Policies

Effective prevention against risky underage drinking — The need for higher excise taxes on alcoholic beverages in Germany

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Abstract — Aim: The study aimed to explore the place of taxation in preventing underage binge drinking in Germany. Method: We reviewed evidence on the role of excise taxes on alcohol in preventing alcohol problems and underage drinking. We analyzed historical German data on tax on alcoholic beverages and compared this with European data, finally calculating tax scenarios and their impact on underage binge drinking. Results: Germany applies lower taxes than many other European countries and alcohol beverage prices have decreased by 30% relative to overall price levels during the last 40 years. Conclusion: An optimal tax rate for reducing underage drinking would be set between the European average tax rates and Scandinavian tax rate levels.

INTRODUCTION — PROBLEMATIC ALCOHOL CONSUMPTION IN GERMANY

Alcohol consumption is among the highest risk factors for decreases in health quality and longevity in high-income countries (WHO, 2009), especially for minors (Han et al., 2009; Hingson et al., 2006). Although German per capita alcohol consumption seems to have declined during the last 30 years (Per capita consumption declined from 12.9 l in 1980 to about 9.9 l in 2007, although this finding has to be treated with caution since it is appears to be at odds with other results — see for instance Cnossen (2007), who uses WHO panel data and states a figure of 13 l for Germany in 2004 also including smuggling and cross-border shopping; our own calculations using data from ’Statistisches Bundesamt’ yield a per capita consumption of 11.5 l ethyl alcohol for the year 2007 under the same assumptions but still by omitting ‘Flavoured Alcoholic Beverages’ (FABs) and so-called intermediate products, since their weight is relatively small. The Eurobarometers from 2003 and 2007 find an increased consumption of at least one alcoholic drink during the last 30 days in Germany rising from 60 to 71%. See Eurobarometers (2003, 2007). (Hüllinghorst, 2005; Gassmann et al., 2009), nearly all of the 15–16-year-olds already consumed alcoholic drinks (Kraus et al., 2007). Approximately one-third of the 12–17-year-olds have consumed at least five alcoholic drinks on one occasion during the last 30 days, a consumption pattern referred to as ’binge drinking’ (Bundeszentrалen für gesundheitliche Aufklärung, 2007; Kraus et al., 2007). Additionally, recent data show increases in alcohol intoxications from 2000 onwards among German teenagers (See ’Statistisches Bundesamt’ (2009). The data on binge drinking can be accessed at www.destatis.de), who with Dutch and Danish teenagers show the most binge-drinking activity across Europe (Stolle et al., 2009). This dangerous consumption pattern bears particular health and socio-economic risks for minors in later life (Viner and Taylor, 2007; Miller et al., 2007). It remains doubtful whether this trend will reverse in 2010, since no effective prevention has been undertaken during the last 2 years. Discussions about the ‘right’ prevention policy should focus on the use of optimal cost-effective instruments. Since ‘behaviour-oriented prevention instruments’ seem rather ineffective (Biglan, 2004; Babor et al., 2003; Anderson et al., 2009) and a recent attempt to restrict alcohol consumption in public (The attempt to restrict alcohol consumption in the inner city of Freiburg, Baden Württemberg by the town’s administration was abolished by the Baden-Württembergian high administration court in 2009.) failed, excise taxes on alcoholic beverages, a rarely used instrument of prevention might be the solution to cope with the underage and binge-drinking problem in Germany. In this article, we present the effect of taxes and their emergence in Germany historically as well as within an EU context and suggest an optimal tax structure with regard to prevention.

EXCISE TAXES ON ALCOHOL — THEORY AND EMPIRICAL FINDINGS

In standard economic theory, non lump-sum taxes lead to excess burdens by interfering in the market mechanism and thus decrease welfare. However, if externalities, i.e. costs are borne by the consuming individual but for example by society, the use of excise taxes on consumption is justified for internalizing these health costs (so-called ’pigouvian taxes’). Another recent strand in the economic literature additionally suggests that individuals bear internal costs from consuming dangerous goods like alcohol, which they might not foresee ex ante (Sloan et al., 2004; Gruber et al., 2005). Addicts often show regret about their past consumption decisions (Gruber and Koszegi, 2001, 2002; Slovic et al., 2004), which may be seen as a proof of irrational decision making. For example, due to perception created by alcohol advertising (Engel et al., 2009), minors might weigh momentary benefits and positive expectancies over perceived vague future costs. Thus taxes may enable individuals to better balance costs against benefits of alcohol consumption by presenting the ’full price’ of alcohol including future health costs. Taxes can then be used as steering devices for consumer’s behaviour without undermining consumer sovereignty (Gruber and Koszegi, 2002; Adams, 2009).

Empirical research broadly finds that tax increases on alcoholic beverages lead to a reduction of alcohol consumption. The meta-analysis by Wagenaar et al. (2009) reviewing 112 studies of tax effects on alcohol demand concluded that taxes...
reduce overall consumption of alcoholic beverages as well as the hazardous consumption due to alcohol dependence (Even after controlling for several methodical problems like publication bias, i.e. the fact that studies showing no significant effects are often left unpublished, and using conservative lower bounds of effect sizes, the findings remain robust. The inverse relationship between taxes and demand is found for all alcoholic beverages. On average, a demand elasticity of $-0.46$ for beer, $-0.69$ for wine, $-0.8$ for spirits and an aggregate value of $-0.28$ for the demand of risky consuming and heavily addicted people are found. Hence, an increase in price by 1% will lead to a fall in demand for beer by 0.46% or by 0.8% for spirits.). This is no surprise since according to the law of demand (Hicks, 1956), almost every raise of taxes on consumption goods leads to a fall in demand with only rare exceptions (Jensen and Miller, 2008). The price mechanism also works in the opposite direction: a recent study from Finland (Mäkelä and Österberg, 2009) analysing the effect of lowered taxes on people’s demand behaviour (In 2004 Estonia, where alcoholic beverages where much cheaper than in Finland, joined the European Union and Finland and huge cross-border shopping and smuggling started between these two countries which forced Finland to cut taxes by $\sim 32\%$. Overall a raise in consumption of pure alcohol by 0.5 l per capita per annum was found. Furthermore, the alcohol-associated liver diseases in Finland increased by 46% within a 3-year period after the tax reduction and the number of alcohol-related deaths by 31%.) found a drastic growth of alcohol consumption and alcohol-associated diseases. However, political concerns might arise that adolescents react to tax increases by switching from expensive to low-priced alcohol and thus might consume even more. To our knowledge, no empirical evidence exists that supports such an effect, neither among casual, underage or even addicted consumers. If alcohol prices rise, people who consumed more expensive alcoholic beverages will generally reduce their demand in total because cheaper alcoholic beverages are no full substitution, i.e. consumers of more expensive alcoholic beverage brands are drinking partly for the presentation or the taste. If taxes thus are raised, minors would have to dedicate a higher income fraction on alcoholic beverages in order to sustain their consumption level. There is broad empirical evidence that adolescents react very sensitively towards price increases (Grossman et al., 1994; Chaloupka et al., 2002; Kenkel, 1993; Grossman et al., 1987; Coate and Grossman, 1988; Laixuthai and Chaloupka, 1993; Chaloupka and Wechsler, 1996; Cook and Moore, 2002). For example the consumption of alcoholic mix beverages containing spirits declined in 2005 by $\sim 50.5\%$ compared to the prior year after a tax on this product category was implemented (The increased demand for beer-mix beverages in Germany is often mistakenly seen as a substitution effect due to the tax on alcopops but rather seems to be a supply side effect from breweries’ competitive strategies. Although sales from this category have increased by 62% since 2004, this cannot account as a full substitution of alcopops containing spirits.). The claim, sometimes made by the alcohol industry, that high taxes do not reduce alcohol consumption or binge drinking because in high-tax Scandinavian countries the consumption levels are also high is not supported by national consumption data (To address this question, we need to acknowledge available European panel data on alcohol consumption and taxes. See for example the “Eurobarometers” of the EC: Special Eurobarometer 272b “Attitudes towards Alcohol”, published 2007 download at http://ec.europa.eu/public_opinion/archives/ebs/ebs_272b_en.pdf and Special Eurobarometer 186: “Health, Food and Alcohol and Safety” published 2003, download at http://ec.europa.eu/public_opinion/archives/ebs/ebs_186_en.pdf, both accessed 21 December 2009.). Although other factors left unconsidered, several publications show that high-tax countries like Finland and Sweden have alcohol consumption levels below the EU25 average for both regular and binge drinking, whereas low-tax countries like Luxembourg, Austria or Germany have higher levels (Another study by Crossen (2007) fails to examine the link between taxes and consumption using panel data from the WHO.).

**EXCISE TAXES ON ALCOHOLIC BEVERAGES IN GERMANY**

Besides internalizing costs to society and making costs to individuals more salient, the main fact about taxes is their fiscal purpose, to raise funds for public services. High tax revenue and prevention of underage drinking might be conflicting objectives, i.e. tax revenue declines the more the individuals, especially minors in the long run, reduce their consumption. To estimate and discuss this trade-off and to derive an optimal excise duty for prevention purposes, we will first take a closer look at the tax landscape in Germany and within the European Union. In Germany beer, spirits, sparkling wine, intermediate products and alcopops containing spirits are taxed, whereas still wine is left untaxed (German tax law for alcoholic beverages is linked to the product categories defined by the “combined nomenclature” of the EU (Regulation (EWG) No. 2658/87 and No. 1214/2007 of the European Commission).). Additionally, this tax structure is close to the lower bounds imposed by European Union law. The lower EU tax bound for still wine is zero; Germany does not levy taxes on wine. The lower bound for beer is $\sim 0.748$ € per hectolitre and degree Plato of the finished beverage, whereas it is 0.787 € in Germany (The measure ‘degree Plato’ is a term which refers to the specific gravity of the beer’s wort. For example, a litre of German beer with 11 degrees Plato would be taxed with $\sim 8.66$ cent and with 8.23 cent at the lower bound.). Only four countries in the EU27 have lower taxes on beer. Spirits are taxed close to the European mean level of taxation, but the German tax rate of 13.03 € per litre ethyl alcohol is still significantly below the European average of 15.45 €. Thus, with regard to European alcohol tax levels (See the Excise Duty Table of the European Commission at http://ec.europa.eu/taxation_customs/resources/documents/taxation/excise_duties/alcoholic_beverages/rates excise_duties-part_L_alcohol-en.pdf, accessed on 01.04.2009.) Germany must be considered as a low-tax country. Despite some evidence that the European tax tariffs harmonized during the last decade (See Lockwood and Migali (2009) and EU-directive 92/84/EEC of the European Council. We calculated variation coefficients and Herfindahl indices for beer and spirits in 2000 and 2010 from the EU excise duty tables. The figures — not presented here — suggest that the tariffs harmonized, although the effect is mostly due to the entering of new EU member countries during that period.), Germany did not ac-
tively contribute to this process (For example, excise Taxes and VAT on beer increased by $\sim37\%$ from 2000 to 2010 on average in the EU, whereas in Germany taxes increased by $\sim2\%$). Since 1950 taxes have only rarely been increased, mostly for spirits during the 1980s. In contrast to taxes on tobacco products, which summed up to 13.4 bn. € in 2009, tax revenues from alcoholic beverages is $\sim3.3$ bn. € in 2009. This equals $\sim1\%$ of total tax revenues in Germany. Hence the fiscal relevance of excise taxes on alcoholic beverages is low. The development of German tax revenues on different categories of alcoholic beverages is shown in Fig. 1.

With the German reunification in 1990, tax revenues from spirits and beer strongly increased but fell back later to approximately the same level as in the mid-1980s.
thermore, tax revenues from beer, sparkling wine and intermediate products seem constant over time, whereas taxes on alcoholic beverages seem rather volatile with elastic responses after tax increases in 1981 and 1982. This is consistent with recent analyses (Wagenaar et al., 2009), which usually state higher demand elasticities for spirits than other alcoholic beverages. Another interesting aspect is the development of beverages’ real prices during the last decades in Germany, i.e. how prices developed relative to consumer price levels. Fig. 2 clearly shows that prices for alcoholic beverages in total and differentiated by beverage category declined relative to the Consumer Price Index (CPI) (We used time series from the “Statistisches Bundesamt” to analyze the development of the different alcoholic beverage prices for beer, wine, spirit and overall in absolute terms as well as with regard to the CPI since 1970.). Whereas the CPI increased by 202% from 1970 to 2008, the price for all alcoholic beverages merely increased by 113%. Thus alcoholic beverages became \( \sim 29.41\% \) cheaper during the last 40 years in Germany. Prices for spirits declined relatively by 33.38%, wine by 37.58% and beer by 25.79%.

Since purchasing power among Germany’s population increased by 30.76% during this period in real terms (Datasource: Statistisches Bundesamt; own calculations.), consumers needed to spend less of their income for the same amount of alcoholic beverages as time went by, thus having incentives to consume more alcohol. In Fig. 3 price changes of alcoholic beverages relative to the CPI are plotted. On only a few occasions alcohol prices increased more than CPI, from which less than half was due to tax increases. Consumers on the other hand need to ‘feel’ or otherwise be aware of taxes in order to react to them (Chetty et al., 2009). Hence a tax increase must exceed a sufficient level in order to affect demand for prevention purposes.

Changes in socio-economic parameters, and various shocks to the German economy (e.g. the German reunification or the economic crises in the 1970s around which some tax increases occurred), furthermore make it difficult to use historical data to trace the relation between consumption and alcohol taxes in Germany. However, making certain assumptions we believe we are able to construct a bandwidth of tax scenarios that might have preventive effects.

Fig. 3. Development of relative prices of alcoholic beverages.
REDUCING UNDERAGE DRINKING BY TAX INCREASES

To summarize so far, compared to the wider EU Germany applies rather low tax tariffs on alcoholic beverages, which also change only seldom. Alcoholic beverages have become cheaper relative to the overall price level in Germany thus providing incentives to consume more alcoholic beverages. In the next step, we will show how an increase in excise taxes on alcoholic beverages in Germany will affect fiscal revenue and consumption levels. We therefore design two different tax scenarios: the first one is called ‘Scandinavian scenario’ in which we raise tax levels to average ‘Scandinavian levels’, defined by the average tax rates of Denmark, Sweden and Finland on 1 January 2009 (Since Norway is not a member of the European Union it is left out here, although including it would have raised taxes even more.). This would mean raising the taxes on beer by ~0.91 € per litre beverage, 1.87 € per litre wine, 0.64 € per litre sparkling wine and 7.52 € per litre spirits (All data on Excise taxes can be found in the EU’s Excise duty tables.). In a second scenario, which we call ‘European scenario’, taxes are levied on European average level as implemented on 1 January 2009. Here taxes on beer would have to be raised by ~0.35 € per litre beverage, wine by 0.55 € and spirits by 0.80 €. Thus both scenarios constitute two poles of an increased tax continuum already applied within the European Union and thus probably easier to implement from a political point of view. For both scenarios, we calculate the corresponding changes in prices, demand and tax revenues by using common consumer prices and the elasticities found by Wagenaar et al. (2009). There are several reasons why we proceeded this way: first, by taking a closer look at the estimated elasticities of alcoholic beverages in past empirical studies, the differentiation between spirits being more elastic than wine and beer is common. Additionally, as already mentioned it is difficult to estimate the occurred demand reactions from the data (However, by examining the elasticities during the tax increases on spirits during the early 1980s, we measured elasticities of ~0.43 to ~0.69 with partly substitution into wine.) thus we decide to use the rather conservative estimates from Wagenaar et al. (2009) as applicable for the German tax scenarios. By doing so, we rely on very robust findings and only run a risk of underestimating the effect of demand reduction. Furthermore, our scenarios are chosen to show vividly in which bandwidth a tax change should occur to take effect.

Tax tariffs are a starting point for calculating the change in common price of the product categories to derive demand actions (Since the estimated elasticities are standardized figures which show the effect from tax as well as price increases, difficulties exist in estimating the effect of a tax rise properly. However, the effect will likely be stronger, we propose, to a rise in taxes and not prices. Research by Kenkel (2005) and Young et al. (2002) suggests that not only taxes on alcoholic beverages are borne by consumers but also industry uses tax increases for masked price increases of their products. The documentation of tax tariffs and retail prices is already known in the Excise Duty tables on tobacco products in the EU. The rationale behind this is simply that tobacco products are subject to Ad-Valorem Taxes which hinge on retail prices. For alcoholic beverages categories, we assumed common retail prices in Germany.). This has again the rationale of conservatively estimating the reduction in consumption, i.e. we tend to underestimate the preventive effect. Since substitution is likely to occur when taxes on just one beverage are increased and adolescents’ spendable income has grown during the last years (Effertz, 2008), it is necessary to subject every alcoholic beverage to tax increases, thus even wines and wine-mix beverages need to be taxed (Empirical evidence on substitutional reactions away from the taxed alcoholic beverage in Germany is too scarce. We thus cannot preclude that relative shifts within demand might occur. However, this is exactly why we used different scenarios with alcohol being taxed more equally to derive a bandwidth for the overall effect on demand.). This also chiefly requires preventing existing opportunities for tax evasion (often due to lobbying), to reduce opportunities for substitution between alcohol sources. The two tax scenarios are shown in Tables 1a and 1b. It is important to note that both scenarios lead to a less concentrated tax structure both with regard to pure alcohol taxation and beverage taxation (This

<table>
<thead>
<tr>
<th>Scandinavian scenario</th>
<th>Current tax per litre beverage</th>
<th>Current tax per litre pure alcohol</th>
<th>Additional tax per litre pure alcohol</th>
<th>Total tax per litre pure alcohol</th>
<th>Additional tax per litre beverage</th>
<th>Total tax per litre beverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beer</td>
<td>0.09 €</td>
<td>1.44 €</td>
<td>18.96 €</td>
<td>20.40 €</td>
<td>0.91 €</td>
<td>1.00 €</td>
</tr>
<tr>
<td>Spirits</td>
<td>4.30 €</td>
<td>13.03 €</td>
<td>22.79 €</td>
<td>35.82 €</td>
<td>7.52 €</td>
<td>11.82 €</td>
</tr>
<tr>
<td>Sparkling wine</td>
<td>1.36 €</td>
<td>12.36 €</td>
<td>6.40 €</td>
<td>18.76 €</td>
<td>0.64 €</td>
<td>2.00 €</td>
</tr>
<tr>
<td>Wine</td>
<td>0.00 €</td>
<td>0.00 €</td>
<td>18.70 €</td>
<td>18.70 €</td>
<td>1.87 €</td>
<td>1.87 €</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>European scenario</th>
<th>Current tax per litre beverage</th>
<th>Current tax per litre pure alcohol</th>
<th>Additional tax per litre pure alcohol</th>
<th>Total tax per litre pure alcohol</th>
<th>Additional tax per litre beverage</th>
<th>Total tax per litre beverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beer</td>
<td>0.09 €</td>
<td>1.44 €</td>
<td>7.29 €</td>
<td>8.73 €</td>
<td>0.35 €</td>
<td>0.44 €</td>
</tr>
<tr>
<td>Spirits</td>
<td>4.30 €</td>
<td>13.03 €</td>
<td>2.42 €</td>
<td>15.45 €</td>
<td>0.80 €</td>
<td>5.10 €</td>
</tr>
<tr>
<td>Sparkling wine</td>
<td>1.36 €</td>
<td>12.36 €</td>
<td>0.00 €</td>
<td>12.36 €</td>
<td>0.00 €</td>
<td>1.36 €</td>
</tr>
<tr>
<td>Wine</td>
<td>0 €</td>
<td>0 €</td>
<td>5.50 €</td>
<td>5.50 €</td>
<td>0.55 €</td>
<td>0.55 €</td>
</tr>
</tbody>
</table>
remain constant. The per capita consumption of pure alcohol would decrease by 32%, spirits by 60%, sparkling wine by 8% and wine by 32%, given that effects sizes are used for prices as above, although Wagenaar et al. (2009) derived them explicitly for price and taxes since the close linear association between prices and taxes. Hence, reduction of risky consum-

<table>
<thead>
<tr>
<th>Scandinavian scenario</th>
<th>Additional tax per litre beverage</th>
<th>Rise in prices percent</th>
<th>Decline in demand percent</th>
<th>Decline in demand of pure alcohol in litres</th>
<th>Additional tax revenues in Mill. €</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beer</td>
<td>0.91 €</td>
<td>70.00%</td>
<td>−32.20%</td>
<td>−1.74</td>
<td>1,498.16 €</td>
</tr>
<tr>
<td>Spirits</td>
<td>7.52 €</td>
<td>75.20%</td>
<td>−60.16%</td>
<td>−1.27</td>
<td>1,581.25 €</td>
</tr>
<tr>
<td>Sparkling wine</td>
<td>0.64 €</td>
<td>12.80%</td>
<td>−8.83%</td>
<td>−0.03</td>
<td>169.09 €</td>
</tr>
<tr>
<td>Wine</td>
<td>1.87 €</td>
<td>46.75%</td>
<td>−32.26%</td>
<td>−0.73</td>
<td>2,525.34 €</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>−3.77</td>
<td>5,773.84 €</td>
</tr>
</tbody>
</table>

The bold values are the total extra amount of excise taxes to be expected from the increase of the excise tax tariff.

<table>
<thead>
<tr>
<th>European scenario</th>
<th>Additional tax per litre beverage</th>
<th>Rise in prices percent</th>
<th>Decline in demand percent</th>
<th>Decline in demand of pure alcohol in litres</th>
<th>Additional tax revenues in Mill. €</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beer</td>
<td>0.35 €</td>
<td>26.92%</td>
<td>−12.38%</td>
<td>−0.67</td>
<td>1,217.67 €</td>
</tr>
<tr>
<td>Spirits</td>
<td>0.80 €</td>
<td>7.99%</td>
<td>−6.39%</td>
<td>−0.14</td>
<td>394.57 €</td>
</tr>
<tr>
<td>Sparkling wine</td>
<td>0.00 €</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00</td>
<td>0.00 €</td>
</tr>
<tr>
<td>Wine</td>
<td>0.55 €</td>
<td>13.75%</td>
<td>−9.49%</td>
<td>−0.21</td>
<td>992.40 €</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>−1.02</td>
<td>2,604.64 €</td>
</tr>
</tbody>
</table>

The bold values are the total extra amount of excise taxes to be expected from the increase of the excise tax tariff.

Table 3. Expected consequences on underage binge drinking 'European scenario'

<table>
<thead>
<tr>
<th>European scenario</th>
<th>Amount of beverages used when binge drinking/30 days</th>
<th>Amount of beverages for representative binge-drinking occasion</th>
<th>Price increase due to tax</th>
<th>Amount adolescent binge drinking before tax rise/30 days prevalence</th>
<th>Amount adolescent binge drinking after tax rise/30 days prevalence</th>
<th>Reduction of adolescent binge drinking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beer</td>
<td>10.00%</td>
<td>30.21%</td>
<td>26.92%</td>
<td>58.70%</td>
<td>36.94%</td>
<td>−37.07%</td>
</tr>
<tr>
<td>Wine/sparkling wine</td>
<td>4.00%</td>
<td>12.08%</td>
<td>11.69%</td>
<td>24.51%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcopops</td>
<td>4.80%</td>
<td>14.50%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spirits</td>
<td>14.30%</td>
<td>43.20%</td>
<td>7.99%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The bold value is the rate of decrease in demand of binge drinking occasions.

finding can be derived by calculating the Herfindahl Index for each tax pattern, i.e. alcohol itself and beverages with regard to their alcohol content are taxed more equally.

To calculate demand reactions and fiscal revenue, we determined the percentage increase in retail price, from which we derived the percentage reduction in demand. For example given an average retail price of 0.65 € per half litre beer, an increase in taxes up to Scandinavian figures equals a price increase of 70%, which yields a reduction in demand of ~32%. This is converted into per capita reduction in pure alcohol consumption. The tax revenue is calculated using the higher tax rates with the reduced amounts of demand (Our calculations incorporate data from the Statistisches Bundesamt on the recorded development of consumption and commonly observed retail prices of the alcoholic beverage categories beer, still wine, sparkling wine and spirits. Intermediate products are left out, since their consumption in Germany is low.). Tables 2a and 2b show the results.

The ‘European scenario’ would yield a decrease in demand for beer by 12.38%, for wine by 9.49% and for spirits by 6.38% and to additional tax revenues of 2.6 bn. €. Overall alcohol consumption would decrease by 1 l when substitution reactions such as smuggling and cross-border shopping are not important. In the ‘Scandinavian scenario’, average beer consumption would decrease by 32%, spirits by 60%, sparkling wine by 8% and wine by 32%, given that effect sizes remain constant. The per capita consumption of pure alcohol would be lowered by 3.8 l, tax revenues would increase by 5.8 bn. €, due to reduced demand.

We also calculated the effectiveness of taxation on adolescent binge drinking for the European scenario in Table 3. Column 2 contains the percentage of 15–16-year-old consumers that binge drank the beverage recently according to the European School Survey Project on Alcohol and other Drugs (ESPAD) study (Kraus et al., 2007). From this information, we calculated in column 3 the amount of a beverage used in a representative binge-drinking event, i.e. the fraction of beverages used if binge drinking took place. Implementing the European scenario and the elasticity estimate by Kenkel (1993), we are able to derive the demand reduction for adolescent binge drinking, which would decrease by more than 37%.

For the Scandinavian scenario no valid estimations are possible, but binge drinking would converge to a rather marginal phenomenon (It remains unclear, whether the ESPAD study (Kraus et al., 2007; Metzner and Kraus, 2008) shows alcopops in the sense the German law defines them— as a mixture of spirits and softdrinks — or all mixtures of alcoholic beverages with softdrinks are included. If alcopops include beer mixtures, reduction is even stronger. We assume that alcopops in the ESPAD study contain beer-, wine-, and spirits-based alcopops with equal parts. Effect sizes are used for prices as above, although Wagenaar et al. (2009) derived them explicitly for price and taxes since the close linear association between prices and taxes. Hence, reduction of risky consum-

Table 2a. Expected additional tax revenues/Scandinavian scenario
tion might even be stronger.). The effect of Scandinavian taxes on German binge drinking might indeed be very strong, but the effect sizes used to calculate the results may lose validity when tax increases are high. Even if Scandinavian taxes were applied in Germany, binge drinking will still occur. However, we conclude that the binge-drinking problem will no longer be such a widespread phenomenon among German minors.

Our estimations furthermore give an intuition for a bandwidth in which the tax increases should lie in order to affect underage drinking strongly enough. Most important is the inclusion of all alcoholic beverages for the tax scenario, to reduce possible substitution of cheaper beverages.

DISCUSSION

The tax increase proposal for alcoholic beverages shows to be a highly important means of prevention since it generates two merits: higher tax revenues instead of spending on costly other preventive measures and due to reduction of consumption less health care costs, mostly for adolescents but also for adults. Several critical aspects about our proposal have to be mentioned: first, the calculated higher tax revenues are short term, meaning that decreasing consumption of alcoholic beverages in total will yield lower tax revenues in later years. But as already shown, excise taxes on alcoholic beverages are not a critical fiscal asset, we thus see the merits of short-term higher tax revenues outweighing the later decrease of negligible fiscal income. Second, a justification for taxes is their internalization function of external costs. In a forthcoming publication (Adams and Effertz, 2010), we estimated the annual social costs due to alcohol consumption in Germany at $27.5 bn. €. Regardless which scenario is implemented, it is highly unlikely that the tax revenues yield a strong enough reduction in consumption to totally internalize these social costs. Hence our proposals, although not accounting for optimality, are economically justified, since they can at least decrease illness including in the long run. A third aspect, showing minors the full price of their intended consumption can be seen as a benefit. Regardless whether binge drinking is aligned with minor’s current preferences, it is highly unlikely that they take the future costs of their consumption into account. If they are sensitive towards tax and price increases, this can be seen as a proof of their accommodation with the health implications they are not aware of. Hence, high taxes especially in Germany are not only a device for fiscal purposes but an effective prevention instrument.

Of course other means of prevention should also be mentioned and adopted: advertising bans on screen media and outdoors seem to be effective (Ellickson et al., 2005; Snyder et al., 2006; Engels et al., 2009). Raising the legal drinking age to 18 for all alcoholic beverages in Germany should be implemented. Most important here is the fact that the distribution of alcoholic beverages from older to younger children will be shifted upwards, making it more costly for younger adolescents to obtain alcoholic beverages, i.e. they need to put more effort in developing strategies to circumvent the legal age barrier. For high risk groups, programmes that strengthen resilience patterns are necessary. Taken together, this mix completes a necessary and urgent health policy to confront Germany’s growing problem of underage binge drinking. Concerning information campaigns, although some studies found significant effects when parents were addressed (Lightwood et al., 2008; Koutakis et al., 2008), overall their effectiveness is weak (Anderson et al., 2009; Babor et al., 2003) and seems difficult to steer (Christakis et al., 2007, 2008; Zhao et al., 2007). Existing German prevention campaigns that focus on teaching ‘responsible consumption’ lack, to our awareness, any empirical validation and cost–benefit evaluations. Hence, they do not seem to fit the need for an urgent solution of the acute problematic German situation with regard to costs and duration.

CONCLUSIONS

Binge drinking in Germany has become a serious problem among adolescents. Taxes on alcoholic beverages appear to be a possible means of reducing this problem. Current alcohol taxation in Germany is low. Starting with levying taxes up to the European average level would probably reduce pure alcohol per capita consumption by ~1 l and underage binge drinking by more than 37%. Tax revenues will increase by 2.6 billion €, allowing a better tax structure. The implementation of average European tax levels is a necessary starting point in helping to solve the problem of underage binge drinking.

Conflict of interest statement. None declared.

REFERENCES


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