Pricing of alcohol

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Introduction

The most common measure by which the public sector at local, state or national level has affected the economic availability of alcoholic beverages is taxation in its different forms. These include, among others, setting excise duties or value added taxes on alcoholic beverages. Historically, the most common reason for taxing alcoholic beverages has been to acquire financial resources for the public sector (Babor et al., 2010). However, the effects of price changes on alcohol consumption and related harm are the same regardless as to whether the changes in taxes – leading to price changes – are motivated by fiscal, social order or public health interests.

Besides taxing alcoholic beverages, there are other measures affecting the economic availability of alcohol such as minimum prices for alcoholic beverages or regulation of discount prices. Until recently, however, the primary research and policy attention has been directed towards tax levels, and the effects of tax and price changes are often not clearly distinguished.

The impact of changes in prices of alcoholic beverages on alcohol consumption and related harm has been more extensively studied than any other potential alcohol policy measure (Anderson & Baumberg, 2006). When other factors remain unchanged, an increase in alcohol prices generally leads to a decrease in alcohol consumption, and a decrease in alcohol prices usually leads to an increase in alcohol consumption (Anderson & Baumberg, 2006). As a rule, the effect of a change in prices of a certain magnitude has different effects on the consumption of different kinds of alcohol, for example, distilled spirits, wines and beer. Usually elasticity values also vary between countries, and their values may change within a country as time passes (see, for example, Bruun et al., 1975; Ornstein & Levy, 1983; Leung & Phelps, 1991; Edwards et al., 1994; Österberg, 1995; 2001; Leppänen, Sullström & Suoniemi, 2001). The addictive nature of alcohol implies that the short-term price elasticity of alcoholic beverages is smaller in absolute value than the long-term price elasticity (Anderson & Baumberg, 2006; Box 1).

Box 1. Price elasticity of alcoholic beverages

In econometric studies, the term "price elasticity" is used to express the effect of price changes on alcohol consumption. Negative own price elasticity value means that changes in prices and consumption are in the opposite direction: a rise in price leads to a decrease in consumption and a reduction in price leads to an increase in consumption. The numerical value of price elasticity gives the strength of the effect of a price change on consumption.

Alcoholic beverages are said to be price-elastic if the elasticity has an absolute value greater than one, which means that the percentage change in the amount of alcohol consumed is greater than the percentage change in price. If the price elasticity has a value of -1.5, it means that a 1% rise in alcohol price will reduce alcohol consumption by 1.5%.

If the elasticity has an absolute value smaller than one, alcoholic beverages are said to be price-inelastic. This means that the percentage change in the amount of alcohol consumed is smaller than the percentage change in price. If the price elasticity has a value of -0.5, it means that a 1% rise in alcohol price will decrease alcohol consumption by 0.5%.

Price inelasticity does not mean that consumption is not responsive to price changes. Rather, it means that the proportional change in consumption is smaller than the proportional change in price. Only if the price elasticity value is 0.0 will price changes have no effect on consumption.

A wide range of studies have shown that increasing the price of alcohol reduces both acute and chronic harm related to drinking among people of all ages. This kind of evidence indicates that heavy or problem drinkers are no exception to the basic rule that alcohol consumers respond to changes in alcohol prices (Babor et al., 2010).

Studies have found that increases in prices of alcoholic beverages disproportionately reduce alcohol consumption by young people, and also have a greater impact (in terms of alcohol intake) on more frequent and heavier drinkers than on less frequent and lighter drinkers (Anderson & Baumberg, 2006). Changes in alcohol prices have also been found to influence drinking to the point of intoxication.

Summary of recent evidence

Since 2006, three meta-analyses of the effects of changes in alcohol prices and taxes on drinking have been published (Table 1). The latest one, published in 2009 by Wagenaar and colleagues, is based on 112 studies reported in English (Wagenaar, Salois & Komro, 2009). The meta-analysis by Fogarty (2006) is based on elasticity estimates from those studies dealt with in Alcohol Policy and the Public Good, published in 1994 (Edwards et al., 1994; Fogarty, 2006). The analysis by Gallet (2007) includes 132 studies of alcohol price, income or advertising elasticities from 24 countries.

Table 1. Own-price elasticities for alcoholic beverages in three recent meta-analyses

Source	Distilled spirits	Wine	Beer	All alcoholic beverages
Fogarty, 2006	-0.70	-0.77	-0.38	N/A
Gallet, 2007	-0.68	-0.70	-0.36	-0.50
Wagenaar, Salois & Komro, 2009b	-0.80	- 0.69	-0.46	-0.51

The explanation for the low absolute value of own-price elasticity for beer could be that beer is a common beverage consumed during everyday leisure activities or with meals in countries where the studies in these meta-analyses originate. In these countries beer may be viewed as a necessary commodity among beer drinkers. In some other countries, beer is more of a luxury item with higher price elasticity (Edwards et al., 1994). This point is highlighted in the case of wine, which seems overall to have a higher absolute value for own-price elasticity than beer. In countries where it is an ordinary beverage with meals, wine can, however, be quite price-inelastic, with a low absolute value (Edwards et al., 1994). On the other hand, not so many decades ago, wine was quite a rare luxury item in the Nordic countries, where it was used mostly on festive occasions. It is, therefore, no surprise that at that time wine had an own-price elasticity of -1.6 in Sweden, and in later years the price elasticity of wine has been -1.5 in Norway and -1.3 in Finland (Sundström & Ekström, 1962; Horverak, 1979; Salo, 1990).

As Wagenaar and colleagues emphasize, price elasticities are not inherent properties of alcoholic beverages (Wagenaar, Salois & Komro, 2009). In the same manner as different uses of alcoholic beverages are reflected in price elasticity values, so the substitution between different alcoholic beverages as well as other commodities mainly depends on the uses of alcoholic beverages (Bruun et al., 1975). For instance, in a country where wine is used as a beverage with meals, a substantial increase in wine prices could increase the consumption of bottled water but it would hardly increase the use of home-distilled spirits or illicit drugs. In countries where alcoholic beverages are mainly used as intoxicants, increases in alcohol prices are more likely to lead to an

increase in the consumption of home-distilled or -brewed beverages or even illicit drugs than of bottled water or milk.

Besides the price elasticity for all alcoholic beverages of -0.50 in the short term, Gallet also found a long-term elasticity of -0.82 (Gallet, 2007). Furthermore, he examined the importance of income elasticities for the demand of alcoholic beverages. In his meta-analysis income elasticity for all alcoholic beverages is 0.50, meaning that a 1% increase in consumers' incomes leads to a 0.5% increase in alcohol consumption (Gallet, 2007).

One of the results in the meta-analysis by Wagenaar and colleagues is that price changes affect all types of beverage and all kinds of drinker, from light to heavy drinkers. According to their analyses, price and tax changes affect heavy drinking significantly, but the magnitude of the effect on heavy drinkers was less than on overall drinking (Wagenaar, Salois & Komro, 2009). In Switzerland, over four waves of panel data, Gmel and colleagues found that heavier drinkers increased their consumption more sharply in the short term but declined to the level before the tax change in the long term (Gmel et al., 2008). Furthermore, recent studies of the effects of tax changes on problem indicators provide strong evidence that changes in alcohol taxes do influence the rates of problem drinking (Babor et al., 2010). For instance, the reduction in alcohol taxation in Finland in 2004 had substantial effects on alcohol-related sudden deaths, overall alcohol-related mortality, and criminality and hospitalizations (Koski et al., 2007; Herttua, 2010; Mäkelä & Österberg, 2009). In Alaska, United States, excise duty increases in 1983 and 2002 were associated with substantial reductions in alcohol-related disease mortality (Wagenaar, Maldonado-Molina & Wagenaar, 2009).

Affordability

The term "alcohol affordability" is nowadays also frequently used. This refers to people's ability to buy and consume alcohol, and it is a function of alcohol price and consumers' income (Rabinovich et al., 2009). According to Rabinovich and colleagues, affordability of alcohol increased between 1996 and 2004 in almost all EU member states. Their analysis also indicated that across the EU, 84% of the increase in alcohol affordability in the period 1966–2004 was driven by increases in income, and only 16% was driven by changes in alcohol prices (Rabinovich et al., 2009). This is because while incomes have increased considerably across the EU countries, the relative prices of alcoholic beverages have remained relatively stable or fallen (Rabinovich et al., 2009).

In the period 1995–2010, developments in excise duty rates were not at all uniform. In some countries (mainly the Nordics), alcohol excise duty rates were lower in nominal terms in 2010 than in 1995. In some countries, Germany being the most important example, alcohol excise duty rates were held constant in nominal terms in the 1955–2010. In most of the countries belonging to the EU before May 2004, the nominal values of alcohol excise duty rates were increased but by less than the rate of inflation, meaning than even in these countries the real values of excise duties fell. Only in a few countries, such as Greece and Italy, the nominal values of excise duty rates were increased so much that the excise duty rates also increased in real terms (Österberg, 2011).

Countries that joined the EU in 2004, and later countries such as Bulgaria and Romania, had to increase their alcohol excise duty rates considerably before or when they joined the EU. In almost all new EU member states since 2003, the nominal and real values of alcohol excise duty rates increased between 2004 and 2010. The exceptions are Cyprus, with a constant nominal rate, and Malta, with a constant excise duty rate for beer and a 50% decrease for distilled spirits.

Despite increases in alcohol excise duty rates in the new EU member states, the lowest excise duty rates were still found among them in 2011, Bulgaria and Romania being the clearest examples. Low excise duty rates for beer can also be found among the older member states (Germany, Luxembourg and Spain) (Österberg, 2011).

By 2011, no EU member states had moved from a zero excise duty rate for wine to a positive excise duty rate. In fact, during the creation of the single market in 1993 or in the process of joining it later, four countries (Bulgaria, Hungary, Luxembourg and Romania) abandoned their former positive duty rate for wine.

Minimum prices

A complementary measure to tax increases, and one which manages any lack of pass-through of tax to price, is to set a minimum price per gram of alcohol, a policy option with an impact on heavy consumers far in excess of that on light consumers. The impact has been tested in Canada (Stockwell et al., 2012), and modelled in the United Kingdom in England (Purshouse et al., 2009) and Scotland (ScHARR, 2010), where there is currently a law before the Scottish Parliament to introduce a minimum price for alcohol of €0.07/g alcohol (Scottish Government, 2012).

Minimum alcohol prices in British Columbia, Canada, were adjusted intermittently over the years 1989–2010. Time-series and longitudinal models of aggregate alcohol consumption with price and other economic data as independent variables found that a 10% increase in the minimum price of an alcoholic beverage reduced its consumption relative to other beverages by 16.1% (Stockwell et al., 2012). Time-series estimates indicated that a 10% increase in minimum prices reduced the consumption of spirits and liqueurs by 6.8%, wine by 8.9%, alcoholic sodas and ciders by 13.9%, beer by 1.5% and all alcoholic drinks by 3.4%.

In England, 59% of the alcohol sold for consumption elsewhere ("off trade") and 14% of the alcohol sold for consumption on the premises ("on trade") is sold for less than 5 pence (£0.05/€0.06) per gram of alcohol (Purshouse et al., 2009). Modelling estimated that setting a minimum price of 5 p/g (€0.06/g) would reduce overall consumption by 2.6% (a 3.4 g reduction per week), affecting heavy drinkers far more (25 g/week) than moderate drinkers (0.01 g/week). It was estimated that annual deaths would decline by 157 in the first year and by 1381 after 10 years. Annual hospital admissions would fall by an estimated 6300 in the first year and by 40 800 after 10 years. The intervention would also lead to an estimated decline of 16 000 criminal offences during the 10 years modelled. During the same period, the study predicted that there would be 12 400 fewer unemployed people and 100 000 fewer sick days. The study estimated the value of these reductions in harm to society as £5.4 billion (€6.2 billion) over 10 years. The estimated value of this minimum price policy for the first year included National Health Service savings (£25 million/€29 million), the value of quality-adjusted life-years (QALYs) gained through better health (£63 million/€72 million), savings related to the costs of crime (£17 million/€19 million), the value of crime QALYs gained (£21 million/€24 million) and employment-related benefits (£312 million/€356 million). Again, the cost impact of this policy on consumers varied substantially among different groups of drinkers. It would cost drinkers an estimated £22 (€25) per year, ranging from £106 (€121) for heavy drinkers down to £6 (€7) for moderate drinkers. If no changes were made to consumption, it would cost heavy drinkers an estimated additional £138 (€157) per annum and moderate drinkers an estimated additional £6 (€7).

Symmetry of price elasticities

It has been argued that, because of the addictive nature of alcohol, price elasticities of alcoholic beverages may not be symmetrical (Bruun et al., 1975). In other words, a decrease of a certain magnitude in alcohol prices may have a greater impact on alcohol consumption than the same magnitude of price increase realized afterwards (see Box 2). Another reason for asymmetrical price elasticities could be that alcoholic beverages are so easily available that a further increase in alcohol availability will not increase alcohol consumption because the market is already saturated. Saturation has also been used as one explanation for the results in the Nordic alcohol tax study (Room et al., 2012).

Box 2. Alcohol tax changes in Finland in 2004–2010

In March 2004, Finland reduced its alcohol excise duty rates by an average of 33%. The motivation for this decrease was that in May 2004, Estonia, which had much lower alcohol prices than Finland, joined the EU. As quantitative quotas for travellers' tax-free alcohol imports for own use from other EU member states had been abolished in January 2004, it was feared that private alcohol imports from Estonia would greatly reduce the amount of state-collected alcohol taxes as well as alcohol-related employment in Finland.

In 2005, total alcohol consumption per capita was 12% higher than in 2003. Despite the tax decreases, alcohol imports by travellers doubled between 2003 and 2005 and their share of total alcohol consumption rose to 17% in 2005. Meanwhile, domestic sales of alcoholic beverages increased. Despite a 7% increase in domestic alcohol sales from 2003 to 2005, the state collected 29% less excise duty on alcoholic beverages in 2005 than in 2003.

In 2008 and 2009, alcohol excise duty rates were increased three times, by an average of about 10% each time. Between 2007 and 2010, total alcohol consumption fell by 3% and alcohol imports by travellers rose by 11%. Despite the 7% decrease in domestic sales of alcoholic beverages between 2007 and 2010, the state collected 27% more alcohol excise duties in 2010 than in 2007.

These data show that consumption went up by 12% when taxes fell by 33% on average, but went down by only 3% when taxes went up about 30%, an example of asymmetry in elasticities.

The Nordic alcohol tax study dealt with Denmark, Finland and Sweden, which were all forced to abolish their quantitative quotas for travellers' alcohol imports from other EU member states at the beginning of 2004 (Karlsson & Österberg, 2009). In order to combat increases in alcohol imports by travellers, alcohol excise duty rates for distilled spirits were reduced in Denmark in October 2003. In Finland, excise duty rates were decreased for all alcoholic beverages in March 2004 (Box 2). In Denmark, neither the alcohol sales statistics nor the survey data found an increase in total alcohol consumption and there were no clear increases in mortality or morbidity series. The picture was much the same for the effects in Southern Sweden where an increase in travellers' alcohol imports from Denmark was expected (Room et al., 2012). Only in Finland was there found evidence of increases in alcohol consumption and related harm (Box 2).

Conclusions for policy and practice

Recent research evidence with regard to the economic availability of alcohol confirms previous knowledge and does not alter the fundamental conclusions of Bruun and colleagues in 1975. As Wagenaar and colleagues conclude their meta-analysis: "Results confirm previous reviews of this literature, but extend results in important ways ... Price affects drinking in all types of beverages and across the population of drinkers from light drinkers to heavy drinkers" (Wagenaar, Salois & Komro, 2009b).

The effects of prices as measured with price elasticities differ both across countries and different time periods as well as with regard to different categories of alcoholic beverage. These differences are related to the use values of alcoholic beverages and consumers' preferences as well as the actual uses of such beverages. Local drinking habits should, therefore, be taken into account when alcohol policy measures that affect the economic availability of alcohol are planned.

References

Anderson P, Baumberg B (2006). *Alcohol in Europe. A public health perspective*. London, Institute of Alcohol Studies.

Babor TF et al. (2010). *Alcohol: no ordinary commodity. Research and public policy*, 2nd ed. Oxford, Oxford University Press.

Bruun K et al. (1975). *Alcohol control policies in public health perspective.* Helsinki, Finnish Foundation for Alcohol Studies.

Edwards G et al. (1994). *Alcohol policy and the public good.* Oxford, Oxford University Press.

Fogarty J (2006). The nature of the demand for alcohol: understanding elasticity. *British Food Journal*, 108:316–332.

Gallet CA (2007). The demand for alcohol: a meta-analysis of elasticities. *The Australian Journal of Agricultural and Resource Economics*, 51:121–135.

Gmel G et al. (2008). Estimating regression to the mean and true effects of an intervention in a four-wave panel study. *Addiction*, 103:32–41.

Herttua K (2010). *The effects of the 2004 reduction in the price of alcohol and alcohol-related harm in Finland. A natural experiment based on register data*. Helsinki, The Family Federation of Finland.

Horverak Ø (1979). *Norsk alkoholpolitik 1960–1975 [Norwegian alcohol policy 1960–1975]*. Oslo, Statens Institutt for Alkoholforskning.

Karlsson T, Österberg E (2009). *Alcohol affordability and cross-border trade in alcohol*. Östersund, Swedish National Institute of Public Health.

Koski A et al. (2007). Alcohol tax cuts and increase in alcohol-positive sudden deaths – a time-series intervention analysis. *Addiction*, 102:362–368.

Leppänen K, Sullström R, Suoniemi I (2001). *The consumption of alcohol in fourteen European countries. A comparative econometric analysis*. Helsinki, Stakes.

Leung S, Phelps C (1991). My kingdom for drink. A review of estimates of the price sensitivity of demand for alcoholic beverages. In: Hilton ME, Bloss G, eds. *Economics and the prevention of alcohol-related problems*. Rockville, MD, US Department of Health and Human Services, National Institute on Alcohol Abuse and Alcoholism:1–32.

Mäkelä P, Österberg E (2009). Weakening of one more alcohol control pillar: a review of the effects of the alcohol tax cuts in Finland in 2004. *Addiction*, 104:554–563.

Ornstein SI, Levy D (1983). Price and income elasticities and the demand for alcoholic beverages. In: Galanter M. *Recent developments in alcoholism*. New York, Plenum:303–345.

Österberg E (1995). Do alcohol prices affect consumption and related problems? In: Holder HD, Edwards G, eds. *Alcohol and public policy: evidence and issues.* Oxford, Oxford University Press:145–163.

Österberg E (2001). Effects of price and taxation. In: Heather N, Peters TJ, Stockwell T, eds. *International handbook of alcohol dependence and problems*. Chichester, John Wiley and Sons, Ltd.: 685–698.

Österberg E (2011). Alcohol tax changes and the use of alcohol in Europe. *Drug and Alcohol Review*, 30:124–129.

Purshouse R et al. (2009). *Modelling to assess the effectiveness and cost–effectiveness of public health related strategies and interventions to reduce alcohol attributable harm in England using the Sheffield Alcohol Policy Model version 2.0. Report to the NICE Public Health Programme Development Group*. Sheffield, University of Sheffield, School of Health and Related Research (ScHARR).

Rabinovich L et al. (2009). *The affordability of alcoholic beverages in the European Union. Understanding the link between alcohol affordability, consumption and harms.* Cambridge, RAND Europe.

Room R et al. (2002). *Alcohol in developing societies: a public health approach*. Helsinki, Finnish Foundation for Alcohol Studies.

Salo M (1990). *Alkoholijuomien vähittäiskulutuksen analyysi vuosilta 1969–1988 [An analysis of off-premise retail sales of alcoholic beverages, 1969–1988]*. Helsinki, Alko.

Scottish Government (2012). Alcohol – minimum pricing [web site]. Edinburgh, The Scottish Government (http://www.scotland.gov.uk/Topics/Health/health/Alcohol/minimum-pricing, accessed 23 February 2012).

ScHARR (2010). *Model-based appraisal of alcohol minimum pricing and off-licensed trade discount bans in Scotland using the Sheffield Alcohol Policy Model (v2): an update based on newly available data*. Sheffield, University of Sheffield, School of Health and Related Research (ScHARR) (http://www.scotland.gov.uk/Publications/2010/04/20091852/0, accessed 23 February 2012).

Stockwell T et al. (2012). Does minimum pricing reduce alcohol consumption? The experience of a Canadian province *Addiction*, doi: 10.1111/j.1360-0443.2011.03763.x

Sundström Å, Ekström J (1962). *Dryckeskonsumtionen i Sverige [Beverage consumption in Sweden]*. Stockholm, Industrins Utredningsinstitut.

Wagenaar AC, Maldonado-Molina MM, Wagenaar BH (2009). Effects of alcohol tax increases on alcohol-related disease mortality in Alaska: time-series analyses from 1976 to 2004. *American Journal of Public Health*, 99:1464–1470.

Wagenaar AC, Salois MJ, Komro KA (2009). Effects of beverage alcohol price and tax levels on drinking: a meta-analysis of 1003 estimates from 112 studies. *Addiction*, 104:179–190.