⁹ The World Health Organization has estimated that brief interventions would avoid 408,000 years of disability and premature death in the EU at an estimated cost of €740 million each year (Anderson and Baumberg 2006).

Table 9. Effectiveness of Alcohol Policies

Strategy or intervention	Effectiveness
	+++ = highest
	0 = not effective
	? = unknown
<i>Taxation and pricing</i>	
Alcohol taxes	+++
<i>Regulating physical availability</i>	
Minimum legal purchase age	+++
Government monopoly of retail sales	+++
Server legal liability	+++
Restrictions on density of outlets	++
Hours and days of sale restrictions	++
<i>Drink-driving counter-measures</i>	
Random breath testing (RBT)	+++
Lowered BAC ^a limits	+++
Low BAC ^a for young drivers ('zero tolerance')	+++
Administrative licence suspension	++
Designated drivers and ride services	0
<i>Altering the drinking context</i>	
Outlet policy to not serve intoxicated persons	+++
Enforcement of on-premise regulations	++
Training bar staff to manage aggression	+
Voluntary codes of bar practice	0
Promoting alcohol-free activities	0
<i>Treatment and early intervention</i>	
Brief intervention with at-risk drinkers	++
Alcohol problems treatment	+
Mutual help/self-help attendance	+
Mandatory treatment of repeat drinking-drivers	+
<i>Regulating alcohol promotion</i>	
Advertising bans	+
Advertising content controls	?
<i>Education and persuasion</i>	
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).

Note

^a Blood alcohol content.

in illicit production or smuggling) can have significant impact on harmful alcohol consumption at the population level.⁵⁰

Beyond that, reduced access to alcohol (in public buildings, work places, at sporting events, etc.), random breath testing, and lower BAC limits for young or professional drivers are highly cost-effective strategies. Her et al. (1999) find that the lower the outlet density, the lower consumption and alcohol-related problems will be. Wagenaar and Toomey (2000) document that changes in minimum drinking age laws can have substantial effect on youth drinking and alcohol-related harm, particularly road traffic accidents. Reviews have found that lower BAC limits for young drivers reduce fatal crashes by between 9%

⁵⁰ Similarly, the WHO's CHOICE (Choosing Interventions that are Cost-Effective) provides estimates of the impact and cost of implementing policies in reducing DALYs due to harmful alcohol use (WHO 2002).

and 24% (Shults et al. 2001). By contrast, designated drivers – e.g. BOB, the non-drinking driver in Belgium and the Netherlands – seem to have little effect and may even be harmful by suggesting that everyone in the car can be stone drunk as long as the driver is sober. Indeed, several studies indicate an increase in passenger alcohol consumption when a designated driver is available. Harding and Caudill (1997), for example, estimate that the mean increase in the BACs of passengers of designated drivers was 0.17g/l, with young and high-risk drinkers particularly likely to increase consumption.

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.

7. Implications for the EU's Alcohol Tax Policy

This paper has shown that 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 foetal damage.

Economic theory prescribes that the external costs of harmful alcohol use should be internalized in price, among others through excise taxation. In the main, the external costs are a function of the frequency and volume of alcohol consumption. This means that they differ from one drinker to another. While moderate drinkers may derive health benefits from alcohol consumption, heavy drinkers cause most of the external costs. For lack of information, however, it is not possible to differentiate alcohol excise duties on the basis of the kind of drinker and his drinking habits. Fortunately, the level of the uniform Pigouvian duty that has to be imposed can be inferred from information on drinking patterns and volume, the shape of the damage function, the total level and pattern of the external costs, and the price responsiveness of drinkers. This permits an assessment of the gain from a reduction in external costs caused by heavy drinkers relative to the loss in consumption benefits of moderate drinkers.

Ten per cent of all drinkers consume one-third to one-half of all alcohol sold and are responsible for most of the external costs. While there are no explicit external cost studies of harmful alcohol use in the EU, the external costs can be inferred from social cost studies. The tangible costs of heavy drinking are high in most Member States; apparently, heavy drinkers do not pay their way. An analysis of a social cost study for the UK indicates that alcohol excise duty collections do not cover the tangible costs of harmful alcohol use, narrowly defined. This is certainly the case in many other Member States with similar

drinking patterns but lower alcohol excise duties. Apparently, the price elasticity of demand of heavy drinkers is sufficiently large to induce them to lower their consumption if alcohol prices rise in response to higher excises. Presumably, higher excises would reduce overall consumption as well as harmful alcohol use, particularly by young people.⁵¹ Clearly, more can be done to align the excise duties on beer, wine and spirits in line with alcohol content.

The excise taxation of alcohol is a fairly blunt instrument, causing welfare losses to non-harmful 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 supplemented, therefore, by regulatory measures aimed at specific problem groups, such as young drinkers and alcohol-dependent drinking. 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 access to alcohol in public buildings, work places and at sporting events, and drink-driving tests. A lower limit of 0.2g/l or less should be considered for young drivers. Differentially higher excise duties on 'alcopops' appear to reduce youth drinking. Perhaps lessons can be learned from Sweden, which has high excise duties and is an island of moderation with low rates of heavy, binge and youth drinking.

There is a case for narrowing differences in alcohol taxes between EU Member States by significantly increasing the agreed EU-wide floors to alcohol taxes. 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. Approximation of duty rates might be difficult, however, in view of the zero duty on wine in many Member States in combination with the maintenance of an approximate alcohol-duty relationship between wine, beer and spirits. Also, agreement is unlikely to be promoted by the Commission's proposal to further liberalize intra-EU alcohol transfers by allowing consumers to buy non-commercially at distance (COM(2004) 227).

Over the years, EU Member States have come closer together in alcohol consumption levels, drink preferences and youth drunkenness. Accordingly, harmful alcohol use is more of a common problem than it used to be. This suggests that a common reflection on measures to tackle the issues is called for.

⁵¹ It is often argued that the output, income and employment generated by the alcohol industry (some 2½ million people are employed in alcohol production and distribution in the EU – see Naert, Naert and Maex (2001)) must be viewed as benefits to the community at large, but this proposition rests on the unlikely assumption that, in the absence of drinking, the money 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.

References

- Academy of Medical Sciences (2004). *Calling Time: The Nation's Drinking as a Major Public Health Issue*, www.acmedsci.ac.uk
- Anderson, P. and B. Baumberg (2006). *Alcohol in Europe*, Institute of Alcohol Studies, London
- Aspect Consortium (2004). *Tobacco or Health in the European Union: Past, Present and Future*, European Commission, Brussels
- 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
- Barker, F. (2002). 'Consumption externalities and the role of government: the case of alcohol', New Zealand Treasury, Working Paper 02/25, www.treasury.govt.nz/workingpapers/2002/02-25.asp
- Bergmann, E. and K. Horch (2002). *Kosten Alkoholassoziierter Krankheiten: Schätzung für Deutschland*, Robert Koch Institut, Berlin
- Bird, R. and S. Wallace (2006). 'Taxing alcohol: reflections from international experience', in S. Cnossen (ed.), *Excise Tax Policy and Administration in Southern African Countries*, UNISA Press, Pretoria
- 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*, 99/12, 1520–8
- Brand, S. and R. Price (2000). *The Economic and Social Costs of Crime*, Home Office Research Study 217, London
- 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/mn_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*, 97/7, 633–45
- 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., H. Saffer and M. Grossman (1993). 'Alcohol-control policies and motor-vehicle fatalities', *Journal of Legal Studies*, 22, 161–86
- 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*, 65, 782–93
- Christiansen, V. and S. Smith (2001). 'The economics of duty-free shopping', CESifo, Working Paper 595
- Clements, K.W., W. Yang and S.W. Zheng (1997). 'Is utility addictive? The case of alcohol', *Applied Econometrics*, 29/9, 1163–7
- Cnossen, S. (2006). 'Tobacco taxation in the European Union', *FinanzArchiv*, 62/2, 305–22
- 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
- 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*, 314, 1164, bmj.bmjournals.com/cgi/content/full/314/7088/1164
- Collicelli, C. (1996). 'Income from alcohol and the costs of alcoholism', *Alcologia*, 8/2, 135–43
- 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

- 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*, John Wiley and Sons, West Sussex
- Cook, P.J. and M.J. Moore (1993). 'Economic perspectives on reducing alcohol-related violence', in *Alcohol and Interpersonal Violence: Fostering Multidisciplinary Perspectives*, Research Monograph 24, National Institute on Alcohol Abuse and Alcoholism, Bethesda, MD
- Cook, P.J. and M.J. Moore (2002). 'The economics of alcohol abuse and alcohol-control policies', *Health Affairs*, 21/2, 120–33
- Corrao, G., R. Luca, V. Bagnardi, A. Zambon and K. Poikolainen (2000). 'Alcohol and coronary heart disease: a meta-analysis', *Addiction*, 95/10, 1505–23
- Crawford, I., Z. Smith and S. Tanner (1999). 'Alcohol taxes, tax revenues and the Single European Market', *Fiscal Studies*, 20/3, 287–304
- Crooks, E. (1989). *Alcohol Consumption and Taxation*, Report 34, Institute for Fiscal Studies, London
- Devlin, N.J., P.A. Scuffham and L.J. Bunt (1997). 'The social costs of alcohol abuse in New Zealand', *Addiction*, 92/11, 1491–505
- Diamond, P. (1973). 'Consumption externalities and imperfect corrective pricing', *Bell Journal of Economics*, 4/2, 526–38
- Elinder, L.S., L. Joossens, M. Raw, S. Andréasson and T. Lang (2003). *Public Health Aspects of the EU Common Agricultural Policy: Developments and Recommendations for Change in Four Sectors (Fruit and Vegetables, Dairy, Wine and Tobacco)*, National Institute for Public Health, Stockholm, www.fhi.se/upload/PDF/2004/English/eu_inlaga.pdf
- 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
- ETSC – European Transport Safety Council (2003). *Cost-Effective EU Transport Safety Measures*, Brussels, www.etsc.be/documents/costeff.pdf
- Eurobarometer (2003), Health, Food and Alcohol and Safety, European Commission.
- European Commission (2004). Report from the Commission to the Council, the European Parliament and the European Economic and Social Committee on the Rates of Excise Duty Applied on Alcohol and Alcoholic Beverages, COM(2004) 223 final, Brussels
- Farrell, S., W.G. Manning and M.D. Finch (2003). 'Alcohol dependence and the price of alcoholic beverages', *Journal of Health Economics*, 22/1, 117–47
- Fenoglio, P., V. Parel and P. Kopp (2003). 'The social cost of alcohol, tobacco and illicit drugs in France, 1997', *European Addiction Research*, 9/1, 18–28
- Fleming, K., E. Thorson and C.K. Atkin (2004). 'Alcohol advertising exposure and perceptions: links with alcohol expectancies and intentions to drink or drinking in underage youth and young adults', *Journal of Health Communication*, 9/1, 3–29
- Garcia-Sempere, A. and E. Portella (2002). 'Los estudios del coste del alcoholismo: marco conceptual, limitaciones y resultados en España', *Addiciones*, 14/1, 141–53
- 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*, 60, 78–89
- Grossman, M., F.J. Chaloupka, H. Saffer and A. Laixuthai (1994). 'Effects of alcohol price policy on youth: a summary of economic research', *Journal of Research on Adolescence*, 4/2, 347–64
- Grossman, M., F. Chaloupka and I. Sirtalan (1998). 'An empirical analysis of alcohol addiction: results from the Monitoring the Future panels', *Economic Inquiry*, 36, 39–48
- Gruber, J. and B. Koszegi (2001). 'Is addiction "rational"? Theory and evidence', *Quarterly Journal of Economics*, 116, 1261–303
- Harding, W.M. and B.D. Caudill (1997). 'Does the use of designated drivers promote excessive alcohol consumption?', in C. Mercier-Guyon (ed.), *Proceedings of the 14th Annual Conference on Alcohol, Drugs and Traffic Safety, Volume 3*, Centre d'Études et de Recherches en Médecine du Trafic, Annecy
- Harrison, P. and W.J. Kessler (2000). 'Alcohol policy and sexually transmitted disease rates – United States, 1982–1995', US Department of Health and Human Services, Center for Disease Control, Epidemiology Program Office, *MMWR Weekly*, 49/16, 364–9

- Harwood, H., D. Fountain and G. Livermore (1999). 'Cost estimates for alcohol and drug abuse', *Addiction*, 94/5, 631–4
- Harwood, P. (2000). *Updating Estimates of the Economic Costs of Alcohol Abuse in the United States: Update Methods, and Data*, report prepared by the Lewin Group for the National Institute on Alcohol Abuse and Alcoholism
- Her, M., N. Giesbrecht, R. Room and J. Rehm (1999). 'Privatizing alcohol sales and alcohol consumption: evidence and implications', *Addiction*, 94/8, 1125–39
- 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
- Huang, C.D. (2003). 'Econometric models of alcohol demand in the United Kingdom', Government Economic Service, Working Paper 140, customs.hmrc.gov.uk/channelsPortalWebApp/channelsPortalWebApp.portal?_nfpb=true&_pageLabel=pageExcise_ShowContent&id=HMCE_PROD_008459&propertyType=document
- IAS – Institute of Alcohol Studies (2003). *Economic Costs and Benefits*, IAS Fact Sheet, 14 November
- Johansen, D., M. Gronbaek, K. Overvad, P. Schnohr and P-K. Andersen (2005). 'Generalized additive models applied to analysis of the relation between amount and type of alcohol and all-cause mortality', *European Journal of Epidemiology*, 20/1, 29–36
- 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
- Kenkel, D.S. (1993). 'Drinking, driving and deterrence: the effectiveness and social cost of alternative policies', *Journal of Law and Economics*, 26/2, 877–913
- Kenkel, D.S. (1996). 'New estimates of the optimal tax on alcohol', *Economic Inquiry*, 34, 296–319
- KPMG (2001). *Excessive Alcohol Consumption in the Netherlands: Trends and Social Costs*, KPMG Economic Consulting, Hoofddorp
- Leifman, H. (2001). 'Estimations of unrecorded alcohol consumption levels and trends in 14 European countries', *Nordisk Alkohol- & Narkotikatidskrift*, 18, 54–70
- Lemmens, P. (2001). 'Relationship of alcohol consumption and alcohol problems at the population level', in H. Heather, T.J. Peters and T. Stockwell (eds), *International Handbook of Alcohol Dependence and Problems*, Wiley, New York
- Leppänen, K., R. Sullström and I. Suoniemi (2001). 'Effects of economic factors on alcohol consumption in 14 European countries', *Nordic Studies on Alcohol and Drugs*, 18, 100–16
- Leung, S. and C. Phelps (1993). 'My kingdom for a drink ...? A review of estimates of the price sensitivity of alcoholic beverages', in M.E. Hilton and G. Bloss (eds), *Economics and the Prevention of Alcohol-Related Problems*, NIH Publication 93-3513, National Institutes of Health, Rockville, MD
- Lieber, C.S. (2003). 'Alcohol and health: a drink a day won't keep the doctor away', *Cleveland Clinic Journal of Medicine*, 70/11, 945–53
- Lima, E. and T. Esquedro (2003). 'The economic costs of alcohol misuse in Portugal', Universidade do Minho, Nucleo de Investigação em Microeconomica Alicada, Working Paper 24
- MacDonald, Z. and M.A. Shields (2001). 'The impact of alcohol consumption on occupational attainment in England', *Economica*, 68/271, 427–53

- Manning, W.G., L. Blumberg and L.H. Moulton (1995). 'The demand for alcohol: the differential response to price', *Journal of Health Economics*, 14, 123–48
- 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*, 261, 1604–9
- Markowitz, S. (1999). 'The price of alcohol, wife abuse, and husband abuse', National Bureau of Economic Research, Working Paper 6916
- Markowitz, S. (2000). 'An economic analysis of alcohol, drugs, and violent crime in the National Crime Victimization Survey', National Bureau of Economic Research, Working Paper 7982
- Markowitz, S. and M. Grossman (1999). 'Alcohol regulation and domestic violence towards children', *Contemporary Economic Policy*, 16/3, 309–21
- Mathijssen, R. (2005). *An Alcohol Interlock Program*, Traffic Injury Research Foundation, Ottawa
- Matthews, S. and S. 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
- Mill, J.S. (1869). On Liberty.
- Miller, T.R. and L.J. Blincoe (1994). 'Incidence and costs of alcohol-involved crashes in the United States', *Accident Analysis and Prevention*, 26/5, 583–92
- Mirrlees-Black, C. (1999). *Domestic Violence: Findings from a New British Crime Survey Self-Completion Questionnaire*, Home Office Research Study 191, Home Office, London
- Naert, P., S. Naert and D. Maex (2001). 'The socio-economic impact of the European alcoholic beverages industry', in *The Amsterdam Group Report 2001: Alcoholic Beverages and European Society*, TAG
- NIAAA – National Institute on Alcohol Abuse and Alcoholism (2000). *Tenth Special Report to the US Congress on Alcohol and Health*, US Government Printing Office, Washington, DC
- OECD – Organization for Economic Cooperation and Development (2005). *Revenue Statistics 1965–2003*, Paris
- Österberg, E. and T. Karlsson (eds) (2001). *Alcohol Policies in EU Member States and Norway: A Collection of Country Reports*, National Institute of Public Health, Sweden.
- Pacolet, J., T. Degreef and R. Bouten (2003). *Sociale kosten-batenanalyse van alcoholgebruik en -misbruik in België*, KUL, Hoger instituut voor de arbeid, Leuven
- 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
- Peele, S. and A. Brodsky (2000). 'Exploring psychological benefits associated with moderate alcohol use', *Drug and Alcohol Dependence*, 60, 221–47
- Pigou, A.C. (1918). *The Economics of Welfare*, Macmillan, London
- Pogue, T.F. and L.G. Sgontz (1989). 'Taxing to control social costs: the case of alcohol', *American Economic Review*, 79/1, 235–43
- Ramsey, F. (1927). 'A contribution to the theory of taxation', *Economic Journal*, 37, 47–61
- Ramstedt, M. and A. Hope (2003). *The Irish Drinking Habits of 2002: Drinking and Drinking-Related Harm – A European Comparison*, Department of Health and Children, Dublin
- Rehm, J., M. Room, G. Monteiro, K. Gmel, N. Graham, C. Rehn, T. Sempos, U. Frick and D. Jernigan (2004). 'Alcohol', in M. Ezzati, A.D. Lopez, A. Rodgers and C.J.L. Murray (eds), *Comparative Quantification of Health Risks: Global and Regional Burden of Disease due to Selected Major Risk Factors*, World Health Organization, Geneva
- Rehn, N., R. Room and G. Edwards (2001). *Alcohol in the European Region: Consumption, Harm and Policies*, World Health Organization 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*, 301, 1031–4
- Rossow, I., K. Parnanen and J. Rehm (2001). 'Accidents, suicide and violence', in H. Klingemann and G. Gmel (eds), *Mapping the Social Consequences of Alcohol Consumption*, Kluwer Academic Publishers, Dordrecht

- Ruhm, C.J. (1996). 'Alcohol policies and highway vehicle fatalities', *Journal of Health Economics*, 15, 435–54
- Saffer, H. and F.J. Chaloupka (1994). 'Alcohol tax equalization and social costs', *Eastern Economic Review*, 20/1, 33–43
- Saffer, H. and D. Dave (2003). 'Alcohol advertising and alcohol consumption by adolescents', National Bureau of Economic Research, Working Paper 9676
- Salomaa, J. (1995). 'The costs of the detrimental effects of alcohol abuse have grown faster than alcohol consumption in Finland', *Addiction*, 90/4, 525–37
- Scottish Executive Health Department (2003), *Alcohol Misuse in Scotland: Trends and Costs*, Catalyst Health Economics Consultants Ltd, Edinburgh
- Settortobulte, 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*, 21, 66–88
- Single, E., D. Collins, B. Easton, H. Harwood, H. Lapsley, O. Kopp and E. Wilson (2003). *International Guidelines for Estimating the Costs of Substance Abuse*, Canadian Centre on Substance Abuse, Ottawa
- 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, 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 & Rehm's Interpretation of the Theory of Collectivity of Drinking Culture', *Drug and Alcohol Review*, 20/3, 325–31
- 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
- Strategic Task Force on Alcohol (2004). *Interim Report*, Department of Health and Children, Dublin
- Sundhedsministeriet (1999). *De samfundsøkonomiske konsekvenser af alkoholforbrug*, 2nd edn, Ministry of Health, Copenhagen, www.im.dk/publikationer/alkoholrapport/index.htm
- UK Cabinet Office (2003). *Alcohol Misuse: How Much Does it Cost?*, Strategy Unit, London, www.strategy.gov.uk/downloads/files/econ.pdf
- Wagenaar, A.C. and T.L. Toomey (2000). 'Alcohol policy: gaps between legislative action and current research', *Contemporary Drug Problems*, 27, 681–733
- 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*, 4, 380–6
- 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, pp. Ev1–Ev12 in House of Commons Treasury Committee, *Excise Duty Fraud: Fourth Report of Session 2004–05*, The Stationery Office, London
- 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*, 100, 933–44
- White, H.R., D.R. Altmann and K. Nanchahal (2002). 'Alcohol consumption and mortality: modelling risks for men and women at different ages', *British Medical Journal*, 325, 191–8
- WHO – World Health Organization (2002). *Reducing Risks, Promoting Healthy Life*, World Health Report 2002, Geneva
- WHO – World Health Organization (2004). *Global Status Report on Alcohol*, www.who.int/substance_abuse/publications/global_status_report_2004_overview.pdf

- WHO – World Health Organization (2005). *Alcohol Policy in the WHO European Region: Current Status and the Way Forward*, Regional Office for Europe, Copenhagen and Bucharest
- WHO – World Health Organization (2006). *Global Alcohol Database*, www3.who.int/whosis/alcohol/alcohol_about_us.cfm?path=whosis,alcohol,alcohol_about&language=english
- Williams, J., F.J. Chaloupka and H. Wechsler (2002). ‘Are there differential effects of price and policy on college students’ drinking intensity?’, National Bureau of Economic Research, Working Paper 8702
- World Drink Trends* (2004). NTC Publications, Henley on Thames
- Zoback, T.S. and G.D. Williams (1994). *Evaluation Synthesis of the Impact of DWI Laws and Enforcement Methods: Final Report*, Office of Policy Analysis, National Institute on Alcohol Abuse and Alcoholism (NIAAA), Rockville, MD

CESifo Working Paper Series

(for full list see www.cesifo-group.de)

- 1760 Pascalis Raimondos-Møller and Alan D. Woodland, Steepest Ascent Tariff Reforms, July 2006
- 1761 Ronald MacDonald and Cezary Wojcik, Catching-up, Inflation Differentials and Credit Booms in a Heterogeneous Monetary Union: Some Implications for EMU and new EU Member States, July 2006
- 1762 Robert Dur, Status-Seeking in Criminal Subcultures and the Double Dividend of Zero-Tolerance, July 2006
- 1763 Christa Hainz, Business Groups in Emerging Markets – Financial Control and Sequential Investment, July 2006
- 1764 Didier Laussel and Raymond Riezman, Fixed Transport Costs and International Trade, July 2006
- 1765 Rafael Lalive, How do Extended Benefits Affect Unemployment Duration? A Regression Discontinuity Approach, July 2006
- 1766 Eric Hillebrand, Gunther Schnabl and Yasemin Ulu, Japanese Foreign Exchange Intervention and the Yen/Dollar Exchange Rate: A Simultaneous Equations Approach Using Realized Volatility, July 2006
- 1767 Carsten Hefeker, EMU Enlargement, Policy Uncertainty and Economic Reforms, July 2006
- 1768 Giovanni Facchini and Anna Maria Mayda, Individual Attitudes towards Immigrants: Welfare-State Determinants across Countries, July 2006
- 1769 Maarten Bosker and Harry Garretsen, Geography Rules Too! Economic Development and the Geography of Institutions, July 2006
- 1770 M. Hashem Pesaran and Allan Timmermann, Testing Dependence among Serially Correlated Multi-category Variables, July 2006
- 1771 Juergen von Hagen and Haiping Zhang, Financial Liberalization in a Small Open Economy, August 2006
- 1772 Alessandro Cigno, Is there a Social Security Tax Wedge?, August 2006
- 1773 Peter Egger, Simon Loretz, Michael Pfaffermayr and Hannes Winner, Corporate Taxation and Multinational Activity, August 2006
- 1774 Jeremy S.S. Edwards, Wolfgang Eggert and Alfons J. Weichenrieder, The Measurement of Firm Ownership and its Effect on Managerial Pay, August 2006

- 1775 Scott Alan Carson and Thomas N. Maloney, Living Standards in Black and White: Evidence from the Heights of Ohio Prison Inmates, 1829 – 1913, August 2006
- 1776 Richard Schmidtke, Two-Sided Markets with Pecuniary and Participation Externalities, August 2006
- 1777 Ben J. Heijdra and Jenny E. Ligthart, The Transitional Dynamics of Fiscal Policy in Small Open Economies, August 2006
- 1778 Jay Pil Choi, How Reasonable is the ‘Reasonable’ Royalty Rate? Damage Rules and Probabilistic Intellectual Property Rights, August 2006
- 1779 Ludger Woessmann, Efficiency and Equity of European Education and Training Policies, August 2006
- 1780 Gregory Ponthiere, Growth, Longevity and Public Policy, August 2006
- 1781 Laszlo Goerke, Corporate and Personal Income Tax Declarations, August 2006
- 1782 Florian Englmaier, Pablo Guillén, Loreto Llorente, Sander Onderstal and Rupert Sausgruber, The Chopstick Auction: A Study of the Exposure Problem in Multi-Unit Auctions, August 2006
- 1783 Adam S. Posen and Daniel Popov Gould, Has EMU had any Impact on the Degree of Wage Restraint?, August 2006
- 1784 Paolo M. Panteghini, A Simple Explanation for the Unfavorable Tax Treatment of Investment Costs, August 2006
- 1785 Alan J. Auerbach, Why have Corporate Tax Revenues Declined? Another Look, August 2006
- 1786 Hideshi Itoh and Hodaka Morita, Formal Contracts, Relational Contracts, and the Holdup Problem, August 2006
- 1787 Rafael Lalive and Alejandra Cattaneo, Social Interactions and Schooling Decisions, August 2006
- 1788 George Kapetanios, M. Hashem Pesaran and Takashi Yamagata, Panels with Nonstationary Multifactor Error Structures, August 2006
- 1789 Torben M. Andersen, Increasing Longevity and Social Security Reforms, August 2006
- 1790 John Whalley, Recent Regional Agreements: Why so many, why so much Variance in Form, why Coming so fast, and where are they Headed?, August 2006
- 1791 Sebastian G. Kessing and Kai A. Konrad, Time Consistency and Bureaucratic Budget Competition, August 2006

- 1792 Bertil Holmlund, Qian Liu and Oskar Nordström Skans, Mind the Gap? Estimating the Effects of Postponing Higher Education, August 2006
- 1793 Peter Birch Sørensen, Can Capital Income Taxes Survive? And Should They?, August 2006
- 1794 Michael Kosfeld, Akira Okada and Arno Riedl, Institution Formation in Public Goods Games, September 2006
- 1795 Marcel Gérard, Reforming the Taxation of Multijurisdictional Enterprises in Europe, a Tentative Appraisal, September 2006
- 1796 Louis Eeckhoudt, Béatrice Rey and Harris Schlesinger, A Good Sign for Multivariate Risk Taking, September 2006
- 1797 Dominique M. Gross and Nicolas Schmitt, Why do Low- and High-Skill Workers Migrate? Flow Evidence from France, September 2006
- 1798 Dan Bernhardt, Stefan Krasa and Mattias Polborn, Political Polarization and the Electoral Effects of Media Bias, September 2006
- 1799 Pierre Pestieau and Motohiro Sato, Estate Taxation with Both Accidental and Planned Bequests, September 2006
- 1800 Øystein Foros and Hans Jarle Kind, Do Slotting Allowances Harm Retail Competition?, September 2006
- 1801 Tobias Lindhe and Jan Södersten, The Equity Trap, the Cost of Capital and the Firm's Growth Path, September 2006
- 1802 Wolfgang Buchholz, Richard Cornes and Wolfgang Peters, Existence, Uniqueness and Some Comparative Statics for Ratio- and Lindahl Equilibria: New Wine in Old Bottles, September 2006
- 1803 Jan Schnellenbach, Lars P. Feld and Christoph Schaltegger, The Impact of Referendums on the Centralisation of Public Goods Provision: A Political Economy Approach, September 2006
- 1804 David-Jan Jansen and Jakob de Haan, Does ECB Communication Help in Predicting its Interest Rate Decisions?, September 2006
- 1805 Jerome L. Stein, United States Current Account Deficits: A Stochastic Optimal Control Analysis, September 2006
- 1806 Friedrich Schneider, Shadow Economies and Corruption all over the World: What do we really Know?, September 2006
- 1807 Joerg Lingens and Klaus Waelde, Pareto-Improving Unemployment Policies, September 2006

- 1808 Axel Dreher, Jan-Egbert Sturm and James Raymond Vreeland, Does Membership on the UN Security Council Influence IMF Decisions? Evidence from Panel Data, September 2006
- 1809 Prabir De, Regional Trade in Northeast Asia: Why do Trade Costs Matter?, September 2006
- 1810 Antonis Adam and Thomas Moutos, A Politico-Economic Analysis of Minimum Wages and Wage Subsidies, September 2006
- 1811 Guglielmo Maria Caporale and Christoph Hanck, Cointegration Tests of PPP: Do they also Exhibit Erratic Behaviour?, September 2006
- 1812 Robert S. Chirinko and Hisham Foad, Noise vs. News in Equity Returns, September 2006
- 1813 Oliver Huelsewig, Eric Mayer and Timo Wollmershaeuser, Bank Behavior and the Cost Channel of Monetary Transmission, September 2006
- 1814 Michael S. Michael, Are Migration Policies that Induce Skilled (Unskilled) Migration Beneficial (Harmful) for the Host Country?, September 2006
- 1815 Eytan Sheshinski, Optimum Commodity Taxation in Pooling Equilibria, October 2006
- 1816 Gottfried Haber and Reinhard Neck, Sustainability of Austrian Public Debt: A Political Economy Perspective, October 2006
- 1817 Thiess Buettner, Michael Overesch, Ulrich Schreiber and Georg Wamser, The Impact of Thin-Capitalization Rules on Multinationals' Financing and Investment Decisions, October 2006
- 1818 Eric O'N. Fisher and Sharon L. May, Relativity in Trade Theory: Towards a Solution to the Mystery of Missing Trade, October 2006
- 1819 Junichi Minagawa and Thorsten Upmann, Labor Supply and the Demand for Child Care: An Intertemporal Approach, October 2006
- 1820 Jan K. Brueckner and Raquel Girvin, Airport Noise Regulation, Airline Service Quality, and Social Welfare, October 2006
- 1821 Sijbren Cnossen, Alcohol Taxation and Regulation in the European Union, October 2006