Evidence suggests that alcohol taxation, as a means of increasing the price of alcohol, is one of the most effective policy interventions to reduce the level of alcohol consumption and related problems, including mortality rates, crime and traffic accidents. Even small increases in the price of alcohol can have a significant impact on consumption and harm. Despite its reported effectiveness, taxation as a strategy to reduce alcohol-related harm has been underutilised in Australia.

Aside from some positive features, such as lower tax on light and mid-strength beer and the higher tax on ready-to-drink products (RTDs), the alcohol taxation regime in Australia is flawed from both an economic and public health perspective. The National Preventative Health Taskforce reported that while there are some positive aspects to the current regimen, such as the relatively lower rate of tax on low-alcohol beer, there are large inconsistencies in the way different alcohol products are taxed — they are not consistently taxed according to their alcohol content level or their propensity to cause harm. The Australian Government’s own review of the tax system (the Henry Review) concluded that current taxes on beer, wine and spirits are incoherent and if alcohol taxes are to be effective in reducing social harm, the taxation of beer, wine and spirits should be reformed. The review highlighted that “in particular, the wine equalisation tax, as a value-based revenue-raising tax, is not well suited to reducing social harm”. The ideal tax structure, it was suggested, would be a volumetric tax on all alcoholic beverages, applied at the same rate of tax per litre of alcohol across all beverages. However, the review did not provide any detailed estimates or modelling of the optimal tax rate on alcohol nor how this would affect government revenue, overall consumption or changes in the social costs from harmful consumption.

There is growing evidence of public health benefits from taxing alcohol according to alcohol content. One study identified taxation as the most cost-effective strategy to reduce alcohol-related harm in Australia and suggested that the government could achieve over 10 times the health gain if they reallocated the current level of investment to an optimal cost-effective package of strategies starting with taxation changes. This analysis was extended to measure the cost-effectiveness and change in taxation revenue as a consequence of a volumetric tax. Collectively, these two studies demonstrate that a volumetric tax can increase government revenue and save millions of public dollars by averting alcohol-related disease and injury.

Our research undertakes further economic and epidemiological modelling to estimate the impact of alternative alcohol taxation structures on consumption, public health and government revenues.

Methods

Taxation scenarios

Seven different alcoholic beverage types are included in the scenario modelling: low-strength beer; high-strength beer; wine; fortified wine; straight spirits; RTDs; and cider. Of these seven, each is further disaggregated into offsite (bottle shops, supermarkets and alcohol warehouses) or onsite (licensed premises such as pubs, clubs and restaurants) sales.

The range of modelled taxation scenarios were selected on the basis...
### 1 Base-case estimates of alcohol consumption, value and taxation receipts, using 2010 sales data and taxation rates

<table>
<thead>
<tr>
<th>Alcoholic beverage</th>
<th>Annual quantity consumed, '000s litres per capita</th>
<th>Annual quantity consumed, '000s litres pure alcohol</th>
<th>Annual litres pure alcohol per capita</th>
<th>Annual value of consumption, $millions</th>
<th>Annual excise tax collected, $millions</th>
<th>Annual GST collected, $millions</th>
<th>Total annual tax collected, $millions</th>
<th>Price per litre</th>
<th>Price per standard drink</th>
<th>Excise tax per standard drink</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-strength beer onsite*</td>
<td>127</td>
<td>5.7</td>
<td>4.1</td>
<td>0.18</td>
<td>$569</td>
<td>$102</td>
<td>$52</td>
<td>$154</td>
<td>$4.49</td>
<td>$1.78</td>
</tr>
<tr>
<td>Low-strength beer offsite*</td>
<td>30</td>
<td>1.3</td>
<td>0.9</td>
<td>0.04</td>
<td>$399</td>
<td>$10</td>
<td>$36</td>
<td>$46</td>
<td>$13.52</td>
<td>$5.36</td>
</tr>
<tr>
<td>High-strength beer onsite*</td>
<td>1463</td>
<td>65.5</td>
<td>67.3</td>
<td>3.01</td>
<td>$7683</td>
<td>$2060</td>
<td>$698</td>
<td>$2758</td>
<td>$5.25</td>
<td>$1.45</td>
</tr>
<tr>
<td>High-strength beer offsite*</td>
<td>340</td>
<td>15.2</td>
<td>15.6</td>
<td>0.70</td>
<td>$5387</td>
<td>$337</td>
<td>$490</td>
<td>$827</td>
<td>$15.84</td>
<td>$4.36</td>
</tr>
<tr>
<td>Wine onsite*</td>
<td>338</td>
<td>15.1</td>
<td>42.0</td>
<td>1.88</td>
<td>$3904</td>
<td>$559</td>
<td>$355</td>
<td>$913</td>
<td>$11.55</td>
<td>$1.18</td>
</tr>
<tr>
<td>Wine offsite*</td>
<td>1463</td>
<td>65.5</td>
<td>67.3</td>
<td>3.01</td>
<td>$7683</td>
<td>$2060</td>
<td>$698</td>
<td>$2758</td>
<td>$5.25</td>
<td>$1.45</td>
</tr>
<tr>
<td>Fortified wine onsite*</td>
<td>118</td>
<td>5.3</td>
<td>5.4</td>
<td>0.24</td>
<td>$2087</td>
<td>$373</td>
<td>$190</td>
<td>$563</td>
<td>$13.74</td>
<td>$4.90</td>
</tr>
<tr>
<td>Fortified wine offsite*</td>
<td>209</td>
<td>9.3</td>
<td>8.7</td>
<td>0.39</td>
<td>$2510</td>
<td>$605</td>
<td>$228</td>
<td>$833</td>
<td>$12.02</td>
<td>$3.63</td>
</tr>
<tr>
<td>Spirits onsite*</td>
<td>15</td>
<td>0.7</td>
<td>5.4</td>
<td>0.24</td>
<td>$2087</td>
<td>$373</td>
<td>$190</td>
<td>$563</td>
<td>$13.74</td>
<td>$4.90</td>
</tr>
<tr>
<td>Spirits offsite*</td>
<td>46</td>
<td>2.1</td>
<td>16.1</td>
<td>0.72</td>
<td>$2313</td>
<td>$1116</td>
<td>$210</td>
<td>$1326</td>
<td>$49.97</td>
<td>$1.82</td>
</tr>
<tr>
<td>RTDs onsite*</td>
<td>14</td>
<td>0.9</td>
<td>4.3</td>
<td>0.22</td>
<td>$2918</td>
<td>$341</td>
<td>$265</td>
<td>$607</td>
<td>$24.78</td>
<td>$0.74</td>
</tr>
<tr>
<td>Cider onsite*</td>
<td>33</td>
<td>1.6</td>
<td>1.6</td>
<td>0.07</td>
<td>$180</td>
<td>$24</td>
<td>$16</td>
<td>$40</td>
<td>$5.20</td>
<td>$0.39</td>
</tr>
<tr>
<td>Cider offsite*</td>
<td>11</td>
<td>0.5</td>
<td>0.5</td>
<td>0.02</td>
<td>$152</td>
<td>$8</td>
<td>$14</td>
<td>$22</td>
<td>$14.00</td>
<td>$3.35</td>
</tr>
<tr>
<td>Total</td>
<td>2826</td>
<td>126.5</td>
<td>180.6</td>
<td>8.09</td>
<td>$31714</td>
<td>$5693</td>
<td>$2883</td>
<td>$8576</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:**
- GST = goods and services tax.
- RTDs = ready to drink products.
- * Offsite = sold at bottle shops, supermarkets and alcohol warehouses.
- † Onsite = sold at licensed premises such as pubs, clubs and restaurants.

...that they are under consideration by the Australian Government, or being proposed by parts of the alcohol beverage industry or public health groups in Australia. Four scenarios are modelled in this analysis:

- Replace the wine equalisation tax (WET) on wine and cider with a volumetric excise rate equal to the current excise tax rate applicable to low-strength beer sold offsite.
- Apply an excise tax rate to all beverages equal to a 10% increase in the current excise tax rate applicable to spirits and RTDs.
- Apply an excise tax rate to all beverages, increasing it exponentially by 3.0% for every 1.0% increase in alcohol content above 3.2%.
- Apply a two-tiered volumetric excise tax rate: the first tier applies to beer and wine and increases exponentially by 3.0% for every 1.0% increase in alcohol content above 3.2%; the second tier applies the current excise tax rate applicable to spirits and RTDs.

### Economic modelling

Detailed methods are provided in the Appendix (online at mja.com.au). Briefly, the economic modelling considers the extent to which each taxation scenario affects price, consumption and subsequent taxation revenue. Base-case estimates were derived using a combination of data sources. Taxation and duty levies imposed on alcoholic drinks were obtained from Euromonitor International. Taxation revenue related to sales of beer and wine was sourced from the federal budget, while revenue received from the sales of spirits was calculated using Euromonitor International sales data.

Information on annual volume, average value and price of all alcoholic beverages (sold onsite and offsite) were sourced from Euromonitor International. Although the current taxation regime categorises beer into three categories of low, mid and heavy strength, our modelling is based on heavy- and low-strength beer (ie, combined low- and mid-strength) with the excise and subsequent onsite or offsite discounts based on the weighted averages (in volume) of mid- and low-strength beers. We used estimates of price elasticity derived by Purshouse et al to explore variations in consumption patterns as a consequence of varying beverage prices.

### Epidemiological modelling

The method we used to model the taxation scenarios is based on the ACE (Assessing the Cost Effectiveness)-Alcohol project. The method and several applications are reported in detail elsewhere and in the Appendix. Briefly, using a health sector perspective, health outcomes were evaluated in disability-adjusted life-years (DALYs) using a multistate, multiple-cohort life-table model to determine changes in incidence, prevalence and mortality of alcohol-related diseases and injuries due to each scenario. Cost-effectiveness ratios were derived from cost and health outcomes measured over the lifetime of the Australian population in the baseline year of 2009. Future costs and health outcomes were discounted at 3% per annum.

### Results

#### Base case

Box 1 provides data by alcoholic beverage on annual quantity of alcohol consumed; total value of sales; excise, goods and services tax (GST) and total tax collected; price per litre, price and taxation per standard drink.

The base-case results indicate that 2.83 million litres of alcohol were consumed. Based on average alcohol content levels, per capita consumption of pure alcohol was 8.09 litres per person. High-strength beer was the most common alcoholic beverage consumed; 1.46 million litres (or 52% of all alcohol) were sold offsite and 0.34 million litres (or 12% of all alcohol) were sold onsite.
The key finding suggests that any of Box 2 provides a summary of results found among the wine-based products (Box 1). The largest discrepancies are $0.88 for RTDs sold onsite and spirits ard drink for fortified wine to a high of ranging from a low of $0.10 per stand- drink were identified, with amounts of excise tax per standard drink (based on price per standard drink (based on revenue) and spirits sold ofsite at $1.3 billion (or 32% of total revenue). The value per litre of alcohol ranged from a low of $4.49 for low-strength beer sold ofsite to a high of $134.73 for spirits sold onsite. When converted to a price per standard drink (based on average alcohol content levels) RTDs sold onsite were the most expensive, at $7.49 per standard drink.

Significant discrepancies in the amount of excise tax per standard drink were identified, with amounts ranging from a low of $0.10 per standard drink for fortified wine to a high of $0.88 for RTDs sold onsite and spirits (Box 1). The largest discrepancies are found among the wine-based products that are subject to the WET.

Summary of modelled taxation scenarios

Box 2 provides a summary of results for each modelled taxation scenario. The key finding suggests that any of these variations to current taxation of alcohol beverages is a cost-effective health care intervention. All the modelled scenarios are classified as being dominant in comparison to current practice (ie, they save money and are more effective in reducing alcohol-related harm compared with what is currently being achieved).

Applying a universal tax rate on alcoholic beverages equivalent to a 10% increase in the current excise applicable to spirits and RTDs was the scenario that produced the greatest health and economic gains. Overall alcohol consumption would decrease by 10.6%, resulting in 220 000 DALYs being averted. The amount of alcohol-related disease and injury prevented in this scenario would save the health system $3.2 billion over the lifetime of the population. The cost of implementing this scenario ($22 million) is only a fraction of the savings achieved, which underscores how highly cost-effective this scenario would be. This scenario, however, does not address the inefficiencies of the current taxation system — it merely increases the tax for each beverage. Furthermore, under this scenario, overall taxation revenue was estimated to increase by 50% or an additional $4.3 billion per year.

Removing the WET and applying an excise rate on wine and spirits equal to low-strength beer sold ofsite would reduce overall alcohol consumption by 1.3%, resulting in 59 000 DALYs being averted at a cost saving of $820 million. Overall taxation revenue would increase by 15% or an additional $1.3 billion per year.

Discussion

Our analysis has modelled a limited number of alcohol taxation scenarios that may be considered politically feasible. Both the National Preventative Health Taskforce and the Henry Review recommended taxing alcohol according to alcohol content. Our analysis takes these recommendations one step further by exploring subtle but important variations of volumetric taxation. Our modelling suggested that replacing the WET with a volumetric tax, alone, would increase taxation revenue by $1.3 billion, reduce overall alcohol consumption by 1.3%, significantly reduce alcohol-related harm and save lives. A tiered volumetric approach will lead to even greater taxation receipts and higher falls in alcohol consumption.

Alcohol-related harm is now a major public health issue in Australia and globally. Given the substantial external costs associated with alcohol misuse, it has been argued that governments should be more proactive in developing an appropriate policy response to reduce this burden. The most cost-effective strategy that governments are able to adopt is changing the taxation system so that alcohol products are taxed according to alcohol content. Health, tax and economic experts all agree that Australia’s current alcohol taxation is...
incoherent and that reform is needed.\textsuperscript{5,6,11}

Although the modelling approach is documented in the Appendix and a detailed consideration of the strengths and limitations is provided elsewhere, there are several limitations worth noting. Our estimates of price elasticity rely on United Kingdom data.\textsuperscript{10} Although these estimates are based on the latest evidence, there may be variations in Australian consumers’ responsiveness to price changes. Nevertheless, in the absence of comparable Australian data, the UK estimates remain the most appropriate. Our modelling also assumes an immediate reversal of risk for alcohol-related cancers as a consequence of lowering consumption. Adopting a lagged impact may be more appropriate, but the implication on overall results is likely to be minimal, given that cancers represent a small component of total health outcomes.

The political will of government to reform the current taxation of alcoholic beverages has been questioned, and it has been suggested that the government has a direct conflict of interest in alcohol policy, given its reliance on taxation revenue.\textsuperscript{12} Data from our analysis indicate that in 2010 the Australian Government collected close to $8.6 billion from the excise on alcohol products.

Worryingly, government has also been shown to put the alcohol industry’s interests ahead of public health. Despite the Henry Review recommending reform to the WET,\textsuperscript{6} the government announced that it would not do so “in the middle of a wine glut and where there is an industry restructure underway.”\textsuperscript{13}

Overall, our findings suggest that by reassessing the rates of alcohol taxation, the Australian Government is able to improve health, reduce health care costs and substantially increase the amount of alcohol excise tax collected. This research clarifies what the evidence base can tell us about outcomes of specific policies and highlights the need for urgent action on alcohol taxation reform in Australia.

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