



Wine Economics Research Centre Working Paper No. 0610

Special Taxation of Alcoholic Beverages to Correct Market Failures

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April 2010

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ISSN 1837-9397

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Special Taxation of Alcoholic Beverages to Correct Market Failures

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Revision of a paper presented at the AARES/AAWE Workshop on **The World's Wine Markets by 2030**, Adelaide Convention Centre, 8-9 February 2010. With the usual caveats, I am grateful for the comments of Kym Anderson on an early draft.

Abstract

In most countries, including Australia, special excise and other taxes are imposed on beer, wine and spirits. 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. A common specific tax per litre of alcohol by volume across the different beverages levied on a consumption base at the wholesale level, and indexed by a wage index, is proposed.

1. Introduction

Special and relatively high levels of commodity taxation are levied on beer, wine and spirits in most countries, including Australia. They are in addition to the general income, consumption and asset taxes. 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, and it considers options in the choice of the tax base and rates of market failure correction Pigovian taxes. Some of the 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 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. Section 3 discusses the market failure arguments for government intervention to reduce alcohol consumption to raise efficiency. 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. 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

| Alcoholic Beverage | Tax Base | Tax Rate |
|--------------------|---|--|
| Beer | Per litre of alcohol by volume over 1.15% | Fixed excise tax in \$ per litre by volume |

| | | |
|--|--|---|
| <ul style="list-style-type: none"> • Draught, low strength (<3% alcohol by volume) • Draught, mid strength (>3% and <3.5% alcohol by volume) • Draught, high strength (>3.5% alcohol by volume) • Other beer, low strength (<3% alcohol by volume) • Other beer, mid and high strength (>3% alcohol by volume) • Non-commercial, low strength (<3%) • Non-commercial, mid and high strength (>3%) | | <p>6.99</p> <p>21.96</p> <p>28.74</p> <p>35.03</p> <p>40.82</p> <p>2.46</p> <p>2.85</p> |
| <p>Potable spirits</p> <ul style="list-style-type: none"> • Brandy • Other spirits exceeding 10% alcohol content | Per litre of alcohol by volume | <p>Fixed excise tax in \$ per litre by volume</p> <p>64.57</p> <p>69.16</p> |
| Other beverages, including mixed drinks exceeding 10% alcohol | Per litre of alcohol by volume | Fixed excise tax of \$69.16 per litre by volume |
| Wine | Wholesale sales tax, with a large tax free threshold | 29% |

Source: Swan, W. and Tanner, L., (2009), Budget Paper Strategy and Outlook: Budget Paper No. 1, 2009-10, Commonwealth of Australia, Canberra.

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 winery in excess of \$1.7 million wholesale value per year¹. 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

¹ A commonly stated rationale for the WET rebate is to support wine cellar door sales as a part of a regional development strategy. But, there is no rationale to support wine sales but not other regional activities such as food purveyors and other regional tourist operators.

the taxes are collected at the manufacturer level, but most of the economic incidence is passed forward to consumers as higher retail prices².

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 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 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

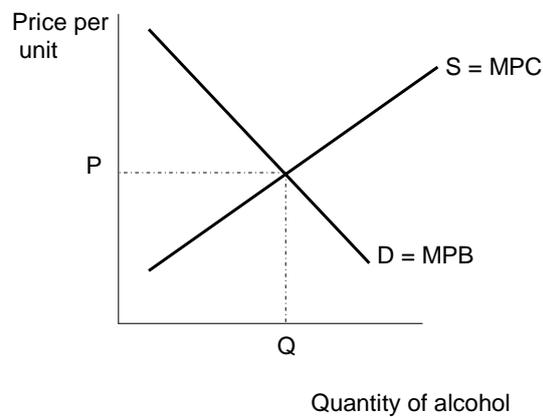
² In the appropriate long run context, a 100 per cent pass forward assumption is used by ABS in its analyses of the distribution of the tax burden (ABS, 2007) and by Warren et al. (2005). For beer and wine, the underlying logic is constant returns to scale production technology and mark-up on marginal cost pricing associated with a number of oligopoly models. In the case of wine, one plausible model is a competitive or monopolistic competitive model and a highly elastic export demand function.

any longer term costs associated with alcohol consumption, including risks to future health and employability. This forward looking decision making framework is best represented in the Becker and Murphy (1988) model of rational addiction.

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 there is a wide range of reported estimates of the own price elasticities of demand for the broad categories of beer, wine and spirits, and for alcoholic beverages as an aggregate, 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.

Figure 1: A competitive market for alcohol



If we make further assumptions that the demand or MPB curve also corresponds to the marginal social benefit (MSB) curve, and 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. This result is straight forward for a closed economy context, but in reality the Australian alcohol beverages markets involve exports and imports. With international trade it is important to distinguish whether the tax is on a consumption base, with imports taxed and exports exempt, or a production base, with imports exempt and exports taxed. Since our interest is in externalities associated with domestic consumption, the paper focuses on a consumption base. A consumption based tax initially collected from producers (as currently and for reasons of low costs) will have similar long run comparative static effects on quantity, price and distributional effects as a consumption based tax initially levied on domestic consumers. For our competitive model with no market failures, the reduced consumption effects of a tax on consumption also would mean a loss of economic

efficiency. The quantity reduction effect of a tax on alcohol and the efficiency loss will be greater the more elastic is the demand.

The following subsections focus on potential market failures on the demand side of the private market for alcohol. In the context of Figure 1, the market failure can be represented as the MSB curve being to the left of the MPB curve. For simplicity no market failures are assumed on the supply side, so that $MPC = MSC$.

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 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 Failure³

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. External costs mean that the MSB include the MPP less the marginal external cost (MEC), with $MSB < MPB$ 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

³ Many argue that moderate consumption of alcohol (1 to 2 standard drinks a day) provides benefits, such as higher life expectancy and less psychological stress, and that some of these benefits are external benefits. These potential external benefits are not considered in this study, but it is recognised that they would reduce the overall tax burden that maximises social welfare.

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 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 investments in better roads 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 excessive 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. 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, government regulations 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)⁴. 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

⁴ 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.

misbehaviour as internal costs, most 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.

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 income⁵. 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

⁵ 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, Barrett, 2002, and 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.

members, a relatively high proportion of the costs of abuse of other family members, of reduction in family income, and even some of the costs of higher morbidity and mortality 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 or private 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 adverse 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 for the family utility model and 70 per cent for the individual model. Total additional health care costs of \$2 billion⁶ 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. Dead weight costs of added distortions to labour and saving decisions of the added tax burden are set at 20 cents per dollar extra tax. 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. 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.

⁶ Collins and Lapsley (2008) indicate that there is some double counting of health costs and road accident costs in their estimates.

For the family utility and decision model, annual external costs of excessive consumption of alcohol exceeds \$5 billion, however, for the individual utility and decision model 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 Total External Costs of Excessive Alcohol Consumption in Australia, 2004-05

| External cost item | Family utility and decision model. External cost in \$ million/year | Individual utility and decision model. External cost in \$ million/year |
|---|---|---|
| Extra costs of crime | 1424 | 1424 |
| Road accident costs on third parties ¹ | 1101 | 1541 |
| Extra health care costs incurred by the non-alcoholics ² | 1582 | 1582 |
| Loss of tax revenue with lower labour return ³ | 1080 | 1080 |
| Dead weight cost of higher tax rates ⁴ | 216 | 216 |
| Loss of disposable income for family members | 0 | x2520, 0 < x < 1 |
| Share of intangible costs of higher morbidity and mortality on family | 0 | y4489, 0 < y < 1 |

¹ Assumes a half of costs are to third parties in case of family and 70 per cent in case of individual utility model.

² Assume 80% of extra costs passed to rest of the population.

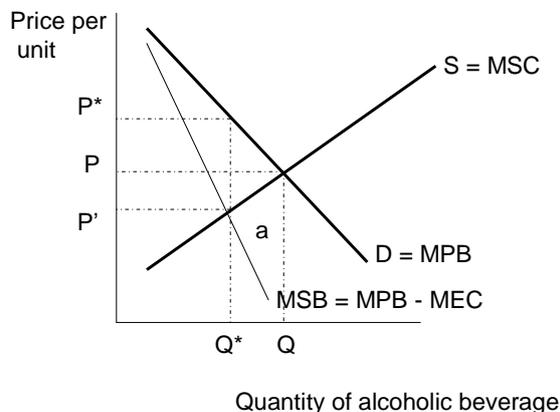
³ Assume an average tax rate of 30%.

⁴ Assume 20 cents per extra dollar tax.

Social costs from Collins and Lapsley (2008), the author estimates.

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 supply⁷ equal to MPC at quantity Q . The effect of the external costs of excessive alcohol consumption is that MSB is given by MPB less MEC, and the MSB curve lies below the MPB curve. 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^* relative to the market solution. Social efficiency in reducing, but not eliminating, excess alcohol consumption, from Q to Q^* is given by area 'a', or the difference between MSC and MSB over the quantity Q^* to Q .

Figure 2: Market for alcohol with external costs



⁷ In the more realistic world trade model context, strictly speaking, the supply curve facing Australian consumers in both Figures 2 and 3 is the excess supply curve equal to the Australian supply less exports and plus imports rather than the Australian supply curve. Free trade makes this excess supply curve more elastic than the Australian supply curve. This move to greater reality does not affect the reasoning and direction of effects of the results reported.

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 with zero transaction costs, 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 in Decisions 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. It is argued that 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 their future health and employment outcomes, 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, 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 time inconsistent 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 from 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 objective of this section. 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 ,

$$E = f(X, Z, e) \quad (1)$$

For the alcohol problem, E includes the external costs of road accidents, law enforcement, extra health costs and the loss of tax revenues on lower labour incomes born by the non-excessive alcohol consumers; 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 term 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. 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.

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 it 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. 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 per litre of alcohol by volume as now levied on beer and spirits is more appropriate than an ad valorem tax as now levied on 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 (Srivastava and Zhao, 2010), and many alcoholics consume two or more forms of the beverage (Ramful and Zhao, 2008).

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 rate (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 rate should be changed.

Whether the simplicity of a common specific tax per litre of alcohol across all the alcohol beverages or a different rate for different beverages is chosen depends primarily on compelling evidence that the marginal external costs vary by type of alcohol beverage. 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. Srivastava and Zhao (2010) using data from the Australian National Drug Strategy Household Surveys (2004) provide a comprehensive assessment of the links between different alcohol beverages and the probability of binge drinking⁸, and then of the links between binge drinking and the external costs associated with risky behaviours, labour market outcomes and measures of health outcomes. In a number of cases, external costs appear lower for wine relative to beer and spirits, but the differences are relatively small in most cases, and Srivastava and Zhao (2010) suggest that econometric studies to correct for demographic and socioeconomic factors are required before drawing strong conclusions on differences in external costs by alcoholic beverage. In time series econometric estimates of the relationship between aggregate alcohol consumption per capita and the incidence of liver cirrhosis mortality and of ischaemic heart disease for ten countries, Karmel (2010) finds that the effects of different types of alcohol are statistically different for most countries, with the adverse effects being less for wine than for beer and spirits. The differences across countries are larger than the differences between alcoholic beverages within a country. Further data demonstrating significant differences between different beverages and the magnitude of differences in marginal external costs by beverage could support different tax rates by beverage. Given the limited available information to date, and with the benefit of simplicity and lower administration and compliance costs, a common tax rate per litre of alcohol by volume regardless of the beverage is proposed.

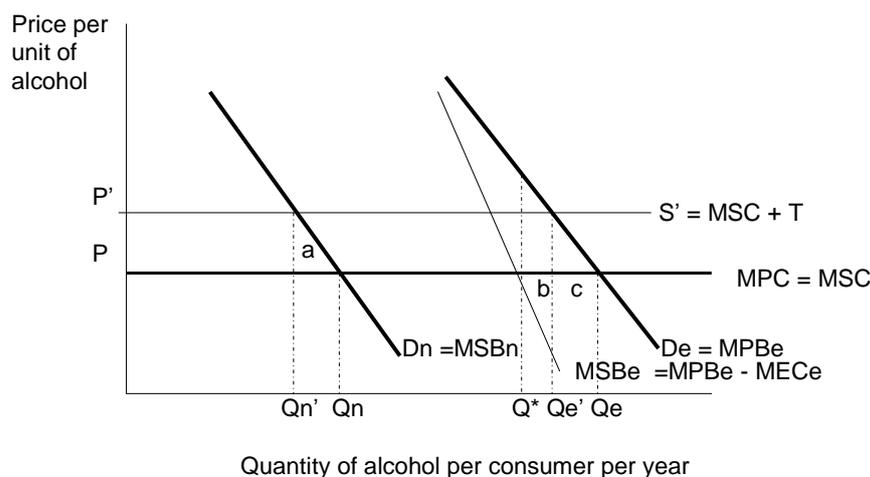
A challenge in choosing a special consumption tax rate which falls on all alcohol to reduce excessive alcohol consumption stems from the heterogeneity of consumers. In particular, the majority do not consume to excess. ABS data (ABS, 2006) indicates that about 25 per cent of alcohol consumers consume 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

⁸ Binge drinking is defined as males consuming 7 or more standard drinks (of 10 grams of alcohol by volume) on any one day, and 5 or more for females.

consumers and cause efficiency losses. Choosing a tax rate has to recognise and then balance these conflicting efficiency effects.

Figure 3, which is based on Pogue and Sgontz (1989), provides a simple illustration for just two groups. The first group are normal alcohol level consumers whose consumption involves no external costs. The second group are 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 $MPBi$ curve, for $i = n$ and e for normal and excessive consumers. Assume for simplicity, and with no loss of generality, a perfectly elastic supply curve equal to $MPC = MSC$. Then, in a market or private choice situation each group chooses quantity Qi . In the case of the normal level consumption group, as in Figure 1, there are no external costs so that $MSB = MSC$, and the chosen Qn 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 $MSB = MPB - MEC$. Then, as in Figure 2, the excessive consumption group consume too much at Qe , with a social optimum at Q^* and a potential efficiency gain of area 'b + c'.

Figure 3: Heterogeneous consumer groups



Suppose a tax at rate T is imposed on producers for all alcohol consumed domestically. This forces the supply function upwards with price rising by T to P' . Both sets of consumers reduce consumption to Q_i' . The tax reduces some of the external costs of excessive drinking with an efficiency gain of area 'c', but at the same time the reduced consumption for the normal group causes a loss of efficiency of area 'a'.

Given the constraint of a flat tax on all groups because of problems of available data and high transaction costs, a lower tax rate than $T^* = MEC$ 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 of excessive consumers, (b) the relatively more numerous the excessive consumers, and (c) the more elastic the demand of the excessive consumption group relative to normal level consumers⁹. This model is readily extended to many groups. But, more groups increase the required 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 at least \$5 billion a year from Table 2 exceeds the total special taxation revenue collected from excise on beer and spirits and the wine equalisation tax of \$3.3 billion a year. This difference 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 cost.

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

⁹ Pogue and Sgontz (1989) derive explicit formula from a formal model.

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 are 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 the minimum drinking age and 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.

The specific tax rate on alcohol beverages should be indexed to the rising cost over time of the external costs. A measure of the growth in average earnings would seem a minimum index. Foregone labour income and associated tax revenue is one of the external costs, costs of traffic accidents include as a large component the value of a life, and labour costs are the largest component of health care costs.

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.

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. Total external costs falling on the non-excessive alcohol consumption general population are estimated to exceed \$5

billion a year. Evidence that the market failures differ between beer, wine and spirits is still being collected and analysed.

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 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 support 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 society and welfare losses for these consumers.

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 external cost, it seems likely that the current aggregate special taxation collected on alcohol could be increased to achieve efficiency gains.

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