Cost benefit analysis of alcohol policy

1. INTRODUCTION

Alcohol is a cause of considerable health and social burden to the European Union. Alcohol is a cause of over some 60 conditions and disorders (Rehm et al 2009), and is the third leading risk factor for ill-health and premature death in the Union after hypertension and tobacco use (Anderson & Baumberg 2006). The harm done by alcohol is exacerbated by health inequalities, and alcohol is a major cause itself of health inequalities within and between countries. It has been calculated that some 25% of the differences in middle aged life expectancy between eastern and western Europe is due to alcohol (Zatonksi et al 2008). It is estimated that the overall social cost of alcohol to the Union is some €125billion each year (Anderson& Baumberg 2006).

There is a very extensive evidence base for the impact of policies in reducing the harm done by alcohol (Anderson et al 2009). Despite the extent of ham and the evidence for effective policy, there remains a gap between current practice and what could be done to reduce the harm done by alcohol (Anderson 2009a). One tool that can be used to fill this gap is economic analysis (Anderson 2009b). For example, the World Health Organization has undertaken cost effectiveness analysis for a range of alcohol policies and concluded that making alcohol more expensive and less available are highly cost-effective strategies to reduce harm (Chisholm et al 2004; Anderson et al 2009). Banning alcohol advertising, drink driving counter measures and individually directed interventions to already at risk drinkers are also found to be cost-effective. In settings with relatively high levels of unrecorded production and consumption, increasing the proportion of alcohol that is taxed may be a more effective pricing policy than a simple increase in tax. Others have extended this work in Australia and Canada to estimate the proportion of the present social costs due to alcohol that could be averted by implementing incremental alcohol Policies (Collins & Lapsley 2008; Rehm et al 2008).

A complete economic analysis to better inform alcohol policy would estimate the overall costs and benefits of alcohol policies (Baumberg 2009), as summarized in the table below, a cost-benefit analysis.

COSTS	BENEFITS
Implementation costs	Reduced health and welfare costs
Costs to industry	Reduced labour and productivity losses
Non-financial welfare costs	Reduced non-financial welfare losses

3. THE COSTS OF ALCOHOL POLICY

The costs of alcohol policy can be considered under the headings of the direct costs of implementing alcohol policy, the costs to the alcohol industry, and non-financial costs, including the value expressed in financial terms that consumers place on the pleasure derived from consuming alcohol.

3.1 Implementation costs

The best available, and indeed the only readily accessible, data set for implementation costs is derived from the WHO CHOosing Interventions that are Cost Effective (WHO-CHOICE) model (WHO 2009). These have been reproduced at the country level for € 2005 costs (Chisholm et al 2009), and are summarized in Figure 1 for the three sub-regions of the European Region of the World Health Organization. The policy option with the greatest cost is implementing brief interventions for heavy drinkers, since there are relatively high health system and staff resource costs. The other policy options have similar costs, with the exception of increasing tax enforcement in jurisdictions with relatively high levels of unrecorded alcohol consumption, where enforcement costs increase.

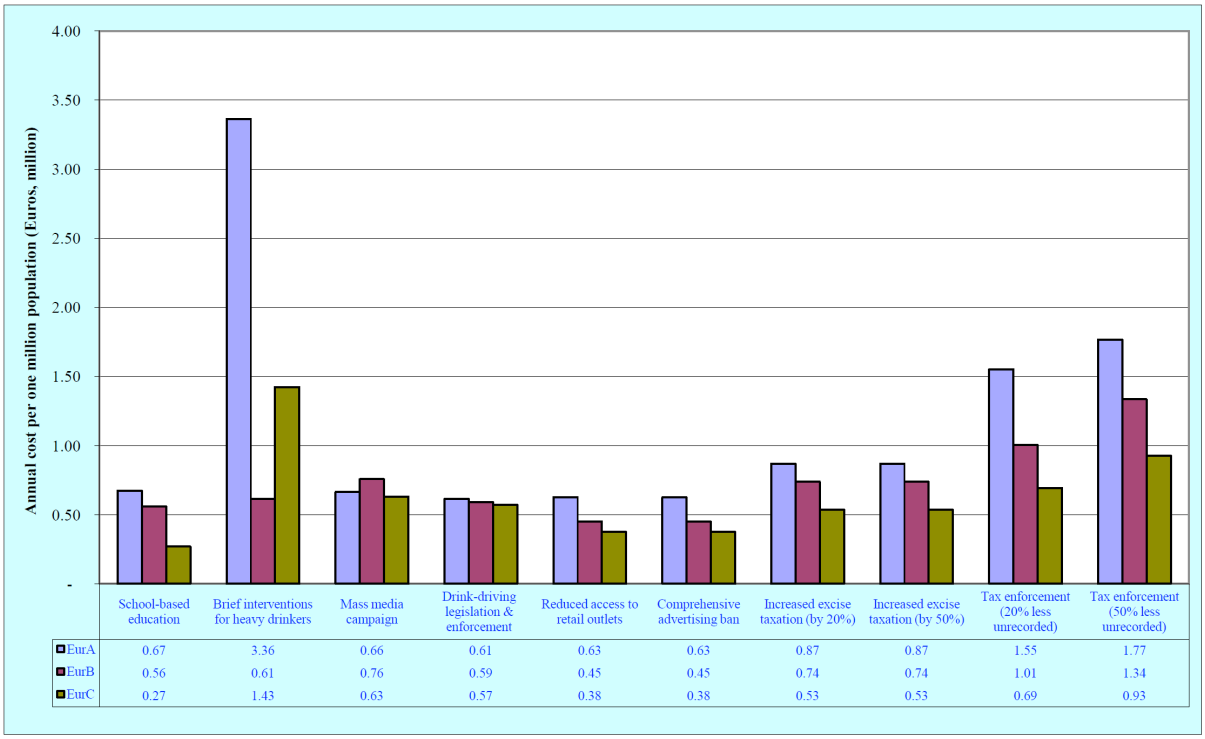

Figure 1 Annual alcohol policy implementation costs, €/person. Source: See Anderson (2009a)

3.2 The costs of alcohol policy to industry

A report by RAND Europe suggests that the alcohol industry makes a modest contribution to the total economy of the European Union (Horlings and Scoggins 2006). This includes €25bn of value-added in the production of beer, wine and spirits; nearly €20bn of value-added in supplying industries to the production of beer, wine and spirits; and an unquantified additional amount of

value-added from other forward and backward linkages within the economy; €10bn added to the EU overall balance of trade; and around 600,000 workers in production of beer, wine and spirits together with viticulture, together with 600,000 workers in supplying industries to beer and spirits production and 2.6m jobs in the retail of beer alone. It should be noted that some of these figures may be over-estimates. For example, the RAND report points out that the2.6m retail jobs for beer will include many part-time jobs, and will be dependent on much more than just alcohol. In the tobacco field, it has been estimated that the full-time equivalent number of jobs is around one-third of the total number of jobs calculated in industry-commissioned research. Further, it should also be noted that the greatest impact on reducing the number of jobs in production and distribution has resulted from mechanization and increased efficiency.

The more important point is that such figures simply cannot be taken as estimates of the economic benefit of the alcohol industry (Anderson and Baumberg 2006; Baumberg 2008). If people reduced their spending on alcohol, they would spend their money in other areas or save it. The jobs that are lost related to alcohol would therefore be counterbalanced by jobs created in other areas. Considering jobs in the economy as a whole, modelling for England suggested that, for example, a 10% increase in the overall price of alcohol would lead to a small reduction in unemployment of 12,800 in one year, Figure 2. Similarly, the introduction of a minimum price of €0.06/gram of alcohol would reduce unemployment by 12,400 in one year (Brennan et al 2008).

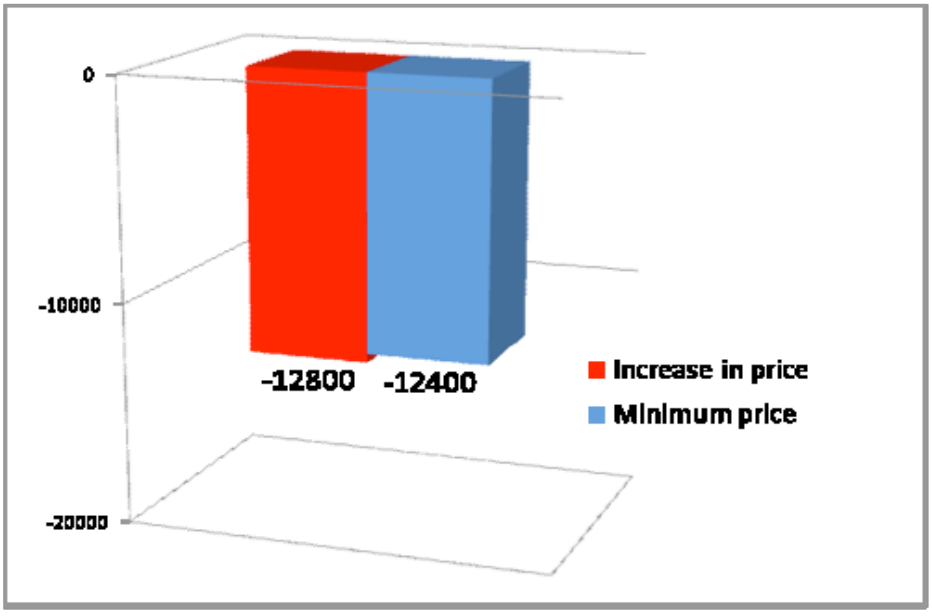

Figure 2 Impact of price measures in reducing unemployment in England. Source: Brennan et al (2008)

3.3 Valuing the pleasure of alcohol

The pleasure of drinking alcohol has sometimes been acknowledged in the public health literature (Anderson and Baumberg 2006), and should ideally be included as a cost of alcohol policy. The main way that internal benefits of a good are measured economically is through the idea of consumer surplus, how much more people would have been willing to pay for the good than the actual price they paid. The problem is that, for alcohol, we do not know how much people would have been willing to pay, and strong assumptions about this are required before we can estimate the

consumer surplus. One study estimated the consumer surplus in London as half of the actual price: Londoners were, on average, willing to pay an extra 50% more compared to the prevailing average price in the market (Aslam et al 2003). But there were many methodological problems with this study.

First, the assumption of a linear demand curve which was used in the study is very likely to be false. A person drinking 40 grams alcohol a week is likely to value these more highly than the same 40g that make up the difference between 460g and 500g a week for another drinker. Put another way, as consumption decreases, it is likely that people are willing to pay a higher price-per-gram than they previously were. This suggests that these estimates of the consumer surplus are likely to be underestimates.

Secondly, the consumer loss will be an overestimate to the extent that it excludes any consumer surplus from the spending that replaces drinking. We can assume that this consumer surplus is lower than for alcohol, otherwise people would simply spend their money differently. But, equally it is highly improbable that such a consumer surplus is non-existent. For example, if people reduced their drinking following an effective intervention, then people would save money that they would otherwise have spent on alcohol, and may instead use this to see live music or go out with friends for a meal. These alternate spending patterns would also be more valuable to people than the money they spent on it.

Finally, and most critically, the estimates assume that consumers are both fully-informed and rational. This becomes difficult to hold when some drinkers, accounting for a sizeable amount of total consumption, are heavy and hazardous drinkers, some of whom will be addicted to alcohol and therefore not making rational, informed purchase decisions (Collins and Lapsley 2002; Kleiman 2008). It can also be argued that non-addicted drinkers are subject to some irrational decision-making particularly while they are drinking. For example, there is neurobiological evidence, that the brain reward circuitries overvalues the pleasure of alcohol, as with other similar drugs, and thus the consumer puts more effort to obtain it, even if it provides no objective or subjective benefit to the user. Thus, alcoholic products directly distort the brain's decisions about how much work to devote to consuming them, leading people to pay more to get an alcoholic drink than it is worth (Redish 2004).

For studies modelling taxation, the increased amount spent on a constant level of alcohol could also be considered as consumer surplus. For example, modelling in England estimated that a 10% increase in the price of alcoholic beverages would reduce consumption by 4.4%, an average reduction of 5.5 g alcohol per week, with a significantly greater reduction of 25 g per week for harmful drinkers (defined as men who drink more than 400 g alcohol per week and women who drink more than 280 g/week) than the 4 g/week reduction for moderate drinkers (men who drink up to 168 g alcohol per week and women who drink up to 112 g/week) (Brennan et al 2008). The direct cost to consumers of the price increase was estimated to vary significantly among different types of drinkers. The overall figure was €38 per drinker per annum, ranging from an estimated €132 annually for harmful drinkers to €19 for moderate drinkers.

4. THE BENEFITS OF ALCOHOL POLICY

4.1 Reducing health and welfare costs

Alcohol has impacts on health and welfare (Anderson & Baumberg 2006; Rehm et al 2009). These impacts can be costed in monetary terms, thus allowing estimates of the avoidable burden of the costs following changes in alcohol policy. A number of studies have added up the health and welfare costs (Rehm et al 2009). In the European Union, the total cost was estimated at €125billion in one year (Anderson & Baumberg 2006), Figure 3.

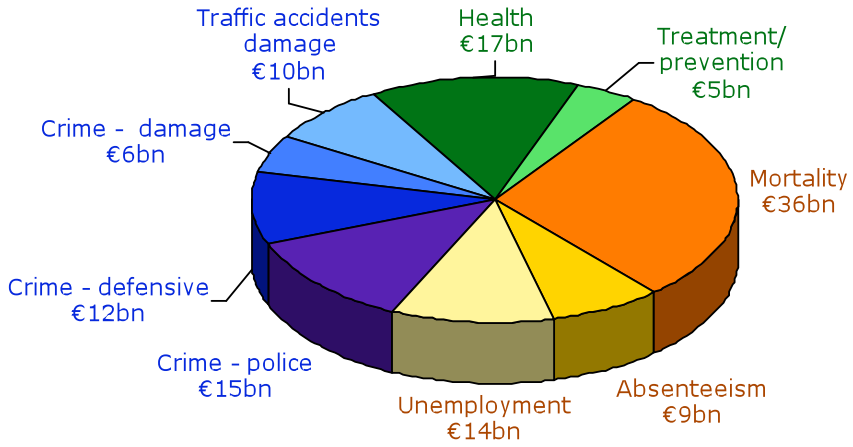

Figure 3 Estimate of social cost in the European Union. Source: Anderson & Baumberg 2006

In Canada, the social costs of alcohol were estimated at CAN$13.5billion, of which health and crime costs were about ¼ each of the total social costs, Figure 4.

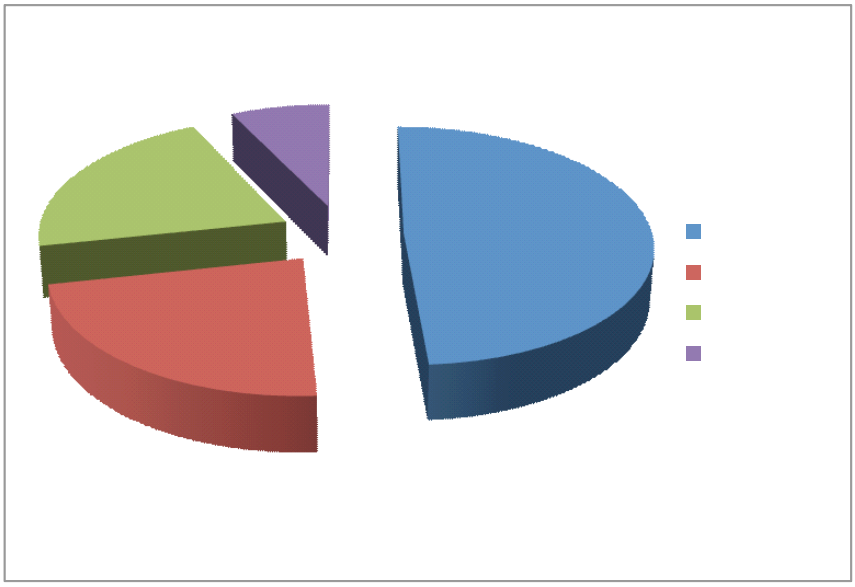

Figure 4 Estimate of social cost in Canada. Source: Rehm et al 2006

The Canadian authors followed their social cost study with an avoidable cost study, estimating how much of the existing social cost could be prevented by introducing strengthened alcohol policy measures, including taxation increases, lowering BAC limit from 0.8g/L to 0.5g/L, zero BAC for all drivers under the age of 21, increasing the minimum legal drinking age from 19 to 21 years, a safer bars intervention; and brief interventions. It was estimated that the policy options would reduce the overall burden of $CAN13.5 billion by some 1 billion, of which almost $230 million or 24% of the total avoidable cost were reductions in health care costs, and $178 million or 18%, were reductions in crime costs.

Similarly, the Sheffield study mentioned above estimated that a 10% price increase could reduce health costs by €50 million and crime costs by €80 million in the 1st year in England (Brennan et al 2008), Figure 5.

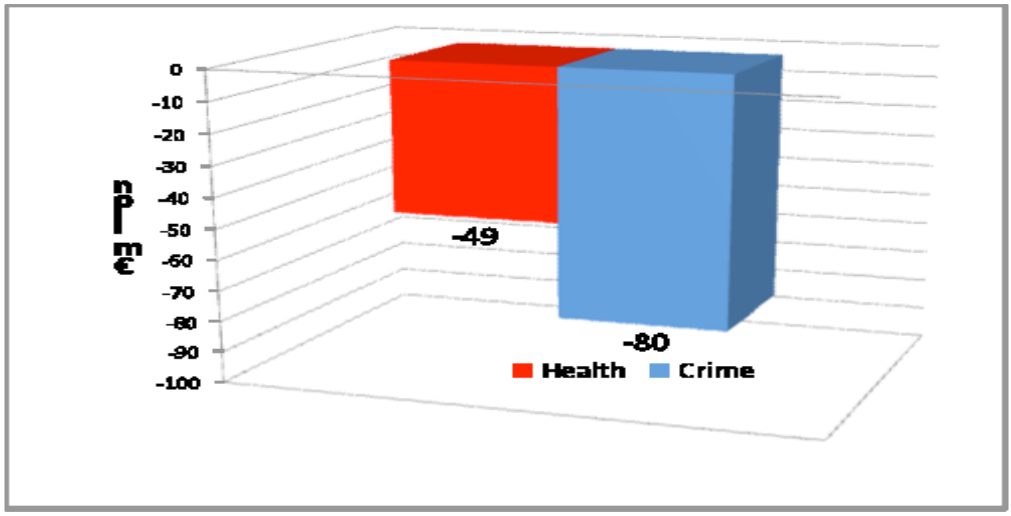

Figure 5 Estimate of impact of 10% price increase on health and crime costs in England, 1st year. Source: Brennan et al 2008

4.2 Reducing labour and productivity costs

Alcohol is considered to have an impact on absenteeism, productivity at work (presenteeism), and lost productivity due to premature mortality (Anderson & Baumberg 2006).

Absenteeism One study has investigated the relationship between per capita alcohol consumption and sickness absence, which was undertaken in Sweden for the period 1935-2002, analyzed through the Box-Jenkins method for time-series analyses (Norström 2006). A 1-litre increase in total consumption was found to be associated with a 13% increase in sickness absence among men ($P < 0.05$). The relationship was not statistically significant for women. This relationship is supported by micro-level data from Finland (Johansson et al 2009), which showed that alcohol consumption measured by drinks per week was positively associated with the number of sickness absence days for both men and women.

A study of 13,582 Australian workers found clear evidence for the impact of drinking patterns on absenteeism (Roche et al 2008). Workers' alcohol consumption was classified according to short- and long-term risk levels. After adjusting for age, gender and marital status, the likelihood of

alcohol-related absenteeism was larger for workers who drank at risky or high-risk levels compared to workers who were low-risk drinkers. For both short- and long-term risk levels, as consumption increased so did the likelihood of alcohol-related absenteeism. Compared to low-risk drinkers, workers drinking at short-term high-risk levels (110g alcohol or more on any one day for a man and 70g alcohol or more on any one day for a woman)at least yearly, at least monthly or at least weekly were 3.1, 8.7 and 21.9 times (respectively) more likely to report alcohol-related absenteeism, Figure 6. Workers drinking at long-term risky (290g-420g per week for a man and 150g-280g per week for a woman) or high-risk levels (430g or more per week for a man and 290g or more per week for a woman) were 4.3 and 7.3 times (respectively) more likely to report alcohol-related absenteeism, compared to low-risk drinkers, Figure 7.

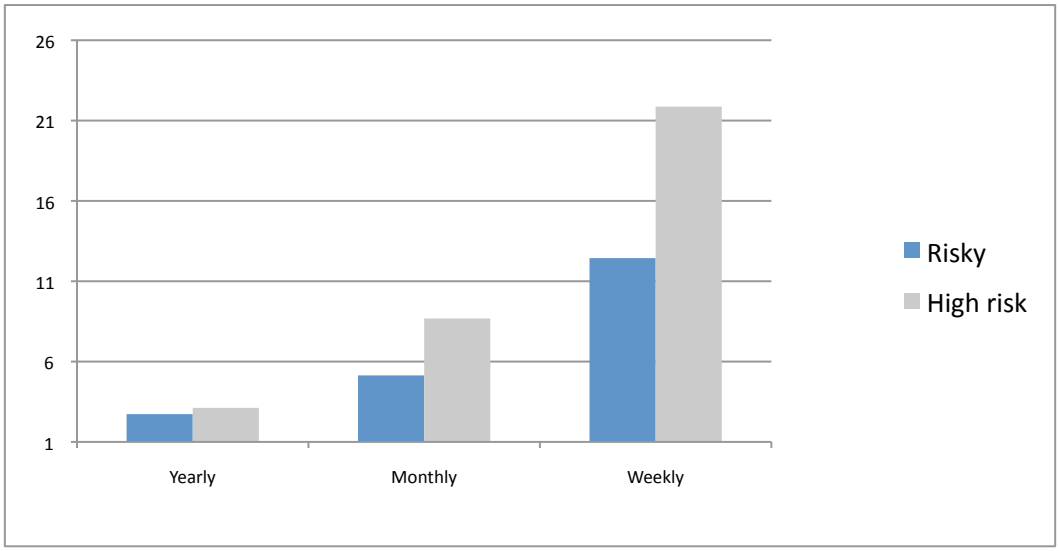

Figure 6 Adjusted ORs for absenteeism in previous 3 months by drinking category (short term risk levels)

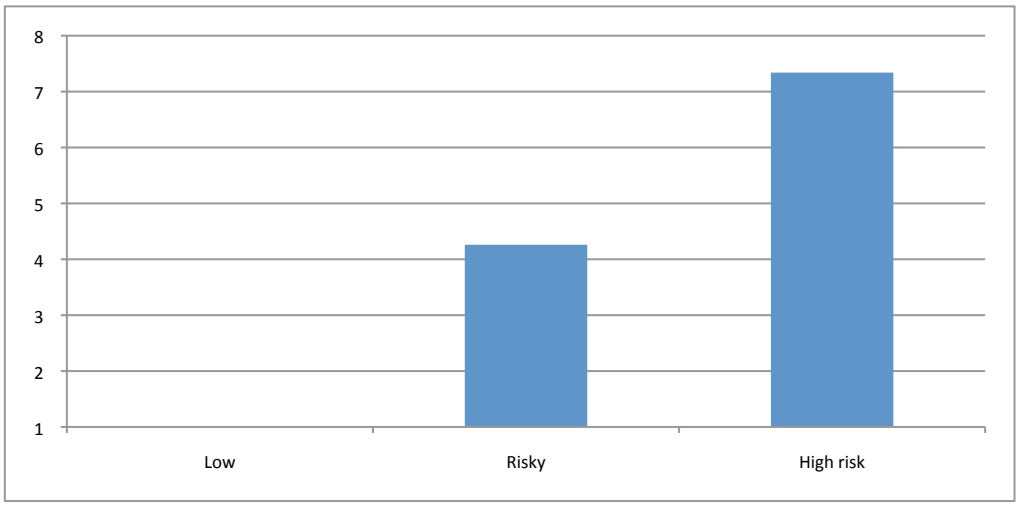

Figure 7 Adjusted ORs for absenteeism in previous 3 months by drinking category (long term risk levels)

Presenteesim due to alcohol Harmful alcohol use and episodic heavy drinking increase the risk of arriving to work late and leaving work early or disciplinary suspension, resulting in loss of productivity; turnover due to premature death; disciplinary problems or low productivity from the use of alcohol; inappropriate behaviour (such as behaviour resulting in disciplinary procedures); theft and other crime; and poor co-worker relations and low company morale. One study conducted at 114 work sites of seven corporations (Mangione *et al.* 1999) showed an almost linear relationship between increasing average consumption and a summary measure of job performance, finding the strongest associations between consumption and getting to work late, leaving early, and doing less work, and only a weak association with missing days of work.

Premature mortality Of all the labour costs, the premature mortality costs are usually the largest. The role of alcohol for premature mortality costs can be estimated using the same AAFs that were calculated for health care costs (see above), noting the difference in the morbidity and mortality AAFs. The Canadian cost study estimated that lost productivity costs were about half of all the social costs, a similar proportion found in other studies (Anderson & Baumberg 2006; Rehm et al 2009). The avoidable cost study found that by implementing all six interventions, the greatest savings would be achieved by lowering productivity losses, i.e. more than CAN$561 million (€364 million) or 58% of the total avoidable cost. The Sheffield study noted that both a price increase and a minimum price could reduce employment related costs by some €360 million in the 1st year in England (Brennan et al 2008), Figure 8.

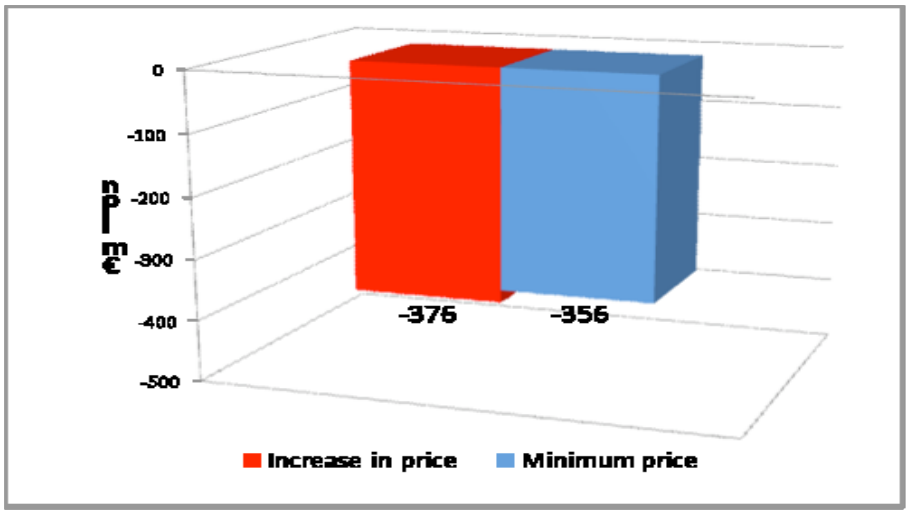

Figure 8 Estimate of impact of 10% price increase and introduction of minimum price (€0.06/g alcohol) employment-related costs in England, 1st year. Source: Brennan et al 2008

4.3 Valuing healthy life

Non-financial welfare benefits of alcohol policy include reduced pain, suffering and loss of life. The health impact itself is relatively simple to estimate as long as the premature mortality/health care estimates have been conducted, such that estimates in the causal role of alcohol for each health condition are available. This health impact must then be combined with a valuation of a year of life and a year of healthy life, which is not straightforward to do.

Suhrcke et al (2008) estimated the monetary worth of increases in life expectancy between 1970 and 2003 in selected European countries. Conceptually, the monetary value of health gains can be

measured by the amount of money people would require to forego these gains. In other words, what income would someone living with a 2003 income and life expectancy require to be willing to live with the life expectancy that prevailed in 1970? The additional income he or she would require is a measure of the monetary value of the additional life years gained between the two years. The difference in lifetime values, and thus the required compensation, is in column 6 of Table 1. This value can then be divided by the extra years of life expectancy over the period (column 7) to yield an annual figure, and it can then be expressed in relation to 2003 GDP per capita in order to reveal its size (column 8). Varying between 29% and 38% of GDP per capita, these percentages illustrate the substantial value attributed to health gains in Europe, a value far exceeding each country's national health expenditures.

Table 1 Monetary value of life expectancy gains in selected European countries, 1970-2003. Source: Suhrcke et al (2008)

Country (1)	Life expectancy at birth (years)		Real GDP per capita (PPP$)		Monetary value		
	1970 (2)	2003 (3)	1970 (4)	2003 (5)	Life expectancy gains (PPP$) (6)	Gains per life year gained (PPP$) (7)	(7) as % of 2003 GDP per capita (8)
Austria	70.02	78.93	3 020	30 094	87 986	9 875	33
Finland	70.40	78.72	2 897	27 619	74 037	8 899	32
France	72.93	79.44	3 659	27 677	54 741	8 409	30
Greece	73.82	78.93	1 613	19 954	29 085	5 692	29
Ireland	70.75	78.28	1 934	37 738	95 450	12 676	34
Netherlands	73.71	78.80	3 542	29 371	45 426	8 925	30
Norway	74.17	79.71	3 015	37 670	64 398	11 624	31
Spain	72.88	79.78	2 313	22 391	45 312	6 567	29
Sweden	74.83	80.37	4 019	26 750	42 705	7 708	29
Switzerland	73.24	80.81	5 222	30 552	69 794	9 220	30
Turkey	54.15	68.70	927	6 772	37 796	2 598	38
United Kingdom	71.95	78.45	3 189	27 147	55 106	8 478	31

However, it is necessary to go beyond value a year of extra life to valuing a year of extra health life. The most common unit to measure healthy life years is Quality-Adjusted Life Years – 'QALYs'. However, both revealed valuation and stated preference approaches to measuring QALYs suffer from severe problems in practice (WHO 2009). For example, the assumption that a QALY has a fixed value that can be applied across different contexts, times and places is questionable. Research has suggested that QALY valuations vary depending on wealth, age, family status, baseline levels of risk, the change in risk, moral responsibility for the risk, and whether the risk is public or private. In the UK, the National Institute for Health and Clinical Excellence was found to use an implicit threshold of £30,000/QALY, which is similar to a 'back of the envelope' calculation in another study that generated QALY estimates from research on the non-financial value of lost life (Baker et al 2003). There is therefore substantial uncertainty as to the monetary value of QALYs (WHO 2009).

Non-Health Impacts on Drinkers There is little data to estimate how much worse quality of life is for those with alcohol use disorders compared to others. An American WTP study asked people how much they would be willing to trade times in different states (Kraemer et al 2005). This found that the average person in their sample valued their quality of life more highly as an abstainer or moderate drinker than as a hazardous or harmful drinker.

Impacts on Victims of Crime Reduced quality of life in victims of crime is a further non-financial cost that occurs due to another person's drinking (Leontaridi 2003; Johansson et al 2006).

Impacts on Drinkers' Relatives People who share a household with someone with a drinking problem have a significantly lower Quality of Life (QoL) than people who did not, and that there was a also slight significant effect among people who knew (but did not share a household) with someone with a drinking problem. Finally, these QoL effects in different domains were turned into a single QoL score, which was treated as a QALY score. The total QALY attributable cost was calculated by multiplying the QALY cost for people that knew someone with a drinking problem by the prevalence of this situation.

5. CONCLUSIONS AND SUMMARY

Returning to the frame work table, we can summarize the costs and benefits of alcohol policy as below.

COSTS	BENEFITS
Implementation costs The WHO CHOICE model provides estimates of the implementation costs of a range of alcohol policies. With the exception of brief interventions in primary care settings, these tend to be rather low.	**Reduced health and welfare costs** Avoidable burden studies have suggested that substantial savings can be gained with incremental alcohol policies. One fifth to one quarter of the total gains can be made in each of reduced health and welfare costs.
Costs to industry Although alcohol policy is likely to lead to some job reduction in the alcohol industry sector itself, the impact on overall employment is likely to be neutral or even beneficial.	**Reduced labour and productivity losses** Although estimating labour and productivity losses has methodological difficulties, avoidable burden studies have suggested that substantial savings can be gained with incremental alcohol policies. One half to three fifths of the total gains can be made in reduced labour and productivity losses.
Non-financial welfare costs The main non-financial welfare cost is the value of the pleasure of consuming alcohol. The size of this value is not known; one study of poor methodology suggested that for Londoners, the value was half of the actual price of alcohol.	**Reduced non-financial welfare losses** The value placed on extra years of life and on years of healthy life can be enormous. In European countries, the value of an extra year of life can be as much as one third to two fifths of GDP. The value of an extra year of healthy life has been valued in some European countries as about €32,000.

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FACT SHEET

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