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Evolving from a rum state: Australia's alcohol consumption

Kym Anderson [†]

Europeans settlers in the Australian colonies had a reputation of being heavy drinkers. Rum dominated during the first few decades, followed by beer. It took until the 1970s before Australia's annual per capita consumption of wine exceeded 10 L, and even then, wine represented only one-fifth of national alcohol consumption. But over the next two decades, per capita wine consumption nearly trebled and beer consumption shrunk – the opposite of what happened to global alcohol consumption shares. This paper draws on newly compiled data sets to (i) reveal that Australia was not much more alcoholic than Britain or southern Europe during the nineteenth century and (ii) help explain why it took so long for a consumer interest in wine to emerge in Australia.

Key words: alcohol beverage consumption mix, beverage consumption intensity index, wine globalisation.

1. Introduction

European settlement began in Australia, in 1788, to serve as a prison for Britain following its defeat in the American War of Independence five years earlier. For the next half-century, the continent's white population was dominated by poor young males from England and Ireland. They and the British officers in charge were reputedly heavy spirits drinkers, predominantly of rum. While that preference gradually waned over the next dozen decades, it was replaced almost exclusively by beer. Wine continued to be a very minor part of alcohol consumption in Australia until the last quarter of the twentieth century. That long-standing lack of consumer interest in wine was mirrored on the supply side: annual wine production per capita took until the 1890s to reach 5 L and was still below 7 L in 1920, 15 L just after World War II and 25 L in the late 1980s. By contrast, average wine production per capita over the 1860–1990 period was more than 100 L in temperate-climate France, Italy and Spain, and 55 L in Argentina. Yet over just two decades from the mid-1980s, Australia's per capita wine consumption nearly trebled at the expense of beer, as national wine production quadrupled (Anderson and Pinilla 2017).

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How unusual was Australia's alcohol consumption volume and mix during its spirits-focused era of the nineteenth century and its beer-focused era of the twentieth century? How much have the per capita alcohol consumption volume and mix converged towards those of the rest of the world over the past few decades? Historically these have been questions of great social concern, particularly during periods when spirits and then beer consumption were at their peak and involved binge drinking for a significant minority. This paper addresses these questions and, in the process, seeks to explain why it took so long for an interest in consuming wine to emerge in Australia.

Such a task necessarily requires comparative data. The novelty of this paper is that it draws on two newly compiled global databases of annual data that go back to the nineteenth century: a detailed wine one that also includes volumes of beer, wine and spirits consumption, and one that includes consumer expenditure on those beverages for all countries back to 2001 and, for high-income countries, back several more decades. Those databases provided the basis for recent surveys of global alcohol consumption pattern convergence (Holmes and Anderson 2017b; Anderson, Meloni, and Swinnen 2018), against which the changing Australian pattern is compared in the present paper.

The paper first describes the global and Australian data sources to be used. It then suggests a useful indicator to summarise consumption pattern changes (including convergence over time) both in total recorded alcohol consumption and in the mix of beverages. The main section then presents findings based on annual data assembled for Australia and the rest of the world from 1961 to the present, for some high-income countries back to the late nineteenth century and for colonial Australia and Britain back to the early 1800s. The final section summarises the findings and concludes.

2. Comparative data sources

The global wine, beer and spirits consumption volume data in this study are sourced from two new annual databases. One includes beverage volumes and stretches back to the 1880s for 11 high-income countries and back to 1961 for all other countries (Anderson and Pinilla 2017). The other includes wine, beer and spirits average consumer expenditure data compiled for all countries back to 2001 and for most high-income countries back to the 1950s (Holmes and Anderson 2017a).

The longer time series on volumes consumed (in litres of alcohol or LAL)¹ includes 48 important wine-producing and/or wine-consuming countries plus

¹ The average alcohol content by volume is assumed to be 4.5 per cent for beer, 12 per cent for wine and 40 per cent for spirits. Ready-to-drink spirits mixers are converted to spirits assuming their alcohol content is 5 per cent. Throughout, 'wine' refers to grape wine. Wine from other fruits is very minor in almost all countries. Rice 'wine', which is made in many Asian countries but each under a different name (sake in Japan, miju in China, cheongju in Korea, etc), is included in the spirits category once converted to volume of alcohol: even though rice wine is fermented, it looks like a clear spirit, is brewed differently than beer and is typically at least 15 per cent alcohol.

five residual regions (treated here as five extra ‘countries’)² that together make up the world. That database has a full suite of data for the period 1961 to 2014 apart from countries that emerged following the breakup of the former Soviet Union and Yugoslavia, for which data begin in 1992. The shorter time series (2001–2015) draws from Euromonitor International (2016) and is compiled for 80 individual countries plus, again, five residual regions.

Euromonitor International (2016) also provides soft drink volume and expenditure data from 2001, and total expenditure on all products. The other key statistic used, as our proxy for real per capita disposable income, is the Maddison GDP estimates in 1990 International Geary–Khamis dollars.³

3. Indicator of consumption pattern intensities

To study differences and convergence across countries in national alcohol consumption volumes and beverage mixes, a helpful indicator is a *beverage consumption intensity index*. This indicates the importance in a particular year of one type of alcoholic beverage in a country’s total alcohol consumption relative to the average share of that beverage in total alcohol consumption by all countries of the world. It is thus defined for country i as:

$$V_{in} = \frac{f_{in}}{f_n}, \quad (1)$$

where there are $i = 1, \dots, 53$ (or 85) countries, and $n = 1, 2, 3$ beverages corresponding to wine, beer and spirits. We define f_{in} as the fraction of wine, beer or spirits consumption in total national alcohol consumption in country i such that $0 \leq f_{in} \leq 1$ and $\sum_{n=1}^3 f_{in} = 1$. This is divided by the fraction for that same beverage in world total alcohol consumption, f_n , with $0 \leq f_n \leq 1$ and $\sum_n f_n = 1$. Weighted averages of intensity indexes for any group of countries are calculated using as weights each country’s consumption of that beverage as a fraction of that group’s total consumption of that beverage.

4. Australia’s evolving alcohol consumption pattern

Australia has native current bushes, but since they produce a sparse crop of very small berries, it is not surprising that there was no evidence of wine being consumed when European settlers arrived in 1788. Australia’s aboriginal population did produce a beer-like product from the nectar of native Banksia

² Those five residual regions together accounted in 2010–2016 for less than 9 per cent of the volume of global recorded alcohol consumption (5 per cent of wine, 6 per cent of spirits and 12 per cent of beer).

³ Maddison (2013) numbers have been updated to 2016 by splicing the latest PPP estimates in 2011 dollars from the World Bank’s International Comparison Project at <http://icp.worldbank.org>.

bushes and a cider-like beverage from the sap of cider gum trees, but both had modest alcohol content (Brady 2008). During their first 50 years, some European settlers in New South Wales experimented with imported vines and made wine to help satisfy their own demand. However, virtually no winegrowers got to the stage of having a regular surplus for commercial sale until the 1840s (McIntyre 2012). Domestic alcohol consumption prior to that instead relied predominantly on imported wines along with imported spirits and beers, supplemented with only a small amount of domestic legal production of spirits and beers and a larger amount of homebrewed beer.

Precise consumption data are unavailable for the early decades of European settlement, but estimates have been generated. Butlin (1983) suggests the mix of wine, spirits and beer and the total volume of alcohol consumption per capita in New South Wales during 1800–1820 were probably similar to those in Britain at the time, once allowance is made for the much higher proportion of adult males in the new colony's population. (Males outnumbered females 3–1 in the 1820s and still 1.5–1 in the 1850s.) Powell (1988) has made the appropriate conversions that suggest there was an estimated average intake of 13 L of alcohol per person in New South Wales during 1800–1820 compared with Britain's 14 L in 1800 and 11 L in 1816 (reported also in Lewis 1992). This is thus contrary to earlier claims by many commentators, and even historians as prominent as Ward (1966), that New South Wales as a penal colony was far more alcoholic than European countries. France, for example, consumed on average more than 10 L of alcohol per year from wine alone between 1835 and 1860, as did Italy in the 1860s and Spain in the 1870s (Anderson and Pinilla 2018)⁴ – despite the fact that in the mid-nineteenth century, per capita incomes in France and Italy were only three-fifths, and Spain's two-fifths, those of Australia and Britain (then the highest in the world, see Maddison 2013).

In the 1830s, Australia's estimated per capita consumption of alcohol (ignoring illegal production) was about the same as in the century's first two decades, at 15 L. This was made up of 12 L from spirits, 2 L from wine and 1 L from beer (Dingle 1980). Australia's consumption then dropped substantially during the depression of the early 1840s.

Australia's annual data become sufficiently reliable from the mid-1840s for a continuous annual time series to be compiled. They show that per capita consumption of alcohol rose hugely in the 1850s with the influx of male migrants and the boost in per capita incomes, thanks to that decade's gold mining boom in Victoria. As the dominance of adult males in the population subsequently fell, so too did per capita alcohol consumption – prodded by a temperance movement similar to that then operating in the United States and United Kingdom (Briggs 1985). Total annual alcohol consumption in Australia was down to 5 L of alcohol per capita by the 1890s, to 4 L by

⁴ In the 1880s, wine's share of the volume of alcohol consumption was 73 per cent in France and 89 per cent in Italy (Anderson & Pinilla 2017).

the late 1920s and below 3 L during the Great Depression. Thereafter, it rose steadily to a peak of 10 L in the mid-1970s before falling back to around 8 L (Figure 1a).

The fluctuations in per capita income can explain only some of those movements: the coefficient of correlation between Australia's alcohol consumption and its GDP is only 0.57 over the period 1860–2016. Other explanations, in addition to dampening influence of the temperance movement, include myriad ever-changing laws, taxes and other regulations affecting the production, importation, sale and consumption of alcohol in each colony and then state and territory (Dingle 1980; Powell 1988; Lewis 1992). Liquor taxes contributed more than one-third of the New South Wales government's revenue through to 1860 and one-quarter of the new Australia federal government's tax revenue in 1901–1905 – and still 10 per cent in the 1930s (Anderson 2015, table 19).

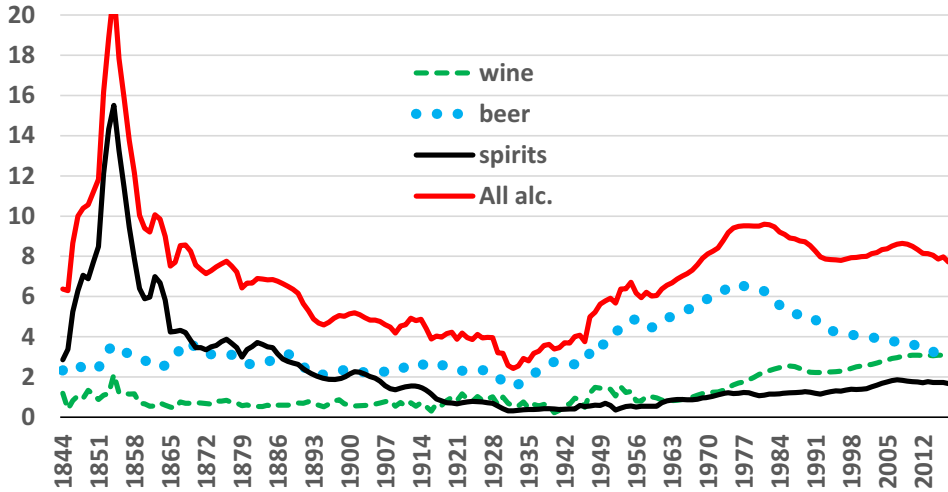
As for the changing composition of alcohol consumption (Figure 1b), it is perhaps less related to per capita income than to consumer relative prices. Spirits dominated the first 100 years of European settlement partly because that was what the settlers' peers back in Britain and Ireland drank, and partly because it was the cheapest beverage to ship halfway around the world per unit of alcohol and was least likely to deteriorate on the trip. It was also a form of currency initially, with wages being paid partly in rum. As well, beer was prohibitively expensive to import and costly to produce domestically: during the first seven decades of European settlement, grains and flour were imported because cropping was not as profitable for Australia's farmers as grazing.⁵ Beer's share of total alcohol consumption was gradually encouraged by the fact that it was becoming relatively cheaper. One reason was that it was taxed at a much lower rate than spirits (Table 1). Even more important was the technological revolution in the beer industry from the late nineteenth century, which led to lager-styled beer being produced by ever-larger brewers exploiting economies of scale.⁶ Refrigeration in hotels added to the rise in quality of beers.

Meanwhile, wine remained the preferred beverage of only a small fraction of Australia's population. Its per capita consumption rose during the 1850s' gold rush and during the two world wars when grain was required to be reserved for food rather than brewing, but otherwise showed a flat trend until the 1960s (Figure 1a). Even after World War II, Australia's liquor licensing laws continued to discourage wine relative to beer consumption – not least

⁵ In fact by 1870, there was still only half a hectare of land being cropped per capita in Australia (of which about half was sown to wheat). Over the next four decades, that area rose to one hectare, shifting the continent from being a net importer to a net exporter of grain. Yet, net exports of grain as a share of Australia's grain production still averaged less than 15 per cent in the 1880s and 19 per cent in the 1890s (Commonwealth of Australia 1904, p. 359).

⁶ This technological revolution led to the number of brewers shrinking in all industrial countries. In the United States, UK and Belgium, for example, by 1980, there were less than one-twentieth the number of brewers that were operating in 1900 (Poelmans & Swinnen 2011, Swinnen & Briski 2017).

(a) Per capita consumption volume (litres of alcohol)^a



(b) Shares of total alcohol consumption volume (%)

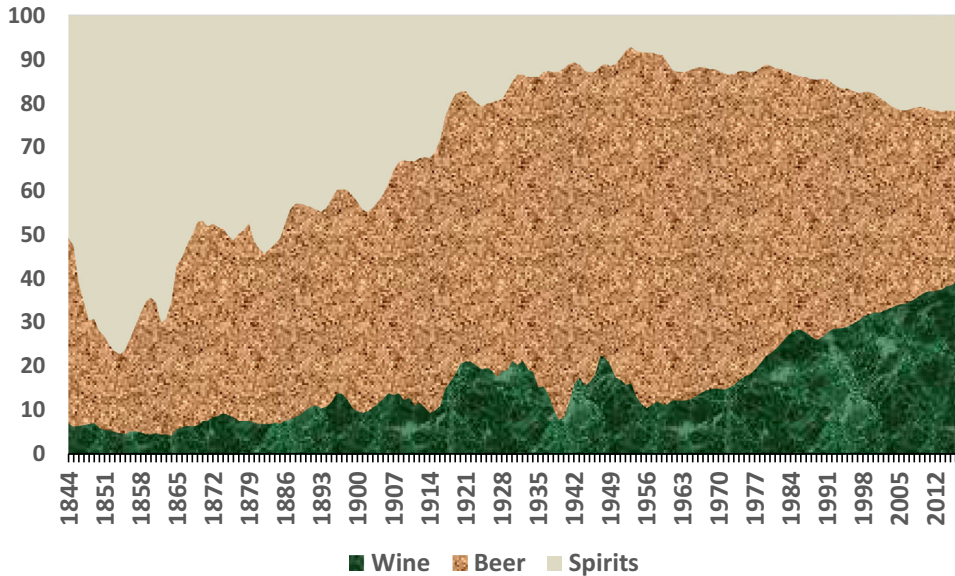


Figure 1 Per capita volumes of and shares of wine, beer and spirits in alcohol consumption, Australia, 1843–2018 (per cent, 3-year moving average around year shown). ^aThe alcohol content is assumed to be 12 per cent for wine, 4.5 per cent for beer and 40 per cent for spirits. *Source:* Author’s compilation from data in Anderson and Pinilla (2017). [Colour figure can be viewed at wileyonlinelibrary.com]

because purchased meals involving wine had to be completed by 8 pm. Thus by the latter 1950s, after war-induced grain rationing to breweries and rations on beer and spirits consumption were removed, beer again comprised three-

Table 1 Shares of wine, beer and spirits in alcohol tax revenue† and in volume of alcohol consumption, Australia, 1887–2015 (%)

	Wine	Beer	Spirits
1887–1890 (NSW only)			
Tax share	5	17	78
Consumption share	9	48	43
1904–1913			
Tax share	2	24	74
Consumption share	13	52	35
1950–1959			
Tax share	0	87	13
Consumption share	14	77	9
1980–1984			
Tax share	0	77	23
Consumption share	24	64	12
2014–2015			
Tax share	13	39	48
Consumption share	40	46	14

Note: †Customs and excise taxes plus (in 2014–2015) the wine equalisation tax.

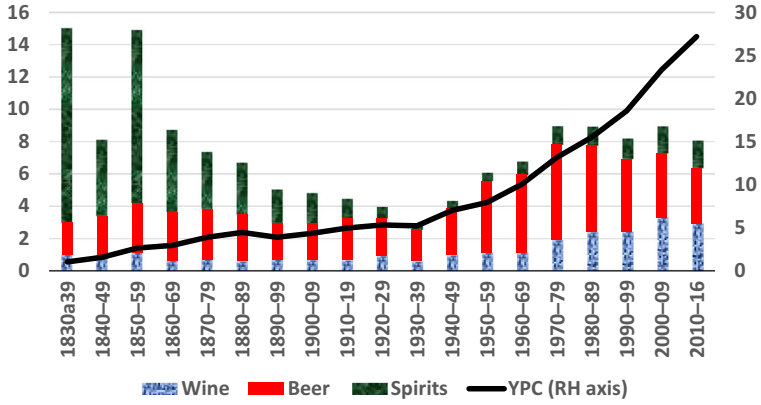
Sources: Anderson (2015) and, for 2014–2015, Parliamentary Budget Office (2015).

quarters of the volume of alcohol consumed in Australia compared with as little as one-seventh coming from wine – despite there being no taxation on wine consumption through most of the 20th century (Table 1). Wine production in Australia remained very low per capita: <10 L pre-1920s and < 20 L prior to 1970. Meanwhile, taxes on wine imported into Australia were high enough to make imports virtually prohibitive (<2 per cent of the volume of domestic wine sales) during 1905–1970 (Anderson 2015, table 13).

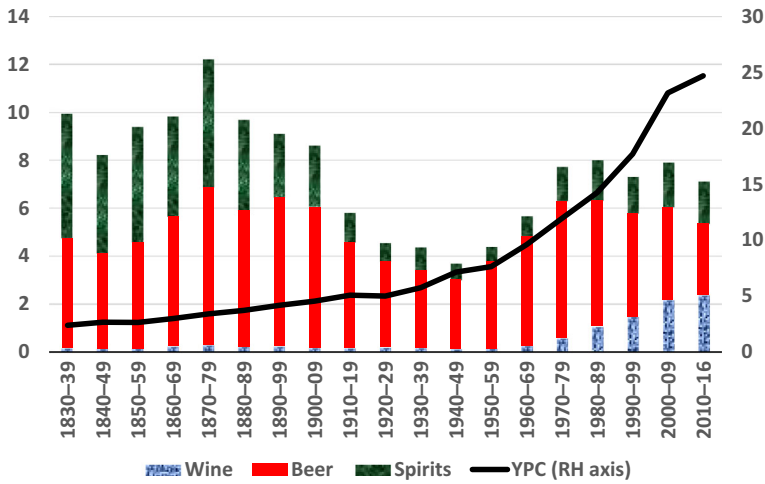
That evolution in the volume and composition of alcohol consumption in Australia follows quite closely that in Britain, bearing in mind the young male adult dominance in the early decades of the colony and in the 1850s' gold rush when the per capita income soared. There are numerous similarities in the decadal changes of the two countries, evident in Figure 2. Total alcohol consumption in both countries peaked in 1982, at an only slightly higher level in Australia (where the average income was 10 per cent higher). This and the early estimates quoted above tempt one to conclude that Australia (i) was not much more alcoholic than Britain (or southern Europe) during its first few decades of European settlement and (ii) that its preference for spirits initially and then beer also was similar to Britain's, especially when Australia's self-sufficiency in wine was still well below 100 per cent prior to the 1890s.⁷ Nor was Australia's consumption pattern much different from that in the United States then: during 1870–1890, for example, the wine/beer/spirits shares of total alcohol consumption were 8/43/49 in Australia while in the United

⁷ Australia's shift in wine consumption from table to fortified wines in the interwar period also was matched in Britain. Evidence of fortified wine's dominance in that period is clear for Australia in Anderson (2015, table 30) on per capita production when wine imports were almost zero, and Anderson & Pinilla (2017, table 276) on the share of Britain's wine imports from Spain, Portugal and Australia, whose wine shipments were almost all fortified.

(a) Australia



(b) United Kingdom



(c) World

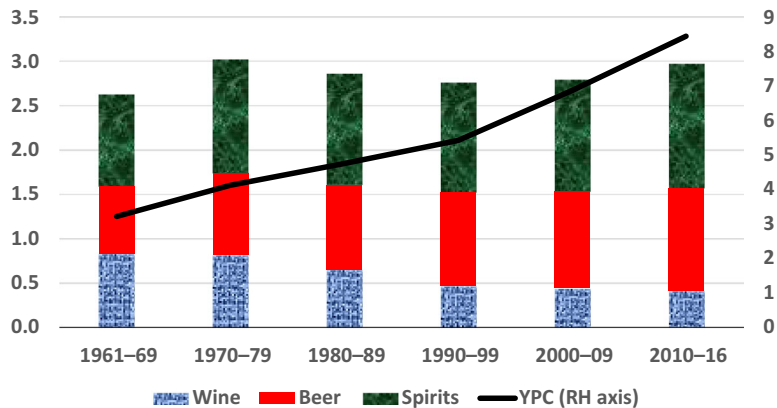


Figure 2 Volume of alcohol consumption per capita by type and real GDP per capita (YPC), Australia, the United Kingdom and the world, 1830–2016 (litres of alcohol and \$'000)^a. ^aReal GDP per capita, shown on the right-hand axis, is in 1990 International Geary–Khamis dollars from www.ggdc.net/maddison/maddison-project/data.htm, updated from 2011 to 2016 by taking the latest PPP estimates in 2011 dollars from the World Bank's International Comparison Project at <http://icp.worldbank.org> and splicing them to the Maddison series.

Source: Author's compilation from data in Anderson and Pinilla (2017). [Colour figure can be viewed at wileyonlinelibrary.com]

States wine was about 5 per cent and spirits close to 60 per cent, and in the 1890s, per capita consumption of alcohol in both countries was very close to 5 L (Alston *et al.* 2018).

The influence of consumer taxes and trade policies on consumer prices of beverages has been non-trivial in Australia as in most countries. Domestic wine consumption was taxed indirectly in the early days of the Federation of Australia. First, there was a tax imposed on wine and brandy imports, which has prevailed to the present (although the most favoured-nation rate is only 5 per cent currently and does not apply to New Zealand wines). As well, a sales tax of 15 per cent was imposed on imported (but not domestically produced) wine from 1930 (Lloyd 1973, Ch. 7). More importantly, the Wine Export Bounty Act, passed in 1924, provided the equivalent of an export subsidy of almost 100 per cent on fortified wine. Since an export subsidy is the equivalent of a production subsidy and a domestic consumption tax, this bounty dampened domestic fortified wine sales, and table wine production, at the same time as boosting production and exports of fortified wines. Production and consumption of beer rose rapidly in the 1930s, presumably as a cheaper substitute for domestic consumers in the wake of the diversion of grapes to the production of fortified wine for export. On top of that, in its June 1925 budget the British Government introduced a generous tariff preference for fortified wines from the British Empire, further raising the consumer price of wine in Australia until both the export bounty and that UK tariff preference were abolished in 1947.

It took another two decades before Australia's wine consumption per capita began to trend upwards – and then, it did so faster than its per capita income, mainly at the expense of beer (Figure 3). The same also happened in the United Kingdom. These trends were contrary to the trend in the global mix of alcohols, in which wine's share was shrinking (Figure 2c).

Several factors contributed to the trend towards wine consumption in Australia after the 1950s. One was the influx of wine-preferring immigrants from Southern Europe, who also influenced the per capita consumption of non-alcoholic beverages: tea-drinking shrunk by three-quarters while coffee-drinking expanded sixfold in the second half of the twentieth century (Figure 4).⁸ Another factor was the spread of wine brand advertising plus

⁸ According to Euromonitor International data, Australia's retail expenditure on coffee, as a share of total hot drink expenditure, rose from 60 per cent to 69 per cent during 2002–16 when globally that share rose from just 56 per cent to 57 per cent (and was 78 per cent in both France and Italy in 2016).

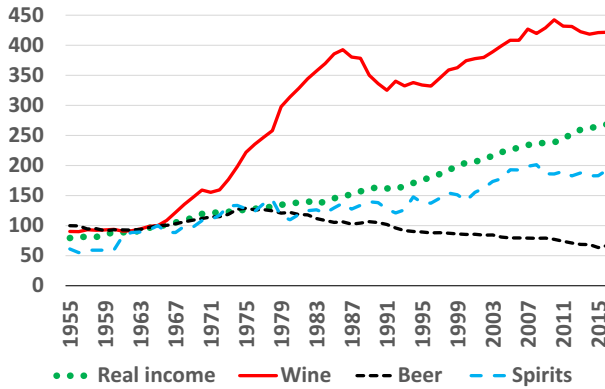


Figure 3 Real GDP per capita (at 2010–2011 prices) and per capita volume of consumption of wine, beer and spirits, Australia, 1955–2016 (1965 = 100).
Sources: Author’s compilation from GDP data in Butlin, Dixon and Lloyd (2014) updated from <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/5204.02015-16?OpenDocument>, and wine data in Holmes and Anderson (2017a). [Colour figure can be viewed at wileyonlinelibrary.com]

new generic promotion domestically by the industry’s Wine Bureau. Yet, another was the fall in the real cost of air travel and of discounts for under 25s that encouraged young people to travel to Europe, where they were exposed to cultures in which wine is integral. As well, the Trade Practices Act of 1974 made retail price fixing illegal and stimulated the emergence and gradual spread of liquor chain stores and wine discounting throughout Australia.

By the mid-1970s, national annual wine consumption per capita was twice its 1950s and 1960s average of 6 L, and it reached three times that level by the turn of this century. This trend was helped by a rapid decline in the real consumer price of wine in Australia, which fell by 8 per cent between 1980

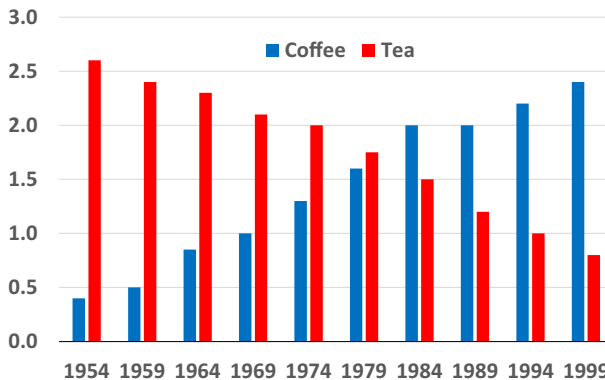


Figure 4 Volume of consumption of tea and coffee per capita, Australia, 1952–1999^a (kg, 3-year averages to 30 June of year shown). ^aABS discontinued this series after 1999.
Source: ABS (2017). [Colour figure can be viewed at wileyonlinelibrary.com]

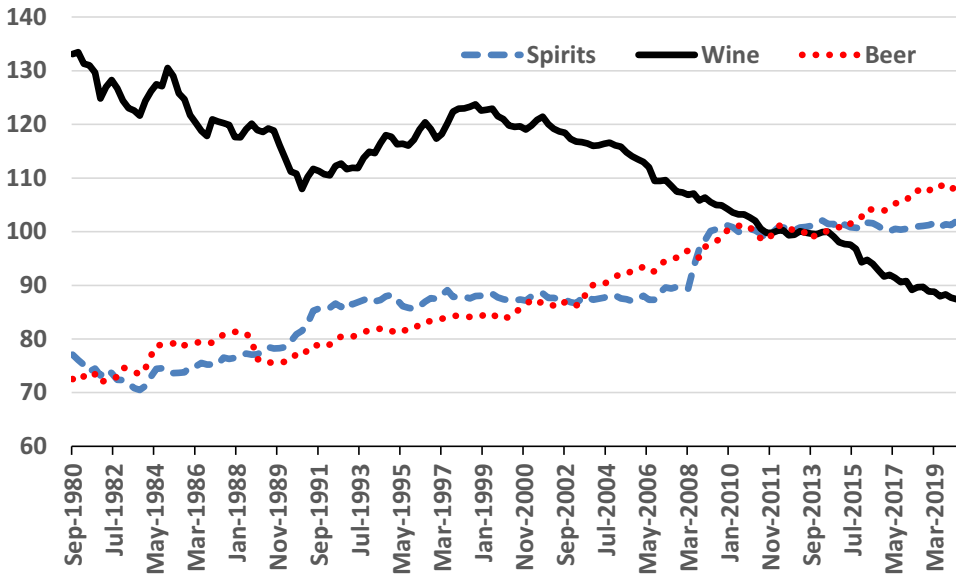


Figure 5 Real domestic consumer prices of beer, wine and spirits, Australia, July–September 1980 to January–March 2020 (2011–2012 = 100).

Source: ABS (2020). [Colour figure can be viewed at wileyonlinelibrary.com]

and 1998 while the real price of beer and spirits each rose about 15 per cent. That is also when Australia almost doubled its per capita production of wine and moved from being a slight net importer to exporting one-quarter of that expanded production and lowering its price at home and abroad. During the next two decades, wine's real price fell a further 29 per cent as beer's rose 29 per cent and the average spirits price rose 16 per cent by 2020 (Figure 5). The rapid growth in domestic production of wine during that period, stimulated by new technologies and firm concentration to exploit scale economies and satisfy supermarket demands for large shipments of homogeneous commercial wine, occurred just as export demand for Australian wine slumped due to a rapidly appreciating real exchange rate and the global financial crisis. These were major contributors to the decline in the retail relative price of wine in Australia during the first two decades of this century (Anderson 2018).

The only reversal in Australia's post-1950s upward trend in wine consumption was in the latter 1980s. That followed the introduction of a 10 per cent wholesale sales tax on wine in August 1984, which was subsequently raised to 20 per cent 2 years later and to 31 per cent in 1993 – causing for a few years that dip in wine consumption shown in Figure 3. By then, Australia had one of the highest wine consumer tax rates among the world's wine-exporting countries, and the only one to be subjected to an ad valorem (rather than volumetric) tax that discriminates more against finer wines (Table 1 and Anderson 2010, 2020).

Beer and spirits consumption, by contrast, has always been subject to very heavy volumetric customs and excise taxation in Australia. To repeat, those taxes contributed one-third of the New South Wales' tax revenue in the middle of the nineteenth century and one-quarter of the new Federation's tax revenue in the early twentieth century (Mill 1925). In recent decades, taxes on beer and spirits sales in Australia have risen each 6 months in line with inflation, whereas the wine wholesale sales tax rate has effectively not risen since 1995 from its *ad valorem* rate of 29 per cent (or 41.9 per cent when the 10 per cent GST is added at the final point of sale).⁹ Once cask wine (wine-in-a-box) became cheaply available from the 1980s, such packaged wine attracted very little tax in terms of dollars per litre of alcohol, thereby disproportionately encouraging consumption at that low end of the quality range (Parliament of Australia 2015).

5. Comparative colonial perspective, 1896

It was not until the late 1880s that beer overtook spirits as the dominant source of alcohol consumption in Australia, when wine's share had yet to exceed 10 per cent. Those shares, and the total volume of alcohol consumed, differed considerably between colonies just prior to them becoming, in 1901, part of the Federation of Australia (or not, in the case of New Zealand).

Figure 6 orders the colonies by per capita alcohol consumption volume, shown relative to the average for Australia in 1896. Western Australia had the heaviest drinkers then, as it was in the midst of its first gold rush: its male population outweighed females by 50 per cent compared with <10 per cent in the rest of Australia by then, and its per capita income was 71 per cent above the continent's average that year (c.f. Australia's drinking binge during the Victorian gold rush of the 1850s, shown in Figure 1a). The other colonies had very similar overall levels of alcohol consumption per capita in 1896, consistent with their similar per capita GDP levels. The exceptions were cool-climate Tasmania and New Zealand, where the volume consumed was about 60 per cent of the other colonies. Almost no wine was drunk (or produced) in those temperate islands, in contrast to warmer South Australia where a wine culture developed from the outset of British settlement in that convict-free colony with its ideal grape-growing conditions. That is, differences in local wine production costs, in addition to income, help explain differences across the colonies in the volume of

⁹ The 1993 tax was later reduced to 22 per cent in October that year but raised an extra two percentage points in July 1994 and again to 26 per cent in July 1995. Meanwhile, State government franchise fees on wine sales had risen to close to 15 per cent at the wholesale level, but from August 1997 those fees were collected by the Federal Government on behalf of the States following a High Court ruling declaring State franchise fees unconstitutional. That made the wine tax a total of 41 per cent. Then, when the Government introduced a general goods and services tax (GST) in 2000 to replace a plethora of wholesale sales taxes, it chose to impose a wine equalisation tax (WET) of 29 per cent at the wholesale level which, together with the 10 per cent GST at the retail level, brought in roughly the same tax revenue from domestic wine consumers as the tax it replaced.

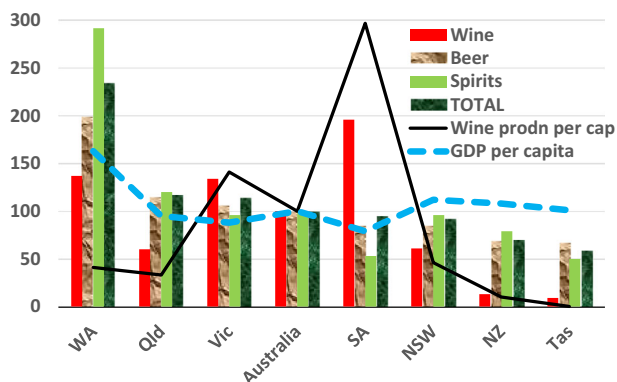


Figure 6 Colonial relative to Australian per capita volume of consumption of wine, beer and spirits, and real per capita GDP and wine production, 1896 (per cent).

Source: Author's compilation from data in Anderson (2015). [Colour figure can be viewed at wileyonlinelibrary.com]

alcohol consumed. Production costs affected the local consumer price of wine relative to other beverages because of high tariffs on inter-colonial wine trade prior (but not subsequent) to Federation in 1901.¹⁰

6. Comparative international perspective

This section compares the Australian alcohol consumption patterns summarised above with those of other countries, regions and the world. It begins by examining first total consumption volumes mapped against real incomes, and then shares of beer, wine and spirits in that total volume over time. Estimates of the beverage consumption intensity index defined above are then reported, before examining comparative expenditure patterns. Finally, comparisons between alcoholic and non-alcoholic beverages are summarised.

6.1 Alcohol consumption volume as real incomes rise: an inverted U

How do Australians compare with the rest of the world in their level of alcohol consumed per capita per year in total and for each of wine, beer and spirits?

If all products could be traded costlessly around the world, and there were no government interventions such as consumption (excise) or trade taxes or differences in value-added tax rates across jurisdictions, then the retail prices of each type of beverage would be identical throughout the world. According to Stigler and Becker (1977), the key reason then for major differences in alcohol consumption patterns would be differences in per capita incomes. If

¹⁰ Wine imported into Victoria and New South Wales was subject to a tariff of at least 11 cents per litre leading up to Federation, at which time the average price of wine exported from Australia was 6 cents (Anderson 2015, tables 15 and 18).

all beverages were normal goods, we might expect convergence in the level and mix of alcoholic (or indeed all) beverages consumed as convergence across countries occurs in national average per capita incomes (which has been happening in recent decades – see, e.g., Baldwin 2016).

In reality, costs of trading beverages across national borders are not zero (even though they have declined greatly over the past two centuries), which means in the past countries tended to concentrate their consumption on those alcoholic beverages that could be produced at lowest cost locally. Hence, the historical dominance of spirits in cold countries, beer where temperate climates allow malting barley to be easily grown and wine in countries best able to produce it, that is, those in the 30° to 50° latitude range near maritime weather influences.

Nor are excise and import taxes on beverages similar across countries, and they vary greatly across beverage types too (Anderson 2010, 2020). In some (perhaps many) cases, those taxes protect local producers and so reinforce climate-induced differences in the consumption mix. Value-added taxes also vary across countries, and so do many other types of regulations on alcohol consumption (Anderson, Meloni, and Swinnen 2018; Meloni *et al.* 2019).

More specifically, temperance movements have had different effects on the social acceptability of alcohol consumption at different times in various places (see, e.g., Wilson 1940; Briggs 1985; Pinney 1989, 2005; Phillips 2014). So too have concerns about human health: as per capita incomes rise, people can afford to spend more on alcohol consumption but also choose to limit its volume for health reasons (in some cases, switching to soft drinks including bottled water), and some people are also substituting towards (especially still red) wine because of its perceived positive influence on health when drunk in moderation (Baxter 2019). Given all the above possible influences on beverage consumption patterns, it would not be surprising if across-country convergence in those patterns was not evident in the data.

One way to begin to look for convergence in alcohol consumption patterns is to plot consumption against real income per capita. This has been done by Holmes and Anderson (2017b, Figure 2a) for all country-year observations for 53 countries and residual regions spanning the world from 1961 to 2014, for the volume of total alcohol consumption per capita as well as for each of wine, beer and spirits. The polynomial fit to those data in that study suggests the overall volume of alcohol consumption first tends to rise with per capita incomes but then falls – tracing an inverted U shape. This is also the case for each of the three beverages when plotted separately by Holmes and Anderson (2017b, Figure 2b–d).

Globally, the total alcohol consumption volume per capita peaks at a real per capita income (in 1990 International Geary–Khamis dollars) of \$16,900 in the case of all alcohol, at almost 9 L per capita (Holmes and Anderson 2017b, Figure 2a). That was the average per capita income Australia reached in 1988–1989. The peak in Australia's alcohol consumption was 9.2 L in 1982 (ignoring the higher levels more than 120 years earlier), but it plateaued at

above 8.6 L from 1974 to 1989 before steadily declining to 7.6 L by 2015. In terms of overall alcohol consumption, it thus appears that in recent decades Australia has been following a very similar inverted U-shaped path to the rest of the world, conditional on per capita income levels, but peaking slightly earlier and at a slightly lower income level than for the world as a whole.

Turning to individual beverages, peak consumption globally occurs at real per capita income levels of \$15,100 for wine (at 2.5 L of alcohol (LAL) per capita), \$18,100 for beer (3.8 LAL) and \$16,350 for spirits (2.0 LAL – see Holmes and Anderson 2017b, Figure 2b–d). By contrast, Australia’s peak consumption levels occur at real per capita income levels of \$24,100 for wine (at 4.0 LAL per capita, in 2006), \$13,200 for beer (6.3 LAL in 1975) and \$25,200 for spirits (1.9 LAL in 2008). That is, Australia peaked much earlier and at a much higher level of consumption for beer, and much later for wine and spirits relative to the rest of the world, with its wine peak level of consumption per capita being 60 per cent above that for the world (Figure 7).

6.2 Shares of wine, beer and spirits in total alcohol consumption volume

Trends in the shares of overall alcohol consumption due to wine, beer and spirits are shown in Table 2 for Australia relative to shares for other high-

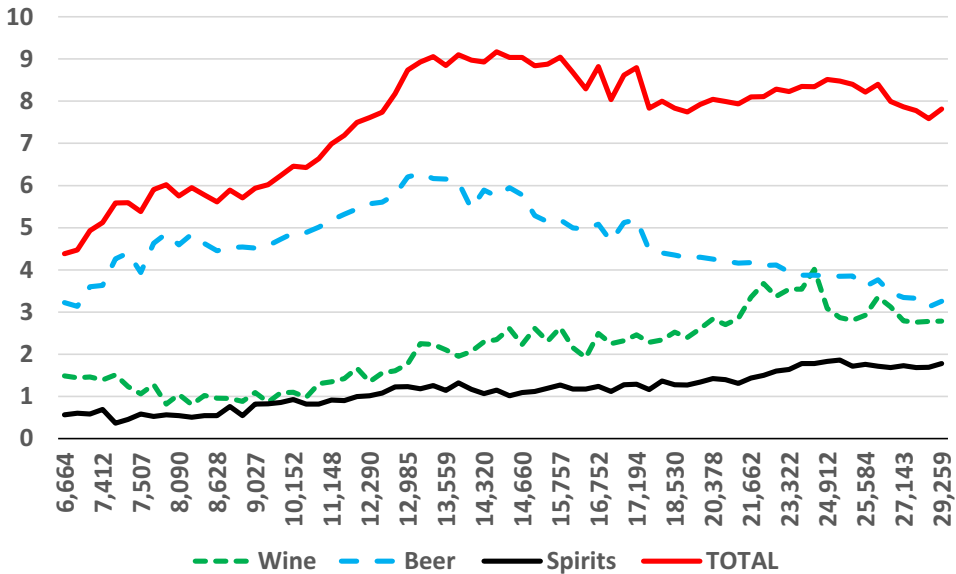


Figure 7 Volume of alcohol consumed as real GDP per capita grew,^a by type of beverage, Australia, 1947–2016 (litres of alcohol per capita per year). ^aReal GDP per capita, shown on the horizontal axis, is in 1990 International Geary–Khamis dollars from www.ggdc.net/maddison/maddison-project/data.htm, updated from 2011 to 2016 by taking the latest PPP estimates in 2011 dollars from the World Bank’s International Comparison Project at <http://icp.worldbank.org> and splicing them to the Maddison series.

Source: Author’s compilation from data in Anderson and Pinilla (2017). [Colour figure can be viewed at wileyonlinelibrary.com]

Table 2 Shares of wine, beer and spirits in total alcohol consumption volume, Australia, New Zealand and other high-income countries, 1888–2014 (%; 5-year averages)

	Wine %					Beer %					Spirits %				
	1888–1892	1925–1929	1961–1964	1980–1984	2010–2014	1888–1892	1925–1929	1961–1964	1980–1984	2010–2014	1888–1892	1925–1929	1961–1964	1980–1984	2010–2014
Australia	10	19	12	24	40	47	61	75	64	46	43	20	13	12	14
New Zealand	2	na	4	17	38	32	na	78	63	43	66	na	18	20	19
Belgium	3	8	13	21	35	62	80	76	61	51	35	12	11	18	14
Canada	na	na	6	14	25	na	na	60	48	49	na	na	34	38	26
Denmark	na	4	8	19	46	na	54	77	65	38	na	42	15	16	16
France	68	82	77	68	58	6	6	10	16	19	26	12	13	16	23
Germany	7	na	18	24	28	49	na	58	56	53	44	na	24	20	19
Italy	95	95	87	80	66	0	1	3	8	23	5	4	10	12	11
Netherlands	4†	8†	9	22	35	25†	47†	48	49	48	71†	45†	43	29	17
Switzerland	63	48	42	49	47	17	25	38	31	34	20	27	20	20	19
United Kingdom	2	4	4	11	41	68	79	81	69	37	30	17	15	20	22
United States	4	na	8	13	18	47	na	48	51	48	49	na	44	36	34
World av.	na	na	34	24	15	na	na	29	33	43	na	na	37	43	42

Note: †1898–1902. ‡1920–1923.

Source: Author's compilation from data in Anderson and Pinilla (2017).

income countries and globally since 1961. That table shows that shares were very different across high-income countries up to the 1960s, especially with respect to wine which ranged from 4 per cent to 87 per cent of all national alcohol sales during 1961–1964 but also for beer (3–81 per cent) and spirits (10–44 per cent). By 2010–2014, the ranges had narrowed somewhat for beer (19–51 per cent) but less so for wine (18–66 per cent) and spirits (11–34 per cent). In 1961–1964, Australia was at the high end of the beer range (75 per cent) and the low end of the wine range (12 per cent); by 2010–2014, it was still at the high end of the beer range but down to 46 per cent, and had moved up to mid-range for wine at 40 per cent. The global average mix changed very substantially over those 53 years though: wine's share more than halved from 34 per cent to 15 per cent, beer's rose by more than one-third from 29 per cent to 43 per cent and spirits' rose but only a little, from 37 per cent to 42 per cent (final row of Table 2). Of the 48 individual countries in the data set, beer remained the main alcohol for 12 of them including Australia; for 11 countries, wine continued to dominate; and for ten countries, spirits retained the largest share between 1961 and 2014 (Holmes and Anderson 2017b, Table 3).

Table 3 compares Australia with New Zealand and six regions that together make up the rest of the world. It reveals that the mix for Australia, as for New Zealand, has switched from being well below to well above the global average wine share and has dropped from well above to close to the global average beer share.

Meanwhile, UK annual wine consumption per capita almost reached that of Australia in 2000–2016 (19 compared with 23 L per capita), but from an even lower base of just 2 L in the 1960s. That rise was due in no small part to

Table 3 Alcohol per capita consumption volume and shares of beer, wine and spirits†, Australia, New Zealand and six regions making up the rest of the world, 1961–1964 and 2010–2014 (LAL and %)

	Consm (LAL/capita)†		Shares, 1961–1964 (%)‡			Shares, 2010–2014 (%)‡		
	1961–1964	2010–2014	Wine	Beer	Spirits	Wine	Beer	Spirits
Australia	6.5	7.3	12	75	13	40	46	14
New Zealand	6.2	6.4	4	78	18	38	43	19
Western Europe	12.3	8.4	55	29	16	42	38	20
East Europe	1.9	7.2	22	22	56	14	42	44
North America	5.4	7.0	8	49	43	18	49	33
Latin America	6.5	5.1	48	34	18	11	60	29
Asia (incl. Pacific)	1.9	3.2	1	12	87	4	34	62
Africa and M East	1.0	1.7	27	38	35	14	67	19
World	2.5	2.7	34	29	37	15	43	42

Note: †These data are volume-based in litres of alcohol (LAL) per year, 4- or 5-year averages. ‡The bold numbers for each country or region indicate which beverage had the highest share in total alcohol consumption volume in the period shown.

Sources: Author's compilation from data in Anderson and Pinilla (2017).

the explosion of exports to the United Kingdom from Australia and then other parts of the New World, which in turn was stimulated by the spread throughout the United Kingdom of supermarkets and liquor chain stores (Anderson 2018). The developments in those countries contrast with the United States, where the 3-tier distribution system has helped to constrain wine consumption to no more than 10 L per capita (up from 4 L in the 1960s).

6.3 Beverage consumption intensity index

As explained above, the consumption intensity index for any beverage is defined as the share in a particular year of that beverage in a country's volume of alcohol consumption relative to the average share of that beverage in alcohol consumption globally. The indexes for Australia, shown in Figure 8a, reveal the path over time for the transition just described: for wine, an index increases from 0.4 to 2.8 times the global average wine share; for beer, a drop from 2.7 to just 1.2 times the global average beer share; and for spirits, the Australian share remains below half the global spirits share.

To compare Australia's transition with that of others, it is helpful to divide into groups the database's 48 countries plus one residual sub-group of countries for each of five geographic regions (called 'countries' too hereafter, for simplicity), so a total of 53. The groupings are chosen according to which of the three beverages has the highest share of the volume of national alcohol consumption in 1961–1964. It turns out those three groups have almost the same number of countries (19 wine-focused and 17 each for beer-focused and spirits-focused, see footnote b of Figure 8). Australia is one of 17 in the initially beer-focused country group. That group's beer intensity index has declined between 1961–1964 and 2010–2014 from close to 2.0 down to 1.3, while their wine intensity index has more than quadrupled from 0.4 to 1.8 and their spirits intensity index has fallen from just below 1.0 to 0.7 (Figure 8b). This indicates that Australia was more beer-focused and less spirits-focused than the average country in this group back in 1961–1964, and has made a more-extreme transformation away from beer and towards wine than the average country in the beer-focused group. Indeed, Australia's wine intensity index, at 2.8, is now almost as high as that for the wine-focused country group of 3.0 (Holmes and Anderson 2017b, Figure 4).

6.4 Alcohol consumption and aggregate expenditure

The inverted U-shaped relationship between national alcohol consumption volume and real GDP, shown in Figure 7 for Australia and in Holmes and Anderson (2017b) for many high-income countries, is not duplicated for consumption expenditure. On the contrary, real expenditure on each of the three alcohol types has risen with real income in Australia. Figure 9a shows expenditure in Australia is still greatest on beer, but the gap between that and

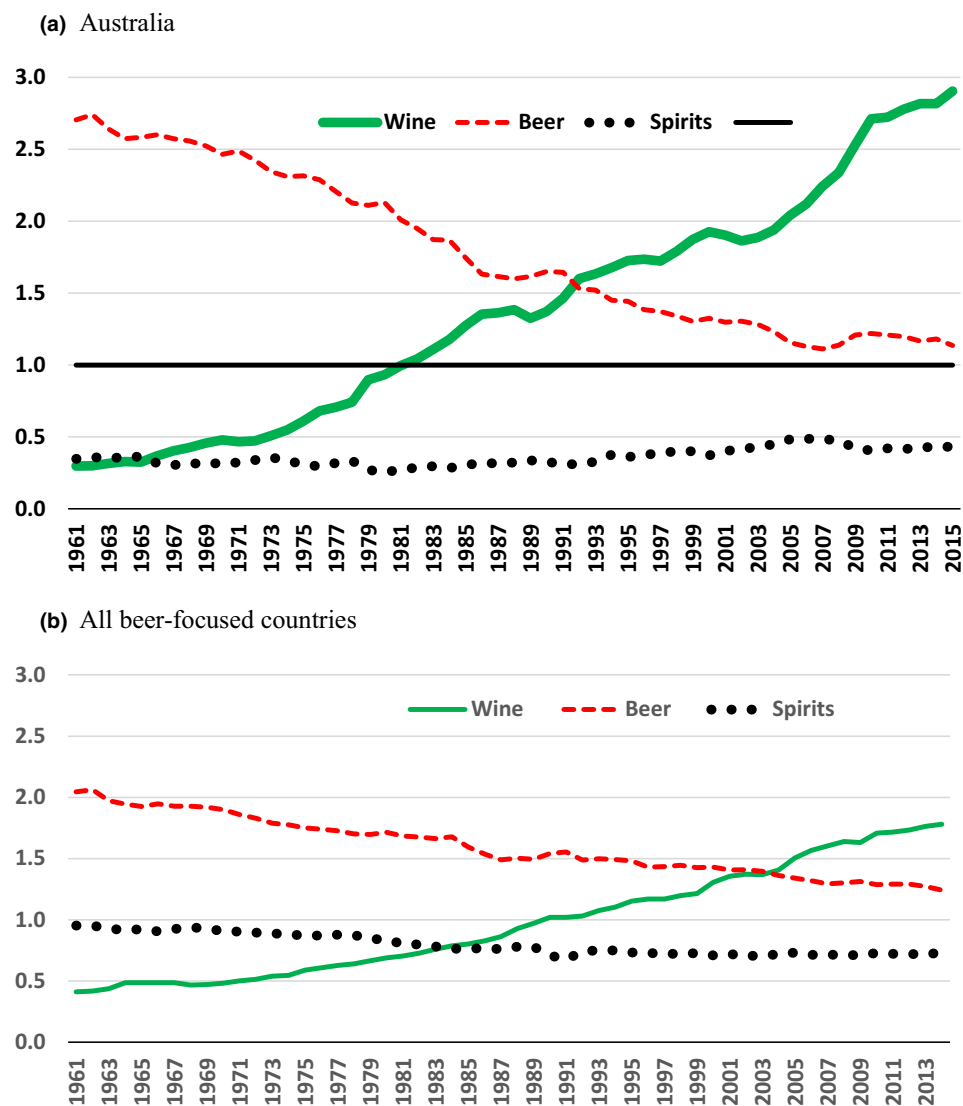


Figure 8 Wine, beer and spirits consumption volume intensity indexes, ^aAustralia and all beer-focused countries as of 1961–1964, ^b1961–2014. ^aThe intensity index is defined as the fraction of wine, beer or spirits consumption in total national alcohol consumption volume in country *i* divided by the fraction for that same beverage in the volume of world total alcohol consumption. ^bBeer-focused countries (those with >50 per cent of alcohol consumption from beer as of 1961–1964) are as follows: Australia, Austria, Belgium-Luxembourg, Canada, Denmark, Germany, Ireland, Malaysia, Mexico, Netherlands, New Zealand, Singapore, United Kingdom, United States, Other Eastern Europe, Other Latin America, Other African and Middle East, Wine-focused countries (those with >50 per cent of alcohol consumption from wine as of 1961–1964) are as follows: Algeria, Argentina, Bulgaria, Chile, Croatia, France, Georgia, Greece, Hungary, Italy, Moldova, Morocco, Portugal, Romania, Spain, Switzerland, Tunisia, Turkey and Uruguay. All others were initially spirits-focused. *Source:* Author's compilation from data in Anderson and Pinilla (2017). [Colour figure can be viewed at wileyonlinelibrary.com]

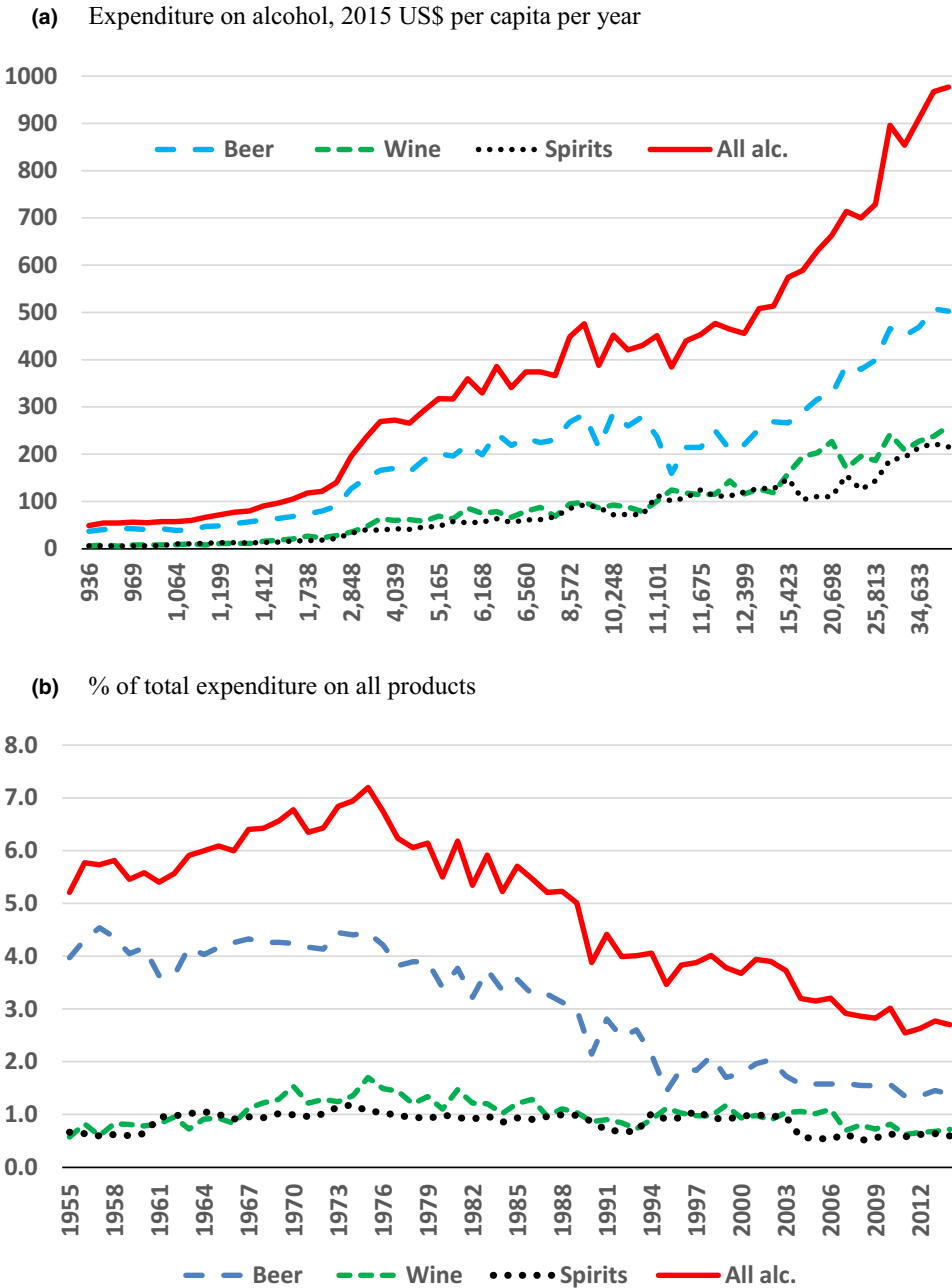


Figure 9 Expenditure on alcohol as aggregate expenditure per capita grew,^a by type of beverage, Australia, 1955–2012 (2015 US\$ per capita per year and per cent of total expenditure). ^aThe aggregate expenditure data shown on the horizontal axis of Figure 9a, in 2015 US dollars, are from Euromonitor International (2016).
Source: Author’s compilation from data in Holmes and Anderson (2017a). [Colour figure can be viewed at wileyonlinelibrary.com]

wine expenditure has narrowed considerably over the past four decades. The share of alcohol in the country’s total expenditure peaked in the mid-1970s at 7 per cent, but it is now barely one-third of that (Figure 9b).

Per capita alcohol expenditure levels in Australia are slightly less than in other countries at comparable real income levels, as can be seen by comparing Figures 9a and 10. The wide variance in per capita alcohol expenditure across equally affluent countries, shown by the dot dispersion in Figure 10, is partly due to differences across countries in value-added or goods-and-services taxes (VAT/GST) and in alcohol excise or consumption taxes (Table 4).

6.5 Alcoholic versus non-alcoholic beverages

As of 2010–2014, alcohol made up two-thirds of Australia’s expenditure on beverages and 3.3 per cent of all expenditure. Those shares are somewhat below New Zealand’s and a little below the global averages: lower than Europe’s, but higher than North America’s. Within the beverage expenditure category, despite the convergence in shares since the 1950s, there are still quite wide differences in the shares of alcohol expenditure on the three main categories (Table 5). Consumer tax differences (Table 4) continue to contribute to that variance.

In the rest of the world, other cold beverages are bottled water (8 per cent of global beverage spending), carbonated soft drinks (15 per cent) and other soft drinks such as fruit juices (13 per cent). Those other beverage shares for

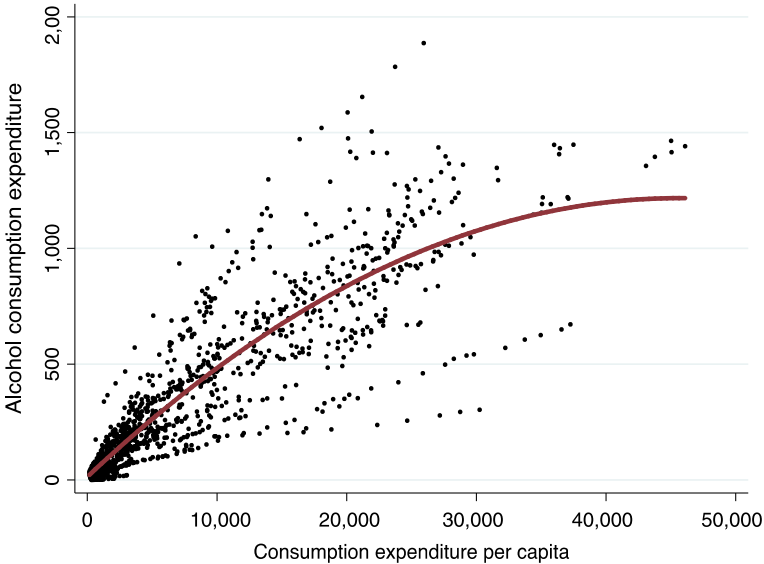


Figure 10 Per capita expenditure on alcohol as total expenditure rises, 80 countries, 2001–2015 (2015 US dollars, one dot per country-year).
 Source: Holmes and Anderson (2017b). [Colour figure can be viewed at wileyonlinelibrary.com]

Table 4 Per capita income, excise taxes on alcohol consumption by type and VAT/GST, various high-income countries, 2018 (% ad valorem equivalent)†

	Per capita income (US\$'000)‡	Commercial wine excise tax (%)	Standard beer excise tax (%)	Spirits excise tax (%)	VAT/GST (%)
Australia	53.2	29	81	165	10
New Zealand	40.6	28	46	100	15
Austria	49.3	0	13	36	20
Canada	44.9	7	55	25	5
Finland	48.3	57	90	143	24
France	41.1	0	19	52	20
Japan	41.3	10	98	10	8
Norway	80.6	96	27	244	25
Sweden	55.5	41	53	161	25
United Kingdom	41.8	49	55	98	20
United States	63.1	6	11	27	0
Unweighted average, all OECD member countries	40.9	20	33	74	18

Note: †Specific excise taxes are converted to an ad valorem equivalent at the following wholesale prices per litre of beverage: commercial wine \$7.50, standard beer \$2 and spirits \$15. ‡Gross national income per capita, Atlas Method, current US dollars, from WDI.

Source: Anderson (2020) and World Bank, *World Development Indicators* (accessed 15 April 2020 at <http://datatopics.worldbank.org/world-development-indicators/themes/economy.html>).

Table 5 Shares of beverage household expenditure by beverage type, Australia, New Zealand and six regions making up the rest of the world, 2010–2014 (%)

	Budget shares of alcohol expenditure (%)			Beverage shares of all expenditure (%)				Alcohol as % of all beverage expenditure
	Beer	Wine	Spirits	All alcohol	Bottled water	Carbonates	Other soft drinks	
Australia	52	26	22	3.31	0.17	0.77	0.68	67
New Zealand	38	40	22	4.60	0.16	0.65	0.63	76
Western Europe	40	34	26	3.88	0.54	0.73	0.53	68
Eastern Europe	46	20	34	5.87	0.53	0.76	0.72	74
North America	48	21	30	1.94	0.34	0.66	0.58	55
Latin America	64	10	26	4.22	0.61	2.01	0.76	56
Africa and M East	60	15	25	2.49	0.57	1.14	0.58	52
Asia	35	15	50	4.29	0.32	0.49	1.07	70
World	44	21	35	3.46	0.43	0.79	0.72	64

Source: Author's compilation from data in Holmes and Anderson (2017a).

Australia are 4 per cent, 13 per cent and 16 per cent, respectively, so more biased towards non-carbonates and less towards bottled water than in the rest of the world.

These differences are in part because retail prices vary between countries: for all soft drinks, they range from an average for 2013–2015 of 70 US cents per litre in Africa and the Middle East to 260 cents in Australasia (Euromonitor International 2016). The availability of low-cost reticulated potable water in lightly populated Australia also helps explain its relatively low expenditure on bottled water.

During 2001 to 2015, the world's volume of alcohol consumption increased by one-quarter (and Australia's by one-eighth) while that of non-alcoholic beverages rose by two-thirds (one-third in Australia). However, global retail expenditure (including taxes) on those two product groups rose much more in current US dollar amounts: 81 per cent for alcoholic and 90 per cent for non-alcoholic beverages globally, and by 105 per cent and 135 per cent in Australia (Euromonitor International 2016). Those large differences between the volume and value increases for alcohol consumption are not inconsistent with the finding of the previous sub-section nationally and globally that the *volume* of alcohol consumption traces an inverted U shape as total expenditure rises whereas alcohol consumption *expenditure* tends to plateau – although it has not quite done so yet in Australia (Figure 9a).

7. Summary and conclusions

This paper sought answers to three questions: How unusual was Australia's alcohol consumption volume and mix during its spirits-focused first century of European settlement and its beer-focused second century?

To what extent has per capita alcohol consumption, and its mix, converged towards that of the rest of the world over the past few decades? and

Why did it take so long for Australia's interest in consuming wine to emerge?

The available evidence suggests Australia was not exceptionally alcoholic after the first few decades of European settlement, compared with Britain and the main wine-producing countries, bearing in mind its very high per capita income and the high share of young adult males in its population up to that time. Nor was its early focus on spirits consumption very different from Britain's, and in any case, that is understandable given Australia's high cost of malting barley production or importation and near-absence of winegrape production during most of the first century of European settlement, as well as the relatively low transport and spoilage costs of importing alcohol in the form of rum versus beer and wine.

The cost of local beer production gradually fell relative to the price of imported spirits over the second half of the nineteenth century and beyond. Imported grain also was becoming cheaper in Britain over those decades. This and the technological revolution in lager beer production lowered the relative price of beer and thus encouraged the substitution of spirits for beer in both countries' alcohol mix. Meanwhile, grape and wine production in

Australia remained very low per capita, and imported wine was subject to almost-prohibitively high taxes. In the interwar period, Australian and UK trade policies encouraged the exportation of Australian wine and thereby raised its domestic price.

During the most-recent four decades, by contrast, the real retail price of wine in Australia has fallen very considerably while prices of beer and spirits have risen. Technological improvements in grape and wine production and associated firm concentration in the wine industry contributed, as did a drop in export demand in the first decade of this century thanks to a real appreciation of the Australian dollar and the global financial crisis. Those forces encouraged an increase in wine's share of Australia's alcohol consumption mix, a trend that is opposite to that for the world as a whole but similar to that of other beer-focused countries as beverage mix convergence occurs with globalisation.

Just as the extent of local availability affected the variability of the share of wine in alcohol consumption in Australasian colonies in the late nineteenth century, so it did for federated Australia in the late twentieth century. But that availability was reflected in the local real price of wine, because of non-trivial trade costs and tariff barriers in the former period and rapid improvements in productivity of Australian wineries in recent decades – causing the consumer price to fall steadily for wine relative to beer, spirits and other products.

Looking ahead for Australia, unless more-stringent alcohol regulations are introduced, the above trends suggest expenditure on alcohol may continue to rise in dollars per capita per year even if the volume of alcohol consumed per capita and alcohol's share of total expenditure have peaked. As for the mix, Australia's wine share is already almost up to that of the wine-focused country group which is three times the global share. Thus, future changes in the mix are likely to be slower than those of the past half-century. Australia's fledgling craft distilleries may lift the share of spirits in Australia's alcohol consumption, given that share is now less than half the global share, while the craft beer revolution in Australia – as in other countries (Garavaglia and Swinnen 2018) – may pause the decline in beer consumption.

Data availability statement

The data that support the findings of this study are openly available as follows: Anderson and Pinilla (2017), Anderson et al. (2017) and Holmes and Anderson (2017a).

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