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The impact of COVID-19 and related restrictions on population-level alcohol sales in Scotland and England & Wales, March–July 2020

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Contents

Main points

- COVID-19 and the measures introduced to control its spread in March 2020 – including a government-enforced lockdown – affected opportunities to purchase alcohol and socialise across the UK.
- The impact of COVID-19 and related restrictions on alcohol consumption were assessed using alcohol retail sales data for Scotland and England & Wales. The study period was 15 March to 11 July 2020. Volumes sold were converted to pure alcohol volumes and expressed per adult, to provide a proxy for population-level alcohol consumption. Interrupted time series regression was used to estimate the effect of the restrictions on alcohol sales after adjusting for seasonal and other underlying trends.
- We found that COVID-19 and related restrictions were associated with a 6% reduction in the volume of pure alcohol sold per adult in Scotland and in England & Wales, compared with what would be expected based on pre-COVID-19 trends. Average weekly alcohol sales during the study period – 17.5 units per adult in Scotland, and 16.7 in England & Wales – remained in excess of the UK Chief Medical Officers' guideline of 14 units per week.
- Alcohol sold for consumption off the premises (off-trade sales) typically accounts for 72% of all per-adult sales in Scotland, and 70% in England & Wales. The increases in off-trade sales between March and July 2020 in Scotland (28%) and England & Wales (29%) did not fully replace the loss of sales for consumption on the premises (on-trade sales).
- Beer typically accounts for around one-third of all pure alcohol sales in Scotland and England & Wales, but these sales fell the most: 23% less pure alcohol was sold as beer per adult in Scotland, and 19% in England & Wales.
- Wine typically accounts for about 30% of all pure alcohol sales in Scotland and England & Wales; the COVID-19 restrictions were associated with a 4% increase in the volume of pure alcohol sold as wine per adult in Scotland, and an 8% increase in England & Wales.

- Spirits typically account for 28% of pure alcohol sales in Scotland, and 21% in England & Wales; per-adult spirits sales in Scotland and in England & Wales did not change during the study period.
- The findings suggest that COVID-19 and the related restrictions to 11 July 2020 resulted in population-level alcohol consumption in Scotland and England & Wales being lower than expected based on pre-COVID-19 trends. However, these population-level findings mask a wide range of individual-level responses to the pandemic and to the related restrictions. Improved understanding of how the COVID-19 restrictions have affected consumption across different population sub-groups is now needed, given the evidence that drinking at hazardous levels may have increased for some.

Background

At the start of March 2020 the UK recorded its first death from coronavirus disease (COVID-19) and the World Health Organization (WHO) declared COVID-19 to be a global pandemic. In the subsequent weeks the governments of the UK and its constituent nations acted to control the spread of the virus by introducing various physical distancing measures. Pubs and restaurants ('on-trade' premises) were closed on 21 March 2020, and a government-enforced lockdown of all non-essential business and travel started on 23 March 2020. As a result the majority of on-trade sales ceased[a] until or beyond the easing of restrictions in July. In contrast, sales of alcohol for consumption off the premises ('off-trade' sales) from grocery stores and off-licences are reported to have increased markedly over the period, at least in terms of value and/or natural volume.[b,1] At a UK level, early indications of the combined effect of these changes to the on- and off-trade are visible in the lower alcohol duty receipts observed so far in 2020: provisional duty receipts from April to July 2020 were 2.4% lower than for the same period of 2019.[2]

The pandemic and related restrictions have exposed a large number of people to psychological, social and economic circumstances which plausibly could have caused their alcohol consumption to increase or decrease. Consumption may have reduced if people socialised less, had reduced disposable income, were prompted to make healthy changes to their behaviour, or were concerned that alcohol could exacerbate COVID-19 severity. Conversely, alcohol consumption may have increased as a response to higher than usual levels of stress related to the pandemic, with healthy behaviours becoming less of a priority, and support for

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[a] Alcohol could legally be sold for consumption off the premises (takeaways) or as room service in hotels, for guests staying for essential purposes.

[b] Natural volume is the total volume of the alcoholic drink. We use pure volume – the volume of pure alcohol (ethanol) within the drink – because pure alcohol volumes are more closely related to health impacts.

behavioural change being less accessible due to the restrictions. The UK evidence to date suggests that since the pandemic began the response has been mixed, with similar proportions of people reporting that they are drinking either more than before or less than before.[3,4,5]

This paper investigates the impact of the COVID-19 restrictions to 11 July 2020, on alcohol retail sales in Scotland, as a proxy for population alcohol consumption. Alcohol sales data provide the most accurate means of estimating population-level alcohol consumption.[6] The impacts are compared with those observed in England & Wales (combined).[c]

Research questions

The study addressed the following research questions:

1. Has COVID-19 and related restrictions affected the total volume of pure alcohol sold per adult in Scotland?
2. To what extent did any impact on per-adult alcohol sales vary by drink category?
3. How does this compare to England & Wales (combined)?

Methods

Study design

We conducted a descriptive analysis of alcohol sales per adult in the weeks before and after the COVID-19 restrictions began – by country, trade sector, and drink category – and assessed how these differed from the average for the time of year. We then undertook interrupted time series regression analyses of the impact of

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[c] England & Wales have different licensing regimes to Scotland. In particular, Minimum Unit Pricing was introduced in Scotland in May 2018, whereas it was introduced in Wales in March 2020, and has not been implemented in England.

COVID-19 and related restrictions on per-adult alcohol sales, adjusted for the underlying trends seen in previous years.

Outcome measure

The primary outcome measure in this study was the volume (litres) of pure alcohol sold per adult per week (off-trade, on-trade, and combined).

Study time period

We used on- and off-trade alcohol sales data from 1 January 2017 to 11 July 2020 (week 28 of 2020). At the end of this time series there was one week in which some on-trade premises had partially reopened in Scotland (outdoors only), and two weeks in which some had reopened in England (Table 1).

When assessing the aggregate impact of the COVID-19 restrictions we used the period from week 12 to week 28 inclusive (15 March to 11 July 2020). This 17-week period consisted of around 10 weeks of full lockdown, around 5 weeks in which people could meet with other households outdoors but hospitality venues remained closed, and around 2 weeks in which hospitality venues could trade (one before lockdown, and the other at the end of the time series). Physical distancing restrictions were in place when on-trade venues could trade.

Data

We obtained data for on-trade and off-trade alcohol sales in Scotland, and in England & Wales combined (see Appendix 1 for more details). Weekly off-trade data were provided whereas the on-trade data were provided for 4-week periods: to produce weekly estimates the on-trade volumes were divided equally between the weeks in the period. On-trade sales were not available for 12 weeks (weeks 13 to 24: 22 March to 13 June 2020 inclusive), because the data provider had insufficient data (due to low on-trade sales during the lockdown) to model sales in this period. For the purposes of our analyses, therefore, on-trade sales in these weeks were assumed to be zero.

We adjusted the off-trade data to reflect the absence of Aldi and Lidl sales, using their estimated share of the market by drink type, country and year. We estimated litres of pure alcohol sold per adult (on-trade, off-trade and combined; by type) each week from week 1 of 2017 to the end of the time series in 2020 (week 28). Our descriptive analysis compared the weeks of 2020 with pooled average figures for the same weeks of 2017–2019. Our statistical modelling (see below) used the full time series.

Statistical modelling

We used interrupted time series regression with seasonal autoregressive integrated moving average (SARIMA) errors to assess whether COVID-19 and related restrictions were associated with a change in the volume of pure alcohol sold per adult in Scotland, and England & Wales. A full description is provided in Appendix 3.

Table 1. Timeline of relevant developments in the COVID-19 pandemic in the UK.

Week number	Date	Where	What happened
10	05/03/20	UK	First COVID-19 death
11	11/03/20	Worldwide	COVID-19 declared a global pandemic
12	16/03/20	UK	All advised against unnecessary social contact and travel Mass gatherings banned
12	20/03/20	UK	Schools close for majority of pupils
12	21/03/20	UK	On-trade premises close
13	23/03/20	UK	Lockdown starts
22	29/05/20	Scotland	Allowed to meet outdoors with people not in household
23	01/06/20	England & Wales	Allowed to meet outdoors with people not in household
27	04/07/20	England	On-trade premises permitted to reopen
28	06/07/20	Scotland	On-trade premises permitted to reopen (outdoors only)

Sources:

- WHO COVID-19 timeline www.who.int/emergencies/diseases/novel-coronavirus-2019/interactive-timeline#event-71
- BBC News website www.bbc.co.uk/news
- Government webpages: www.gov.uk, www.gov.scot, https://gov.wales
- Scottish Parliament Information Centre (SPICe): https://spice-spotlight.scot/2020/12/04/timeline-of-coronavirus-covid-19-in-scotland/

Results and commentary

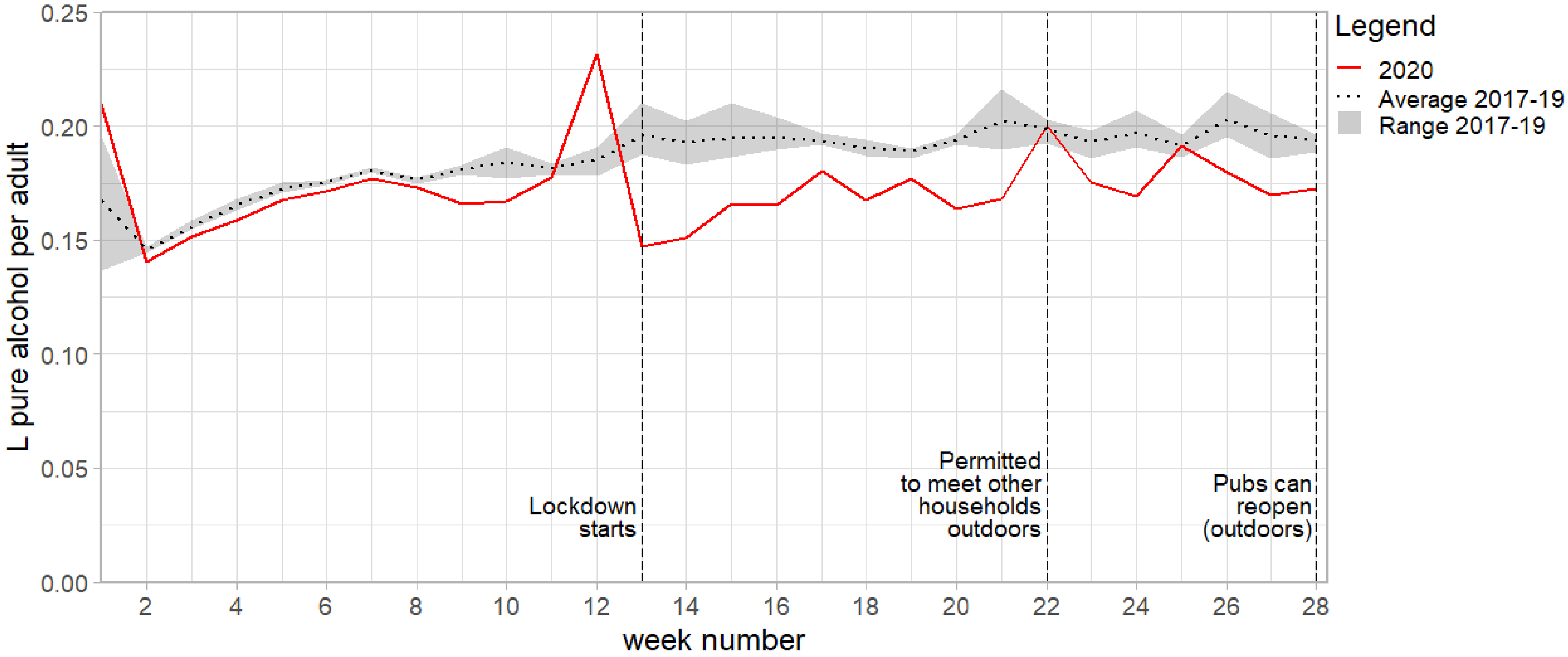
Total weekly alcohol sales: Scotland

In Scotland there was a peak in total alcohol sales in the first week of 2020 (which included New Year's Eve or Hogmanay), followed by slightly lower sales in the rest of January and February (weeks 2 to 8) when compared with the same weeks of 2017–19 (Figure 1). From late February to mid-March (weeks 9 to 11) total alcohol sales decreased to markedly lower levels than the average for the time of year (6% lower on average). Around this time the number of COVID-19 cases in the UK was increasing rapidly, the first COVID-19 death had occurred in the UK, COVID-19 was declared as a pandemic by the World Health Organization, and the UK Government was advising people to restrict activities outside the home.

The contributions of changes in on-trade and off-trade sales to these trends are shown in Figure 2. In the same weeks of 2017–19, 72% of the pure alcohol volume sold in Scotland was sold by the off-trade, and 28% by the on-trade (Appendix 2). The reduced alcohol sales in January and February (weeks 2 to 8) were largely due to lower volumes purchased from off-trade premises, although on-trade purchases were also lower than the average for the time of year. From week 9 on-trade sales decreased (compared to 2017–19) by a larger absolute amount than off-trade sales.

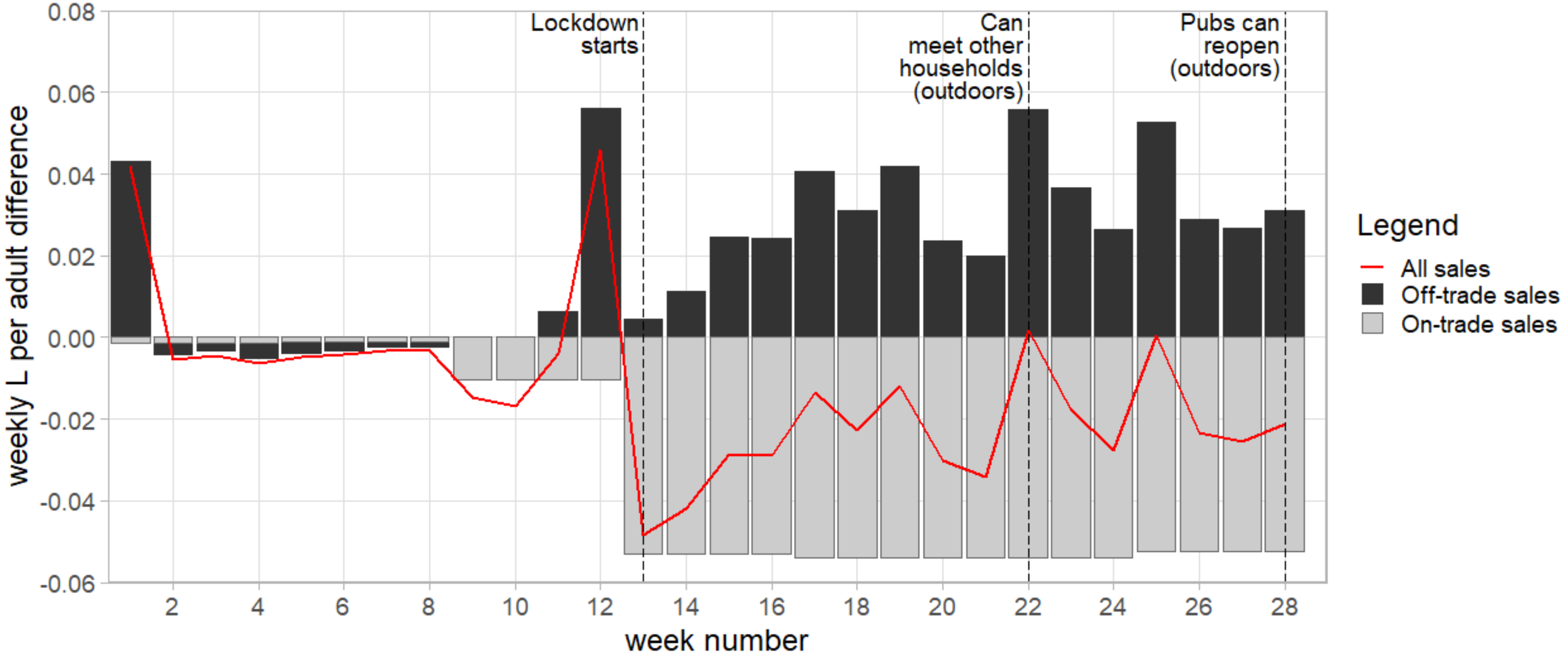
In week 12 (week commencing 15 March 2020) on-trade premises were required to close across the UK (21 March), and it was considered likely that a lockdown, as seen in other European countries, would be imposed imminently. Total alcohol sales for this week increased by 25% (0.05 L per adult) compared with the 2017–19 average (Figure 1), driven by off-trade sales being 42% higher while on-trade sales were 20% lower (Figure 2). While the increased off-trade sales will represent some increased consumption to compensate for reduced on-premises drinking, it is also likely to represent a stockpiling effect (as was seen for other groceries). The off-trade spike in this week should therefore not be interpreted as a big increase in total alcohol consumption.

Figure 1. Total weekly alcohol sales (L pure alcohol per adult, on- and off-trade combined) in Scotland in the first 28 weeks of 2020, compared with the 2017–19 average.



Note for Figure 1: In 2020, week 1 includes New Year's Eve/Hogmanay; weeks 14 and 15 include the Easter weekend and its public holidays; week 19 includes the early May public holiday; week 22 includes the late May public holiday.

Figure 2. Difference in alcohol sales (L pure alcohol per adult) in Scotland in the first 28 weeks of 2020 from the same weeks of 2017–19, by trade sector (see page 13 for explanatory notes).



Notes for Figure 2:

1 In this stacked bar chart the off-trade and on-trade differences add up to the overall difference shown by the red line. Positive (/negative) values indicate an increase (/decrease) in 2020 compared to the 2017–19 average for that week.

2 Weekly on-trade figures were estimated by dividing totals for 4-week periods equally between the relevant weeks. This resulted in estimated on-trade sales of 0.001 L per adult per week for each week of the final period (weeks 25–28), even though pubs, restaurants and cafes were not permitted to open for on-trade sales until week 28.

3 On-trade sales were assumed to be zero between weeks 13 and 24. The difference in on-trade sales shown is therefore the loss of 2017–19 average on-trade sales for that week.

In the following week (week 13, commencing 22 March 2020) lockdown was imposed across the UK to slow the spread of COVID-19. People were instructed to stay at home except for very limited purposes, such as shopping for essential items. The decrease in total alcohol sales per adult (0.05 L per adult: 25% lower than the 2017–19 average) exactly matched the increase of the previous week. This again provides evidence of likely stockpiling in week 12 and suggests that the decrease in week 13 should not be interpreted as a marked fall in consumption. Although off-trade purchases were up by 3% on the 2017–19 average this week there were no on-trade purchases (Figures 1 and 2).

In most of the subsequent weeks until the end of the time series (weeks 14 to 28: 29 March to 11 July 2020) total per-adult alcohol sales remained lower than the average for the time of year in Scotland (Figure 1), as the increase in volumes purchased in the off-trade sector did not fully compensate for the loss of on-trade purchases (Figure 2). However, in weeks 22 and 25[d] off-trade sales per adult did fully compensate for the loss of on-trade sales. In week 22 the late May public holiday occurred and it was announced that households were allowed to meet other households outdoors. The increase in off-trade sales in this week compared to 2017–19 (0.06 L per adult per week) was only matched by that in the pre-lockdown week 12 (Figure 2).

On-trade premises were permitted to serve alcohol to customers outside (for example in beer gardens) in Scotland in the last week of the time series (week 28). If our on-trade sales estimates for weeks 25–28 had all occurred in week 28, which seems likely, this would have had a marginal effect on the results due to the small volumes involved; sales in weeks 25–27 would have been reduced by 0.001 L per adult and sales in week 28 would have increased by 0.005 L per adult. On-trade

[d] If we exclude the on-trade sales figures for week 25 (obtained by dividing the week 25–28 sales data equally between the four weeks, despite sales only being permitted in week 28) it is still correct that off-trade sales fully compensated for lost on-trade sales.

sales in week 28 of 2020 would have been 90% lower than the 2017–19 average for the same week.

Total weekly alcohol sales: England & Wales

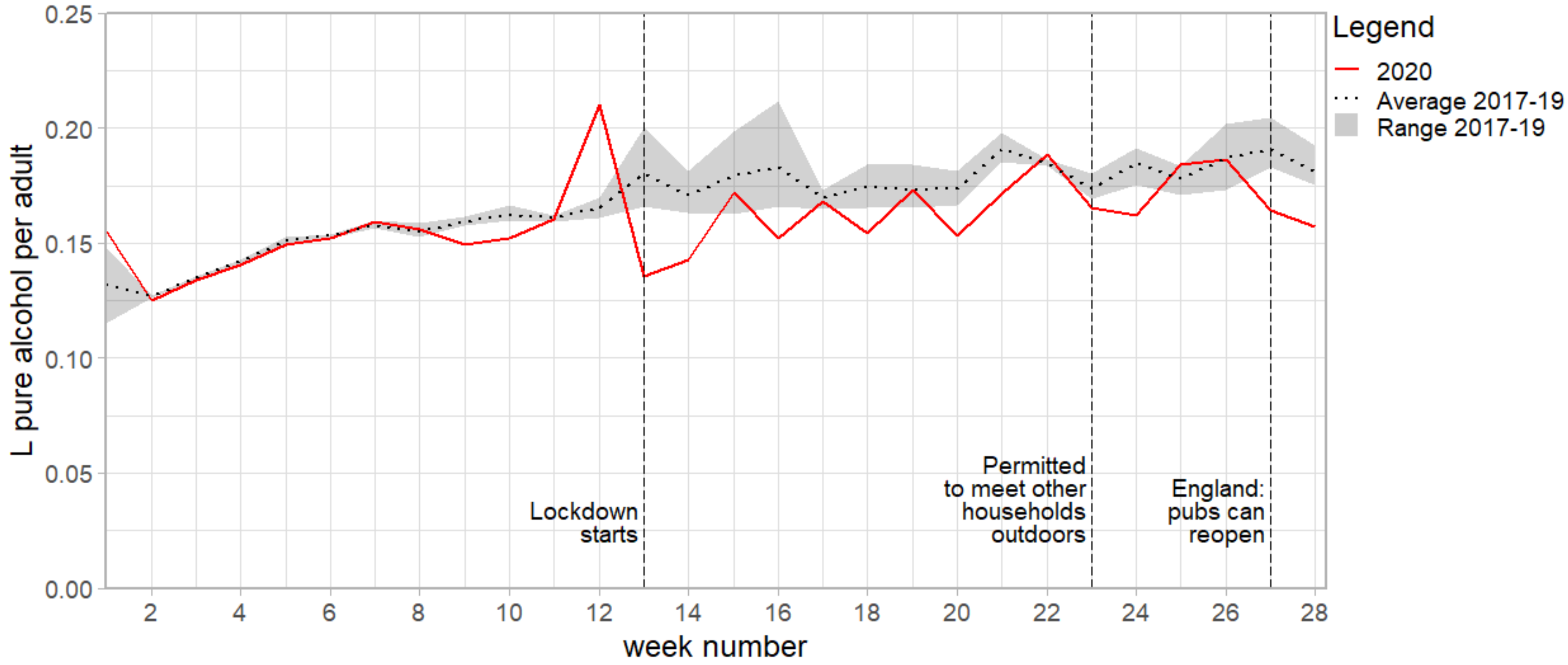
Broadly similar trends in off-trade, on-trade and total alcohol sales were observed in England & Wales in 2020 as in Scotland (Figures 3 and 4). After the peak in the first week, total alcohol sales in January and February of 2020 were around the 2017–19 average in England & Wales (weeks 2 to 8 in Figure 3). Between late February and mid-March (weeks 9 to 11) total alcohol sales were 4% lower than the average for the time of year.

In week 12, when markedly increased total alcohol sales were observed in Scotland, a slightly larger increase (27%, 0.04 L per adult) was observed in England & Wales (47% higher off-trade sales, and 22% lower on-trade sales; Figure 4). The following week (the first week of the lockdown) the increase was countered by a 25% decrease (0.04 L per adult) in total alcohol sales per adult compared with 2017–19 (Figures 3 and 4).

For the remainder of the time series in England & Wales, per-adult alcohol sales remained lower than the average for the time of year in most weeks, indicating that decreased on-trade sales were not fully compensated for by increased off-trade sales (Figures 3 and 4). In three instances, total alcohol sales in this period matched (week 19) or exceeded (weeks 22 and 25[e]) average 2017–19 sales (Figure 4). The announcement that households in England & Wales could meet other households outdoors – in week 23 – did not correspond to an off-trade peak such as that observed for Scotland (although this announcement in Scotland coincided with the late May public holiday, which may have been the driver for the increase).

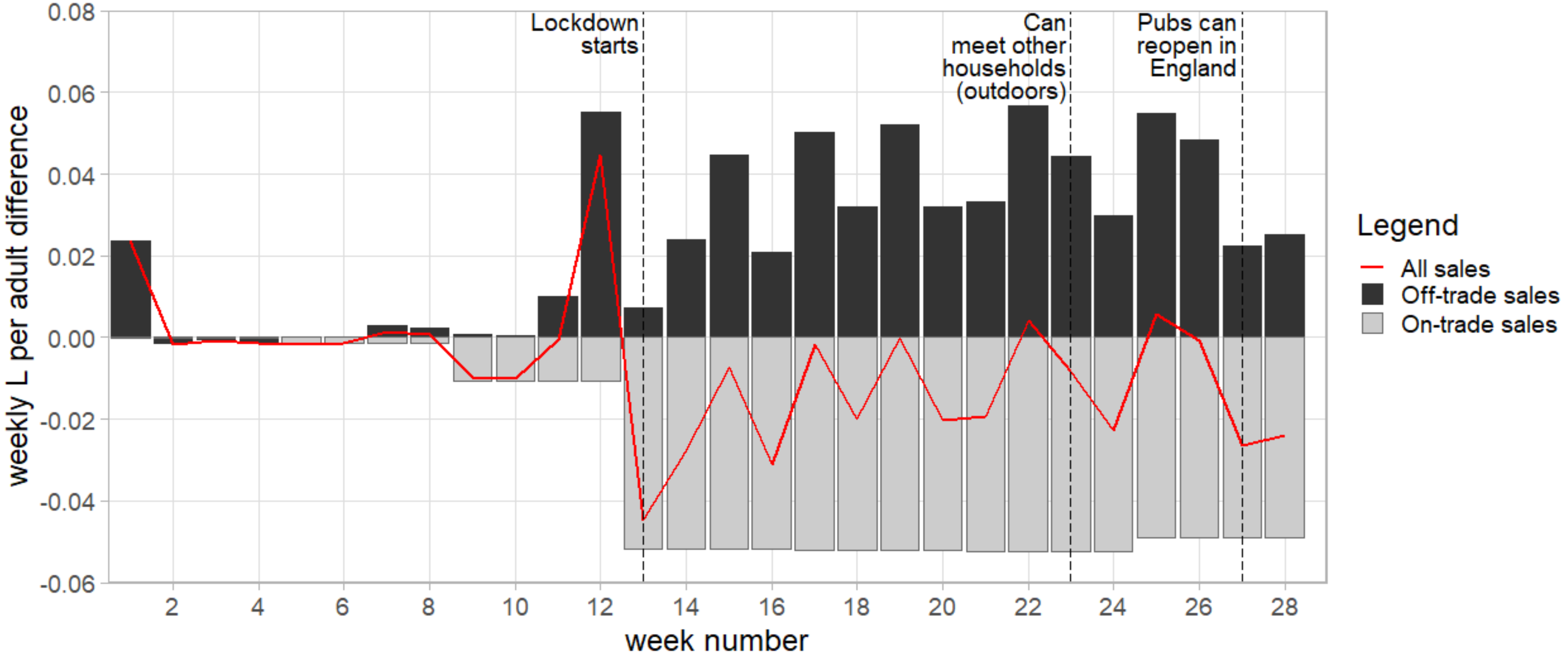
[e] If we exclude the on-trade sales figures for week 25 (obtained by dividing the week 25–28 sales data equally between the four weeks, despite sales only being permitted in weeks 27 and 28) it is still correct that off-trade sales fully compensated for lost on-trade sales.

Figure 3. Total weekly alcohol sales (L pure alcohol per adult, on- and off-trade combined) in England & Wales in the first 28 weeks of 2020, compared with the 2017–19 average.



Note for Figure 3: In 2020 week 1 includes New Year's Eve/Hogmanay; weeks 14 and 15 include the Easter weekend and its public holidays; week 19 includes the early May public holiday; week 22 includes the late May public holiday.

Figure 4. Difference in alcohol sales (L pure alcohol per adult) in England & Wales in the first 28 weeks of 2020 from the same weeks of 2017–19, by trade sector (see page 18 for explanatory notes).



Notes for Figure 4:

1. In this stacked bar chart the off-trade and on-trade differences add up to the overall difference shown by the red line. Positive (/negative) values indicate an increase (/decrease) in 2020 compared to the 2017–19 average for that week.
2. Weekly on-trade figures were estimated by dividing totals for 4-week periods equally between the relevant weeks. This resulted in estimated on-trade sales of 0.004 L per adult per week for each week of final period (weeks 25–28), even though pubs, restaurants and cafes were not permitted to open for on-trade sales until week 27.
3. On-trade sales were assumed to be zero between weeks 13 and 24. The difference in on-trade sales shown is therefore the loss of 2017–19 average on-trade sales for that week.

Weekly alcohol sales by drink category: Scotland

We present the weekly trends in sales of the seven major drink categories in the UK: beer, wine, spirits, cider, fortified wine, ready-to-drink (RTD) beverages, and perry. The results should be interpreted in the context of the wide variation in market share accounted for by these categories: in weeks 1 to 28 of 2017–19 over three-quarters of the volume of all pure alcohol sold in Scotland was accounted for by sales of off-trade wine (24%), off-trade spirits (23%) off-trade beer (17%), and on-trade beer (15%), while combined sales of fortified wine, RTD and perry accounted for just 4% (Appendix 2). We refer to fortified wine, RTD and perry as lower-volume categories as a result.

In Scotland in 2020, combined weekly sales (on- plus off-trade) of the major drink categories followed the trend in total sales to varying degrees (Figures 5a and 5b). At the start of 2020, wine, cider, and perry sales were below the 2017–19 average, while beer and spirits sales were more in line with previous years, and sales of fortified wine and RTD beverages were higher than average.

In weeks 8 to 11, when the UK Government started recommending restricting activities outside the home, beer sales fell by the largest amount (Figure 5a), largely due to reduced sales in pubs and other on-trade venues; in Scotland beer accounts for more than half of the pure alcohol sold in on-trade premises, but less than a quarter of that sold from off-trade premises.[7]

The unseasonal spike in the week before lockdown (week 12) was more pronounced for wine, spirits, and fortified wine than for beer, and the modest spike seen for cider sales only brought levels up to the 2017–19 average. It should be recalled that these increases were driven by off-trade sales (Figure 2), and could represent a stockpiling effect, so should therefore not be interpreted as a large increase in consumption.

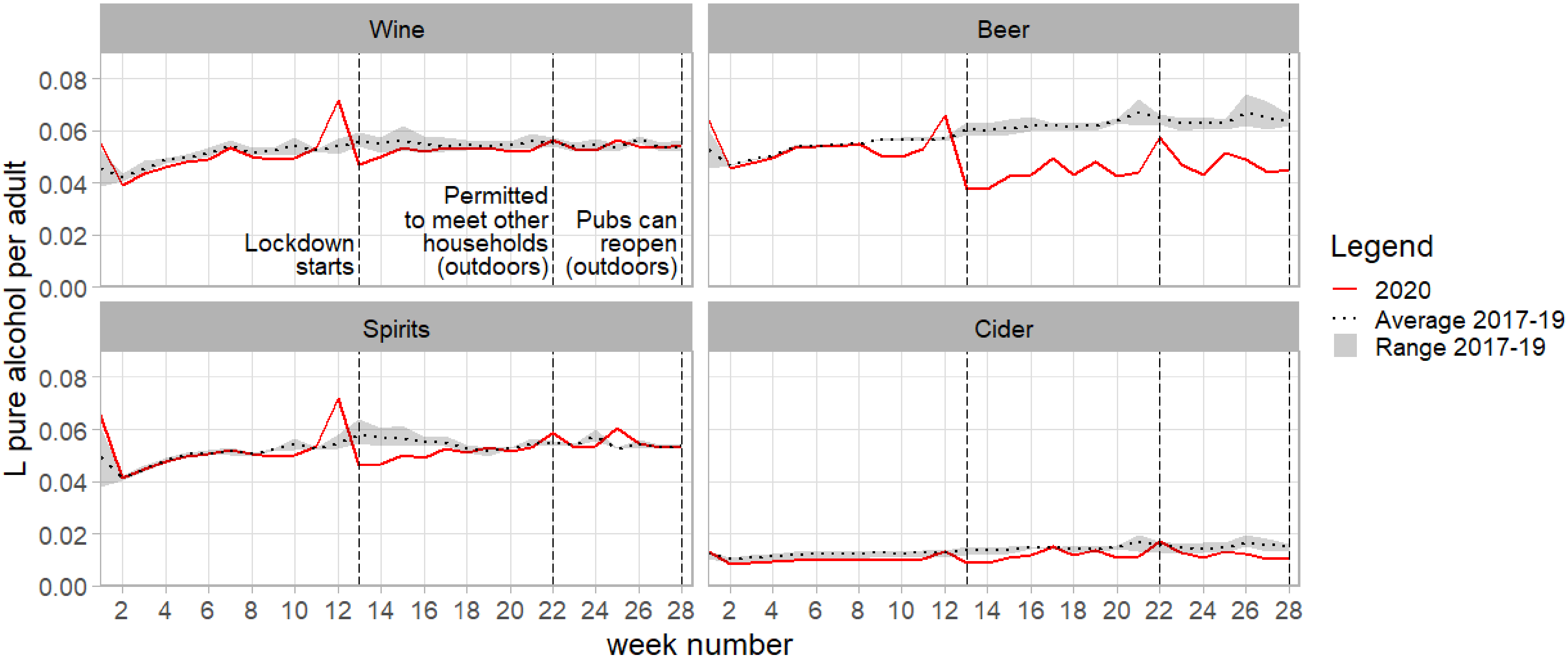
In the first week of lockdown (week 13) sales of wine, cider, spirits, and beer fell to below their pre-lockdown levels (Figure 5a), but fortified wine sales remained at elevated levels (Figure 5b). Sales of wine, cider and spirits remained low for a few weeks before returning to 2017–19 average levels, but beer sales remained markedly lower than the 2017–19 average throughout the remainder of the time series. Fortified wine sales, however, remained higher than the 2017–19 average for most of the remainder of the time series; sales only dipped below the 2017–19 average in weeks 20 and 21 (Figure 5b). RTD sales were also higher than average during the period of the COVID-19 restrictions included in our time series, with the exception of in weeks 13 and 14. Perry sales in 2020 remained lower than average throughout.

Weekly alcohol sales by drink category: England & Wales

In England & Wales, wine and fortified wine sales were lower than the 2017–19 average in early 2020, while beer, cider and perry sales were around average and spirits and RTD sales were above average (Figures 6a and 6b). As in Scotland, in weeks 8 to 11 beer sales fell by the largest amount relative to 2017–19,[f] and the week 12 spike was most pronounced for wine and spirits. When lockdown began (week 13), per-adult sales for all categories were lower than the 2017–19 average, but sales for all categories except beer returned to within the 2017–19 range within three weeks. Beer sales remained markedly lower than the 2017–19 average throughout the remainder of the time series. Sales of spirits, RTD beverages, and fortified wine remained within or above their 2017–19 range during the March to July 2020 COVID-19 restrictions.

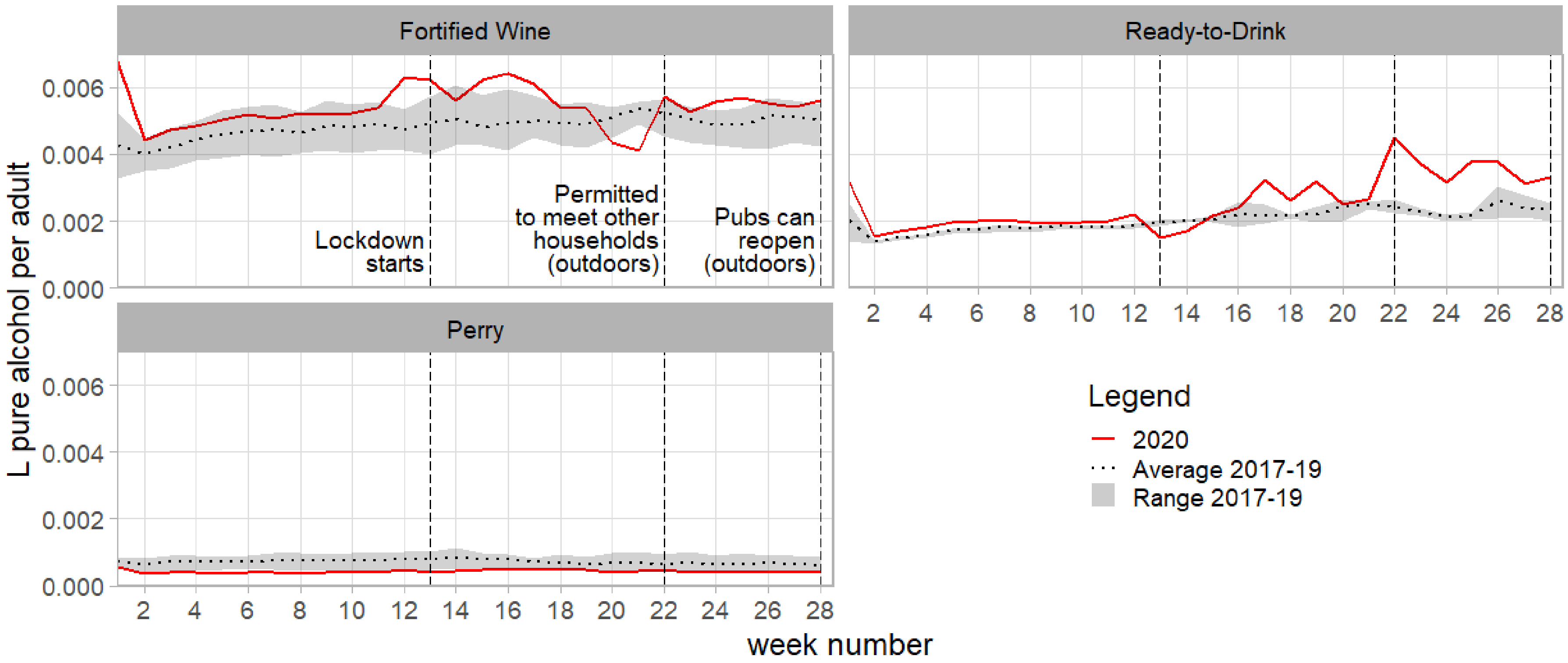
[f] In England & Wales in 2019, beer accounted for 61% of the volume of on-trade sales and 28% of off-trade sales (Giles and Richardson (2020) MESAS Monitoring Report 2020).

Figure 5a. Change in weekly alcohol sales (L pure alcohol per adult, on- and off-trade combined) in Scotland by higher-volume drink category in the first 28 weeks of 2020, compared with the 2017–19 average.



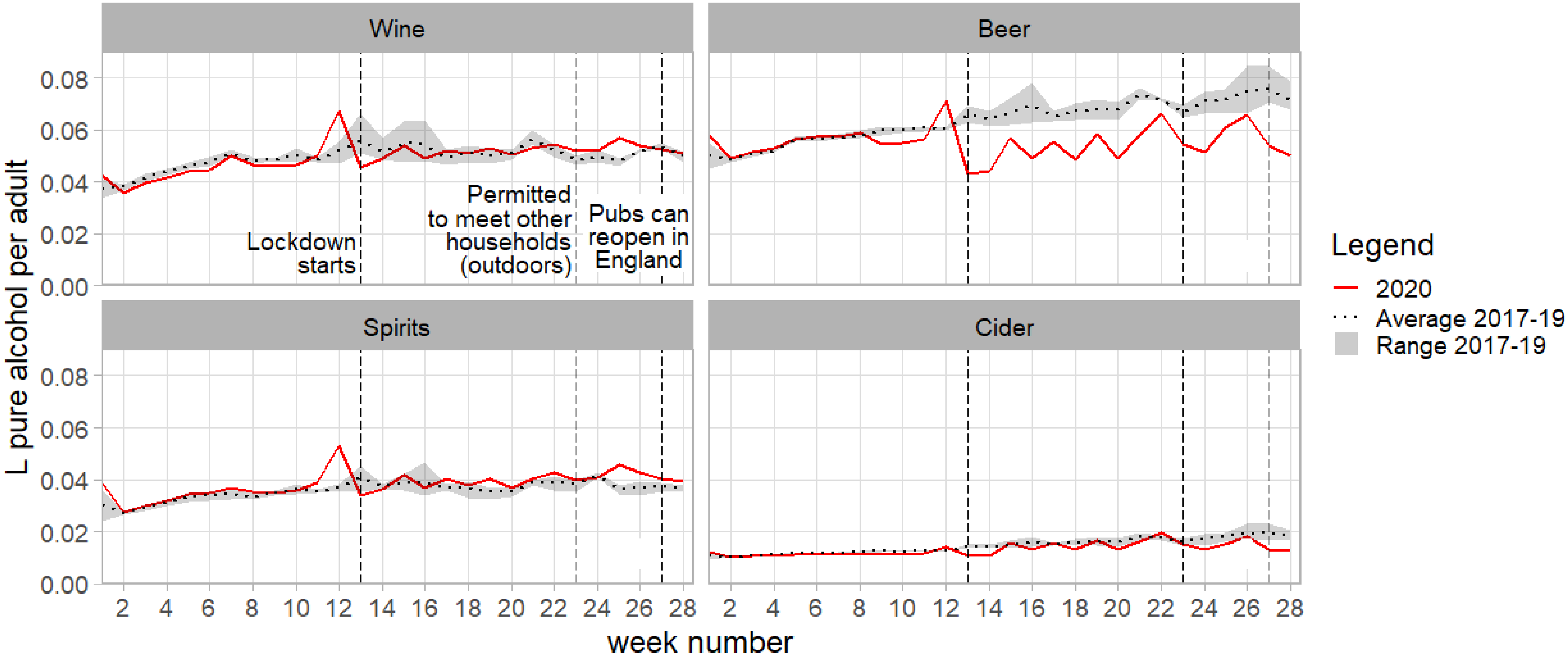
Note for Figure 5a and 5b: Figure 5a shows the higher volume categories, and 5b shows the lower volume categories (note the per-adult sales axis in Figure 5a is an order of magnitude greater than in Figure 5b).

Figure 5b. Change in weekly alcohol sales (L pure alcohol per adult, on- and off-trade combined) in Scotland by lower-volume drink category in the first 28 weeks of 2020, compared with the 2017–19 average.



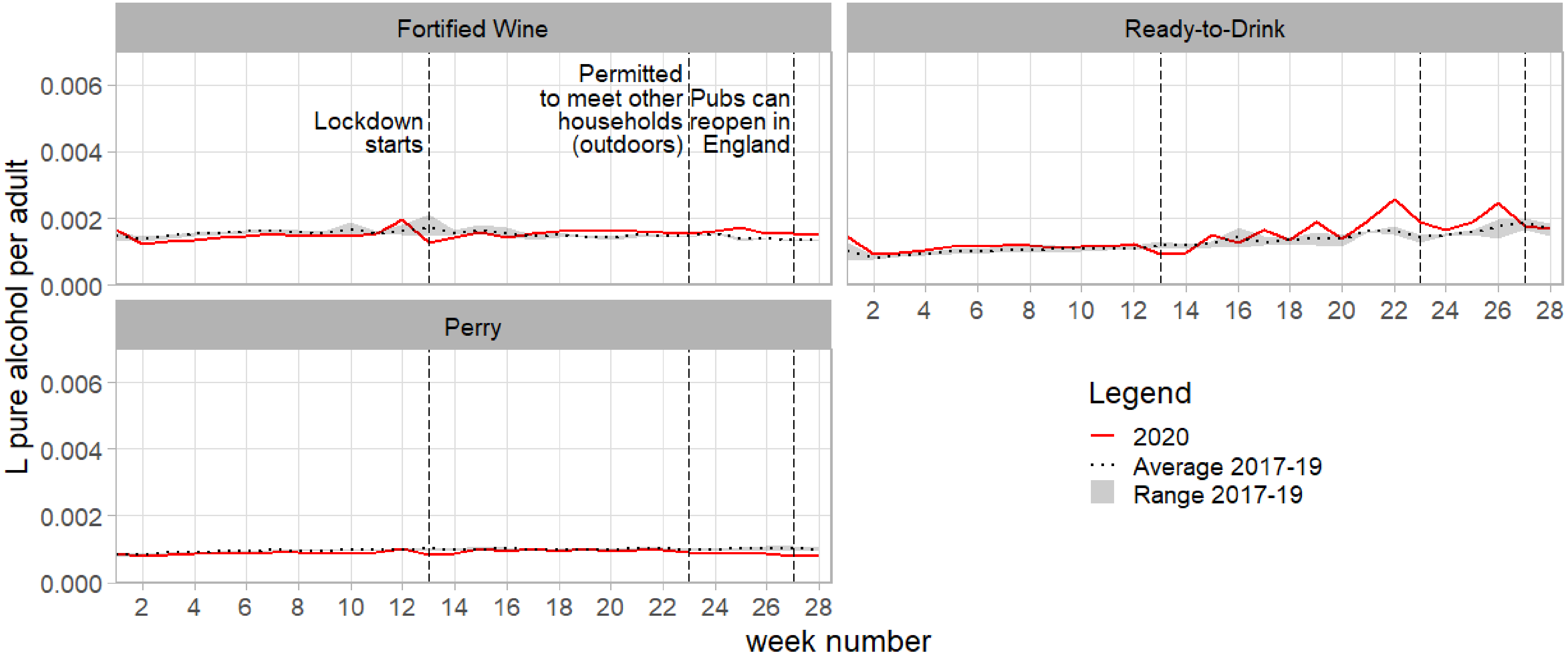
Note for Figure 5a and 5b: Figure 5a shows the higher volume categories, and 5b shows the lower volume categories (note the per-adult sales axis in Figure 5a is an order of magnitude greater than in Figure 5b).

Figure 6a. Change in weekly alcohol sales (L pure alcohol per adult, on- and off-trade combined) in England & Wales by higher-volume drink category in the first 28 weeks of 2020, compared with the 2017–19 average.



Note for Figure 6a and 6b: Figure 6a shows the higher-volume categories, and 6b shows the lower-volume categories (note the per-adult sales axis in Figure 6a is an order of magnitude greater than in Figure 6b).

Figure 6b. Change in weekly alcohol sales (L pure alcohol per adult, on- and off-trade combined) in England & Wales by lower-volume drink category in the first 28 weeks of 2020, compared with the 2017–19 average.



Note for Figure 6a and 6b: Figure 6a shows the higher-volume categories, and 6b shows the lower-volume categories (note the per-adult sales axis in Figure 6a is an order of magnitude greater than in Figure 6b).

Effect of COVID-19 and related restrictions on average sales

Alcohol sales in the 17-week study period (15 March to 11 July 2020) averaged 17.5 units per adult per week in Scotland and 16.7 in England & Wales. We used an interrupted time series (ITS) approach to model the full time series of weekly alcohol sales (2017 to July 2020), with the aim of evaluating whether COVID-19 and related restrictions were associated with a change in the volume of pure alcohol sold per adult. This statistical technique allowed us to take account of underlying trends in sales, in addition to seasonal patterns. We modelled all sales (on-trade plus off-trade) and off-trade sales. We did not model on-trade sales separately because no sales were recorded between weeks 13 and 24, due to the lockdown.

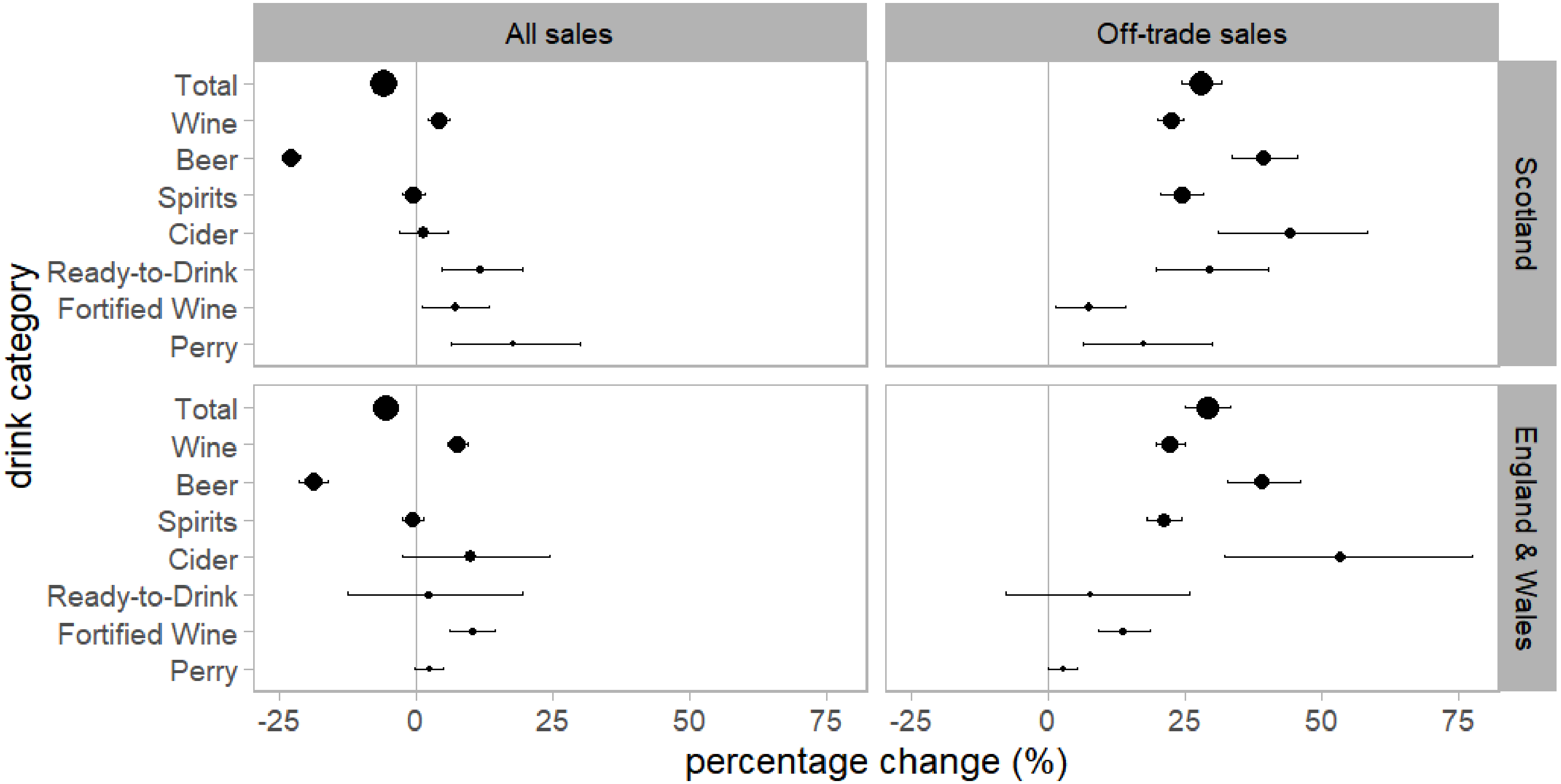
We estimated that COVID-19 and related restrictions were associated with a 6% (95% confidence interval (CI) 4 to 8%) reduction in the total mean weekly volume of pure alcohol sold per adult in Scotland, and a 6% (95% CI 4 to 7%) reduction in England & Wales (Figure 7, Appendix 3). After adjusting for seasonal patterns and underlying trends, per adult off-trade sales increased in Scotland by 28% (95% CI 24 to 32%), and in England & Wales by 29% (95% CI 25 to 33%), but these increases did not fully replace lost on-trade sales volumes.

The ITS analyses of combined on- and off-trade sales by drink category showed that the largest relative reductions in overall per-adult sales were observed for beer: a 23% reduction (95% CI 21 to 25%) in Scotland and a 19% reduction (95% CI 16 to 21%) in England & Wales (Figure 7, Appendix 3). In Scotland, the period of the COVID-19 restrictions was associated with increased per-adult sales volumes of wine (4% increase, 95% CI 2 to 6%), RTD beverages (12%, 95% CI 5 to 19%), fortified wine (7%, 95% CI 1 to 13%), and perry (18%, 95% CI 6 to 30%). In England & Wales we also found significant increases in sales of wine (8%, 95% CI 6 to 9%) and fortified wine (10%, 95% CI 6 to 15%).

Off-trade sales of most alcohol categories increased markedly, with the biggest increases seen for cider (44% (95% CI 31 to 59%) in Scotland, 53% (95% CI 32 to

78%) in England & Wales) and beer (39% (95% CI 34 to 46%) in Scotland, 39% (95% CI 33 to 46%) in England & Wales) (Figure 7, Appendix 3).

Figure 7. Impact (% change) of COVID-19 and related restrictions on all and off-trade alcohol sales, by drink category and country (see page 28 for explanatory notes).



Notes for Figure 7:

1. COVID-19 and related restrictions period: weeks 12 to 28 of 2020 (15 March 2020 to 11 July 2020, inclusive).
2. Estimates adjusted for underlying seasonal and secular trends, using interrupted time series modelling.
3. Category marker size is relative to the market share of that category.
4. Horizontal lines indicate the 95% confidence intervals (CI; the range of values around the estimate that we are 95% confident that the true value lies within). If the CI does not include zero the % change can be said to be statistically significant.

Discussion

Main findings

We found that the COVID-19 pandemic and measures to restrict its spread (to 11 July 2020) were associated with a 6% reduction in the volume of pure alcohol sold per adult in Scotland and in England & Wales, compared with expected sales based on pre-COVID-19 trends. The largest fall in sales per adult was observed for beer (23% decrease in Scotland, 19% in England & Wales); this was a major contributor to the overall absolute decrease in alcohol sales as beer sales account for around one-third of all pure alcohol sales in Scotland and England & Wales. In contrast, per-adult sales of wine increased by 4% in Scotland and 8% in England & Wales, while per-adult sales of spirits were unchanged. Weekly alcohol sales averaged 17.5 units per adult in Scotland, and 16.7 units per adult in England & Wales.

Strengths of this study

We used alcohol sales data as a proxy for population alcohol consumption: the World Health Organization considers this the most objective and reliable approach for this purpose.[6] We have investigated the validity and reliability of the available sales data in a previous study and found them to be a robust source of data for estimating per-adult consumption of alcohol.[8]

The ITS modelling we used to quantify the effect of COVID-19 and related restrictions was a robust approach because it accounted for seasonal changes and other underlying trends in alcohol sales. This strengthened the analysis, and allowed us to more confidently isolate the impact of the pandemic on alcohol sales.

Limitations of this study

The on-trade data from CGA were provided as 4-weekly aggregate figures, hence were not of a sufficient temporal resolution to show week-to-week changes. We could not assess the impact of the six days of on-trade sales in Scotland (eight days in England) that were included at the end of the time series: future work should look at a longer time series to assess these changes.

A number of on-trade premises began to sell alcohol for consumption off the premises (takeaway) during lockdown, and these sales will not have been included in either the off-trade or on-trade data. Hotels were also able to sell alcohol for room service if they had guests staying for essential purposes. We were unable to identify data for these sales so were unable to include them in the analysis. Similarly, while online purchases from supermarkets were included in the off-trade data we obtained, purchases from online specialists (for example from Majestic.com, wine clubs, or Amazon) were not included. In 2013 it was estimated that this omission would result in an underestimate of overall per adult pure alcohol sales in Scotland of 0.1L per adult per year, or about 1%.[8] The market share of online specialists is likely to have increased since 2013.[9]

The incomes of many households may have decreased due to the pandemic control measures, which may have resulted in more shopping at the discount retailers (Aldi and Lidl). Alcohol sales from these retailers are not included in the off-trade data we obtained, but we adjusted for their market share (see Appendix 1). The adjustment will have captured the period affected by the pandemic because the market share data we used have been sampled continuously across the time series.

Interpretation

In response to the pandemic and related restrictions, per-adult alcohol sales decreased in Scotland and England & Wales, although they remained above the recommended maximum of 14 units per week.[10] The reduction in alcohol sales, compared with what would be expected based on underlying and seasonal trends, was due to the closure of on-trade premises, and the concomitant increase in off-trade sales not fully replacing these lost on-trade sales volumes. Alcohol sales duty receipts for April to July 2020 confirm our finding that alcohol sales have decreased.[g,2]

The largest relative and absolute reductions in sales (on- and off-trade combined) were observed for beer: 23% reduction in Scotland and 19% reduction in England & Wales. This is because almost half the per adult volume of beer sold in these countries is sold in on-trade premises.[7] Although off-trade per-adult beer sales increased by 39% in Scotland and England & Wales during the study period, these did not replace the lost on-trade beer sales.

Our descriptive analyses suggested higher fortified wine sales in Scotland for most weeks of 2020, compared with 2017–19, and lower cider and perry sales (Figures 5a and 5b), but these trends were not seen for England & Wales. The Scottish trends mirror those reported in a study to evaluate the impact of Minimum Unit Pricing (implemented May 2018) on off-trade sales,[11] which could potentially be attributed to the large increases in the average sales prices of cider and perry due to MUP, and the resulting increased relative affordability of fortified wine, which, on average, was not impacted by the introduction of a Minimum Unit Price.[12] Although our comparison period (2017–19) includes pre- and post-MUP sales it is possible that the trends we observed could be similarly attributed.

Due to the interrupted time series method we used to analyse sales in weeks 12 to 28 we can be confident that the differences in population-level sales-based consumption we found are related to COVID-19 and the timing of the restrictions imposed to prevent its spread. While the analyses showed a reduction in total alcohol consumption at a population level, these findings may disguise a wide variety of individual and sub-group responses to the pandemic and to the related

[g] The 2.4% reduction in alcohol duty receipts for April to July 2020, compared with 2019, cannot be directly compared with our finding of a 6% reduction. This is because duty receipts also include sales in Northern Ireland and online; the tax payable varies by product and is not based solely on pure alcohol volume; and some duty payments have been delayed during the pandemic.

restrictions, including lockdown. A concerning finding emerging from different sources is that drinking at hazardous levels may have increased during lockdown, particularly among those who were already drinking at higher levels.[3,4,5,13,14,15]

The scale of the population health challenges emerging from the COVID-19 pandemic and the measures imposed to control the spread of the virus will be substantial.[16] While overall alcohol consumption may have decreased across the populations of Scotland and England & Wales it is now crucial to understand how consumption has been affected across different population sub-groups, given the emerging evidence that levels of higher-risk drinking may have increased.

Appendix 1: Alcohol retail sales data

The data

Data on alcohol retail sales in Scotland and England & Wales were obtained from market research specialists, Nielsen and CGA Strategy (CGA), for 2017 to mid-2020. The volume of alcohol sold (litres) was provided for the on-trade by CGA and for the off-trade by Nielsen, across seven alcoholic drink categories: spirits, wine, beer, cider, ready-to-drink beverages (RTDs), perry and fortified wine. A detailed description of the methods used by Nielsen and CGA to produce alcohol retail sales estimates is provided in an earlier report.[17]

Nielsen provided weekly totals (weeks commencing on Sundays), whereas CGA provided data for four-week periods (also commencing on Sundays). To produce weekly figures the CGA volumes were divided equally between the weeks in the period.

The volume of each drink category sold was converted into pure alcohol volume using a category-specific percentage alcohol by volume (ABV). The ABV used was based on the typical strength of drinks sold in that category (except for wine where the same standard ABV was applied across all years due to the complexity of the wine market) and was provided by the data suppliers.

Per-adult alcohol sales were calculated by dividing pure alcohol volumes (litres of pure alcohol) by the total population aged ≥16 years. Mid-year population estimates and projections for Scotland were obtained from National Records of Scotland and for England & Wales from the Office for National Statistics. We interpolated the population data between successive years to estimate weekly populations, as the annual population estimate related to 30 June each year (which usually falls in week 26). Interpolation is the process of estimating unknown values that fall between known values.

Both Nielsen and CGA improve their data retrospectively, therefore estimates reported here may differ slightly to those we have published previously. We consider the most recent data provided by Nielsen and CGA to be the best available as they provide the most robust view of the alcohol market.

Adjusting the data for discount retailers

From September 2011, Nielsen was no longer able to estimate off-trade sales by discount retailers Aldi and Lidl. As such, all off-trade sales data provided since then have been defined as ‘Off-trade excluding discount retailers’.

To ensure the off-trade sales data represent as much of the market as possible we adjusted the figures based on the best available estimate of the market share of Aldi and Lidl. The market share figures are drawn from Kantar Worldpanel consumer panel data. Kantar Worldpanel data are collected by a panel of households (participants aged ≥18 years) who record their grocery purchases, including alcohol, using a barcode reader. Data are only collected on purchases brought into the home and include details such as quantity, price and the store of purchase. Kantar use these data to estimate the market share of discounters in Scotland and England & Wales, by drink category. Market share estimates based on both sales volumes and values are provided on an annual basis.

We obtained discounter market share estimates for 2017 to 2019, and for the first 40 weeks of 2020 (to 4 Oct 2020). We calculated adjustment factors based on the discounter market share each year. We interpolated the adjustment factors between successive years to estimate weekly adjustment factors, which involved assuming that the annual factor applied to the middle week (week 26) of each year. We used the factors to adjust the pure volumes (described above) resulting in adjusted pure volumes.

Appendix 2: Market shares in 2017–19 (weeks 1 to 28)

Table A1: Scotland

Category	Total: L per adult per week	Total: % share of total	Off-trade: L per adult per week	Off-trade: % share of category	On-trade: L per adult per week	On-trade: % share of category
All	0.185	100.0	0.133	72.0	0.052	28.0
Beer	0.059	31.8	0.031	53.3	0.027	46.7
Wine	0.053	28.4	0.044	82.9	0.009	17.1
Spirits	0.053	28.4	0.042	79.5	0.011	20.5
Cider	0.013	7.3	0.009	70.0	0.004	30.0
Fort. Wine	0.005	2.6	0.005	98.9	<0.001	1.1
RTD	0.002	1.1	0.002	76.3	<0.001	23.7
Perry	0.001	0.4	0.001	99.9	<0.001	0.1

Table A2: England & Wales

Category	Total: L per adult per week	Total: % share of total	Off-trade: L per adult per week	Off-trade: % share of category	On-trade: L per adult per week	On-trade: % share of category
All	0.167	100.0	0.117	70.1	0.050	29.9
Beer	0.064	38.0	0.033	52.3	0.030	47.7
Wine	0.049	29.5	0.042	85.5	0.007	14.5
Spirits	0.036	21.4	0.029	80.4	0.007	19.6
Cider	0.014	8.7	0.009	65.4	0.005	34.6
Fort. Wine	0.002	0.9	0.001	95.7	<0.001	4.3
RTD	0.001	0.8	0.001	75.6	<0.001	24.4
Perry	0.001	0.6	0.001	99.3	<0.001	0.7

RTD: Ready-to-drink beverages

Fort. Wine: Fortified wine

Appendix 3: Interrupted time series methodology

Preparing the data

We assessed whether the outcome measures were normally distributed using Kernel Density plots. As our outcome measures – weekly off-trade and total alcohol sales per adult – were not normally distributed and also showed the presence of outliers, these data were transformed using the natural logarithm. This is often an important step for meeting the assumption of a normal distribution when performing Seasonal Autoregressive Integrated Moving Average (SARIMA) modelling.

Diagnosing autocorrelation and non-stationarity

The presence of serial and seasonal autocorrelation and non-stationarity was diagnosed using autocorrelation (AC) and partial autocorrelation functions (PAC). These enabled any significant correlation between error terms at different lag periods and the number of autoregressive (AR) and moving average (MA) terms to be identified and accounted for. Inclusion of deterministic terms was sufficient to address non-stationarity in the mean and variance of the data meaning that differencing was not required.

Selecting the baseline model

Candidate SARIMA models were investigated using plots and AC/PAC plots of the stationary data series. The most appropriate and parsimonious model was selected using the Akaike Information Criterion (AIC) and Bayesian Information Criteria (BIC) statistics.[18]

Testing the effect of the COVID-19 restrictions

We estimated the magnitude and uncertainty of the effect of the COVID-19 restrictions on alcohol sales by including a binary explanatory variable in our SARIMA models, with a value of zero for the time before the physical distancing measures were introduced (1 January 2017 to 14 March 2020) and a value of one from the first week of the physical distancing measures until the end of the data series (15 March 2020 to 11 July 2020). Models were all fitted assuming a change in level (mean). All models controlled for underlying trend, and the Scottish models also included a step-change variable for the start of Minimum Unit Pricing.

Assessment of model fit

For all models, standard diagnostic tests were performed to ensure that the residuals of the fitted models were not significantly different from those expected from white noise or a random series.

Software

Modelling was performed using MATLAB (Version 9.7 update 1).

Results

Change (%) in alcohol sales due to COVID-19 and related restrictions (15 March 2020 to 11 July 2020).

Table A3: Total sales, Scotland

Category	% change (95% confidence interval)	p value
All	-5.8 (-7.8 to -3.9)	<0.001
Beer	-22.8 (-24.6 to -21.1)	<0.001
Wine	4.1 (2.1 to 6.1)	<0.001
Spirits	-0.6 (-2.7 to 1.5)	0.581
Cider	1.2 (-3.1 to 5.7)	0.601
RTD	11.7 (4.6 to 19.4)	<0.001
Fortified wine	7.1 (1.0 to 13.4)	0.020
Perry	17.6 (6.3 to 30.1)	<0.001

Table A4: Off-trade sales, Scotland

Category	% change (95% confidence interval)	p value
All	28.0 (24.4 to 31.7)	<0.001
Beer	39.4 (33.6 to 45.5)	<0.001
Wine	22.4 (20.0 to 24.7)	<0.001
Spirits	24.4 (20.7 to 28.3)	<0.001
Cider	44.2 (31.1 to 58.5)	<0.001

Category	% change (95% confidence interval)	p value
RTD	29.6 (19.8 to 40.2)	<0.001
Fortified wine	7.6 (1.3 to 14.2)	0.016
Perry	17.6 (6.3 to 30.0)	0.002

Table A5: Total sales, England & Wales

Category	% change (95% confidence interval)	p value
All	-5.6 (-7.4 to -3.8)	<0.001
Beer	-18.8 (-21.4 to -16.2)	<0.001
Wine	7.5 (5.7 to 9.3)	<0.001
Spirits	-0.6 (-2.6 to 1.4)	0.560
Cider	10.0 (-2.6 to 24.3)	0.123
RTD	2.2 (-12.5 to 19.4)	0.784
Fortified wine	10.2 (6.0 to 14.5)	<0.001
Perry	2.4 (-0.2 to 5.0)	0.070

Table A6: Off-trade sales, England & Wales

Category	% change (95% confidence interval)	p value
All	29.1 (24.9 to 33.4)	<0.001
Beer	39.3 (32.7 to 46.2)	<0.001
Wine	22.3 (19.7 to 24.9)	<0.001
Spirits	21.3 (18.1 to 24.5)	<0.001
Cider	53.3 (32.3 to 77.5)	<0.001
RTD	7.7 (-7.8 to 25.8)	0.346
Fortified wine	13.7 (9.1 to 18.5)	<0.001
Perry	2.7 (0.1 to 5.4)	0.043

RTD: Ready-to-drink beverages

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