Special Taxation of Wine and Other Alcoholic Beverages

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Abstract

In most countries special excise and other taxes are imposed on beer, wine and spirits. Both the tax base and tax rates usually vary across products and across countries. This paper reviews the market failure arguments for special taxation of alcoholic beverages, evaluates the pros and cons of different externality correction taxes in terms of the tax base and tax rate, and uses the results to suggest reform of the special taxation of alcohol in Australia.

Excessive alcohol consumption involves external costs, including road accidents, violence and crime, extra health care costs, and a part of the loss of lower labour remuneration. Alcohol consumption by volume across the different products is the suggested special tax base. The market failure correction tax rate applied to all alcohol beverages would be a weighted average of the marginal external cost for different categories of consumers classified by different levels of external cost. A special tax on all alcohol consumed required for administrative reasons is a relatively blunt instrument, and the tax likely would be complemented by more targeted instruments such as provision of information and education, restrictions on consumption by youth and drivers. Australia’s current set of excise taxes on beer and potable spirits and the wine equalisation tax cannot be justified as a logical, effective or simple way to correct market failures.
1. Introduction

Special and relatively high levels of commodity taxation are levied on beer, wine and spirits in most countries, including Australia. Initially the rationale for the special taxes on alcohol, and on tobacco, included the dual characteristics of “sin taxes” and the relative ease and low cost of tax collection. Subsequent and additional arguments have included assertions of a relatively low distorting and deadweight cost of taxation on these products because of the relatively low elasticity of demand and because of a complementary relationship in consumption between alcohol with untaxed leisure and home-produced goods and services, but many other products have similar characteristics. Another set of reasons for relatively high rates of taxation of alcohol is as one form of government intervention to correct market failures of too much consumption from a society efficiency perspective. Potential market failures include external costs associated with road accidents, crime and health care expenditures, imperfect information about the longer term effects and habitual effects of excessive consumption of alcohol, and time inconsistency of individual decisions on the purchase of alcoholic beverages.

Using Australia as an illustration, this article reviews the market failure arguments for special taxation of alcoholic beverages in general and of wine in particular, and it considers options in the choice of the tax base and rates of market failure corrective Pigovian taxes. Some of the relative merits of special taxes relative to other forms of government intervention such as information provision and regulations are canvassed. With the taxes being a long lived policy intervention, the analysis is undertaken in a long run equilibrium context.

There is an extensive literature, both in economics and in health care, which directly or indirectly discusses specific taxes of alcoholic beverages and other forms of government intervention to achieve better social outcomes. In the Australian context, recent papers include the economic analyses of Richardson and Crowley (2000) and Clarke (2008), Collins and Lapsley (2008) provide detailed estimates of the costs of alcohol abuse (along with those for tobacco and illicit drugs), the Preventive Health Taskforce (2009) consider the broader set of government intervention instruments to
reduce alcohol abuse (and also for tobacco, illicit drug and over-eating and obesity), and Cnossen (2009) evaluates the excise taxes and the wine equalisation tax. Papers prepared for the Mirrlees Review of the UK taxation system, particularly by Crawford et al. (2008), and commentaries on this paper, review the international literature on excise taxes, including on alcohol. This paper pays special attention to the heterogeneity of consumers in terms of alcohol consumption levels and associated external costs, and in particular a paper by Pogue and Sgontz (1989). Another set of literature provides estimates of key parameters, including of the elasticities of demand for alcoholic beverages, which are important to the discussion, for example the survey by Fogarty (2008). This paper draws on this and other literature, it notes some areas of controversy at the conceptual level as well as at the empirical level, and it derives principles for the choice of a tax base and rate for special taxation of alcoholic beverages to correct market failures.

The rest of the paper is organised as follows. Section 2 sets out the current set of special taxes on different alcoholic beverages. The ad hoc pattern, especially the different rates but also the different bases for different beverages, seems to owe more to historical political expediency to buy-off pressure groups rather than the use of market failure correction arguments. Section 3 discusses the market failure arguments for government intervention to reduce alcohol consumption to raise efficiency. The section provides the background for evaluating different taxes bases and for the choice of tax rate(s). Some of the options for the design of special taxes on alcoholic beverages, and the challenges in choosing between these options, are canvassed in Section 4. Both Sections 3 and 4 include some comparisons of the tax instrument with other policy interventions, such as information provision and education, regulations, and investment in primary health care. A final Section 5 draws together the main implications for reforming the special taxation of alcohol in Australia.

2. Special Taxes on Alcohol in Australia

Excise taxes are levied on beer and potable spirits and a wine equalisation tax is levied on wine. These are special and in addition to the general taxes which apply to most businesses including the alcohol industry: income taxes and the GST levied by the commonwealth; payroll, land, stamp duties and other taxes levied by the states and territories; and rates levied by local governments. Table 1 provides details of the
current set of special taxes on beer, wine and spirits in Australia in terms of the tax base and tax rate.

Table 1: Special Taxes on Alcohol Products in Australia, Applying from February 2009

<table>
<thead>
<tr>
<th>Alcoholic Beverage</th>
<th>Tax Base</th>
<th>Tax Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beer</td>
<td>Per litre of alcohol by volume over 1.15%</td>
<td>Fixed excise tax in $ per litre by volume</td>
</tr>
<tr>
<td>• Draught, low strength (&lt;3% alcohol by volume)</td>
<td>6.99</td>
<td></td>
</tr>
<tr>
<td>• Draught, mid strength (&gt;3% and &lt;3.5%)</td>
<td>21.96</td>
<td></td>
</tr>
<tr>
<td>• Draught, high strength (&gt;3.5% alcohol by volume)</td>
<td>28.74</td>
<td></td>
</tr>
<tr>
<td>• Other beer, low strength (&lt;3% alcohol by volume)</td>
<td>35.03</td>
<td></td>
</tr>
<tr>
<td>• Other beer, mid and high strength (&gt;3% alcohol by volume)</td>
<td>40.82</td>
<td></td>
</tr>
<tr>
<td>• Non-commercial, low strength (&lt;3%)</td>
<td>2.46</td>
<td></td>
</tr>
<tr>
<td>• Non-commercial, mid and high strength (&gt;3%)</td>
<td>2.85</td>
<td></td>
</tr>
<tr>
<td>Potable spirits</td>
<td>Per litre of alcohol by volume</td>
<td>Fixed excise tax in $ per litre by volume</td>
</tr>
<tr>
<td>• Brandy</td>
<td>64.57</td>
<td></td>
</tr>
<tr>
<td>• Other spirits</td>
<td>69.16</td>
<td></td>
</tr>
</tbody>
</table>
Table 1 shows a very different set of special taxes on the different alcohol beverages. A specific tax per unit of alcohol by volume applies to beer and spirits, but even then the first 1.15 per cent is exempt in the case of beer and the rate varies by container size (or for draft versus other beer) and by alcohol content. An ad valorem wholesale sales tax is applied to wine, and then with a significant zero rate threshold per producer. All of the excise tax rates are indexed to the CPI, and adjusted every six months. The tax rate per unit of alcohol is highest for potable spirits and mixed drinks, slightly lower for brandy, lower again for beer, and in the case of beer, the rate is lower for low strength beer and it is much lower for draft beer relative to beer sold in bottles and cans. The effective tax rate per litre of alcohol by volume in wine is relatively low for low value wine, but relatively high for high value wine when compared with the other beverages. The reasons for this diverse pattern of different tax bases and tax rates, and then the different effective tax burdens, on different alcoholic beverages and different places of sale owes more to ad hoc responses to producer lobby groups by the political process over time than to any logical arguments, and in particular those canvassed in the rest of the paper.

For all alcohol beverages, the special taxes apply to an Australian consumption or destination base. That is, imports, with the exception of duty free allowances for international travellers, as well as domestic production consumed domestically are taxed, and exports are exempt.
In 2007-08 the special taxes on alcohol are estimated to have collected $3.3 billion, with $1862 million from excise on beer, $774 million from excise on other beverages and $661 million from the wine equalisation tax (Swan and Tanner, 2009). In practice the taxes are collected at the manufacturer level, but most of the economic incidence is passed forward to consumers as higher retail prices1.

3. Market Failure and the Case for Intervention
This section follows a textbook taxonomy to assess the arguments for government intervention to reduce the alcohol consumption decisions of individuals to achieve a more socially efficient outcome. As a benchmark, it starts with the simple case of no market failure where private decisions correspond with efficient levels of alcohol consumption. It then considers different market failure arguments to achieve social efficiency, and then the implied changes to private purchase decisions.

a. A Competitive Private Market
In modern economies, including Australia, private sector competitive markets, supported with government monitored secure property rights, use prices determined by supply and demand to choose the mix and quantities produced and consumed of products which have private good properties of rival consumption and low costs of exclusion, and also the choice of production methods. These products include the different alcoholic beverages, foods, housing, clothing, recreation and so forth. Other forms of government intervention which directly and indirectly influence market outcomes from the supply side of the market for alcohol, including various forms of assistance to the agricultural sector, regulations and standards on the production of alcohol products, and anti-monopoly monitoring and intervention of businesses along the supply chain, can be important but they are not considered here.

A competitive market for a particular alcohol product or the aggregate product category alcohol is shown in Figure 1. The demand curve D represents the marginal private benefits (MPB) of the alcohol product to consumers. It represents consumer

1 In the appropriate long run context, a 100 per cent pass forward assumption is used by ABS in its analyses of the distribution of the tax burden (ABS, 2007) and by Warren et al. (2005). For beer and wine, the underlying logic is constant returns to scale production technology and cost mark-up pricing associated with a number of oligopoly models. In the case of wine, one plausible model is of competitive behaviour and a highly elastic export demand function.
valuation of the social, recreational, taste and other sensations gained and it deducts any costs of alcohol consumption. Well informed and far-sighted rational individuals will take into consideration not just current period benefits and costs to them, but also any longer term costs associated with alcohol consumption, including risks to future health and employability, and any future benefits. This forward looking decision making framework is best represented in the Becker and Murphy (1988) model of rational addiction. Consumers are willing to purchase more alcohol at lower prices as the opportunity cost of this product falls relative to other expenditure options, including, for example food, clothing, entertainment and education. There is considerable econometric evidence that the market demand curve for individual alcoholic beverages, and for alcohol as an aggregate, is price sensitive (see, for example, the review study by Fogarty, 2008). Although a wide range of estimates of the own price elasticities of demand for the broad categories of beer, wine and spirits, and for alcoholic beverages as an aggregate, have been reported, almost all are significantly negative, and most are in the inelastic zone. There is more variation of estimates of the cross-price elasticities among the different alcoholic beverages across the different studies, with many not being statistically different from zero.

The supply curve in a competitive market represents the marginal private cost (MPC) of producing the product, including the opportunity cost of labour, capital, materials, land, water and other natural resources. In the context of the production of alcohol, rather than a competitive model, the wine industry likely is better described as a monopolistic competitive industry (many producers of differentiated products and low costs of entry and exit), and the beer and potable spirits industries as a differentiated oligopoly (a few producers and high costs of entry and exit). Then, the industry supply curve will be above the MPC. However, given the characteristics of a mature product, and one or both of intense competition among the producers of highly substitutable products and the intense scrutiny of monopolistic behaviour by the ACCC, the difference between the market supply curve and a MPC curve likely is not large both absolutely and relative to the same comparison for other industries in the economy.
With a competitive market, the quantity produced and consumed of each alcohol product is determined to equate the D and S curves with price P and quantity Q. Further, over time, changes in tastes, prices of other products, income and information about the longer term effects of alcohol on health and employability shift the demand curve; changes in technology and input costs shift the supply curve; and price changes in response to the demand and supply curve shifts to coordinate new equilibrium market outcomes.

If we make further assumptions that the demand or MPB curve also corresponds to the marginal social benefit (MSB) curve, and that the supply or MPC curve corresponds to the marginal social cost (MSC) curve, the market solution depicted in Figure 1 corresponds also to the most efficient level of consumption of alcohol from a society perspective.

Note from Figure 1 that a tax on the alcohol product, which can be imposed on the buyer or seller side, reduces consumption. For our competitive model with no market failures, the reduced consumption also would mean a loss of economic welfare or economic surplus. The quantity reduction effect of a tax on alcohol and the efficiency loss will be greater the more elastic is the demand or the supply curve.
The following subsections focus on potential market failures on the demand side of the private market for alcohol. In principle, market failure can be represented either so that the MSB does not correspond with the MPB, with the result that the MSB is to the left of MPB, or as an upward shift of the MPC to a higher MSC. The latter option is followed.

b. Deficient Information as a Market Failure

A key assumption for efficiency of private market decisions on purchases of alcohol is that consumers are fully informed. This includes knowledge of the links between the consumption of alcohol today on the formation of drinking habits and the consequences for health, employability and other future benefits and costs. Given the long time lags, often decades, the important role for habits, and the variation of responses to alcohol between individuals with different genetic and other characteristics, it is easy to doubt the veracity of the perfect knowledge assumption. While some uninformed consumers will consume more alcohol resulting in greater future costs relative to benefits than they would choose under perfect knowledge, others will err on the conservative side and consume too little alcohol because of imperfect information. Reality is that individuals every day make a range of decisions under conditions of imperfect knowledge, including the consumption of alcohol, and that some uncertainty is endemic.

Given that information about the links between alcohol consumption today and future health, employability and other outcomes have public good properties of non-rival consumption and high costs of exclusion, market forces alone will provide too little of this information. A first best solution is for government to fund the provision of information on the links between alcohol consumption and longer term behaviour, health, employability and other outcomes. This includes funding the underlying research and direct information provision and education of consumers. Government also could improve the information available to consumers by investing in the skills and advice provided by the primary health care sector and by monitoring and regulating the advertising of alcohol. There seems to be compelling evidence that the magnitudes of adverse future effects and the risks of excessive alcohol consumption habits forming are much greater for younger people, and this has led many
governments, including in Australia, to regulate against alcohol consumption below a certain age.

Specific taxes on alcoholic beverages are a less direct and a blunter instrument compared with information provision and regulations on youth consumption. A tax falls on all consumption of the product regardless of whether it is consumed by the informed or the uninformed, and very high rates would be required to drive consumption for youth to zero.

c. External Costs of Excessive Alcohol Consumption as a Market Failure

While a large part of the costs both in the current period and in future periods of excessive alcohol consumption are private costs born by the individual and included in their personal consumption choice decision, some of the costs are born by third parties as external costs and are excluded from the private market decision. Splitting the costs of excessive alcohol consumption, such as those reported in Collins and Lapsley (2008), into private and external costs is controversial. Manning et al. (1989) and Richardson and Crowley (2000) are two reported attempts. Potential areas of external costs include additional motor vehicle accidents, additional outlays on health care and on law enforcement, mistreatment of other family members, and some of the costs of reduced labour market participation and productivity. The presence of external costs means that the MSC include the internal or MPC plus the marginal external cost (MEC), with MSC > MPC for excessive alcohol consumption. The neglect of MEC in private market decisions means that the levels of consumption of alcoholic beverages resulting from private market decisions are greater than a social optimum, with an efficiency cost.

Alcohol intoxication is well recognised as a disproportionate contributor to road accidents (ABS, 2006), with costs associated with the loss of life, the medical and other costs of injury, damage to property and extra policing. Costs born by the individual are internal costs, and rational consumers include the risk weighted costs of road and other accidents of driving in their private market decision to purchase alcohol and to drive. But, the costs to passengers and others are external costs, although arguably some drivers and their passengers factor in at least some of these
potential third party road accident costs in their private decisions. While special taxation of alcohol and the ensuing price increase reduces alcohol consumption and alcohol related road accidents, most governments, including in Australia, also have adopted more targeted interventions, including regulations against drink driving, advertising the dangers and costs of drink driving, and greater car safety.

Under current institutional relationships affecting the supply and funding of health care in Australia, and in most other countries, a portion of the additional costs of health care of individuals attributable to the consumption of alcohol are born not by the individual but shared with the total population. In the case of public funded health care, including Medicare, public hospitals and pharmaceutical benefits, the extra health costs are met by higher tax burdens for all taxpayers, both the excessive alcohol consumers and others. Further, because taxation involves deadweight costs of distortions to economic decisions as well as a transfer, the economic cost of an additional tax dollar exceeds a dollar (and on some estimates by more than $1.20). In the case of health care costs funded through private health insurance, restrictions imposing community rating mean that the higher health care costs of alcoholics raise the break-even insurance premiums not only for these higher-at-risk people, but also for the rest of the insured population. Drinkers at risk are estimated to make-up no more than a quarter of alcohol consumers, and those at high risk less than 15 per cent (ABS, 2006). Since excessive alcohol consumers directly and indirectly bear a share of the extra health costs, and they bear directly the costs of higher morbidity and mortality of their own excess consumption, only a portion of the higher costs of health associated with excessive consumption of alcohol is not taken into account by individuals in a private market context when choosing alcohol consumption levels.

Excessive consumption of alcohol encourages some to engage in criminal activities to a greater extent than otherwise. While criminals bear some of the costs of their misbehaviour as internal costs, some of the costs of alcohol induced criminal behaviour falls on other personnel, and the general community has to meet the costs of the additional resources allocated to law enforcement.

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2 Low risk was defined as up to 28 standard drinks per week for a male and up to 14 standard drinks per week for a female, high risk more than 43 standard drinks a week for a male and 29 or more for a female, with risky between these extremes. A standard drink contains 10 grams of alcohol.
One of the costs of alcoholism is lower labour market outcomes associated with higher absentee rates, higher unemployment, earlier retirement, and lower productivity and wage rates (Collins and Lapsley, 2008, Preventive Health Task Force, 2009). Initially, most of the lower labour market return is born by the individual as a private cost or reduction in personal income. An area of debate in calculating external costs is whether some of the decline in productivity spills over as lower productivity of the wider workforce, and then how large is the spill over share? The lower gross labour income means both a fall in disposable income as an internal cost to the alcohol consumer and a lower contribution of taxation revenue. Since this lower tax contribution to government revenue means a combination of less government services for the general population and higher tax rates than otherwise, a portion of the lower labour remuneration associated with alcoholism is passed on as an external cost to others.

A controversial debate on what to include in the external costs of excessive alcohol consumption (and also consumption of tobacco, illegal drugs and excess food consumption leading to obesity), and the magnitude of the external costs, concerns whether the focus is on the family or the individual (see, for example, Crawford, et al., 2008). If a family focus is taken, with the implicit assumption that individuals in making decisions are fully cognisant of the preferences and effects of their decisions on all family members, any spill-over costs of excessive alcohol consumption by one person on others in the family are internal or private costs. For example, the costs of physical and verbal abuse of spouses and children, of lower available disposable incomes for other family members, and of extra family time devoted to care of the alcoholic would be regarded as internal costs taken into account by the rational family utility maximising consumer of alcohol. By contrast, if the focus is on the individual, and with some supporting evidence that some individuals under-weight, or even ignore, some to all of the effects of their decisions on the utility of other family members, a relatively high proportion of the costs of abuse of other family members,

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3 While Collins and Lapsley (2008) state these costs are born by employers, employees directly and explicitly lose from earlier retirement and higher unemployment. There are a number of studies (for example, Hirschberg and Lye, 2004) showing an inverted U relationship between wage rates and alcohol consumption which is consistent with the argument that excessive consumption results in lower promotion and wage rates.
of reduction in family income, and even some of the costs of higher morbidity and mortality correctly become external costs born by other family members. Clarke (2009) supports this view, while Manning et al. (1989) lean towards treating intangible costs to family members as internal costs. Taking an aggregate society perspective, truth likely falls between the two extreme perspectives.

Illustrative estimates of the total external costs of excess alcohol consumption are shown in Table 2. This table uses the list of external costs described above for the two situations of a family utility and decision model (that is all costs on family members as well as for the alcoholic are regarded as internal costs) and of an individual utility and decision model (which includes costs born by other family members as external costs). The raw cost data is from Collins and Lapsley (2008) for 2004-05. These social cost estimates are subject to controversy and there are acknowledged uncertainties in estimates of, for example, the links between alcohol consumption to road accidents, adverse health outcomes and employment, and the dollar sums attached to these outcomes. All of the costs associated with criminal activity of $1.4 billion are assigned to external costs. A half of the tangible costs of road accidents associated with alcohol of $2.2 billion are treated as costs to third parties. Total additional health care costs of $2 billion are split 20 per cent to excessive alcohol consumers as internal costs and the rest as external costs. Of the estimated $3.6 billion loss of labour income, 30 per cent is allocated as a loss of government tax revenues, with 30 per cent being the average tax to GDP ratio. In the case of an individual utility and decision model, a portion, x, of the loss of disposable labour income is an external cost to other family members, but this loss is an internal cost for the family utility and decision model. No estimate is provided for the deadweight loss associated with aggravated distortions to work versus leisure, capital market and other decisions necessitated by higher tax rates to replace the foregone labour income tax revenue and the additional social security transfers to the sicker alcoholics. If the individual utility and decision model is used, a share, y, of the estimated intangible costs of greater mortality and morbidity of the alcoholic is born by other family members. For the family utility and decision model, annual external costs of excessive consumption of alcohol exceed $5 billion, however, for the individual utility and decision model

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4 Collins and Lapsley (2008) indicate that there is some double counting of health costs and road accident costs in their estimates.
which includes as external costs also the losses to other family members, the external cost estimate increases at least two-fold.

Table 2: Illustrative Estimates of the External Costs of Excessive Alcohol Consumption in Australia, 2004-05

<table>
<thead>
<tr>
<th>External cost item</th>
<th>Family utility and decision model. Illustrative cost in $ million/year</th>
<th>Individual utility and decision model. Illustrative cost in $ million/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extra costs of crime</td>
<td>1424</td>
<td>1424</td>
</tr>
<tr>
<td>Road accident costs(^1)</td>
<td>1101</td>
<td>1101</td>
</tr>
<tr>
<td>Extra health care costs incurred by the non-alcoholics(^2)</td>
<td>1582</td>
<td>1582</td>
</tr>
<tr>
<td>Loss of tax revenue with lower labour remuneration(^3)</td>
<td>1080</td>
<td>1080</td>
</tr>
<tr>
<td>Loss of disposable income for family members</td>
<td>0</td>
<td>x2520, 0 &lt; x &lt; 1</td>
</tr>
<tr>
<td>Deadweight costs of higher tax rates</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Share of intangible costs of higher morbidity and mortality</td>
<td>0</td>
<td>y4489, 0 &lt; y &lt; 1</td>
</tr>
</tbody>
</table>

\(^1\) Assumes a half of costs are to third parties.

\(^2\) Assume 80% of extra costs passed to rest of the population.

\(^3\) Assume an average tax rate of 30%.

na for not available.

Raw economic costs from Collins and Lapsley (2008).

Some of the effects of external costs associated with excess consumption of alcohol are illustrated in Figure 2. This figure builds on Figure 1, and in particular the private market decision on consumption equating demand equal to MPB with supply equal to
MPC at quantity Q. The effect of the external costs of excessive alcohol consumption is that the marginal social cost (MSC) is given by MPC plus the marginal external cost (MEC) curve and MSC lies above the MPC. The MEC is shown as increasing in quantity to reflect that low levels of consumption involve minor spill-over costs to third parties and that it is excessive consumption in the form of regular heavy consumption or the less frequent binge drinking which generates most of the external costs. Then, equating MSB and MSC results in a smaller level of consumption of alcohol at Q*. Social efficiency in reducing excess alcohol consumption, but not eliminating all of the external costs, from Q to Q* is given by area ‘a’.

Figure 2: Market for alcohol with external costs

Figure 2 also provides the corrective tax. This would be set at the MEC, or as \( T = P^* - P' \). In practice the MEC curve almost certainly varies across individuals and perhaps also by alcohol beverage. In a first best world a society maximising tax on alcohol to internalise the external costs of excessive consumption and to capture the potential efficiency gain of area ‘a’ also will vary with quantity, the individual and over time for each individual.

d. Time Inconsistency as a Market Failure
A controversial set of arguments claiming private individuals will consume too much alcohol if left to their own decisions comes from the field of behavioural economics. Consumers lack the willpower to carry out rational individual and society efficient choices, and as a result decisions taken are time inconsistent (see for example, Gruber and Koszegi, 2001, Gruber, 2008, and Cnossen, 2009). The essence of the argument is as follows. Consumers are aware of the time lags between excess alcohol consumption and its adverse effects on one’s future health and employment outcomes, and perhaps also on near future behaviour and well-being, and they plan rationally. However, on occasions they are unable to muster the willpower to carry out their plans. At the next decision period, and relative to the longer run rational plan, they over-weight the immediate benefits of alcohol consumption today and under-weight the costs of poorer health and labour market outcomes in the future. Hyperbolic discounting provides one formal model of time inconsistent behaviour. Experimental economics and anecdotal explanations of actual behaviour provide support for the time inconsistent behaviour model, in general and specifically for alcohol purchases.

The effect of time inconsistent preferences can be illustrated with the assistance of Figure 1. The market demand curve, D, of rational individual decision making if plans were carried out is also the marginal social benefit, MSB. However, for time inconsistent consumers of alcohol, the revealed market demand or MPB is to the right of MSB. Left to market forces, too much consumption of alcohol would result from the perspective of both the rational individual who can carry out their plans and a society efficient perspective. While such behaviour provides a prima facie case for government intervention to reduce alcohol consumption, it places government in a paternalist role. Also, government has limited information about the magnitude of the time inconsistent decision, and the magnitudes of the time inconsistency and excess alcohol consumption will vary across different individuals and also over time for any individual.

A number of policy interventions, including taxes on alcohol, have been considered as options, and as a component of a package of complementary interventions, to ameliorate the effects of time inconsistent decisions on alcohol consumption. The most direct set of measures seek to improve the ability of individuals to carry through with their rational plans. These include measures that help strengthen personal
convictions and confidence, such as associations like Alcoholics Anonymous, and support for primary health providers and other family members. General taxes on alcohol fall on all consumers, both those with and without time inconsistent preferences, and then at the same rate on consumers with different degrees of time inconsistency.

4. Special Taxes to Reduce Excessive Alcohol Consumption

The design of special taxes on alcohol with the aim to internalise the external costs in private decisions is the focus of this section. Also considered are some of the relative merits of taxes versus other intervention instruments, including regulations and information provision. To focus the discussion, it is useful to have in mind a general relationship linking the external cost, E, with potential taxable terms, X, other measureable factors affecting the external cost, Z, and unknown other explanatory variables or an error term, e,

\[ E = f(X, Z, e) \]  

(1)

For the alcohol problem, E includes the road accident costs, law enforcement costs, extra health costs and loss of tax revenues on lower labour incomes born by the non-excessive alcohol consumers discussed in section 3c above; potential controllable variables for influence by government policy intervention, the X, include various measures of alcohol consumption, and specific activities and venues associated with excessive alcohol consumption; the Z include genetics and family history; and, the e term represents all other explanatory variables.

At least three facts of reality about (1) are important in assessing the merits of a special tax instrument to reduce excessive alcohol consumption. First, function (1) is not well understood and/or that the Z and error term e are relatively large compared with the X terms in explaining E. Second, there is a non-linear relationship between X and E. In particular, at low levels of alcohol consumption the external costs are minimal, and there is some evidence of positive external benefits, and with excessive consumption the marginal external costs increase at an increasing rate. Third, the market demand for alcohol is price sensitive (see, for example, the review by Fogarty, 2008) with the result that special taxation of alcohol will reduce aggregate consumption. Although there is anecdotal evidence that the price sensitivity of
demand by the excessive alcohol consumers is less than for the average consumer, there is very little convincing econometric evidence.

a. Tax Base

A number of questions need to be asked in choosing a taxable sum, namely from the potential X terms in (1), on which to apply a special tax to reduce excessive alcohol consumption. Ideally, this would be a variable that both is highly correlated with the external costs to be internalised and which is readily measured at low cost.

All else constant, a taxable term closest to the external cost is preferred. Since external costs by definition are not market goods as a result of incomplete property rights, a proxy measure has to be used. Excessive alcohol consumption is more highly correlated with E than is all alcohol consumption. But, it is not clear how to measure “excessive consumption”, the costs would be very high, and it is likely that the required information would run into serious ethical and privacy questions. As a result, discussion and analysis of taxation of alcohol focuses on a general tax on all alcohol consumption.

A related issue is at what level of the supply chain is the tax to be applied? In principle it could be at the retail level, the wholesale level, or the manufacturing level. Consideration of the number of firms and of the ease and costs of tax administration and compliance favour the choice at the supply chain level where the industry is most concentrated. At least in the case of beer and spirits, but less so for wine, the wholesale or manufacturing stages are more concentrated than the retail stage. Unless there are demonstrated significant gains for a change, the manufacturing stage now in place seems appropriate.

As the relevant market failure costs of excessive alcohol consumption primarily refer to domestic residents, a corrective tax base would be a consumption or destination base rather than a production or origin base. That is, the special tax on alcohol would include all imports, as well as domestic production, but exports would be exempt. With the exception of duty free allowances for international travellers, a tax expenditure which should be scrapped, the consumption base principle is applied with the current excise tax and wine equalisation tax.
Special taxation of alcohol to achieve efficiency is more effective if there are no close substitute and non-taxed products which also involve market failure problems. There is mixed econometric evidence about the sign, significance and magnitude of cross-price elasticities of alcohol with hard drugs and petrol sniffing which also incur external costs and time inconsistent decisions.

A specific or volumetric tax, for example per litre of alcohol by volume as now applies to beer and spirits, is more appropriate than an ad valorem tax as now applies to wine. The volume of alcohol consumed is more closely correlated with the magnitude of the external costs than is the dollars spent on alcohol. While some have argued that the higher the alcohol concentration the easier and quicker it is to get drunk, the evidence is that excessive consumption is found across consumers of the different beverages with different alcohol concentration rates, and many alcoholics consume two or more forms of the beverage.

In general, there are good reasons for a common specific tax per litre of alcohol across all the alcohol beverages to replace the present diverse and ad hoc pattern of rates described in Table 1. Most of the external costs, and the problems of time inconsistent choices, are highly correlated with the volume of alcohol consumed regardless of the beverage. A lower correlation seems evident between the external cost and the type of beverage or its point of consumption. That is, a common tax rate per litre of alcohol by volume regardless of the beverage is proposed. A single rate across all alcohol beverages and for different distribution points and forms provides further advantages of simplicity, and lower administration and compliance costs.

From another perspective, there is little if any logic with the current set of diverse rates as a means of correcting market failures. For example, there is no evidence that beer consumed in a hotel or club leads to lower external costs than bottles and cans of beer consumed at home, and if this is the case, logic requires also lower rates for spirits and wine consumed in a pub or club than when consumed elsewhere. Most experience suggests that expensive wine is less subject to excessive consumption than lower valued wine, which is the opposite of the implied external cost of the ad valorem wine equalisation tax.
b. Tax Rate
As illustrated in Figure 2, the efficient tax rate would be set at the MEC of the product being taxed at the social optimum level of consumption. In the general case of (1) linking the external costs E to alcohol consumption X, the MEC is an increasing function of the consumption quantity. In this context the MEC exceeds the average external cost. An important implication of this point (also made by Clarke, 2008) is that little is to be gained by comparing the average tax (which also equals the marginal tax rate with a uniform tax) with estimates of the total cost of an externality, and its implied average external cost, in assessing whether a tax should be changed.

A challenge in choosing a special consumption tax which falls on all alcohol to reduce excessive alcohol consumption stems from the heterogeneity of consumers. In particular, the majority do not consume to excess. ABS data (ABS, 2006) indicates that about 25 per cent of alcohol consumers consume at a risky level and less than 15 per cent at a high risk level. A larger share of total alcohol consumption, about 30 per cent, is estimated by Collins and Lapsley (2008) to be at abusive levels. A general tax on alcohol will achieve efficiency gains for the excessive consumers as illustrated in Figure 2, but at the same time the tax will reduce alcohol consumption by the other consumers and cause efficiency losses. Choosing a tax rate has to recognise these conflicting efficiency effects.

Figure 3, which is based on Pogue and Sgonitz (1989), provides a simple illustration for just two groups, the normal alcohol level consumers whose consumption involves no external costs and excessive level consumers where consumption involves external costs. Following the format of Figures 1 and 2, in a competitive market the demand curves for a representative consumer in each group is represented by a MPB curve, and we assume further that MPB = MSB with all external costs placed on the supply side of the market. Assume for simplicity, and with no loss of generality, a perfectly elastic supply curve equal to MPC. Then, in a market or private choice situation each group chooses quantity Q. In the case of the normal level consumption group there are no external costs so that MSB = MSC, and the chosen Q is efficient for both these individuals and society. By contrast, in the case of the excessive consumption group there is a positive external cost and the MSC = MPC + MEC. Then, as in Figure 2, the
excessive consumption group consume too much, with a social optimum at $Q^*$ and a potential efficiency gain of area ‘$b + c + d’.  

**Figure 3: Heterogeneous consumer groups**

![Graph showing the relationship between price, quantity, and marginal social cost for heterogeneous consumer groups.](image)

Suppose a tax at rate $T$ is imposed on all alcohol. This forces the supply function upwards with price rising by $T$ to $P'$, and both sets of consumers reduce consumption to $Q'$. The tax reduces some of the external costs of excessive drinking with an efficiency gain of area ‘$c + d’’, but at the same time it causes a loss of efficiency of area ‘$a’ for the other group.

Given the normal constraint of a flat tax on all groups, a lower tax rate than $T^* = \text{MEC}$ of the excessive consumption group is required. In principle, the compromise that achieves overall efficiency (and assuming a $ is a $ for both groups) is a rate that equates the marginal efficiency gain of less alcohol consumption and a reduction of external costs of the excessive consumption group with the marginal efficiency loss of too little consumption by the other group. This will be a weighted average with a higher tax rate (a) the larger the MEC, (b) the relatively more numerous the excessive consumers, and (c) the relatively more elastic the demand of the excessive
consumption group relative to normal level consumers. This model is readily extended to many groups, but in practice with an increased requirement for data on numbers, magnitude of MEC functions and product demand elasticities by consumer group.

What tax rate should be used? The estimated total external cost of $5 billion a year plus from Table 2 exceeds the excise on beer and spirits and wine equalisation tax collection of $3.3 billion a year. This differential is much less than similar estimates derived by Richardson and Crowley (2000) and Cnossen (2009), both of whom attribute a larger share of costs of alcohol consumption to external costs than this study. With the MEC being greater than the average external cost, the market failure correction Pigovian tax would be higher than a rate that covers the measured average external costs.

There are two other considerations working in the direction of a lower tax rate on alcohol consumption when the restriction is a common tax rate on all alcohol consumption. First, if the demand elasticity of excessive alcohol consumers is less than for normal consumers, the analysis of Figure 3 points to a lower weighted average MEC and tax rate. While there is limited robust econometric evidence on the relative elasticities by type of consumer, logic and anecdotal evidence is consistent with excessive alcohol consumers having less elastic demands. Second, for some groups of excessive alcohol consumers other government intervention instruments are more targeted than a general tax. Examples include regulations on drink driving, provision of information and education, and provision of support services to reduce time inconsistent decisions. These other instruments, when effective, reduce the magnitude of the MEC, and then of the required market failure correction tax rate.

In summary, this analysis suggests a higher tax rate per litre of alcohol by volume across the different beverages than that which would collect about the same aggregate revenue as the current excise on beer and potable spirits and the wine equalisation tax. However, there is not enough evidence to say that the efficient rate would be as high as the current top rate on potable spirits other than brandy.

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5 Pogue and Sgontz (1989) derive explicit formula from a formal model.
c. Some Other Tax Issues

Additional special taxation of alcohol represents both an increase in overall taxation revenue and an increase in the share of that aggregate collected as indirect tax. With no other tax policy changes, the higher indirect tax burden ultimately is passed forward to individuals, and primarily as a higher CPI or cost of living, with second round implications for efficiency and equity. In principle the windfall revenue gain can be, and arguably should be, used to fund other tax reductions as a part of an approximate aggregate revenue neutral tax reform package to modify adverse second round efficiency and redistribution effects.

Consider efficiency effects. There is a potential gain, or dividend, in reduced distortions to alcohol purchase decisions and external costs as discussed. But, at the same time the associated increase in aggregate indirect taxes reduces the effective purchasing power for an hour of work and further distorts labour market decisions. The aggravated labour market distortions have their own efficiency costs. These second round efficiency costs can be offset in part by using the revenue windfall to reduce other distorting taxes, and in particular the general and broad based income tax and/or the GST. Overall, if the tax changes on alcohol result in the sought efficiency gains, a roughly aggregate revenue neutral package of reforms is a positive sum game for society.

The higher aggregate tax burden redistributes income from consumers of the special taxed alcohol beverages to government. Since alcohol by volume has a low income elasticity, the initial redistributive effects of higher alcohol taxation will be regressive. Further, the incidence will be relatively high on the excessive consumers, and especially on most alcoholics who also have relatively poor health and labour market experiences. Even with the best intentions, it is inevitable that any compensation

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6 Formally, the difference between the labour cost to the employer and effective purchasing power to the employee of a period of work is given by \((1 – Ty) / (1 + Ti)\), where Ty is the income tax rate that determines disposable income to the employee, and Ti is the aggregate indirect tax rate, including GST and the special taxes on alcohol, which reduces the products that can be purchased per dollar of disposable income. The greater is Ty or Ti, the less is the return from employment.

7 If no compensating tax reductions are funded, the extra efficiency costs mean that the excessive alcohol consumption tax to correct for market failures in alcohol consumption should be set at less than the MEC (Crawford, et al., 2008).
scheme funded from the tax revenue windfall will involve rough justice. A potential counter argument is that the higher tax induced reduction in excessive alcohol consumption reduces the private costs, as well as the social costs, of some excessive drinkers, and that this gain offsets some and perhaps more than the loss of a higher market price. The net redistribution achieved with a package of increased taxes on alcohol and lower income or GST taxes will result in both winners and losers.

There is no economic logic, but perhaps some political logic, in hypothecating the special tax revenue collected on alcohol for other government programs to reduce excessive alcohol consumption, such as information provision, education and investment in primary health care. The scale of these programs should be based on their own formal benefit cost assessment, and there is no reason why the expenditures should equal the alcohol tax revenue. Also, as argued in the preceding paragraphs, there are other legitimate tax reduction claims on the revenue windfall.

Of course there are important interdependent relationships, many of them complementary rather than competitive, between the different forms of government intervention, including special taxation, to reduce excessive alcohol consumption. For example, in general, the more successful are such programs as information provision and education, regulations to reduce drink driving, and so forth in reducing excess alcohol consumption and its associated external costs, the lower the relevant MEC to be corrected and the lower the market failure correction special tax rate.

5. Conclusions
There are significant market failures with excessive alcohol consumption in Australia. Up to 25 per cent of alcohol consumers, and up to 30 per cent of alcohol consumption, is regarded as at risk. Market failures from excessive consumption include imperfect information about the longer term adverse effects of excess consumption, external costs falling on the general population associated with crime, health care, motor vehicle accidents and lost government revenue, and other costs born by other family members, and the effects of time inconsistent decisions. External costs falling on the non-excessive alcohol consumption general population are estimated to exceed $5 billion a year. There is no robust evidence that the market failures differ between beer, wine and spirits.
A number of different government instruments in addition to special taxation are available to correct the market failures associated with excessive alcohol consumption, and to reap improvements in social efficiency. In many situations, instruments other than special taxes on alcohol are more directly targeted at correcting the market failure and they have smaller adverse secondary effects. Examples include direct information provision and education of the habit forming and longer term adverse effects on health and employability of excessive consumption; regulations on consumption by the young and of drivers; and providing supports to assist individuals to reduce time inconsistent decisions. A general special tax on all alcohol consumption does reduce consumption given the compelling evidence of the price sensitivity of demand, but it is a blunt instrument. In particular, while a general tax on alcohol reduces excess consumption, at the same time it also reduces consumption by the majority of consumers incurring low or zero external costs and in so doing causes efficiency losses for these consumers and for society.

The ideal market failure correction tax on alcohol is argued to be a specific tax per litre of alcohol by volume with the rate given by a weighted average estimate of the marginal external cost across different categories of consumers. The current pattern of different excise tax rates on different beverages, and then the variations for different forms of beer, and the ad valorem wine equalisation tax have no logic as a mechanism to correct for market failures. A single flat rate on all alcohol beverages would be simpler and with lower operating costs. There are no available estimates of the required MEC, and this has to be a priority area for future work. Even so, given the highly non-linear relationship between the external costs and alcohol consumption, with the result that the MEC far exceeds the average marginal external cost, it seems likely that current tax rates could be increased to achieve efficiency gains. Any net revenue gains from higher special taxation of alcohol should be tagged for funding a package of lower income and/or general consumption taxation to counter, at least in part, adverse second round efficiency and equity effects of the increase in aggregate tax revenue.

References
