

# ALCOHOL TAXES VERSUS PREVENTATIVE MEASURES : A THEORETICAL NOTE

By P A Black\*

Department of Economics, University of Stellenbosch  
South Africa

## *Abstract*

The paper assumes that damages in the form of deaths and traumatic injuries caused by alcohol-related road accidents constitute a significant part of the negative externalities associated with alcohol consumption. It then compares the conventional Pigouvian solution with the impact that a *sufficiently* high penalty on drunken driving and better law enforcement may have. It is hypothesised that these measures may cause heavy drinkers either to cut back on their consumption of alcohol on occasions when they have to drive a vehicle, or to maintain their consumption levels but refrain from driving. The welfare losses are much lower for each of these scenarios, and are also carried specifically by those responsible for the negative externality. An attempt is also made to consider how individuals may respond to higher penalties and / or a more effective law enforcement system.

*JEL Classification* : H21 H23

*Keywords*: drunken driving; negative externalities; Pigouvian tax; preventative penalties; law enforcement; welfare losses

## **1. Introduction**

The purpose of this note is to compare the efficiency of excise taxes on alcohol consumption with that of direct measures aimed at eliminating or reducing the negative externalities caused by excessive drinking. The analysis below is based on the Pigouvian (1946) notion of the “externality problem”, and assumes that alcohol (and tobacco) or “sin” taxes are aimed exclusively at internalising the associated negative externalities, or reducing them to their so-called optimal levels (e.g. McNutt, 2002: 246). Thus, we assume governments do *not* as such base their decisions to tax alcoholic beverages on a need to boost their revenues.

- 
- Corresponding author: Philip A Black. Tel: - 0027 - 21 808 2247 / 0027 – 82 82 777 40; Fax: -21 808 4367; E-mail: pablack@sun.ac.za / pablack@telkomsa.net

It is however generally recognised that an excise tax on alcohol is a blunt instrument that fails to differentiate between moderate and heavy drinkers; it is at best an “approximate Pigouvian” tax (Smith, 1996) inasmuch as it cannot distinguish between the relative price elasticities of different categories of alcohol consumers (Pogue & Sgontz, 1989; Kenkel, 1993). Most governments therefore also rely on a host of regulatory measures to control alcohol consumption. These include advertising bans, restricted drinking hours and age and physical space restrictions. As far as excessive alcohol consumption is concerned, the legal enforcement of property rights often takes the form of stiff penalties on drunken driving and on abusive or intrusive behavior on the part of drunk persons. Excessive alcohol consumption contributes to a large proportion of road accident-related deaths and traumatic injuries<sup>1</sup>, and the damage thus caused arguably constitutes a significant part of the negative externalities associated with alcohol consumption. We therefore limit our analysis to a comparison between an excise tax and an *effective* penalty on drunken driving.

## 2. Analysis

Figure 1 shows two market demand curves in respect of alcohol consumption.  $AB = \sum_i MPB$  ( $i = 1, 2, \dots, n$ ) is the demand curve for relatively heavy drinkers whose alcohol consumption has a negative external effect on others – given by the difference between  $AB$  and  $AE = \sum_i MSB$ . Similarly,  $AC = \sum_j MSB$  ( $j = n+1, \dots, z$ ) is the corresponding demand curve for moderate drinkers, with there being no external effects. Given the total market demand curve,  $AD$ , and marginal cost  $MPC = MSC$ , equilibrium occurs at point  $G$  where  $Q_4 = Q_1 + Q_2$  are consumed at price  $P_1$ .

The value of the negative externality is  $HG$  per unit of alcohol consumed, or  $AGH$  in total, and the Pigouvian solution is given by an *ad valorem* tax equal to  $NM$ , where (total)  $MSB = MSC$  at point  $N$ . Although the externality has been reduced to its optimal level,  $AMN$ , price is now higher for both heavy and moderate drinkers. Apart from the deadweight loss,  $MNG$ , all consumers,

---

<sup>1</sup> In South Africa it is estimated that some 50 per cent of accident-related deaths, and more than half of traumatic injuries caused by road accidents, involve blood-alcohol concentrations greater than or equal to the legal limit for driving (Parry et al., 2003)

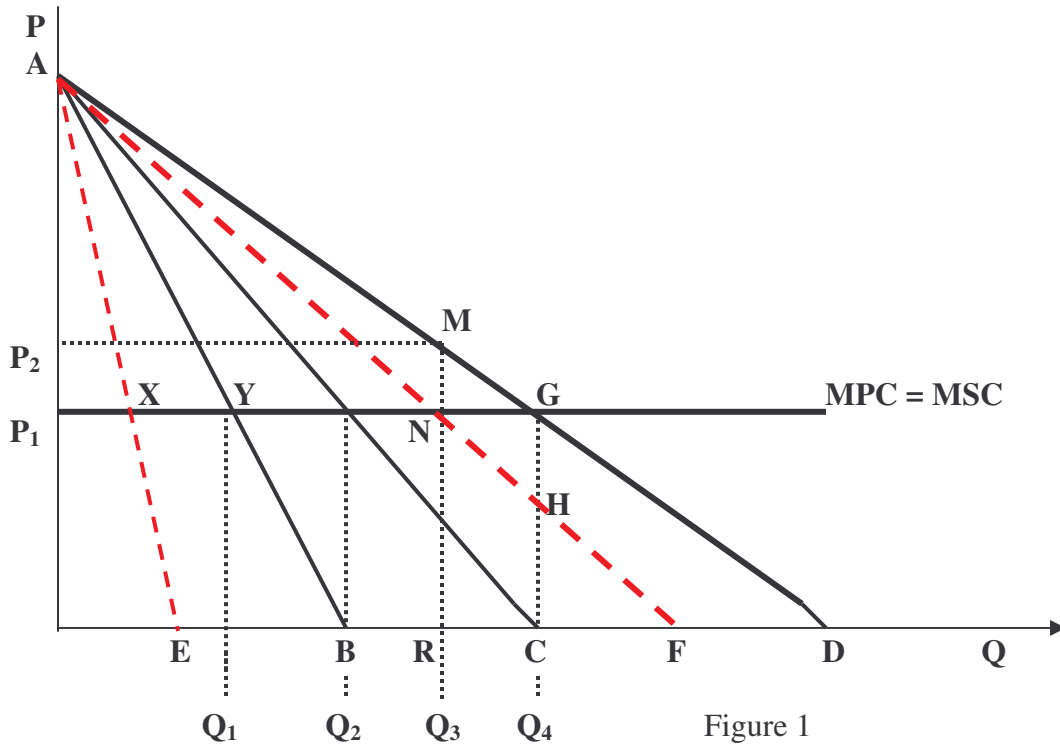


Figure 1

including moderate drinkers, have suffered consumer surplus losses. In addition, the value lost by the alcohol sector, NRCG, is conveniently assumed to be transferred to other sectors. But if changing jobs takes a long time, e.g. due to contracts and spatial friction, and capital equipment in the alcohol sector is standing idle, the welfare losses will be higher than the conventional consumer surplus and deadweight losses.

Instead of a Pigouvian tax, it may be worth considering (tighter) regulatory measures aimed directly at reducing the externality, as these may involve smaller welfare losses. As an example, assume that the above externality refers exclusively to damages associated with automobile accidents caused by drunken drivers. By raising the penalties on drunken driving *sufficiently*, and/or strengthening the law enforcement capability, heavy drinkers may maintain their consumption levels but refrain from driving, or they may cut back on their consumption of alcohol on occasions when they have to drive a vehicle. In the former case the externality will be eliminated so that AB and AD in Figure 1 will equal  $\sum_i MSB$  and  $\sum_t MSB$ , respectively, with there being no welfare losses other than perhaps the administrative costs of raising the penalties and, for heavy drinkers, the cost of arranging alternative transport.<sup>2</sup> In addition, with consumption

<sup>2</sup> There may be an additional cost involved in strengthening the law enforcement capability, but this would be carried by all drinkers and non-drinkers. Alternatively, the required funding could be acquired through a re-allocation of the existing budget.

levels being maintained (at  $Q_1$ ,  $Q_2$  and  $Q_4$ ), there will be no sectoral losses or costs involved in resources being re-allocated to other sectors.

If in the latter case, i.e. that of lower alcohol consumption, the externality is also eliminated, the two demand curves, AB and AD, will shift inwards to, say, AE and AF (or  $\sum_i MSB$  and  $\sum_t MSB$ ). The only welfare loss would be carried by (formerly) heavy drinkers – given by a decrease in consumer surplus equal to  $AXY$  in Figure 1; though the sectoral loss will be the same as before. Moderate drinkers will consume the same quantity as before at the same price. The net effect is thus a reduction in the relative numerical importance of heavy drinkers and a concomitant increase in that of moderate drinkers.

For both these admittedly strong hypotheses it is only the perpetrators of the externality – drunk drivers – who effectively carry the burden of removing or reducing the negative external cost. A weaker form of the above hypotheses would be that high penalties or better enforcement reduce (rather than eliminate) the negative externality, in which case a smaller tax would be required to achieve  $MSB = MSC$ . But here too heavy drinkers would carry a relatively heavier burden in reducing the externality while moderate drinkers would pay a lower tax.

### 3. Preventative Measures and Individual Responses

We have said nothing about the nature or magnitude of the penalty required to change the behaviour of alcohol consumers – merely that it be “sufficient”. This is clearly a complex issue as people are bound to respond differently to a given set of (dis)incentives, with individual responses depending on many factors, not least of which is the law enforcement capability within their communities. The critical question here is whether higher penalties and/or a higher level of law enforcement will *change* the behaviour of (heavy drinking) individuals.

Such individual responses can be easily captured conceptually. Consider a drunk person, or someone expecting to be drunk, having to decide whether to drive or not. If he chooses not to drive, his utility is  $\bar{u}$  (i.e. the reference point in terms of prospect theory). If he decides to drive he faces the risky prospect,  $P = (v, u^+, u^-)$ , where  $u^+$  and  $u^-$  represent the utility gain and loss, respectively, with the difference depending on his expectation of whether he will be arrested and sentenced for drunken driving;  $v$  is the decision point (or probability) afforded  $u^+$ . While the individual’s choice will depend on the value of  $\bar{u}$  relative to  $u^+$  and  $u^-$  (given that  $u^+ \geq \bar{u} \geq u^-$ )

(Quiggin, 1982; Kahneman & Tversky, 2000), several factors may cause him to alter the value of  $v$ . Thus he may reformulate the prospect by reducing  $v$  if the penalty for drunken driving is raised, or if (new) information about road blocks along his intended route should reach him. He may in fact rationally choose the certain prospect,  $\bar{u}$ , in which case the policy actions (higher penalties, better law enforcement) would have changed his behaviour to the benefit of his community.

A related issue is the possible existence of a relationship between law enforcement capability on the one hand, and the size of the penalty on the other: a high enforcement capability coupled with a moderate penalty may yield the same result as a low enforcement capability and a relatively high penalty. This point is illustrated in Figure 2 where the incidence of drunken driving,  $d = d(\alpha, e)$ , with  $\alpha$  being a measure of the level of law enforcement and  $e$  is the monetary value of the penalty (assumed constant). The figure simply shows that a high level of law enforcement ( $\alpha_2$ ) coupled with a relatively low penalty ( $e_1$ ) produces the same incidence of drunken driving ( $d_1$ ) as a low enforcement level ( $\alpha_1$ ) and a high penalty ( $e_2$ ).

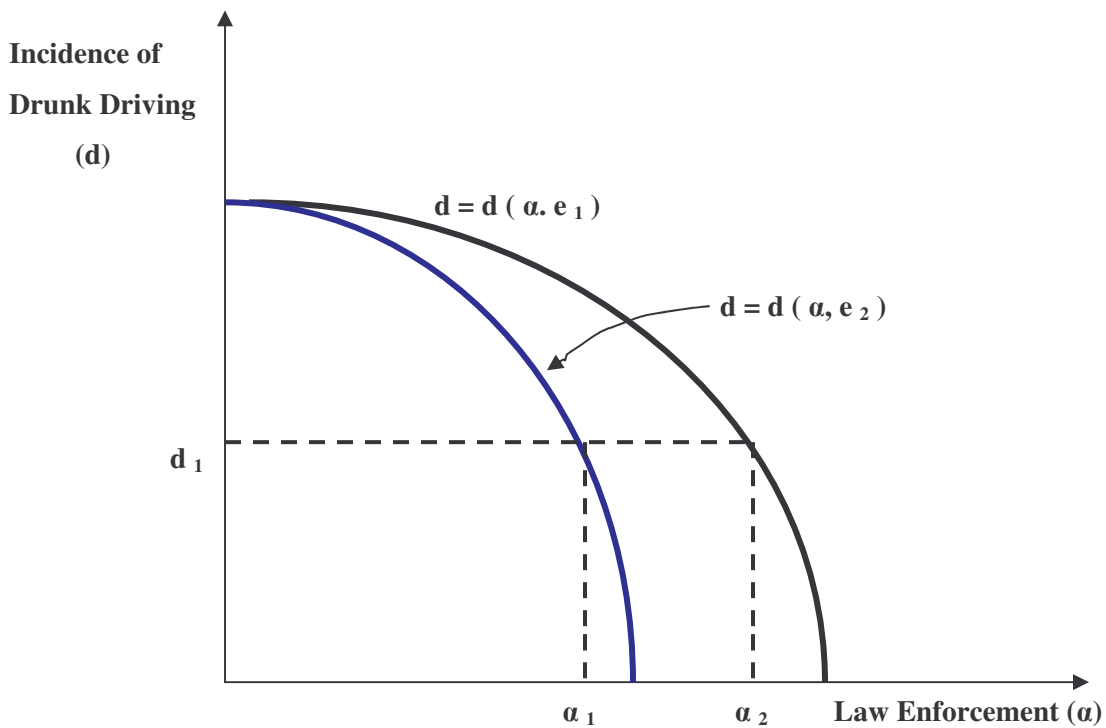


Figure 2

The above analysis raises some critical policy issues and may be a fruitful area for empirical research – estimating the impact of changes in penalties on the incidence of both drunken driving *per se* and accidents caused by drunk drivers, at different levels of law enforcement.

#### **4. Conclusion**

Our basic proposition is straightforward: if damages caused by drunken driving do constitute a significant part of the total external costs of alcohol consumption, a sufficiently high penalty for drunken driving and/or a high level of law enforcement – both aimed at internalising the externality – will carry a lower welfare cost than a conventional Pigouvian tax. If drunken driving were eliminated in the process, it is only the formerly heavy drinkers – not moderate drinkers – that will bear (their own) private costs.

The external costs associated with alcohol consumption are evidently not limited to damages caused by drunken driving. Abusive or rowdy behaviour by drunks may impact negatively on the properties and physiological and psychological well-being of other persons, including family members (see Black & Mohamed, 2006); drunk pedestrians may inflict damages on innocent sober drivers (Parry et al., 2003); and the after-effects of excessive drinking may lower productivity and raise absenteeism among the work force (Xie et al., 1999). Of course, some of these effects could also be reduced through higher legal penalties coupled with a more efficient judicial and law enforcement system.

#### ***REFERENCES***

Black, P.A. & Mohamed, A.I., 2006. “ ‘Sin’ Taxes and Poor Households: Unanticipated Effects”, *South African Journal of Economics*, 73: 1.

Kahneman, D & Tversky, A, 2000. *Choices, values and frames*. Princeton: Princeton University Press

Kenkel, D.S., 1993. “Drinking, driving, and deterrence: The social costs of alternative policies”, *Journal of Law and Economics*, 36.

McNutt, P.A., 2002. *The economics of public choice*, 2<sup>nd</sup> ed. Cheltenham: Edward Elgar

Pogue, T.F. and Sgontz, L.G., 1989. "Taxing to control social costs: the case of alcohol", *American Economic Review*, 79: 235-243.

Parry, C.D.H., Myers, B. & Teide, M., 2003. "The case for an increased tax on alcohol in South Africa", *South African Journal of Economics*, 71: 2

Pigou, A.C., 1946. *The economics of welfare*, 4<sup>th</sup> ed. London: MacMillan.

Quiggin, J, 1982. "A theory of anticipated utility", *Journal of Economic Behaviour and Organisation*, 3.

Smith, S., 1996. "Taxation and the environment", in: Devereux, M.P. ed. *The Economics of Tax Policy*. Oxford: Oxford University Press.

Xie, X., Rehm, J., Single, E., & Robson, L., 1999. "Methodological issues and selected economic consequences of substance abuse in Ontario", *Addiction Research*, 7.