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Cost benefit-analyses of alcohol policy

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Abstract – *Introduction.* This paper summarizes what is known about cost-benefit analysis of alcohol policies in Europe and globally.
Methods. Pub Med, Medline, Econ Lit and Google scholar were searched using the terms cost-benefit analysis, cost-effectiveness analysis, alcohol and alcohol policy.
Results. No publications in academic journals were found. Using data from the Sheffield Alcohol Policy Model and a report prepared for the New Zealand Law Commission, potential costs and benefits of a tax increase that results in a 10% average price increase in the cost of alcohol in England are described under the headings of implementation costs, costs to the alcohol industry, non-financial welfare costs, reduced health and welfare costs, reduced labour and productivity losses, and reduced non-financial welfare losses.
Conclusions. The transition costs to the industry are not known, but likely to be small and much smaller than overall estimated reduced labour and productivity costs. On balance, and without including transition costs to the alcohol industry, a tax increase that results in a 10% average price increase in the cost of alcohol in England would result in one year financial benefits of €698 million, more than a 10:1 ratio compared with the estimated costs of €61.6 million. Only including the real tangible costs, the benefit-cost ratio increases to over 150:1.

Key words: Alcohol policy, Cost-benefit analysis

INTRODUCTION

Social policy can be defined as the laws, rules, directives, programs, and other instruments employed by governments to increase investments in human capital, encourage behaviours with positive externalities, discourage behaviours with negative externalities, or reduce disparities in wealth, income or consumption (1). Social policy includes a range of substantive policy areas including early childhood development, education, physical and mental health, juvenile justice, crime, housing, income support and employment.

How should society assess the value of the different interventions that could be implemented in policy arenas? Cost-benefit analysis (CBA) provides a framework for comprehensively taking account of the full range of social benefits and costs. Although CBA has traditionally been used for infrastructure investments, economic regulation, and environmental policy, it is also applied to social policy (1).

The application of CBA to alcohol policies requires prediction of the effects of investments of resources by society and the valuation of these effects in a money-metric, normally present-value Euros. The purpose of CBA is to identify the most

efficient policy. Efficiency simply means getting the most value from the resources available. There are four important issues when applying CBA to alcohol policy: 1. the need for a comprehensive approach to assess the impact of alcohol policies; 2. the need to recognize and explicitly address the uncertainties involved when applying CBA to alcohol policy; 3. the need to consider addictive behaviours that do not satisfy the assumptions of neoclassical welfare economics, and 4. the application to policies that often have strong distributional goals and consequences (2).

This paper aims to identify and describe published cost-benefit analyses of alcohol policies in Europe and in the world as a whole.

METHODS

As part of activities undertaken in the SMART project "Standardizing Measurement of Alcohol-Related Troubles", co-financed by the European Commission (3), existing cost-benefit analysis of alcohol policy were aimed to be identified and described. Pub Med, Medline, Econ Lit and Google scholar were searched using the terms cost-benefit analysis, cost-effectiveness analysis, alcohol and alcohol policy. In addition, related reports by the World Health Organization (4, 5) were examined, which led to the identification of further grey literature.

RESULTS

The searches found no published CBAs on alcohol policy either in Europe or in the world as a whole. One study in London (6) provided some data on social costs and benefits of consumption, costs of crime (including drunk driving), and workplace costs. However, a complete CBA study of alcohol policy is still a gap in the current literature.

The Sheffield Alcohol Policy Model (7, 8) in England is the closest approach to a cost-benefit analysis. The epidemiological mathematical model primarily appraised 18 pricing policies, with English data from the Expenditure and Food Survey and the General Household Survey for average and peak alcohol consumption. The model used results from econometric analyses (256 own-price and cross-price elasticity estimates) to estimate effects of policies on alcohol consumption. Risk functions from systemic reviews and meta-analyses were applied, or derived from attributable fractions, to model the effect of consumption changes on health and welfare and labour and productivity costs. Forty seven different illness groups were considered, accounting for co-morbidities and dual diagnoses. Covariate adjustment was made for income, since alcohol consumption is also influenced by income (9). Costs to people other than the drinker (10) were not included.

A report prepared for the New Zealand Law Commission provided an analytical framework, and, using the results of the Sheffield Alcohol Policy Model considered the benefits, costs and taxation of alcohol, but was not a full cost-benefit analysis (11).

Table 1.
Headings for describing costs and benefits of alcohol policy

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

The main findings of the Sheffield Alcohol Policy Model (SAP) and the report prepared for the New Zealand Law Commission (RLC) are now described under the headings in Table 1. Both SAP and RLC primarily modelled the impact of price or excise tax changes. These are, of course, only one part of evidence based alcohol policy (12), and it would be beneficial for subsequent analyses to model the impact of other policy changes (as SAP has and is doing) (7). The cells in two top rows in the table are real tangible monetary costs, whereas the cells in the bottom row are monetary valuations of non-tangible costs, and thus do not represent real tangible money.

The principles discussed in the paper are common to most European and high income countries, although the exact estimates of the monetary value of the costs and benefits will, of course, vary from country to country.

Implementation costs

Implementing alcohol policy costs money. However, neither the SAP nor the RLC included implementation costs (although these are available from the WHO-CHOICE model) (13). What the RLC did note, though, is that following an excise increase, due to the alcohol price elasticities being inelastic (elasticities being lower for the more common beverage type, such as beer, than for less common beverage types) (14), consumers pay more for a reduced volume of alcohol consumed, and this excess payment is transferred to the government in terms of revenue. This revenue can be either rebated to general taxpayers or used to reduce revenue from less efficient taxes, thus improving the efficiency of the total tax structure. Alcohol tax increases that are used to reduce income taxes reduce the dead weight burden of the system as a whole (15), since the marginal cost of raising and collecting alcohol taxes are considerably lower than the marginal costs of collecting income taxes. It was estimated that for the New Zealand Government to raise an additional dollar would cost the economy around 18 cents if labour taxes are raised but less than 3 cents if the excise were raised. Assuming a revenue neutral re-balancing, the New Zealand economy would be better off by around 15 cents for every additional dollar reduction in labour taxes matched by a dollar increase in alcohol excise.

Costs to alcohol industry

Neither the SAP nor the RLC included costs to the alcohol industry, although elsewhere, it has been noted that transition costs are likely to be small (16). The main financial cost of an alcohol price increase will be in the transition costs required to

move from producing alcohol to producing replacement goods and services. At the outset, it is important to note that the productivity of each worker is a key determinant of industry employment, alongside the total output level. It is technological innovation that has led to improved productivity that explains the fivefold increase in the amount of beer produced per employee in the brewing industry in the UK 1963–2003 (see 16). Similarly for wine, mechanical harvesting and pruning are increasingly used in lower-quality as well as higher-quality production, while the labour intensity of winegrape production has been reduced by mechanisation and computerisation of irrigation. When considering employment transition costs, workers with transferable skills and low-skilled workers will find adjustment easier than workers with specialist skills that cannot be used in alternative employment. Much of the capital invested in drinks production will be unsuited to any other use (e.g. brewing equipment). However, if the change in demand is slow then the replacement of equipment at the end of its lifespan will be able to reflect the changing economic realities.

The transition costs in the retail sectors will vary depending on the type of establishment. Those businesses depending relatively little on alcohol sales will be able to adjust easily to changes in alcohol sales, which will fall within the usual sales fluctuations that are experienced. Remembering that spending on alcohol will be replaced by alternative spending, these businesses will also see new areas of spending within their own stores (depending on exactly where this spending goes), further reducing the transition costs. In contrast, those businesses depending primarily on alcohol sales, which in practice means specialist alcohol retailers and bars, will be more affected by changes in alcohol sales, less likely to receive the replacement spending, and less able to adjust. Even for these workers though, most work is low-skilled and badly paid, and the transition to other low-skilled work incurs much lower transition costs than movement among higher-skilled, more specialised occupations.

The transition costs of a 10% price increase subsequent to a tax increase to the alcohol sector are not known. They are likely to be small, particularly for a relatively small consumption change of 4–5%, which is what the SAP finds for a 10% price rise.

Valuing the pleasure of alcohol

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 RLC discussed consumer surplus at length, the London report (6) tried to measure it, but with great methodological difficulty (4), so it is not discussed further here, and the SAP, although not intentionally doing so, provided data by which it could be measured.

Consumer surplus is defined as the difference between the value at which a consumer (or the sum of consumers) values his or her consumption and the price that he or she paid for the consumption. Thinking about the demand curve for a product (Figure 1), this value is represented by the area between the demand curve (D) and the horizontal line representing the price paid by (all) consumers (P0).

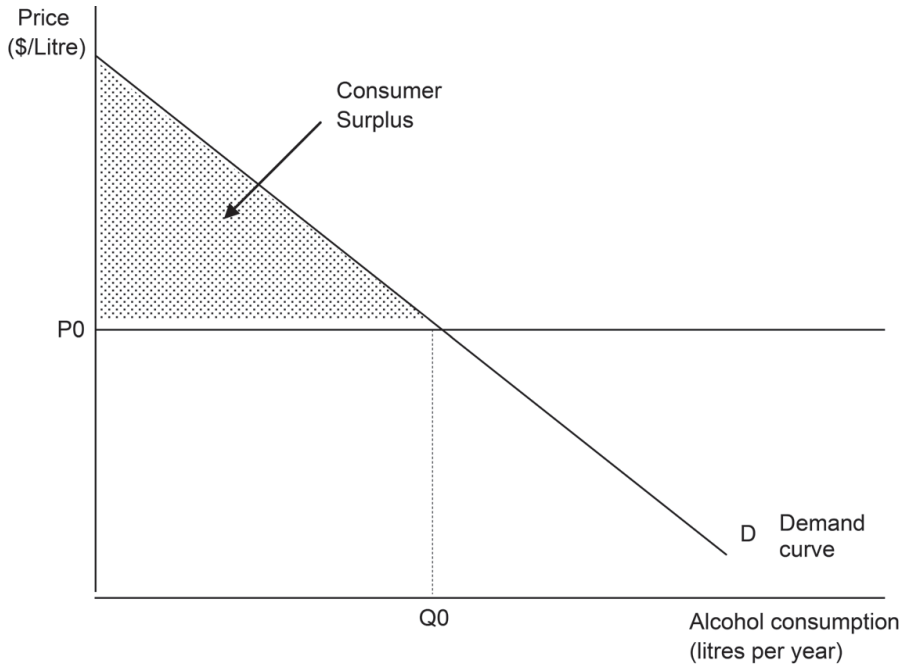

Figure 1.
Consumer surplus is the excess of willingness to pay over price

Policy measures that affect the demand for goods will impact on consumer surplus, and hence changes in consumer surplus are important criteria by which to assess policies. For example, a tax on a product will reduce consumer surplus, as the gap between what consumers are willing to pay and the price (after tax) is reduced. Typically, the bulk of the loss in consumer surplus is transferred to the government in the form of taxation revenue, but some part of the consumer surplus disappears altogether. This is because the price rise as a result of the tax leads to a fall in consumption of the product, eliminating the consumer surplus that accrued over that range.

RLC noted several factors that impact on the magnitude of the consumer surplus. First, some consumers are poorly informed on the delayed impact of alcohol consumption, and there is a perception, especially among young drinkers, that whatever the risks 'they don't apply to me'; second, there is a change in preferences and behaviours with age, with alcohol consumption and heavy drinking occasions normally declining with age; third, family and welfare systems that look after people if they become ill, disabled or unemployed creates a 'moral hazard', meaning people are likely to take on more risks than if the safety net were unavailable; fourth, the heavy expenditure on the promotion and advertising of alcohol by the industry which stimulates alcohol consumption amongst youth, a strong predictor of lifetime drinking patterns, raises the question in what sense can the preferences of individual consumers be said to be 'sovereign', as distinct from 'manipulated'?; and, fifth, the evidence suggesting that peer group pressure is strongly influential in individual values, preferences and drinking behaviour, which again raises the question of the sovereignty of the preferences of individual consumers.

Thus, consumers are spending and drinking more than they would in the absence of these factors. In economics, this is termed irrational consumption (2). Irrational consumption affects the demand curve, with the diagonal line in Figure 1 coming down and to the left. The consequence of this shift in the demand curve is that the consumer surplus is estimated to be much lower than portrayed in Figure 1, and, there is a range of alcohol consumption over which the price of alcohol exceeds the true willingness to pay for alcohol (according to the adjusted demand curve), meaning there are costs to consumers that are unmatched by benefits. RLC noted that the welfare implications of an excise tax increase are different from the case of a normal good. For irrational alcohol consumption, true (adjusted) consumer surplus and the loss of consumer surplus due to excise increases is more than offset by the gain in excise tax revenue; and there may be significant costs of consumption unmatched by consumer surplus benefits, and these costs can be reduced through an excise tax increase.

The RLC noted that crucial to assessing the impact of policy measures, such as an increase in the rate of excise, it is important to know the proportion of alcohol consumption at hazardous or harmful levels that could be considered irrational? In New Zealand, the RLC estimated that the proportion of total alcohol consumption which is consumed at harmful or hazardous levels is in excess of 67% and possibly substantially so. The relevance of this discussion is that where it is assumed that some part of alcohol consumption is irrational, any resulting correction of the observed demand curve may well impact on two thirds of total consumption, and therefore be very material in its impact on the welfare benefits and costs of an excise increase or any other policy intervention.

Based on the data provided by SAP, and not counting for irrationality, it can be estimated that the total consumer loss from a 10% price increase is €2258 million, of which €2200 million is transferred to the government in terms of revenue, and rebated to consumers and thus revenue neutral.

Reducing health and welfare costs

SAP considered this in detail, since this was the main purpose of the model. RLC used some of the SAP findings to apply to New Zealand.

SAP modelled a range of policy options to reduce health and welfare costs, including general price increases, introducing a range of minimum prices per gram of alcohol, as well as restrictions on availability and marketing and the impact of delivering brief interventions for hazardous and harmful alcohol consumption. The bulk of the estimates and more detailed information were given for the price options. This document focuses on the impact of an across the board 10% price increase, as this is a feasible option, consequent to tax changes.

The English and Scottish governments have given close attention to moving to uniform price floors to raise the prices of the cheapest forms of alcohol up to a minimum of €0.06 per gram of alcohol. The great advantage of this policy is that it targets very directly the cheapest forms of alcohol which are known to be purchased prefe-

rentially by heavy drinkers and teenagers. However, the disadvantage of minimum price floors imposed by regulation, rather than by taxation, is that they would create a major transfer to retailers and producers. This problem does not arise with a uniform increase in the rate of excise on alcohol, which still has the advantage that, at least to some degree, it causes bigger price increases to the cheapest forms of alcohol.

SAP aimed to capture policy impacts for 47 health conditions for which evidence suggests alcohol plays a contributory role (17). When modelling the link between consumption and harm, one important input is the assumption surrounding the 'time lag' – the time needed to achieve the full benefit (reduction in harms) associated with a reduction of consumption. Such data is necessary for chronic conditions. A review of the literature found little evidence for population-level time lags for chronic conditions. However evidence was found for the time lag between onset of chronic consumption and onset of disease in individuals. The average time lag to full effect varies between 5 and 15 years, depending on the condition. Such evidence was reported for neurological disorders, chronic pancreatitis induced by alcohol, alcohol cardiomyopathy, alcoholic liver disease, oesophageal cancer, epilepsy, heart failure and oral cancer, although it is acknowledged that the exact onset of harmful consumption is very difficult to establish. The time lag for full effect associated with certain types of cancer was reported to be slightly higher, for example the lag between consumption and onset of laryngeal and rectal cancer (between 15 and 20 years). A mean lag of 10 years was assumed for all chronic conditions.

The model estimated that a 10% increase in the price of alcoholic beverages would reduce the annual number of deaths by 297 within the first year and 1513 per year after 10 years. In addition, hospital admissions would decline by an estimated 12,550 in the initial year, reaching full effect after 10 years with 50,691 avoided admissions annually. The savings to the health service were estimated at €65 million in the first year.

In SAP, the model estimated that a 10% increase in the price of alcoholic beverages would reduce the annual number of crimes by 97,000 per year, with a saving of €118 million.

The RLC only considered reductions in costs of health harms and concluded that a 50% increase in alcohol excise would provide a net benefit of the equivalent of €43 million and a 100% increase, a net benefit of the equivalent of €73 million.

Reducing labour and productivity costs

SAP modelled the impact of alcohol policy on both unemployment and on absenteeism, but not productivity.

For unemployment, SAP based its model on work undertaken by MacDonald and Shields (18), which showed that "problem drinking", measured by a combination of psychological and physical symptoms, or in terms of quantity and frequency of alcohol consumption, was negatively associated with the probability of being in work. This study analysed data from the Health Survey for England (1997–1998) and focused on males aged 22 to 64 years. Being a problem drinker lead to a reduction

in the probability of working of between 7% and 31%. In the Sheffield model, the excessive risk of being unemployed was derived from the mean employment rate, the proportion of problem drinkers (considered equivalent to harmful drinkers, and therefore related to mean consumption level) and the increased probability of not working if someone is a problem drinker. The probability of working was assumed to be driven by mean consumption rather than peak consumption. Excess risk was assumed to start after a threshold of 7.1 units per day (1 unit = 8 grams alcohol) for males and 5.0 units per day for females (equivalent to 50 and 35 units per week respectively) based on the harmful drinker definition. Considering jobs in the economy as a whole, SAP estimated that a 10% increase in the overall price of alcohol would lead to a small reduction in unemployment of 12,300 per year, with a net saving of €352 million. Thus, looking at employment as a whole, the costs of alcohol policy seem negative. That is, using the example of England, an alcohol policy that increases the price of alcohol gives an economic benefit from increased employment, rather than a cost.

SAP based its estimates for absenteeism on a study of 13,582 Australian workers, which found clear evidence for the impact of drinking patterns on absenteeism (19). 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 (110 g alcohol or more on any one day for a man and 70 g 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. Workers drinking at long-term risky (290 g – 420 g per week for a man and 150 g – 280 g per week for a woman) or high-risk levels (430 g or more per week for a man and 290 g 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.

SAP quantified reductions in the workplace harms of sickness absence and unemployment financially based on average salaries. From a public sector perspective the costs to be included would be the lost productivity from public sector employees and possibly the sickness and unemployment benefit payments across the remaining population. There is some debate about the latter costs, since it could be argued that these should be treated as transfer payments (a redistribution of income in the market system which does not directly absorb resources or create output) and therefore be excluded. Only the lost productivity is included in the model, but the public sector component has not been separated out. The study estimated that a 10% price increase would reduce employment related costs by some €405 million in the first year in England, split as €53 million absence related costs and €352 unemployment related costs.

For most people, it seems simple common-sense that alcohol impacts on people's productivity when they are at work. It is, however, very difficult to accurately estimate

the cost that result from this. The initial problem is that it is very difficult to measure productivity, outside of occasional exceptions like assembly-line manual work. To get around this, economists usually use wages as a proxy for productivity, on the assumption that the labour market works smoothly enough that lower productivity will be reflected in people's pay. However, aside from finding that heavy drinking is usually bad for people's pay, a number of studies have found that wages tend to be lower for abstainers than light drinkers.

A meta-analysis of papers that have reported a positive impact of alcohol consumption on earnings, has shown the relationship to be an artefact (20). The abstainers in the study samples included two types, those that have never had a drink and those that are ex-drinkers. Ex-drinkers may have health problems, partly or wholly as a result of past drinking patterns and as a result have become abstainers. Also as the sample becomes older, there may be an increase in ex-drinkers being defined as abstainers in the sample. In the medical literature, Fillmore et al. (21) concluded that the cardiac protection associated with alcohol consumption may be over-estimated due to the inclusion of ex-drinkers in the abstainers. This may also be true in the wage models – the higher the proportion of abstainers in a sample indicates the higher the proportion of ex-drinkers that are now counted as abstainers. Possibly these individuals have stopped drinking due to negative impacts on their productivity and their potential for job mobility. Thus, the greater the number of ex-drinkers the greater the difference between the human capital of those in the still-drinking group and those that have had to stop drinking. The meta-analysis in fact confirmed this conclusion (20). When the proportion of the abstainers in the sample was less than 28%, there was no beneficial impact of alcohol on wages; this only became apparent when the proportion of abstainers was greater than 28%.

Lye & Hirschberg (20) performed a meta-analysis of the studies reported turning points, which are interpreted as the level of alcohol consumption past which further consumption leads to negative impacts on wages and thus would be detrimental to the return on human capital. Up to the turning point there would be a positive though diminishing benefit gained from additional consumption of alcohol. A meta-analysis of the lower bound of the 95% confidence intervals for the turning point obtained from the studies, accounting for the potential simultaneity of alcohol consumption and wages found that the lower bound for the turning point was indistinguishable from zero, and thus, there was no level of alcohol consumption that had a positive impact on wages. It was concluded that alcohol consumption was a proxy, albeit imperfect, for all personality traits that have a positive influence on human capital.

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.

Much of the reservation about putting a monetary value on life and health stems from a misunderstanding of what such a value actually means. In fact, economists cannot and do not seek to place a monetary value on any identified person's life. Instead, they are valuing comparatively small changes in the risk of mortality, a very different matter. Although less elegant, it would be more appropriate to say the value of small mortality risk reductions than the value of life. While normally no one would trade his or her life or health for money, most people weigh safety against cost in choosing safety equipment or against time when crossing a busy street. Those contemplating a dangerous job, such as in mining, will demand a wage premium in return for accepting greater risk. People obviously act as if life were not priceless and, in making these choices, are implicitly putting a price on or attributing a value to changes in the risk of mortality.

One way to make the value attributed to health more explicit is by measuring the extent to which one is willing to trade health for those things that have a price. So-called willingness-to-pay (WTP) methods do precisely that, either by analysing how people act or how they answer certain questions. In revealed-preference studies economists infer WTP from the premiums people implicitly demand for accepting more hazardous jobs or from the sums they pay for safety-enhancing products, such as seat belts and smoke detectors. Knowing these premiums and the risks associated with them makes it possible to calculate the value of a statistical life, which can then be used to place a value on changes in the risk of mortality.

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'. This simply means giving a year in a particular state a value less than one, where one would be a year with perfect quality-of-life. For example, if one valued a year with alcohol dependence as having a QALY value of 0.6, this means one values 6 years in perfect health as the same as 10 years with alcohol dependence. Numerous studies in health economics have attempted to produce financial valuations of QALYs, using the WTP techniques mentioned above.

However, both revealed valuation and stated preference approaches to measuring QALYs suffer from severe problems in practice (4). 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.

SAP used UK government QALY financial valuations (€24,000 per health QALY and €97,000 per crime QALY, considering that crime has a greater impact on quality adjusted life years than impaired health), and discounted QALYs at 3.5% a year, a standard economic procedure to 'discount' future costs to create a total value in the present, because €100 today is valued more highly than €100 in 10 years time.

The estimated value of the harm reductions in the first year following a 10% price increase were €71 million for health related QALYs and €39 million for crime related QALYs (the price increase had a proportionally greater impact in improving health for more people than in reducing crime).

CONCLUSIONS

There is still a lack of cost-benefit analyses of alcohol policy. Nevertheless, based on the information presented in this paper, it is possible to sum up the costs and benefits modelled of an excise increase that results in an across the board 10% increase in the price of alcohol, based on SAP, and these are illustrated in Table 2.

Table 2.
Summary of costs and benefits of alcohol policy

Costs	Benefits
Implementation costs €3.7 million Costs to industry Not known, but likely to be small	Reduced health and welfare costs €183 million Reduced labour and productivity losses €405 million
Consumer loss not transferred to government in terms of revenue €58 million	Reduced non-financial welfare losses €110 million

SAP did not report on implementation costs. However, the WHO-CHOICE model estimated that a tax increase of 25% in the United Kingdom would cost about an extra €3.7 million to administer. This is about 0.17% of the expected revenue increase resulting from a 10% price increase (€2200 million).

SAP did not consider transition costs to the alcohol industry. However, based on Baumberg (15), these are likely to be small, and certainly of an order of magnitude smaller than the estimated benefits of reduced labour and productivity losses of €405 million. This is an area for further study.

SAP did not estimate losses to consumer surplus. However, the model demonstrated that a 10% price increase would result in an extra spend by consumers of €2200 million. However, as pointed out in the text, this money, in the presence of a tax increase, and assuming that the tax increases follows through 100% to a price increase would return to the government as tax revenue, which can be rebated to consumers in a variety of ways. The €2200 million is thus a transfer rather than a cost. There is though, a loss to consumer surplus, representing the value that consumers place on the foregone consumption that is reduced due to the price increase. This is an intangible cost that can be estimated at €58 million. This estimate is based on a view of rational demand for alcohol. But, as has been pointed out, this is not the case, and, in the presence of irrational demand, the loss of the adjusted consumer surplus is more than likely offset by the gain in excise tax revenue; in addition, the tax increase reduces any extra costs of consumption unmatched by consumer surplus benefits.

On the benefit side, there are real tangible benefits due to reduced health and welfare costs (€183 million) and reduced labour and productivity losses (€405 million). These benefits do not include benefits to people other than the drinker, and may possibly be doubled when doing so.

Finally, there are non-tangible benefits due to the value of reduced health and crime-related QALYs (estimated at €110million). This estimate would increase if the values of all benefits to people other than the drinker are included.

Putting this altogether, if we just include the tangible costs, above the line of the table, at an implementation cost of €3.7 million, a tax increase would bring benefits worth €588 million – a figure that would be even higher if we consider the benefits accruing to people other than the drinker. This favourable balance would need to be adjusted, once accurate estimates of the likely rather small transition costs to the alcohol industry are included.

If we consider add in the non-tangible costs and benefits, below the line of the table, the value of benefits (€110 million) outweigh the estimated value of the loss consumer surplus (€54 million).

Finally, it should be pointed out that the example used in this primer of cost-benefit analysis for alcohol policy used a hypothetical tax increase that would lead to an overall price increase of 10% as an example. Different outcomes and different costs would result from other policy measures (11). In particular, and also, the value of the consumer surplus and its transferability would differ from policy measure to policy measure. For example, an increase in the minimum legal purchase age would significantly impact on the consumer surplus of 18 to 20 year olds, but not the consumer surplus of the majority of drinkers. There would, however, be no offsetting transfer to government, as there is with an excise tax.

REFERENCES

1. Weimer DL, Aidan RV (2009) *Investing in the Disadvantaged: Assessing the Benefits and Costs of Social Programs*. Washington, D.C.: Georgetown University Press.
2. Vining A, Weimer DL (2010) An Assessment of important issues concerning the application of benefit-cost analysis to social policy. *Journal of Benefit-Cost Analysis*, 1 (1), 1–38. doi: 10.2202/2152-2812.1013
3. Anderson P, Baumberg B (2010) *Cost benefit analyses of alcohol policy – a primer*. Warsaw, Institute of Psychiatry and Neurology.
4. WHO (2009) *WHO Guide to Identifying the Economic Consequences of Disease and Injury.* Geneva, Switzerland: Department of Health Systems Financing Health Systems and Services, World Health Organization. http://www.who.int/choice/publications/d_economic_impact_guide.pdf [accessed 6/8/2009]
5. World Health Organization (WHO) (2010) *Best practice in estimating the costs of alcohol – Recommendations for future studies.* WHO Regional Office for Europe, Denmark.
6. Aslam S, Barham L et al. (2003) *Alcohol in London: a cost-benefit analysis. A Final Report for the Greater London Authority.* Prepared by NERA. London, UK. http://www.london.gov.uk/mayor/health/drugs_and_alcohol/docs/cost_benefit_alcohol.pdf

7. Purshouse R, Brennan A, Latimer N, Meng Y, Rafia R, Jackson R, Meier P (2009) *Modelling to assess the effectiveness and cost-effectiveness of public health related strategies and interventions to reduce alcohol attributable harm in England using the Sheffield Alcohol Policy Model version 2.0.* Report to the NICE Public Health Programme Development Group.
8. Purshouse RC, Meier PS, Brennan A, Taylor KB, Rafi R (2010) Estimated effect of alcohol pricing policies on health and health economic outcomes in England: an epidemiological model. *Lancet*, 375, 1355–1364.
9. Rabinovich L, Brutscher P-B, Vries H, Tiessen J, Clift J, Reding A (2009) *The affordability of alcoholic beverages in the European-Union Understanding the link between alcohol affordability, consumption and harms.* Technical Report. RAND Corporation.
10. Laslett A-M, Catalano P, Chikritzhs Y, Dale C, Doran C, Ferris J et al. (2010) *The range and magnitude of alcohol's harm to others.* Fitzroy, Victoria: AER Centre for Alcohol Policy Research, Turning Point Alcohol and Drug Centre, Eastern Health.
11. Marsden Jacob Associates (2009) *The benefits, costs and taxation of alcohol: towards an analytical framework.* Report.
12. Anderson P, Chisholm D, Fuhr DC (2009) Effectiveness and cost-effectiveness of policies and programmes to reduce the harm caused by alcohol. *Lancet*, 373, 2234–2246.
13. Chisholm D, Rehm J, Frick U, Anderson P (2009) *Alcohol policy cost effectiveness briefing notes for 22 European countries.* http://www.ias.org.uk/buildingcapacity/resources/brie ng-notes/cp-allcountries.pdf
14. Wagenaar AC, Salois MJ, Komor KA (2009) Effects of beverage alcohol price and tax levels on drinking: a meta-analysis of 1003 estimates from 112 studies. *Addiction*, 104, 179–190.
15. Ramsey F (1927) A contribution to the theory of taxation. *Economic Journal*, 37, 145, 47–61.
16. Baumberg B (2008) *The value of alcohol policies: a review of the likely economic costs and benefits of policies to reduce alcohol-related harm on the global level.* London, Paper prepared for the WHO Department of Mental Health Substance Abuse. Geneva, World Health Organization.
17. Jones L, Bellis M, Dedman D, Sumnall H, Tocque K (2008) *Alcohol attributable fractions for England.* North West Public Health Observatory, Liverpool.
18. MacDonald Z, Shields MA (2004) Does problem drinking affect employment? Evidence from England. *Health Economics*, 13 (2), 139–155.
19. Roche AM et al. (2008) Workers' drinking patterns: the impact on absenteeism in the Australian work-place. *Addiction*, 103, 738–748.
20. Lye J, Hirschberg J (2010) Alcohol Consumption and Human Capital: a retrospective study of the literature. *Journal of Economic Surveys*, 24, 2, 309–338. doi: 10.1111/j.1467-6419.2009.00616.x
21. Fillmore KM, Stockwell T, Chikritzhs T, Bostrom A, Kerr W (2007) Moderate alcohol use and reduced mortality risk: systematic error in prospective studies and new hypotheses. *Annals of Epidemiology*, 17, 5 Suppl, S16–S23.

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