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Nudging Alcohol Moderation via Excise Tax Reform: The Case of Beer in Australia

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Nudging Alcohol Moderation via Excise Tax Reform: The Case of Beer in Australia

[Short title: **Nudging Alcohol Moderation via Beer Tax Reform**]

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Author statements

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Nudging Alcohol Moderation via Excise Tax Reform: The Case of Beer in Australia

[Short title: **Nudging Alcohol Moderation via Beer Tax Reform**]

Abstract

Australia taxes alcohol consumption more than most other affluent economies. A switch to low-alcohol beer has been encouraged in Australia by it being subject to a lower rate of excise tax than regular beer, but no such incentive applies to packaged mid-strength beer. Would more or less alcohol be consumed if the tax rates for mid-strength beer were lowered, for example to those for low-strength beer? This study estimates changes in demand that could result from such a policy change. It finds that alcohol consumption from each of beer, wine and spirits could fall, but by little more than 1% in total.

Keywords: Alcohol taxation; excise tax reform; mid-strength beer

1 Introduction

Consumer demand for alcoholic beverages has been shifting from quantity to quality as incomes have grown and, with that, a greater desire for healthy living. One manifestation of that is a rising demand for lower-alcohol beverages. In response, brewers in Australia and elsewhere have generated new technologies to produce lower-alcohol beers. Among them are mid-strength beers: they have attractive flavour profiles not too dissimilar to their full-strength counterparts, and so have rapidly grown in popularity.

To encourage this development, governments of some countries, including Australia and the United Kingdom, have set lower excise tax rates on some lower-alcohol beers. This has been one of the policy reforms advocated by many health and anti-alcohol lobby groups, and endorsed by the WHO (2022, p.21). In Australia, low-alcohol beer is subject to a much lower rate of excise tax than regular beer. However, mid-strength beer attracts the same rate of excise tax as full-strength beer except when served from a tap – and even then, the tax rate is only one-quarter less than that for regular full-strength beer on tap.

Australia's beer tax regime raises an interesting empirical question: Would more or less alcohol be consumed if the tax rates for mid-strength beer were to be lowered, for example to those for low-strength beer? The question is important because recent research finds that regular-strength beer (along with pre-mixed spirits in a can) ranks the highest in terms of links to negative externalities associated with excessive or binge consumption of alcohol (Srivastava, Yang and Zhao 2022). But the answer is not obvious because, while lowering the mid-strength tax rates would encourage some shift away from full-strength beer and possibly from wine and spirits consumption, it could also cause a shift away from low-alcohol beer consumption.

This article provides a set of answers to that empirical question. It does so by focusing on the demand side of the alcoholic beverage market, assuming that suppliers are sufficiently competitive as to be able to readily meet any changes in demand that a tax change might generate. Indeed there is evidence, from a recent change in the UK's beer tax regime, that brewers are able to marginally lower their alcohol content of beers within weeks of changes in excise tax rates and steps (Burton et al. 2024). To address the research question, the minimum needed to be able to draw on the standard theory of consumer behavioural responses to retail price changes are pertinent data on Australia's alcohol consumption patterns and estimates of own- and cross-price elasticities of demand for various beverages.

The article is structured as follows. Section 2 provides, by way of background, recent trends in lower-alcohol vs regular beer consumption in Australia compared with the rest of the world, the impact of the taste swing toward lower-alcohol beers on Australia's alcohol consumption so far this century, and a simple projection of alcohol consumption from beer sales in Australia to 2030 if the excise tax regime is unchanged. Section 3 describes a standard equilibrium displacement model to estimate the beer and total alcohol consumption consequences of reducing the excise tax on mid-strength beer. The baseline scenario assumes the rates of tax on mid-strength beer are lowered to the same rates as currently applied to low-strength beer while maintaining the differences in rates for draught versus packaged beers. That change provides an estimate of the maximum policy reform that is likely to be tolerable politically and bureaucratically in the absence of a broader reform of alcohol taxes. The results are discussed in Section 4 along with caveats, before conclusions are drawn in the final section.

The results suggest that while Australian brewers are actively developing and promoting lower-alcohol beverage categories, thereby potentially contributing to reducing national alcohol consumption, they could contribute even further if mid-strength beer consumption were to be taxed at a lower rate such as that currently applied to low-strength beer. While this study's estimated magnitude of the effect of such a policy 'nudge' (to use the term coined by Thaler and Sunstein 2008) is not large, at no more than 1%, the fact that it is positive may prompt more-sophisticated empirical modelling of such a simple-to-implement policy reform.

2 Background

2.1 Recent Trends in Consumption of Lower-alcohol Beers versus Regular Beers

As incomes have grown and with it a greater desire for healthier living, there has been a shift in consumer demand from quantity to quality of alcoholic beverages such that the volume of alcohol consumption per adult has been falling since the mid-1970s in Australia and globally. Producers have responded accordingly, as reflected in the premiumization of beer, wine and spirits on the world's beverage markets.¹

A related recent consumer trend has been a preference shift toward lower-alcohol beverages. In Australia that trend has been reported in an analysis of the first 13 years of this century in Australia (Callinan et al. 2018), and it has continued in the most-recent decade.

In addition to health and lifestyle changes, reasons for the decline in the volume of alcohol consumed and the switch to lower-alcohol beverages include ever-stricter drink-driving laws and random breath testing of car drivers, and changing gender roles (Callinan et al. 2018). As well, increasing numbers of younger people (Generations Y and Z), who were the most inclined in Australia to engage in excessive/binge drinking (Srivastava and Zhao 2010; Srivastava, Yang and Zhao 2022), have been choosing to drink less in recent years, including via switching to lower-alcohol beverages.²

Similar trends leading to the consumption of lower-alcohol beverages have been observed in Great Britain (Anderson, Llopis and Rehm 2021) and Spain (Anderson and Kokole 2022), although the trends are as yet less clear in other countries (Anderson, Kokole and Llopis 2021).

At a 2022 World Health Assembly at the WHO, a Global Strategy to Reduce the Harmful Use of Alcohol listed proposed ways to increase the substitution toward lower-alcohol beverages (WHO 2022, p.21). That report draws among others on Rehm et al. (2016), who suggest one potential mechanism to reduce alcoholic consumption is by current drinkers replacing standard alcoholic beverages with similar beverages of lower alcoholic strength, assuming there is a less-than-fully-compensating increase in the quantity of beverage consumed.

Rehm et al. (2016) suggest consumers could be nudged further toward lower-alcohol beverages via excise taxes that are set lower the lower is a product's alcohol content. They note that the public health benefit of this could coincide with the profit motive of producers, since the lower tax could allow them to set lower retail prices on the lower-alcohol products.

¹ In the case of wine, this per adult decline has more than offset the growth in the world's adult population such that global wine consumption has been declining in recent years (OIV 2024).

² Furthermore, the share of people 18 years and older whose annual alcohol consumption exceeded lifetime risk guidelines fell from 22% in 2004-05 to 16% by 2017-18 (AIHW 2022). The legal minimum age for drinking alcohol in Australia is 18 years.

Griffiths, O’Connell and Smith (2019) add that such nudging could not only lower the social cost of drinking but also boost consumer welfare for the majority of households that are not involved in heavy or binge drinking. Whether it would lead to less overall alcohol consumption is an empirical question, and the focus of the present analysis.

In a report focusing on Europe, the WHO (2020) suggested that a tax system with higher rates of taxation for stronger products may be one of the most effective ways of improving health. It gave two reasons. First, drinkers can consume a greater volume of alcohol more quickly through stronger products, and such products may therefore be more closely associated with intoxication. Second, production and distribution costs per litre of alcohol are likely to be lower for stronger products, that is, the same volume of alcohol can be sold more cheaply in stronger products at the same rate of tax. As if in response, the European Union recently widened the strength band for beer that benefits from reduced excise rates, from 2.8% to 3.5% alcohol by volume (ABV), to incentivize both the production and consumption of less-than-full-strength beers. Meanwhile, Anderson et al. (2020) present evidence from Britain showing that when new lower-alcohol beers were introduced to the market from 2015, the consumption of alcohol from beer did indeed fall.

The producer response to this health/lifestyle-inspired consumer trend has been mixed. In particular, brewers have found it much easier than distilleries and especially wineries to generate new technologies to produce lower-alcohol products that have attractive flavour profiles not too dissimilar to their full-strength counterparts.

In the case of beer in Australia, from the late 1970s a category labelled ‘light’ developed that had fewer calories than full-strength beers. The calorie reduction was accomplished primarily by reducing the carbohydrate content, but also by reducing the alcohol content. But because many ‘light’ beers were less flavoursome and more watery than regular beers, they had only limited appeal to traditional beer drinkers. More recently new low- and mid-strength beers have come on the market that contrast with those earlier ‘light’ beers by explicitly aiming to be as flavoursome as full-strength beers. Their alcohol contents are defined by the Australian Tax Office to be above 1.15% and up to 3% for low-strength and above 3% and up to 3.5% for mid-strength (ATO 2025a).

The share of no-alcohol, low-alcohol and mid-strength beers accounted in 2021, respectively, for just 2%, 0.7% and 1% of the volume of global beer sales, according to Plato Logic (2022). However, that 3.7% total is nearly double the world’s 2.0% share of a dozen years ago, hence the global interest in these categories’ further growth potential.

Australia has been a laggard in the no-alcohol category, but has been among the leaders in the low- and mid-strength categories globally. According to Plato Logic, the latter two’s combined share in Australia was 23% in the 1990s and 28% in the 2000s, when it was only 1% in the rest of the world, and by the 2020s that combined share has been above 27% for Australia (all but one-ninth of it mid-strength) compared with 2% for the world (Table 1).³ By contrast, when 2% of beer sales globally were zero alcohol in 2021, that category share in Australia was under 1% (less than 0.3% according to Plato Logic but 0.9% according to Euromonitor International 2023). Meanwhile, the share of full-strength beer in Australia’s total beer sales volume has fallen from 80% in the 1990s to 75% in the 2000s and around 72% in the early 2020s (row 6 of Table 1).

[Insert Table 1 around here]

³ However, Plato Logic sets the border between low- and mid-strength beer at 2.8% ABV rather than the 3% used in Australia, so its estimate of the Australian share of low- (mid-)strength is somewhat lower (higher) than reported below from other sources.

By comparison with other countries, only New Zealand and the Netherlands have lower no-alcohol shares than Australia, only Germany and Sweden have had higher low-alcohol shares than Australia, and only Sweden has a substantial share like Australia (around one-quarter) of mid-strength beer (Plato Logic 2022).

2.2 Impact on Alcohol Consumption of the Taste Swing Toward Mid-strength Beer

The long-term trends for Australia since the mid-1980s are summarized in Figure 1. Overall annual beer sales volumes have been declining slightly for decades (Anderson 2020b), and especially for full-strength beer but also more recently for low-strength beer. The share of low-strength beer exceeded that for mid-strength beer in the 1990s but the ranking reversed by the 2000s (when the former was still mostly ‘light’ beer), and the low-strength share has fallen continuously since then (Table 1). Meanwhile, the mid-strength share grew rapidly in the 2010s as consumption of full-strength beer continued its decline (Figure 1).⁴

[Insert Figure 1 around here]

That trend is also clear in consumption of just draught beer (i.e., on-premise): Figure 2 shows a considerable decline in draught consumption of alcohol from full-strength (and low-strength) beer since 2004 while that from mid-strength beer has risen sharply, from 8% to 23%. (It also shows the dip in on-premise beer consumption during the COVID-19 years of 2020 to 2022 that is not present in Figure 1 because the latter includes off-premise consumption which more than substituted for the reduction in on-premise consumption.) The 15 percentage-points rise in the alcohol share of mid-strength since 2004 came from a 13 percentage-points fall in the large share of full-strength beer and an eight percentage-points fall in the much smaller share of low-strength beer.

[Insert Figure 2 around here]

The overall consumption of beer in Australia declined by 4% over the past two decades, but the consumption of alcohol from beer dropped by one-eighth over that same period thanks to the shift in the mix of beers toward mid-strength. Moreover, because of the one-third increase in the number of adults (those 15 years and over) in the population over the past two decades, annual consumption of alcohol from beer per adult has dropped by about one-third, from almost five litres to just over three litres.

Changes in beer consumption depend on many things, including growth in the adult population and per capita income, altered demographics, and relative retail (tax-inclusive) price changes including from differing excise tax rate changes (Colen and Swinnen 2016). Australia is no different from other high-income countries in this respect: its historic rates of change in the levels of consumption of various types of beers have been affected by income and population growth, inflation-led increases in alcohol excise tax rates as well as changes in tastes/preferences, among other things (Anderson 2020b).

Were those numerous forces to cause similar extents of change in Australia’s beer consumption levels over the rest of this decade as in recent years, they could look as shown in Table 2 and Figure 3 in the absence of any tax reform. Such changes would cause consumption of beer to be 2.5% lower in 2030 than in 2024, and consumption of alcohol from beer to be 3% lower. Mid-strength’s share of total beer consumption would be 3.6 percentage points higher by the end of the decade than in 2024 under the current beer excise

⁴ The Australian alcohol consumption data were recently revised by AIHW (2023). See the Appendix for details.

tax regime. But it would be higher if Australia's tax on mid-strength beer consumption were to be lowered, for example to that for low-strength beer (as is now the case in the UK).

[Insert Table 2 and Figure 3 around here]

2.3 The Evolution of Alcohol Excise Taxes in Australia

Australia taxes its alcohol consumption more than most other affluent economies apart from Finland and Norway.⁵ It used to have beer tax rates similar to the United Kingdom's, but recent reforms there have left Australia's much higher for packaged beers: since 3 February 2025, low- and mid-strengths in the UK are taxed at just under A\$19 per LAL and fuller-strength ($\geq 3.5\%$ but $< 8.5\%$ ABV) at A\$43, compared with almost A\$53 for low-strength and A\$62 for mid- and full-strength packaged beers in Australia.⁶ True, tax rates in Australia are lower for on-trade tap beer than for packaged beers, but that is true in some other countries as well (see OECD 2024 and European Commission 2023), including the UK. The current tax on mid-strength draught beer is A\$33.11/LAL in Australia, which is just over twice the UK rate of A\$16.30/LAL (Table 3).

[Insert Table 3 around here]

Also, Australia taxes packaged beer more heavily than all other alcoholic beverages except low-priced wines. In Australia the excise on beer and spirits is a specific tax (\$x per litre of alcohol) whose rate is raised every February and August in line with CPI inflation. Wine, by contrast, is subject to an *ad valorem* tax and so its specific alcohol tax equivalent varies positively with the price of a wine and negatively with its alcohol content. That wine tax rate has been unchanged from 29% since a 10% goods and services tax (GST) was introduced in 2000. As a consequence, the rates of taxation on beer and spirits have increased relative to those on wine every half-year since 2000. They are shown for August 2002 and 2024 in Figure 4 assuming all wines were 12.5% ABV in 2002 and still wines had risen to an average 13.5% by 2024. The tax on medium- and full-strength packaged beer in Australia is now half as high again as that on even super-premium still wine, and it is nearly twelve times that on non-premium (cask) wine. By way of comparison, wine in the UK is now taxed more heavily than premium wines in Australia (compare the lower half of Table 3 with the right-hand side of Figure 4).

[Insert Figure 4 around here]

How might this difference between Australia's beer and wine taxation alter over the rest of this decade? It depends in part on the rate of inflation. Assuming the wine tax rate of 29% remains unchanged, and the rate of inflation only gradually falls from its 2023 level above 5% to the RBA's upper target level of 3% by 2028, then by 2030 the tax on medium- and full-strength packaged beers would be almost double that on super-premium still wine.

3 Data and Method: An Equilibrium Displacement Model

⁵ Japan also had higher beer tax rates than Australia, but it began to lower them from 1 October 2021 in 3 steps, the second one being 1 October 2023 (Anderson 2020a). Meanwhile, the yen has devalued by about one-sixth against the AUD since that reform began, so in October 2023 Japan's per litre beer rates were well below Australia's (AUD1.85 for full-strength beer compared with AUD2.41 in Australia). See OECD (2024).

⁶ Note that the ABV for mid-strength beer in Australia is $\leq 3.5\%$, whereas in the UK it is $< 3.5\%$.

To estimate the likely effects of a change in beer tax rates as of 2023 or 2030, a simple spreadsheet model has been developed. It is necessarily based on a large number of assumptions in addition to the consumption data that are described in the Appendix. The most important are the own- and cross-price uncompensated elasticities of consumer demand for the four types of taxed beers (low-, mid-, regular full-, and premium full-strength) and for wine and spirits.⁷

The only econometric study of the demand for alcohol in Australia that includes that disaggregation into four beer types is by Srivastava et al. (2015). For present purposes there are several problems with that study. One is that its estimates are based on Neilson monthly scanner data, so they refer only to the off-trade where elasticities are far higher than for the on-trade. Clements et al. (2022) suggest the price elasticity of demand is seven times larger in the off-trade than the on-trade for mid-strength beer, and nearly twice as large for full-strength beer (based on Jiang et al. 2019). Second, the scanner data used by Srivastava et al. (2015) are from 2004 to 2010, when the share of mid-strength beer was much smaller than today and conversely for the low-strength share (Table 1). And thirdly, such high-frequency data (purchases in the past month) invariably lead to higher elasticity estimates than when annual consumption data (such as from ABS/AIHW) are used (Fogarty 2010; Clements et al. 2022). The own-price elasticities for mid-strength beer to be used here are therefore much lower for draught beer than for packaged beer.

Since there are no other elasticity estimates available for Australia that disaggregate into the four beer types (let alone by off- vs on-trade or, better still, by packaged and draught) than those in Srivastava et al. (2015), three simulations are reported in this study. Scenario 1 uses the estimates from Table 4 of Srivastava et al. (2015) of unconditional uncompensated elasticities of demand for different beverage types with respect to a change in the price of mid-strength packaged beer (reported in Table 4 below),⁸ and assumes (for reasons mentioned earlier in this paragraph) that those with respect to the price of draught mid-strength beer are one-third as large. Scenario 2 assumes the lower limit of those elasticities is half as large; and Scenario 3 assumes the upper limit of those elasticities is twice as large as those in Scenario 1.

[Insert Table 4 around here]

Other assumptions are as follows:

- The tax reduction is fully passed on to consumers (even though in reality there may be imperfect competition such that a fraction is retained by the producer).
- The retail mark-up on the tax-inclusive wholesale prices (whether packaged or draught) is a constant percentage, so that any percentage change in the latter will be the same as that at the retail levels.
- The off-trade accounts for 81% of the volume of sales (Euromonitor International (2023)), all packaged, and the remaining 19% sold by the on-trade is split 3% packaged and 16% draught.
- Pre-tax wholesale prices for low-, mid-, regular full-, and premium full-strength beers are \$3.00, \$2.50, \$2.50 and \$3.00 per litre, respectively (based on Dan Murphy retail prices

⁷ 'Zero'-alcohol beers (those with less than 1.15% ABV) are ignored here, because even though they are a rapidly growing segment, they currently represent less than 1% of the Australian market so a lowering of the tax on mid-strength beer is unlikely to have a discernible effect on the share of zero beers.

⁸ Unconditional uncompensated elasticities are used to allow for substitutions both among alcoholic beverages and between alcoholic beverages and other goods such as soft drinks (with total household expenditure unchanged).

in January 2025 and assuming a one-third mark-up from wholesale excise-inclusive prices plus the GST of 10%.

4 Results: Estimated Consumption Impacts of Reducing Tax on Mid-strength Beer

To estimate the likely effects on beer and alcohol consumption of a change in beer excise tax rates as of 2024, the spreadsheet model described in the previous section is used. The most important assumptions are the own- and cross-price elasticities of consumer demand for the four types of taxed beers (low-, mid-, regular full-, and premium full-strength) and for wine and spirits, all with respect to the price of mid-strength beers. As already noted, there are no reliable econometric estimates available at that level of disaggregation, let alone ones that also distinguish packaged from draught beer, so results have been generated using a baseline set of demand elasticities plus two alternative sets of demand elasticities (to represent possible lower and upper bounds on the sizes of those elasticities). They are applied to 2024 market data; they were also applied to projected 2030 data but, because the 2030 volumes are similar to those for 2024, the results are almost the same and so are not reproduced here.

What size tax change should be considered? It would be a stretch to expect a lowering overnight of the Australian rates to the new UK rates, since for packaged mid-strength beer with 3.49% ABV the latter are much less than half Australia's rates (Table 3). But a significant move in that direction, and one that is consistent with the Global Alcohol Action Plan and the Technical Manual of the WHO (2022, 2023b), would be to lower the current Australian excise rates on mid-strength beer, for example to those applying to low-strength beer. That would make the rate on low- plus mid-strength packaged beers in Australia still more than twice that in the UK, while the rate for that category of draught beer would then be below the UK's (see Table 3).

If the Australian tax rates shown in Table 3 were changed such that those applying to mid-strength beer were replaced by the lower ones applying to low-strength beer, the prices of mid-strength beer would fall by 5.1% for packaged beer and by 16.1% for draught beer (assuming proportional mark-ups to retail). In that case the simulated changes to consumption of various alcoholic beverages and of alcohol are as shown in the final four columns of Table 5.

[Insert Table 5 around here]

In all three scenarios, such a tax reform would expand consumption of mid-strength beer at the expense of the other beer categories, especially regular-strength beer. The net effect in those scenarios on total beer consumption would be a very slight increase (between 0.5% and 2.1%), and there would be a slight reduction in the total volume of alcohol consumed (between 0.2% and 1.2%). The increase in alcohol from mid-strength beer consumption (between 9% and 35%) is estimated to come from substitution away from consumption of wine and spirits as much as from regular-strength beer. It is such that total alcohol consumption would fall by between 0.5ML and 2.2ML per year under this tax reform, according to these scenarios (final row of each of the three parts of Table 5).

5 Discussion of results

In the absence of any changes in Australia's alcohol tax regime and if recent changes in beer consumption patterns were to continue as depicted in Table 2, national consumption of alcohol from beer would be 3% lower by 2030, when mid-strength's share of total beer consumption would be 3.6 percentage points higher than in 2024. That is a much larger change than would result from a reduction in the mid-strength beer tax rate to the low-strength beer rate, of between 0.1% and 0.2% of consumption as reported in Table 5. But the latter would be additional to the projected fall depicted in Table 2 and so could be still considered desirable as a tax reform.

The above results are but one set of answers to the research question posed at the outset. Another set could be generated showing the effects of altering the mid-strength beer tax rates only, say, half-way toward the low-strength rates. That provides numbers half the size of those in Table 5, making clear that the more ambitious the reform, the larger the benefits.

Another set of results could be generated by closing the gap in tax rates between packaged and draught beers. That would generate a smaller or larger drop in national alcohol consumption than shown in Table 5, depending on whether the convergence was toward the higher (packaged) or lower (draught) tax rate.

And yet another set of alternative results to those in the baseline scenario could be generated by changing just a subset of elasticities for alternative scenarios rather than all of them equally as in Scenarios 2 and 3 in Table 5. Such an analysis could be stimulated by a new econometric study that updated the estimates of elasticities in Srivastava et al. (2015).

6 Conclusion

The above estimates suggest lowering the taxes on mid-strength beer to the rates applying to low-strength beer in Australia could lower the nation's alcohol consumption by as much as 1%. Other consequences of such a tax reform would be a fall in excise tax revenue for the government, but also a fall in expenditures on health because of a likely fall in negative externalities (anti-social and illegal activities) associated with excessive alcohol consumption from full-strength beer (Srivastava, Yang and Zhao 2022). As well, consumer welfare would rise as a consequence of lowering that tax rate.

Two areas of further research could improve on the above empirical analysis: more-disaggregated econometric estimates of demand elasticities (see also Nelson 2013), and a more-sophisticated model of the demand for beverages in Australia that included estimates of changes in consumer welfare and in excise tax revenue collection by the government.

If the Australian Government were to be stimulated to focus on alcohol tax reform by the WHO's December 2022 claim that no level of alcohol consumption is good for health (<https://www.who.int/europe/news-room/04-01-2023-no-level-of-alcohol-consumption-is-safe-for-our-health>), a richer analysis would be justified. That could include more-sophisticated modelling of beer tax reform so as to capture supply responses by brewers, and perhaps the types of consumption by different types of drinkers (see Srivastava, Yang and Zhao 2022).

A more complex analysis could explore the consequences of coupling beer tax reform with a reform of wine taxation.⁹ For example, switching from an *ad valorem* to a per unit of alcohol

⁹ A further possibility is to empirically analyse the impact on consumption of various other drinks of the imposition of taxes on sugar-sweetened beverages.

tax on wine consumption in Australia, as advocated by many public health advocates including PHAA (2025), would raise the price of non-premium wine relative to premium wine and other beverages. According to the estimates by Srivastava et al. (2015), the own-price uncompensated elasticity of demand for non-premium (i.e. cask) wine is -3.0 while the cross-price elasticities of demand for bottled wine, beer and spirits with respect to the price of cask wine are generally positive and small. Those estimates suggest such a switch in the tax on wine would greatly lower national alcohol consumption from cask wine while not raising it much from other beverages. And, like a reduction in the tax rate on mid-strength beer, such a reform to wine taxation would reduce the extent of negative externalities associated with excessive alcohol consumption, since in the case of wine that is associated most with cask wine and least with fine wine (Srivastava and Zhao 2010; Srivastava, Yang and Zhao 2022).

Appendix: Estimating beer consumption from ABS, AIHW and ATO data and projecting to 2030

For Australian official data in this article, the calendar years shown in figures and tables refer to fiscal years ending 30 June. The most-recent official data on alcohol consumption from the Australian Bureau of Statistics are for fiscal years 1945 to 2018 (ABS 2019). They are based primarily on data from the Australian Taxation Office which reports the litres of alcohol that are subject to excise duty each month (ATO 2025a). The first five rows of Table 1 rely primarily on ABS (2019) for data to 2018 and thereafter ATO data after following the ABS's manipulations of the latter data. A slightly revised set of official numbers has since been provided by AIHW (2023), with revisions going back to the previous decade. Those new numbers, in the second set of five rows of Table 1, form the basis of this article. That series currently only goes to 2020 though, so projections are provided in Table 1 and Figure 1 for 2021 to 2024 by assuming the proportional difference between the ATO and AIHW numbers for each category in 2018-2020 is maintained in the subsequent four years.

Australia's beer consumption is projected to 2030 assuming no change in alcohol taxation. This was done by first examining the projections of Plato Logic and Euromonitor International. Both have similar straight-line projections over the next few years, and suggest the total to change very little. Recent trends suggest we assume the following annual changes in the volumes consumed of each beer type: a rise of 8 ML per year for mid-strength and annual falls of 3 ML and 12 ML for low- and full-strength beers, respectively (see Table 1). That provided the trends shown in Table 2. They can serve as a counterfactual against which to compare policy reform scenarios. Further growth in the mid-strength category seems likely given that regular full-strength beer still accounts for three-fifths of Australian beer sales, and that these days mid- and full-strength beers are seen as relatively close substitutes in terms of flavour. An increasing number of brands are therefore likely to launch more mid-strength variants in coming years.

Consumers are also likely to continue to seek premium beers as they look for a greater range of styles and flavours. Neither of the projections of Plato Logic (2022) and Euromonitor International (2023) sub-divide the full-strength beer category into regular and premium/craft. Euromonitor suggests the premium share by volume had risen to 11% by 2022. For present purposes we assume the premium share of the total volume of beer consumption is 11% in 2023 and 14% by 2030.

The tax categories are defined for Australia as follows:

No-alcohol: $\leq 1.15\%$ of alcohol by volume (ABV),

Low-alcohol: above 1.15% and up to 3% ABV,
Mid-alcohol: above 3% and up to 3.5% ABV, and
Full-strength: more than 3.5% ABV.

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Ethical approval

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Competing interests

The author has no financial or personal interests in the results reported in this paper.

Supplementary material

The spreadsheet used to generate the results is available online at ...

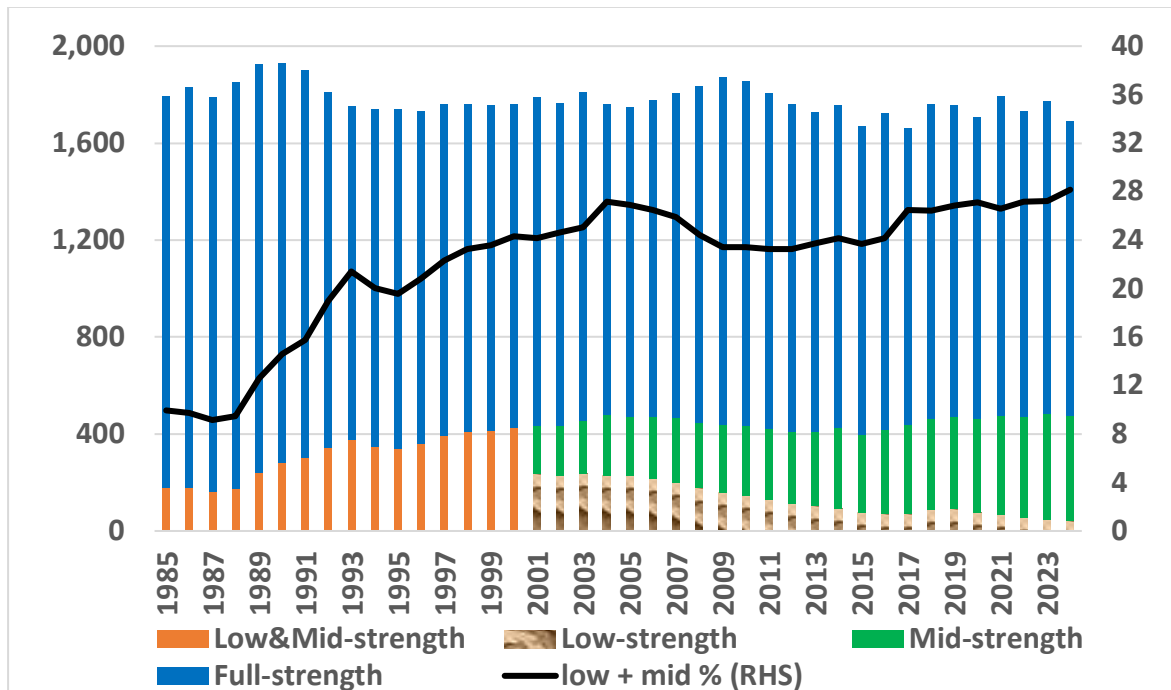
References

- ABS (2019), *Apparent Consumption of Alcohol, Australia, 2017–18*, Cat. No. 4307055001DO001, Canberra: Australian Bureau of Statistics, September.
- ABS (2022), *Consumer Price Index*, Cat. No. 6401.0, Canberra: Australian Bureau of Statistics, July.
- AIHW (2022), *Australia's Health Performance Framework*, Canberra: Australian Institute for Health and Welfare, accessed 21 October at <https://www.aihw.gov.au/reports-data/australias-health-performance/australias-health-performance-framework/national/all-australia/behaviours/health-behaviours/>
- AIHW (2023), *Apparent Consumption of Alcohol in Australia 2019-20: Supplementary Data Tables*, Canberra: Australian Institute for Health and Welfare, October. <https://www.aihw.gov.au/reports/alcohol/apparent-consumption-of-alcohol-in-australia/data>
- ATO (2025a), *Beer Clearance Summary Data*, Australian Taxation Office, Canberra. Accessed 17 January 2025 at <https://data.gov.au/data/dataset/excise-data/resource/3d06e99b-0efa-42d7-9714-d7ef5fec913>
- ATO (2025b), "Excise Duty Rates for Alcohol", Australian Taxation Office, accessed 17 January 2025 at <https://www.ato.gov.au/business/excise-on-alcohol/excise-duty-rates-for-alcohol/#Alcoholratesforbeer1>
- Anderson, K. (2020a), "Consumer Taxes on Alcohol: An International Comparison over Time", *Journal of Wine Economics* 15(1): 42-70, February.

- Anderson, K. (2020b), “Evolving from a Rum State: A Comparative History of Australia’s Alcohol Consumption”, *Australian Journal of Agricultural and Resource Economics* 64(3): 724-49, July.
- Anderson, P. and D. Kokole (2022), “The Impact of Lower-Strength Alcohol Products on Alcohol Purchases by Spanish Households”, *Nutrients* 2022, 14, 3412, August. doi.org/10.3390/nu14163412.
- Anderson, P., D. Kokole and E.J. Llopis (2021), “Production, Consumption, and Potential Public Health Impact of Low- and No-Alcohol Products: Results of a Scoping Review”, *Nutrients* 2021, 13, 3153, September. doi.org/10.3390/nu13093153.
- Anderson P., E.J. Llopis, A. O’Donnell, J. Manthey and J. Rehm (2020), “Impact of low and no alcohol beers on purchases of alcohol: interrupted time series analysis of British household shopping data, 2015–2018”, *BMJ Open* 2020;10:e036371. doi:10.1136/bmjopen-2019-036371
- Anderson, P., E.J. Llopis and J. Rehm (2021), “Evaluation of Alcohol Industry Action to Reduce the Harmful Use of Alcohol: Case Study from Great Britain”, *Alcohol and Alcoholism* 55(4): 424-32, May. doi: 10.1093/alcalc/agaa029.
- Burton, R., C. Henn, N. Fitzgerald and N. Sheron (2024), “The Early Impact of the UK’s New Alcohol Taxation System on Product Strength and Price: An Exploratory Comparative Descriptive Study”, *Public Health* 232: 61-67, July.
- Callinan, S., O. Stanesby, M. Cook and M. Livingston (2018), “Popularity of Heavy, Mid-Strength and Light Beer in Australia from 2001-2013”, Centre for Alcohol Policy Research, La Trobe University, Bundoora, July.
- Clements, K.W., M.J.M. Mariano, G. Verikios and B. Wong (2022), “How Elastic is Alcohol Consumption”, *Economic Analysis and Policy* 76: 568-81.
- Colen, L. and J.F.M. Swinnen (2016), “Economic Growth, Globalisation and Beer Consumption”, *Journal of Agricultural Economics* 67(1): 186-207.
- Euromonitor International (2023), *Passport: Beer in Australia*, London: Euromonitor International, July.
- European Commission (2023), *Excise Duty Tables: Part 1: Alcoholic Beverages*, Brussels: European Commission.
- Fogarty, J. (2010), “The Demand for Beer, Wine and Spirits: A Survey of the Literature”, *Journal of Economic Surveys* 24(3): 428-78.
- Griffiths, R., M. O’Connell and K. Smith (2019), “Tax Design in the Alcohol Market”, *Journal of Public Economics* 172: 20-35, April.
- Jiang, H., M. Livingston, R. Room, and S. Callinan (2016), “Price Elasticity of on-and off-Premises Demand for Alcoholic Drinks: A Tobit Analysis”, *Drug and Alcohol Dependence* 163: 222-28.
- Masala, F. (2023), *The New Alcohol Duty System*, London: House of Commons Library, 15 August. [UK new alc tax system 0823.pdf](#)
- Nelson, J.P. (2013), “Meta-analysis of Alcohol Price and Income Elasticities, with Corrections for Publication Bias”, *Health Economics Review* 3: 17, <http://www.healtheconomicreview.com/content/3/1/17>
- OECD (2024), *Consumption Tax Trends*, Paris: OECD, November.

- OIV (2024), *The Global Vine and Wine Sector: 100 Years of Evolution*, Dijon: OIV (International Organisation of Vine and Wine), 29 November.
- PHAA (2025), “Preventing Harm Caused by Alcohol Products: Policy Position Statement”, accessed on 4 February at <https://www.phaa.net.au/Web/Web/Advocacy/Policy-position-statements.aspx>
- Plato Logic (2022), *World Beer Report 2022*, Basingstoke UK: Plato Logic, October.
- Rehm, J., D.W. Lachenmeier, E.J. Llopis, S. Imtiaz and P. Anderson (2016), “Evidence of Reducing Ethanol Content in Beverages to Reduce Harmful Use of Alcohol”, *The Lancet Gastroenterology & Hepatology* 1(1): 78-83, September.
DOI: 10.1016/S2468-1253(16)30013-9
- Srivastava, P., K.R. McLaren, M. Wohlgenant and X. Zhao (2015), “Disaggregated Econometric Estimation of Consumer Demand Response by Alcoholic Beverage Types”, *Australian Journal of Agricultural and Resource Economics* 59(3): 412-32.
- Srivastava, P., O. Yang and X. Zhao (2022), “Equal Tax for Equal Alcohol? Beverage Types and Antisocial and Unlawful Behaviours”, *Economic Record* 98(323): 354-72.
- Srivastava, P. and X. Zhao (2010), “What Do the Bingers Drink? Micro-Unit Evidence on Negative Externalities and Drinker Characteristics of Alcohol Consumption by Beverage Types”, *Economic Papers* 29(2): 229-50.
- Thaler, R.H. and C. Sunstein (2008), *Nudge: Improving Decisions about Health, Wealth, and Happiness*, New Haven CT: Yale University Press.
- WHO (2020), “Alcohol Pricing in the WHO European Region: Update Report on the Evidence and Recommended Policy Actions”, Geneva: World Health Organization.
- WHO (2022), “Draft Action Plan (2022–2030) to Effectively Implement the Global Strategy to Reduce the Harmful Use of Alcohol as a Public Health Priority”, Report to the third high-level meeting of the General Assembly on the Prevention and Control of Non-Communicable Diseases, Geneva: World Health Organization, May.
<https://www.who.int/teams/mental-health-and-substance-use/alcohol-drugs-and-addictive-behaviours/alcohol/our-activities/towards-and-action-plan-on-alcohol>
- WHO (2023a), *Global Report on the Use of Alcohol Taxes 2023*, Geneva: World Health Organization, December.
- WHO (2023b), *WHO Technical Manual on Alcohol Tax Policy and Administration*, Geneva: World Health Organization, December.

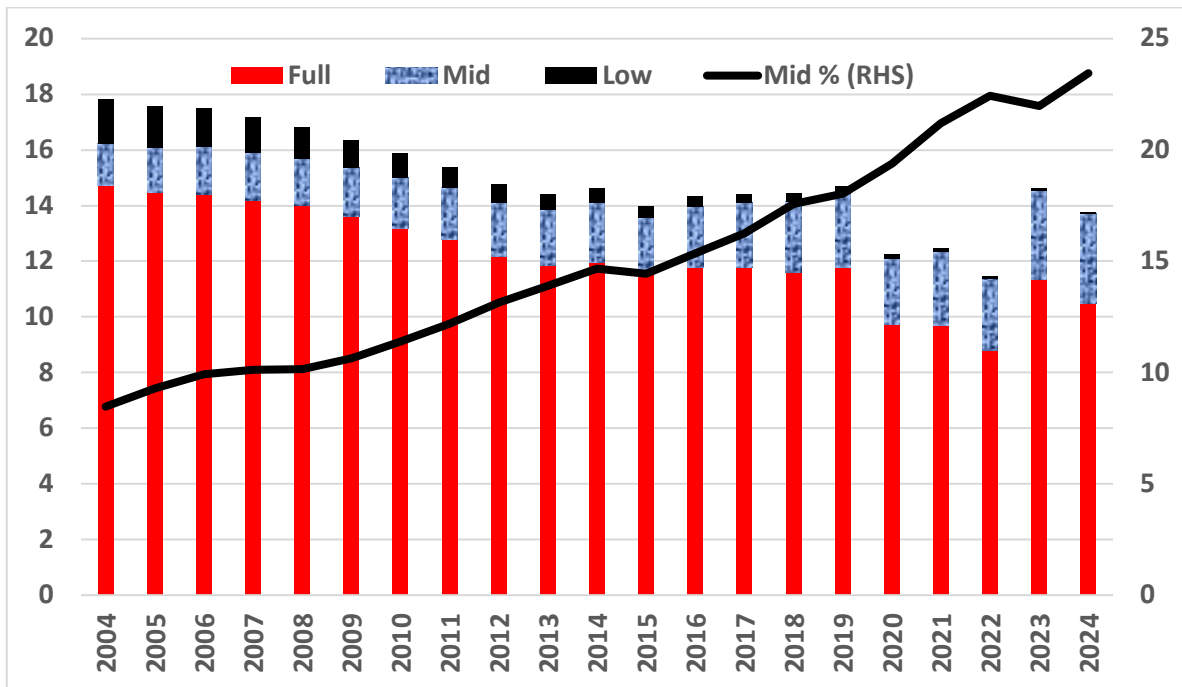
Figure 1: Volume of beer consumed as full- and as low- or mid-strength,^a Australia, fiscal years ending 30 June, 1985 to 2024 (ML)



^a Low-strength is above 1.15% but $\leq 3\%$ alcohol by volume (ABV); mid-strength is above 3% but $\leq 3.5\%$ ABV; and full-strength is $> 3.5\%$ ABV. No-alcohol beer (defined as $\leq 1.15\%$ ABV) is not reported by ATO because it attracts no tax, nor by AIHW because it contains no alcohol, but it would add less than 1% to the total volume of beer consumed in Australia in the 2020s and less than 0.1% pre-2014 (see Table 1).

Sources: compiled from data in ABS (2019) to 2000, AIHW (2023) to 2020 and the author's projection thereafter based on trends in ATO (2025a).

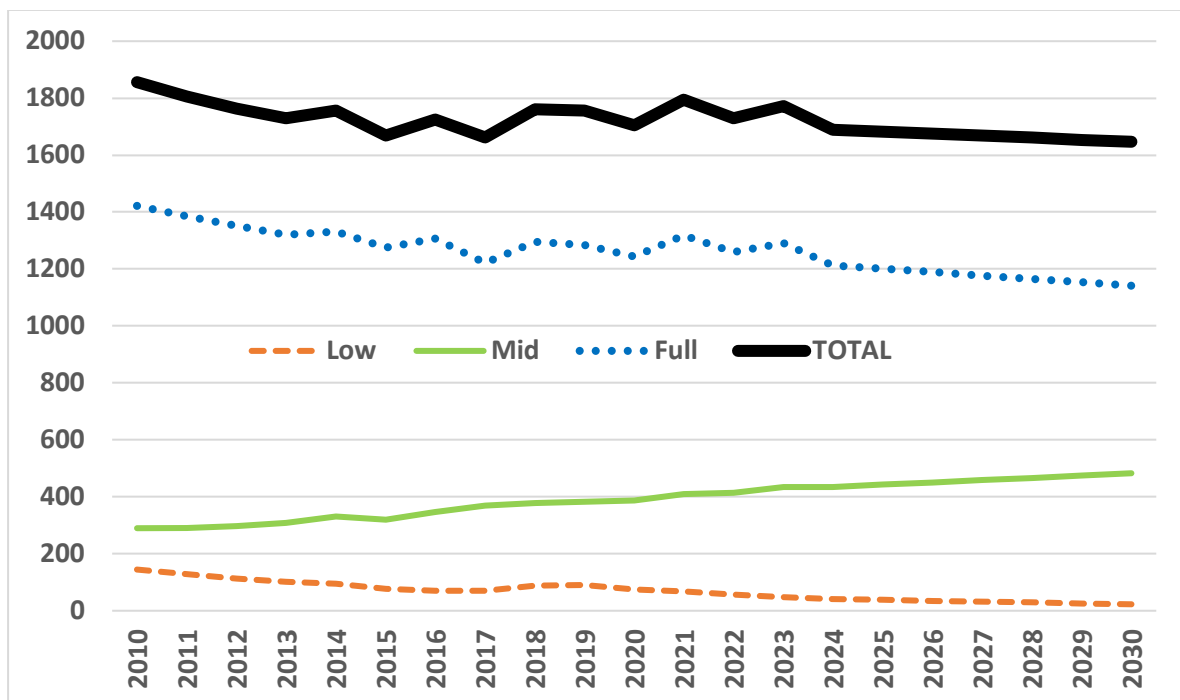
Figure 2: Volume of alcohol consumed as draught full-, mid- or low-strength beer and mid % of total,^a Australia, fiscal years ending 30 June, 2004 to 2024 (ML of alcohol from beer, including the 1.15% of alcohol which is not taxed)



^a Low-strength is above 1.15% but $\leq 3\%$ alcohol by volume (ABV) and assumed average ABV of 2.45%; mid-strength is above 3% but $\leq 3.5\%$ ABV and assumed average ABV of 3.45%; and full-strength is $> 3.5\%$ AVB and assumed average ABV of 4.60%. No-alcohol beer (defined as $\leq 1.15\%$ ABV) is not reported by ATO because it attracts no tax.

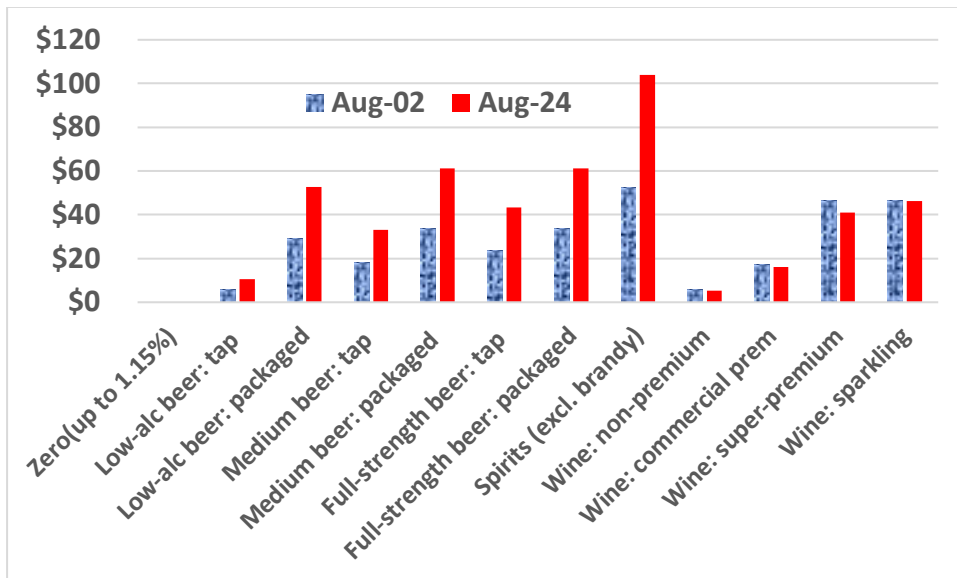
Source: ATO (2025a).

Figure 3: Recent and projected volumes of beer consumption by type, Australia, 2010 to 2030 (ML)



Source: As in Figure 1 to 2023, then author's straight-line projection thereafter from Table 2.

Figure 4: Beer and spirits excise tax rates and Wine Equalization Tax^a, Australia, August 2002 and August 2024 (AUD per litre of alcohol)



^a In the case of wine, the tax is 29% of the wholesale price, and is shown above at the following representative pre-tax prices per litre of A\$2.50 for non-premium, A\$7.50 per commercial premium and A\$20 for super-premium still wines and A\$20 for sparkling wines. Wine’s average alcohol level in Australia is assumed to have been 12.5% in 2002 and (for still wines) 13.5% in 2024. The 10% goods-and-services tax on the retail price is not included, as it applies to all beverages and most other products.

Source: ATO (2025b) and Anderson (2020a).

Table 1: Shares of volume of beer consumption in Australia that are Low-, Mid- and Full-strength, No-alcohol,^a and Premium, 1990 to 2023 (%)

According to:	1990s	2000s	2010s	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
<i>ATO/ABS:</i>																	
--Full-strength ^b	78.8	74.8	74.5	73.0	73.1	72.8	72.4	71.9	72.3	71.4	71.1	69.3	69.3	69.3	69.5	68.9	68.8
--Mid-strength		13.2	19.7	17.2	18.1	19.2	20.3	21.7	22.2	23.7	24.8	25.1	25.1	26.0	26.4	27.6	28.3
--Low-strength		12.0	5.7	9.8	8.8	8.1	7.4	6.4	5.5	4.9	4.1	5.6	5.6	4.7	4.1	3.5	3.0
--L&M strength	20.0	25.2	25.4	27.0	26.9	27.2	27.6	28.1	27.7	28.6	28.9	30.7	30.7	30.7	30.5	31.1	31.2
--L&M total alc ^c		17.5	18.9	17.6	17.6	17.7	17.9	18.3	18.3	18.7	19.9	21.4	21.4	21.6	21.6	22.3	22.5
<i>AIHW:^d</i>																	
--Full-strength ^b		74.6	75.5	76.6	76.8	76.7	76.3	75.8	76.3	75.8	73.5	73.6	73.1	72.9	73.4	72.9	72.8
--Mid-strength		13.5	19.0	15.6	16.1	16.8	17.8	18.9	19.1	20.1	22.3	21.4	21.7	22.7	22.8	23.9	24.5
--Low-strength		11.9	5.6	7.8	7.1	6.4	5.9	5.3	4.6	4.1	4.2	5.0	5.1	4.4	3.8	3.2	2.7
--L&M strength		25.4	24.5	23.4	23.2	23.3	23.7	24.2	23.7	24.2	26.4	26.4	26.9	27.1	26.6	27.1	27.2
--L&M total alc ^c		18.3	18.7	17.6	17.6	17.7	17.9	18.3	18.1	18.7	19.8	20.3	20.6	20.9	20.9	21.6	21.7
<i>Euro Int'l:</i>																	
--Low-strength											11.5	12.5	13.2	13.1	13.1	13.5	
--No-alcohol											0.43	0.52	0.71	0.80	0.93	1.50	
--Premium				2.1	2.7	3.3	3.9	4.5	5.1	5.7	6.0	6.3	7.0	8.0	10.0	11.0	
<i>PlatoLogic</i>																	
--Mid-strength	10.4	17.3		19.9	19.7	20.9	22.2	23.6	24.3	25.8	26.9	27.4					
--Low-strength	12.2	10.8		6.4	5.9	5.5	5.0	4.3	3.8	3.3	2.8	3.7					
--L&M strength	22.6	28.1		26.3	25.6	26.4	27.2	27.9	28.1	29.1	29.7	31.1					
--No-alcohol	0.20	0.05		0.06	0.06	0.06	0.08	0.10	0.12	0.13	0.15	0.20					

^a No-alcohol means $\leq 1.15\%$ of alcohol by volume (ABV); Low-alcohol is above 1.15% but $\leq 3\%$ ABV; mid-strength is above 3% but $\leq 3.5\%$ ABV; and full-strength is $> 3.5\%$ ABV. The break between low- and mid-strength in Plato Logic data is 2.8%, not 3%.

^b The full-strength share is 100 less the L&M strength share, so it includes the Premium share.

^c 'L&M total alc' is the share of total alcohol from beer that is consumed as low- or mid-strength beer.

^d AIHW data end in 2020, so subsequent years are projected based on the above ATO data.

Sources: Compiled from ABS (2019), AIHW (2023), ATO (2023a), Euromonitor International (2023) and Plato Logic (2022).

Table 2: Projected consumption of beer by alcohol strength, fiscal years 2024 to 2030 (ML)

Beer volume	2024	2025	2026	2027	2028	2029	2030	2030 (% share)	Assumed change/yr (ML)
Low	41	38	35	32	29	26	23	1	-3
Mid	435	443	451	459	467	475	483	29	8
Full	1213	1201	1189	1177	1165	1153	1141	69	-12
TOTAL	1689	1682	1675	1668	1661	1654	1647	100	

Alcohol volume	2024	2025	2026	2027	2028	2029	2030	2030 (% share)	
Low	1	1	1	1	1	1	1	1	
Mid	15	15	16	16	16	16	17	24	
Full	56	55	55	54	54	53	52	75	
TOTAL	72	71	71	71	70	70	70	100	

Source: Author's calculations based on 2024 data in Figure 1 and the assumed extent of annual beer volume changes shown in the final column.

Table 3: Beer excise tax rates and assumed alcohol strengths, Australia and United Kingdom, 3 February 2025 (A\$ per litre of alcohol)

<i>Australia^a:</i>	<i>Australian tax rates</i>			Taxed ^a ABV (%)
	Packaged beer rate (A\$/LAL)	Draught beer rate (A\$/LAL)	Assumed alcohol by volume (%)	
Low-strength ($\leq 3\%$ ABV)	52.87	10.57	2.45	1.30
Mid-strength ($> 3\%$ but $\leq 3.5\%$ ABV)	61.57	33.11	3.45	2.30
Regular full-strength ($> 3.5\%$ ABV)	61.57	43.39	4.60	3.45
Premium full-strength ($> 3.5\%$ ABV)	61.57	43.39	4.95	3.80

<i>United Kingdom^b:</i>	<i>UK alcohol excise tax rates (A\$/LAL)</i>			
	Packaged beer rate	Draught beer rate	Still wine rate	Spirits rate
Low- & mid-strengths ($< 3.5\%$ ABV)	18.92	16.30	18.92	18.92
Higher strengths ($\geq 3.5\%$ but $< 8.5\%$)	42.89	36.94	50.55	50.55
Very high strengths (8.5% to 22%)	58.17		58.17	58.17

^a The first 1.15% of alcohol by volume (ABV) is not taxed in Australia. Australian rates will be raised at the start of February and August each year by the rate of inflation in the preceding 6 months.

^b The UK rates are converted from UK Pounds to AUD at the official (RBA) exchange as of 16 January 2025 (A\$1 = £0.5078). UK rates will be raised on 1 February in future years at the rate of inflation in the preceding 12 months.

Source: ATO (2025b) and UK Government (<https://www.gov.uk/guidance/alcohol-duty-rates>).

Table 4: Estimated unconditional uncompensated (Marshallian) elasticities of demand for different beverage types with respect to a change in the price of mid-strength beer, Australia (based on 2004-10 off-trade Neilson scanner data)

Own- and cross-price elasticities of demand (Change in volume w.r.t. a change in the price of mid-strength beer)							
Low-strength beer	Mid-strength beer	Full-strength beer (regular)	Full-strength beer (premium)	Bottled red Wine ^b	Bottled white wine ^b	Cask wine ^b	Spirits
-0.018 ^a	-3.413	0.950	0.682	0.179	0.150	0.193	0.14

^a A negative value is unrealistic so in the analysis to follow this low-strength beer elasticity is assumed to be zero (although it has almost no effect on the results because by 2024 there was very little low-strength beer consumed in Australia – see Figures 1 and 2).

^b The sales-weighted average of these wine elasticities is 0.175.

Source: Srivastava et al. (2015).

Table 5: Simulated changes to the volumes of beer and alcohol consumed in Australia resulting from replacing the tax rates on mid-strength beer with those for low-strength beer, 2024^a

	Elasticity wrt price of mid-strength packaged	Elasticity wrt price of mid-strength draught	ML change in total volume	% change in total volume	ML change in total alcohol	% change in total alcohol
Scenario 1						
Beer:						
Low	0.000	0.000	0.0	0.0	0.0	0.0
Mid	-3.413	-1.138	75.0	17.8	2.6	17.8
Regular	0.950	0.317	-50.9	-4.9	-2.3	-4.9
Prem.	0.682	0.227	-6.5	-3.5	-0.3	-3.5
All beer			17.6	1.0	-0.1	-0.1
Wine	0.175	0.058	-5.1	-0.9	-0.7	-0.9
Spirits	0.140	0.047	-0.8	-0.7	-0.3	-0.7
ALL ALCOHOL					-1.1	-0.6
Scenario 2 (lower bound)						
Beer:						
Low	0.000	0.000	0.0	0.0	0.0	0.0
Mid	-1.707	-0.569	37.5	8.9	1.3	8.9
Regular	0.475	0.158	-25.4	-2.5	-1.2	-2.5
Prem.	0.341	0.114	-3.3	-1.8	-0.2	-1.8
All beer			8.8	0.5	0.0	-0.1
Wine	0.088	0.029	-2.5	-0.5	-0.3	-0.6
Spirits	0.070	0.023	-0.4	-0.4	-0.2	-0.4
ALL ALCOHOL					-0.5	-0.6
Scenario 3 (upper bound)						
Beer:						
Low	0.000	0.000	0.0	0.0	0.0	0.0
Mid	-6.826	-2.275	149.9	35.5	5.2	35.5
Regular	1.900	0.633	-101.8	-9.9	-4.7	-9.9
Prem.	1.364	0.455	-13.1	-7.0	-0.6	-7.0
All beer			35.1	2.1	-0.2	-0.2
Wine	0.350	0.167	-10.9	-1.8	-1.4	-1.9
Spirits	0.280	0.093	-1.6	-1.5	-0.7	-1.5
ALL ALCOHOL					-2.2	-1.2

^a That tax change lowers the price by 5.1% for packaged mid-beer and 16.1% for draught mid-beer. The baseline scenario assumes demand elasticities with respect to the price of mid-strength packaged beer are those in Table 4 of Srivastava et al. (2015) and Table 4 above, and those for draught beer are one-third of those in light of the findings of Jiang et al. (2016) and Clements et al. (2022). The other two scenario assume elasticities are half as large (the assumed lower-bound) or twice as large (the assumed upper-bound) as those in the baseline scenario.

Source: Author's calculations.