Container Deposit Scheme Price Monitoring

6-MONTH REPORT

14/06/2021

Pink Lake
analytics

Executive Summary

Based on data available to March 2021, there is not strong evidence that beverage prices have risen by more than the weighted average scheme price of 12.82 cents as a result of the introduction of the Container Deposit Scheme (CDS).

The overall estimate of price impact of the CDS on prices of non-alcoholic drinks is 10.5 cents in metro markets and 7.3 cents in regional markets. For alcoholic beverage the estimates are 7.6 cents in metro markets and 8.2 cents regional markets.

The method for estimating the price impacts is a difference-in-difference estimator, derived from fitted linear regression models of beverage prices. The models use information about the market, retailer, brand, beverage type, pack size and container size to model prices. The model also allows for a price trend over time and a one-off change at October 2020 which is measured for WA and other states separately. The WA-specific change at October 2020 is the estimate of the impact of the CDS.

The estimates of price impacts in this report are based on prices observed 12-15 months prior to and 6 months after the introduction of the CDS. Data collection is continuing and updated estimates will be produced once 12 months of post-CDS data have been collected. The additional data are expected to improve the accuracy of the estimates presented here.

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1 The Container Deposit Scheme

Western Australians can now take their empty beverage containers to a Containers for Change refund point and receive 10 cents for every eligible container returned.

The container deposit scheme, Containers for Change, commenced on 1 October 2020.

The scheme's objectives (Department of Water and Environmental Regulation *2019b*) are to:

- increase recovery and recycling of empty beverage containers
- reduce the number of empty beverage containers that are disposed of as litter or to landfill
- ensure that first responsible suppliers of beverage products take product stewardship responsibility
- provide opportunities for social enterprise and benefits for community organisations
- create opportunities for employment
- complement existing collection and recycling activities for recyclable waste.

Beverage containers between 150 millilitres and 3 litres in volume eligible for the refund include:

- soft-drink cans and bottles
- bottled waters – both plastic and glass
- small flavoured-milk drinks
- beer and cider cans and bottles
- sports drinks and spirit-based mixed drinks.

2 Price Monitoring

2.1 Economic Regulation Authority terms of reference

The Treasurer has asked the ERA to monitor and report on the prices of beverages affected by the Container Deposit Scheme.

The Western Australian Container Deposit Scheme commenced on 1 October 2020 and allows consumers to take empty beverage containers to a refund point to receive a refund of 10 cents. Introduction of the scheme will likely result in an increase in the prices of some beverages.

The Treasurer has asked ERA to report on (Hon Ben Wyatt MLA *2019*):

1. the effect of the Scheme on prices of beverages during the monitoring period;
2. the method applied by the ERA to assess the effect of the Scheme on prices of beverages during the monitoring period; and
3. recommendations to address any adverse effects on prices arising from the Scheme and on the need to continue price monitoring.

In monitoring the effect of the scheme on prices, the ERA must monitor the effect in regional and remote Western Australia.

2.2 Pink Lake Analytics terms of reference

The ERA engaged statistical consulting firm Pink Lake Analytics to assist in quantifying beverage prices changes, if any, that are attributable to the container deposit scheme for the ERA's Draft Report and Final Report.

Pink Lake Analytics was engaged to, for each of the ERA's reports:

- Review the raw datasets and prepare for analysis.
- Perform difference-in-difference analysis on each dataset for each product categories and in aggregate.
- Consider changes in price indices for beverages published by the ABS.
- Draft an analytical report on the analysis and results.

In undertaking this analysis, Pink Lake Analytics had access to the following data sets:

- Non-alcoholic beverage prices
- Alcoholic beverage prices
- Regional beverage prices.

3 Data

To meet the terms of reference of the price monitoring study, datasets need to cover both metropolitan and regional WA; other Australian states for comparison; and six types of alcoholic and non-alcoholic beverages.

The datasets available to ERA and Pink Lake Analytics are summarised in Table 3.1 and the coverage is visualised in Figure 3.1. The two metropolitan data sources are existing products from data providers. The regional dataset was commissioned by the ERA for the purpose of monitoring regional beverage prices.

Table 3.1: Data sources for price monitoring

	The Nielsen Company	**The Invigor Group**	**Goomalling Community Resource Centre**
Scope	WA and selected other states	WA and all other states	42 regional WA towns
Beverages	Non-alcoholic	Alcoholic	Alcoholic and non-alcoholic
Frequency	4 weekly	Monthly	Monthly

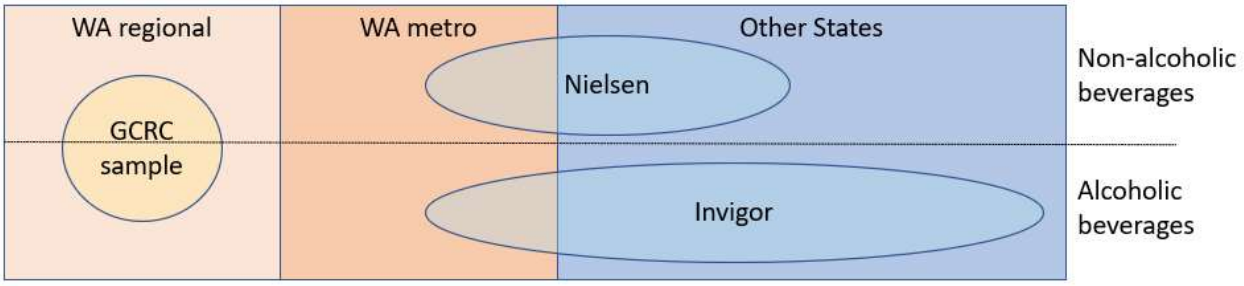

Figure 3.1: Illustration of coverage of available data

3.1 Metro WA non-alcoholic beverage prices

The metropolitan non-alcoholic beverage price data are collected by Nielsen. The data are collected via scanned receipts of purchases by consumers recruited by Nielsen for survey purposes. The drink categories are shown in Table 3.2.

Table 3.2: Drink categories - metro data, non-alcoholic beverages

Analysis category	Nielsen drink categories
Soft Drinks	Softdrinks, Energy Drinks, Flavoured Milk, Sport Drinks, Mixers, RTD_Tea
Water	MineralWater, StillFunctional_Water
Fruit Juice	Juice

The Nielsen data include the number of units of each product that have been purchased. This allows for a weighted regression model to be used that gives more weight to more commonly purchased products.

3.2 Metro WA alcoholic beverage prices

The prices of alcoholic beverages in metropolitan markets are collected by Invigor. The prices and beverage characteristics are collected via web-scraping of online liquor stores. The dataset includes every state and territory in Australia from October 2019 to March 2021 inclusive.

3.3 Regional beverage prices

Container beverage prices were collected in 42 Western Australian regional and remote towns over the period July 2019 to March 2021. Where possible, identical products were sampled each month to enable an unbroken chain of prices for individual items. As price and product information were entered manually by price collectors into spreadsheets, substantial editing was required to match individual items over time and also to use recorded information to derive the price per container.

3.4 Data quality assessment

The datasets were filtered to include only containers that are eligible containers under the CDS (Department of Water and Environmental Regulation *2019a*). Also, records were only kept in the sample if they:

1. Had a valid price or a price that could be interpreted by recorded text in the case of the regional sample (e.g. "2 for $4.00");
2. Had a valid pack size;
3. Had a price between $0.20 and $100.00 as some records clearly had incorrectly recorded the price of a different pack size to the one stated which invalidates the derived container price;
4. Had a recorded brand, container and container size; and
5. Had at least 4 observations before the introduction of the CDS and 4 observations after.

The sample sizes remaining after each of these steps are shown in Table 3.3. The last step of filtering, requiring that there are at least 4 observations before and after the CDS introduction, removes a potential bias due to products that are only captured in the later months of the study. For example, the web-scraping of alcoholic beverage prices included more products as time went on. If these newly added products were of higher value than the average, this would introduce an upward bias to the measurement of price changes over time.

There was no requirement that identical products were sampled across states. Such a restriction would exclude many products that are particular to, or popular in, certain states. The modelling methods employed do not require that identical products are present in WA and comparison state samples. Some products in the comparison states were excluded from the regional data analysis (cider and RTDs sold in packs of 24 or more) because this was a broad class of products priced in metropolitan online stores but not collected in the regional data; and pack size had a very strong relationship with container price.

Due to the restrictions in place to prevent the spread of COVID-19, data collection in regional stores was paused over March and April 2020. There were also fewer locations sampled in May 2020. The missing data during this period does not preclude the use of the statistical models presented here. Time in these models is an attribute of each price measurement than can partially explain variation in price via a linear trend over time and a shift in level at the time of the CDS introduction. Each price measurement has the time attribute recorded so such modelling is possible. This kind of missing data problem would be more of an issue with a time series model such as an autoregressive model that assumes time series data with regular frequency.

The trajectories of prices over time for individual goods are shown in Figures 4.1 and 4.2. Although there are many items represented on the same plot in these figures, the transparency of the lines allows the overall dispersion and trend of the prices to be observed. The darker paths in soft drinks and water show that many items had a constant price until October 2020 and then a uniform increase. This shows that some products have little fluctuation over time whereas others vary greatly.

Table 3.3: Sample sizes through editing stages

	Price recorded	Pack size recorded	Price trimmed	Brand recorded	n >=4 pre/post
Soft drinks	8541	7762	7745	7548	4770
Water	5445	4547	4539	4221	1807
Fruit juice	6219	701	701	688	440
Beer	7595	7342	7340	7187	3939
Cider	1522	1485	1485	1435	900
RTD	4598	4489	4488	4327	2925

4 Modelling Price Changes

The concept of statistical modelling of the price impact of the CDS is to develop a model for price that that explains a product's price in terms of the characteristics of the product and the market. If variation in pricing can also be usefully explained by whether the product is for sale before or after the introduction of the CDS, the influence of this factor in dollar terms can be estimated.

4.1 Difference-in-difference estimator

The difference-in-difference estimator is the parameter estimate from a fitted model of beverage price. This is the estimator used in the monitoring of beverage prices by other regulators in NSW (Independent Pricing and Regulatory Tribunal NSW *2018*) and Queensland (Queensland Productivity Commission *2020*) and is the estimator preferred by the ERA. The qualities of this estimator have been reviewed in depth and found to be well-suited to the purpose of estimating the change in price attributable to the introduction of the CDS in WA.

The difference-in-difference estimator can be implemented by both a multiple linear regression model and a linear mixed effects model.

The purpose of including the linear mixed effects model in the analysis is to observe how sensitive the estimates of price impacts are to the choice of model. We would expect the two methods to give similar results, although the mixed effects model would normally give lower standard errors. The multiple linear regression model has a more natural way of including weighted data via weighted least squares. This makes the multiple linear regression model more desirable for the aggregate estimates for non-alcoholic and alcoholic beverages which use weights to include the relative importance of the individual beverage types.

The two models are defined below.

4.1.1 Multiple linear regression model

The form of the linear model is as follows:

$$P_{it} = \beta_0 + \beta_1 \text{WA}_i + \beta_2 \text{CDSWA}_t + \beta_3 \text{WA}_i \times \text{CDSWA}_t + \boldsymbol{\gamma}\mathbf{X}_{it} + \epsilon_{it}$$

Where:
P_{it} is the price in dollars of item i at time t,
$\text{WA}_i = 1$ if the i^{th} price comes from Western Australia and 0 otherwise,
$\text{CDSWA}_t = 1$ if time t is after the introduction of the CDS in Western Australia and 0 otherwise,
$\mathbf{X}$ is a matrix of explanatory variables known for the i^{th} measurement at time t, and
The parameter of interest as a measure of price impact of the introduction of the CDS on Western Australian prices is β_3.

Prices from multiple states are modelled so that any effect that coincides in timing with the introduction of the CDS in WA but affects multiple states does not confound the estimate of the introduction of the CDS on prices in WA.

The linear model was implemented with the *lm()* function in the base *stats* package of R. This function uses a direct method to solve the linear least-squares problem to fit the model. To keep only those explanatory variables that were useful in explaining variation in price, step-wise variable selection was used based on the Akaike Information Criterion (AIC[1]). This was implemented with the *stepAIC* function from the Modern Applied Statistics with S (*MASS*) package (Venables and Ripley *2002*). This procedure helps to select a parsimonious model[2] for container price. The variables that this procedure selected can be seen in the output in the Appendix.

4.1.2 Linear mixed effects model

An alternative to the multiple linear regression model given above is a linear mixed effects model. The linear mixed effects model includes a random effect for the variation between individuals. In this case, an individual is a particular product on a shelf of a particular store and its price is monitored over time. The variation between individuals is captured by the μ_i term in the model equation below, where each i is particular product in a particular store measured at time t.

$$P_{it} = \mu_i + \beta_0 t + \beta_1 \text{WA}_i + \beta_2 \text{CDSWA}_t + \beta_3 \text{WA}_i \times \text{CDSWA}_t + \epsilon_{it}$$

The linear mixed effects model was implemented with the *lme()* function in the *nlme* package of R (Pinheiro et al. *2020*). The *lme()* function uses a restricted maximum likelihood method for parameter estimation.

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[1] *Akaike information criterion - Wikipedia*

[2] That is, favouring a simple model if it has the same predictive power as a more complex model.

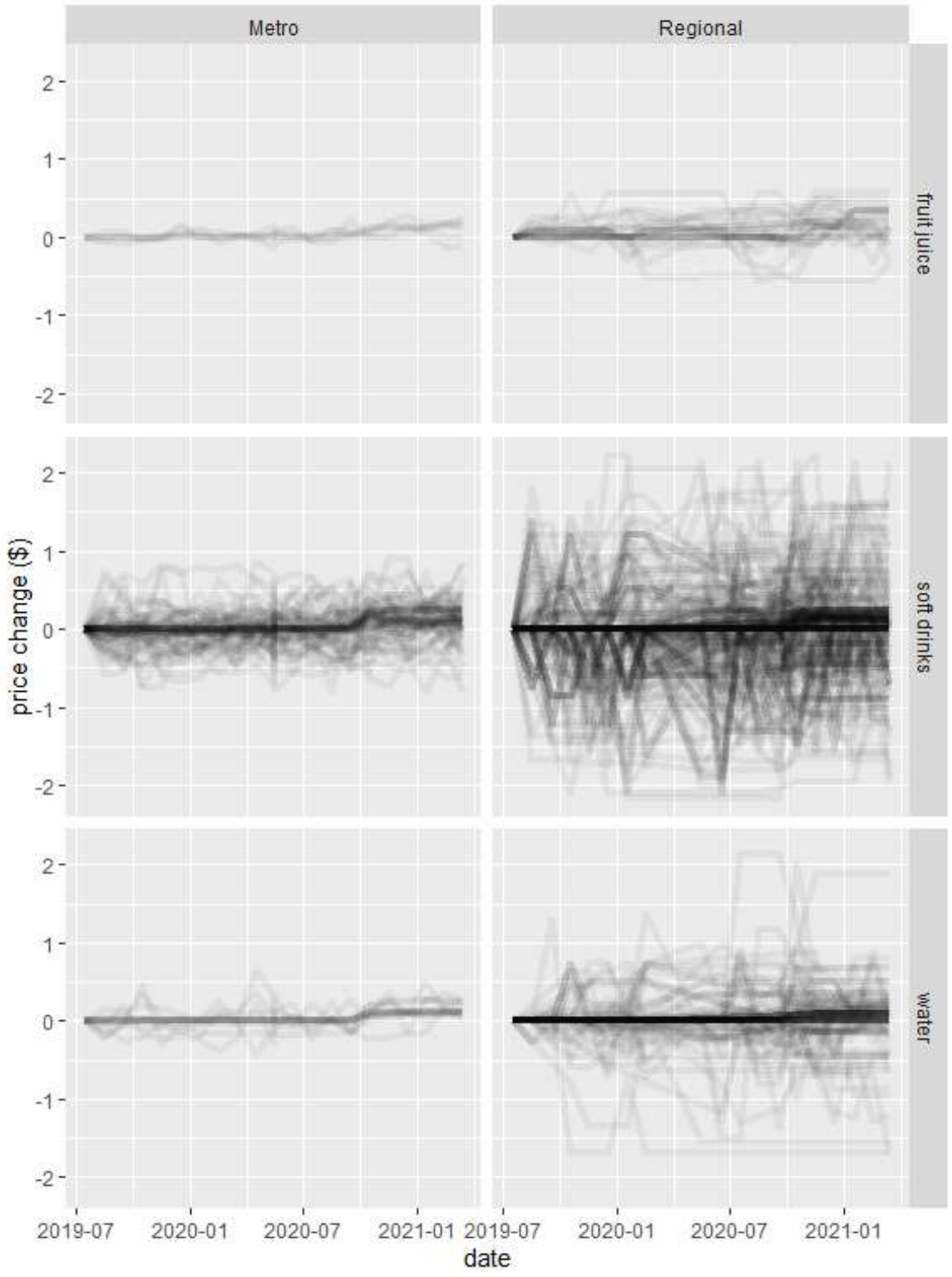

Figure 4.1: Price changes over time in WA non-alcoholic beverages. Each line represents an individual store item. Darker grey lines show multiple items with the same price overlayed. Zero on the y-axis represents the first price observed for the individual product.

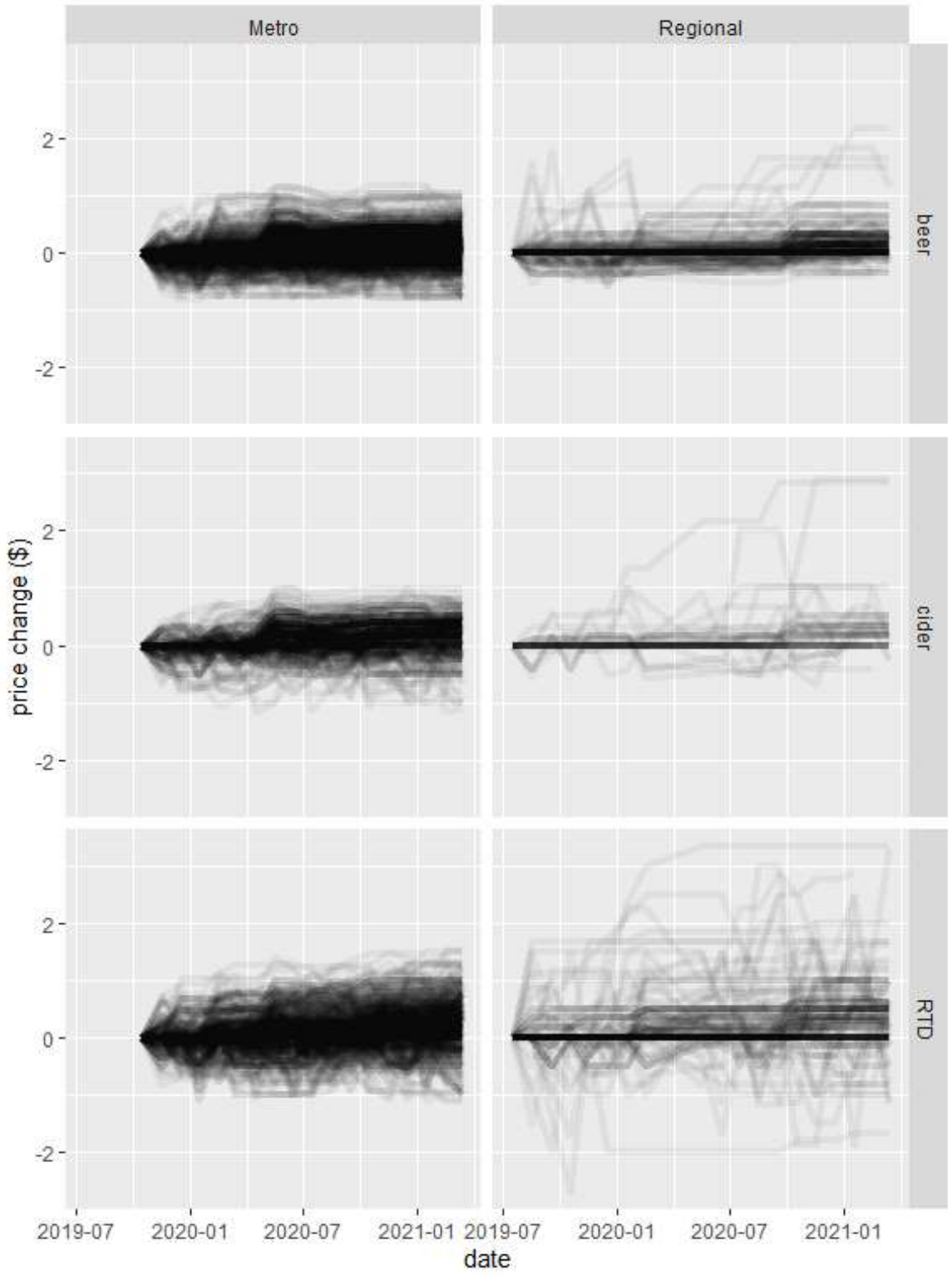

Figure 4.2: Price changes over time in WA alcoholic beverages. Each line represents an individual store item. Darker grey lines show multiple items with the same price overlayed. Zero on the y-axis represents the first price observed for the individual product.

4.2 Combining data sources

In order to create an estimate of the price impact of the CDS across non-alcoholic beverages and across non-alcoholic beverages, the available data need to be weighted in some way so that drink categories that account for more sales have more influence on the overall estimate. The metropolitan non-alcoholic data have sale volumes for each product and these are used in estimation for each drink category and for the overall metropolitan non-alcoholic beverage estimate. The relative contribution of soft drinks, water and fruit juice observed in the metropolitan sample can also be used to weight these three drink categories in the regional data to get an estimate for non-alcoholic drinks.

The relative contribution of each non-alcoholic drink category is shown in Table 4.1.

Table 4.1: Share of non-alcoholic drink categories according to Nielson data

Drink category	Share (%)
Fruit juice	3.85
Soft drinks	77.90
Water	18.25

For alcoholic drinks, the relative market share of beer, cider and RTDs is measured in market research (Roy Morgan *2019*) and discussed in industry commentary (Jackson *2019*). This analysis of Australian consumer habits in 2019 indicate the market share to be approximately as in Table 4.2.

Table 4.2: Share of alcoholic drink categories according to Roy Morgan research

Drink cateogry	Share (%)
Beer	82.3
Cider	7.0
RTD	10.7

4.3 Variable Selection

The explanatory variables available for modelling of metro non-alcoholic beverage prices were:

- state
- product_class
- brand_class
- retailer_class
- pack_class
- container volume
- time

For alcoholic drinks in metro sample:

- state
- product_class
- brand_class
- material
- retailer_class
- pack_class
- ml_containers
- time

The regional sample included the same variables as well as a variable describing remoteness of the town where the sample was collected.

State

The states available in the Nielson dataset were WA, NSW, Queensland and Victoria.The Invigor dataset based on web-scraped data cover all states and territories.

Table 4.3: States available.

Non-alcoholic	**Alcoholic**
Western Australia	Western Australia
New South Wales	New South Wales
Victoria	Victoria
Queensland	Queensland
	South Australia
	Tasmania
	Northern Territory
	Australian Capital Territory

The results for alcoholic beverages below are presented for two different sets of comparison states: Firstly, for NSW, Victoria and Queensland; and secondly for all states. This allows observation of sensitivity of estimates to the set of states used for comparison.

Product class

Product classes give more detail on the nature of the product, below the drink category. This can help explain variation in pricing. For example, all else being equal, a low alcohol beer will be cheaper than full-strength due to taxation.

Table 4.4: Product classes

Drink Category	Product classes
Soft drinks	Energy Drinks; Flavoured milk; Iced tea/coffee; Mixers; Soft drinks; Sport_Drinks
Water	Mineral Water; Still Water
Fruit juice	Fruit juice
Beer	Full strength major; Full strength other; Low alcohol
Cider	Cider-apple; Cider-other; Cider-pear
RTD	Whisky ; Rum; Vodka; other

Brand class

Non-alcoholic beverage brands were classified into three categories: Major Brands, Tier 2 brands; and Other brands. These are in Table 4.5.

Table 4.5: Brand categories - non-alcoholic beverages

Drink Category	Major Brands	Tier 2
Soft Drinks	Coca-Cola Amatil, Asahi	Private Labels (Woolworths,Coles,Aldi)
Water	Coca-Cola Amatil, Asahi	Private Labels (Woolworths,Coles,Aldi)
Fruit Juice	Lion, Asahi,Heinz	Private Labels (Woolworths,Coles,Aldi)

Alcoholic beverage brands were classified into three categories shown in Table 4.6 according to the parent company of the brand.

Table 4.6: Brand categories - alcoholic beverages

Drink Category	Brand group 1	Brand group 2
Beer	Carlton United Breweries / Asahi	Lion / Kirin
Cider	Carlton United Breweries / Asahi	Lion / Kirin
RTD	Carlton United Breweries / Asahi	Diageo

Retailer class

Different classes of retailers may have different pricing levels or changes. This variable allows to model to account for variation in pricing caused by the diversity in types of retailers in the sample

Table 4.7: Retailer categories - non-alcoholic beverages

Retailer class	Retailers
Major Retailers	Woolworths, Coles
Tier 2 Retailers	IGA Group, Aldi, Farmer Jacks
Other Retailers	Others

Table 4.8: Retailer categories - alcoholic beverages

Retailer class	Retailers
Coles Retailers	Coles group liquor stores
Woolworths Retailers	Woolworths group liquor stores
Hotel	Pubs and HOtels (regional dataset only)
Other Retailers	Others

Pack class

Mean container price is strongly negatively correlated to the number of containers in the pack. For alcoholic drinks packs of size 4 are common and these container prices are similar to single container prices. Lower prices emerge as pack sizes reach 6 and again when they reach 24.

Table 4.9: Pack class

Non-alcoholic	Alcoholic
1	1<6
2+	6<24
	24+

Container size

For non-alcoholic beverages, the container size classes in Table 4.10 are used. For alcoholic beverage containers, there is less variation in container size and the volume of the container in millilitres is used as a continuous explanatory variable.

Table 4.10: Container size

Container size	Container volume
Small	599ml or less
Medium	600-1000ml
Large	1001ml or more

Time

The month and year in which the measurement is taken is also entered as an explanatory variable to model a linear trend over time.

Remoteness

The Australian Statistical Geographic Standard codes each area in Australia to a remoteness index. The towns in the regional data sample were each matched to their given remoteness classification by postcode.

Table 4.11: ASGS remoteness categories

Remoteness level
Inner Regional Australia
Outer Regional Australia
Remote Australia
Very Remote Australia

5 Results

The estimates of the price change attributable to the introduction of the CDS are shown in Figure 5.1. The bars represent 95% confidence intervals around the parameter estimates. The two models, multiple linear model and linear mixed effects models, produce broadly similar estimates of price impact. The linear mixed effects model produces estimates with narrower confidence intervals as this model uses the added information of the same product being measured over time.

Impact estimates for some beverages have quite wide 95% confidence intervals. For example RTDs and cider in regional markets and water and fruit juice in metropolitan markets. This reflects lower sample sizes for these beverages as well as variation in container prices that is less well explained by the known characteristics of the products and retailer. There is more sample available for the beverages that make up a larger proportion of the aggregate non-alcoholic and alcoholic beverage classes. In the case of the regional sample, it is by design that soft drinks and beer have more products in sample than other beverages. The estimates for aggregate non-alcoholic and alcoholic beverage classes benefit from this design and have improved accuracy.

The regional cider sample gives an estimate of price change that is well above the 12.82 cent weighted average scheme price and the 95% confidence interval for the linear mixed model estimate lies above this point too. The regional sample for cider can be seen in Figure 4.2 to have a small sample and some products with very high price increases over this period. The addition of further sample with 6 more months of price records may moderate this output.

The estimated price changes, with standard errors in brackets, are also recorded in Table 5.1 to Table 5.4. Confidence intervals are obtained based on normal approximations to the distribution of

estimators. These are calculated via the R functions *confint.lm* for multiple linear regression models and *intervals.lme* for the linear mixed models.

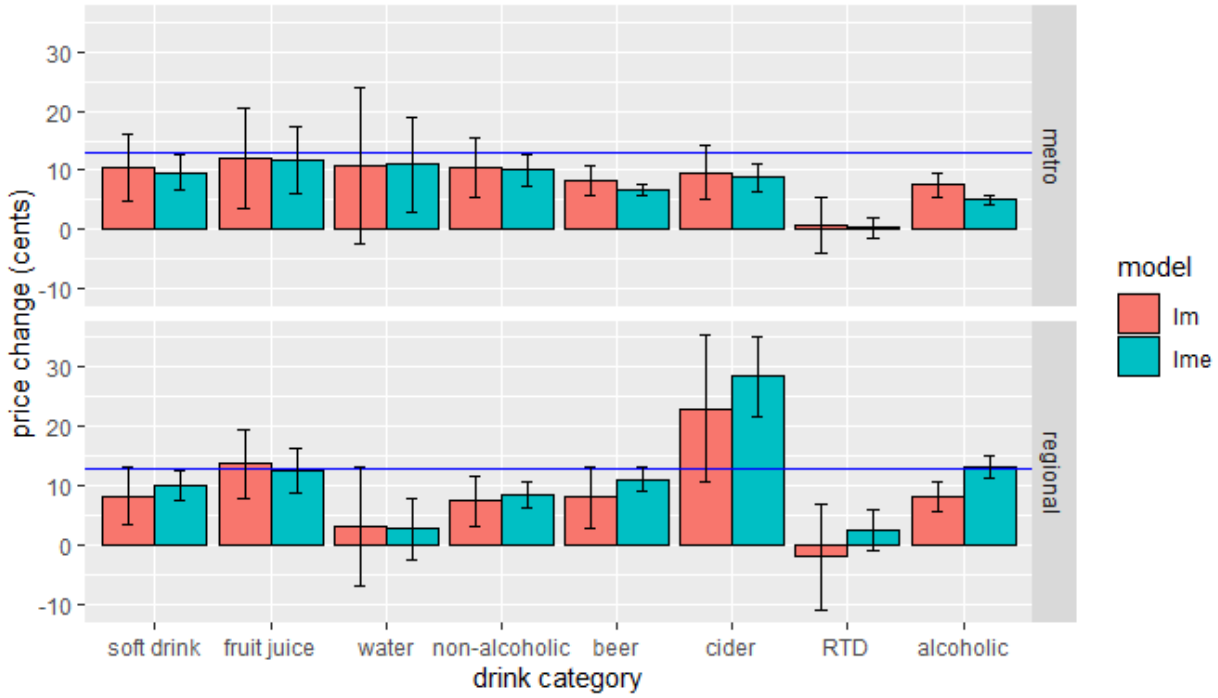

Figure 5.1: Estimated price changes with error bars representing 95% confidence intervals. Horizontal blue line is at 12.82 cents, the weighted average scheme price. Data are from WA,NSW,QLD and VIC.

*Table 5.1: CDS price change estimate (standard error) for metropolitan non-alcoholic beverage markets. *, **, *** denote estimates significantly different to zero at 0.1, 0.05 and 0.01 levels respectively. '$$' means that the estimate is also significantly higher than 12.82 cents at the 0.05 level. 95% confidence intervals are shown underneath each estimate.*

Region	model	subset	soft drinks	water	fruit juice	non-alcoholic
Metro	lm	WA+NSW+QLD+VIC	***10.4(2.9)	10.8(6.7)	***11.9(4.3)	***10.5(2.5)
			(4.7,16.2)	(-2.3,23.9)	(3.5,20.4)	(5.5,15.5)
Metro	lme	WA+NSW+QLD+VIC	***9.6(1.5)	***11.0(4.0)	***11.7(2.9)	***10.0(1.4)
			(6.6,12.6)	(3.1,18.9)	(6,17.4)	(7.3,12.7)

*Table 5.2: CDS price change estimate (standard error) for metropolitan alcoholic beverage markets. *, **, *** denote estimates significantly different to zero at 0.1, 0.05 and 0.01 levels respectively. '$$' means that the estimate is also significantly higher than 12.82 cents at the 0.05 level. 95% confidence intervals are shown underneath each estimate.*

region	model	subset	Beer	cider	RTD	Alcoholic
metro	lm	all	***9.1(1.2)	***9.5(2.2)	1.2(2.2)	***8.2(0.9)
			(6.6,11.5)	(5.2,13.8)	(-3.1,5.5)	(6.4,10.1)
metro	lm	WA+NSW+QLD+VIC	***8.3(1.4)	***9.7(2.4)	0.7(2.4)	***7.6(1.0)
			(5.6,10.9)	(5,14.3)	(-4,5.4)	(5.5,9.6)
metro	lme	all	***7.2(0.5)	***8.8(1.2)	0.3(0.8)	***5.3(0.4)
			(6.3,8.2)	(6.5,11.1)	(-1.3,1.9)	(4.5,6.1)
metro	lme	WA+NSW+QLD+VIC	***6.7(0.5)	***8.8(1.2)	0.3(0.9)	***5.0(0.4)
			(5.6,7.7)	(6.5,11.1)	(-1.4,2.1)	(4.2,5.9)

*Table 5.3: CDS price change estimate (standard error) for regional non-alcoholic beverage markets. *, **, *** denote estimates significantly different to zero at 0.1, 0.05 and 0.01 levels respectively. '$$' means that the estimate is also significantly higher than 12.82 cents at the 0.05 level. 95% confidence intervals are shown underneath each estimate.*

Region	model	subset	soft drinks	water	fruit juice	non-alcoholic
regional	lm	WA+NSW+QLD+VIC	***8.1(2.5)	3.1(5.2)	***13.7(3.0)	***7.3(2.2)
			(3.1,13.1)	(-7,13.2)	(7.8,19.6)	(3,11.5)
regional	lme	WA+NSW+QLD+VIC	***10.0(1.3)	2.7(2.6)	***12.6(2.0)	***8.4(1.1)
			(7.4,12.7)	(-2.4,7.8)	(8.7,16.5)	(6.2,10.6)

*Table 5.4: CDS price change estimate (standard error) for regional alcoholic beverage markets. *, **, *** denote estimates significantly different to zero at 0.1, 0.05 and 0.01 levels respectively. '$$' means that the estimate is also significantly higher than 12.82 cents at the 0.05 level. 95% confidence intervals are shown underneath each estimate.*

region	model	subset	beer	cider	RTD	alcoholic
regional	lm	all	***8.6(2.6)	$$***24.1(6.3)	-1.0(4.3)	***9.0(1.2)
			(3.6,13.6)	(11.7,36.4)	(-9.4,7.4)	(6.6,11.4)
regional	lm	WA+NSW+QLD+VIC	***8.1(2.6)	***23.1(6.3)	-1.9(4.6)	***8.2(1.3)
			(3,13.2)	(10.6,35.5)	(-10.8,7.1)	(5.7,10.7)
regional	lme	all	***11.7(1.0)	$$***29.3(3.6)	*3.1(1.7)	***13.7(0.9)
			(9.6,13.7)	(22.3,36.4)	(-0.2,6.5)	(12,15.5)
regional	lme	WA+NSW+QLD+VIC	***11.2(1.0)	$$***28.4(3.4)	2.6(1.8)	***13.2(0.9)
			(9.1,13.2)	(21.7,35.1)	(-1,6.1)	(11.4,15)

Tables 5.1 to 5.4 show that in general the two modelling methods produce similar estimates of price impact. For metropolitan non-alcoholic drinks the estimate of price impact is similar across the three beverage types. Metropolitan data produce large standard errors on estimates for water and fruit juice compared to soft drinks. This is due to the larger sample size for soft drinks, as illustrated in Figure 4.1. For metropolitan alcoholic drinks, beer and cider had similar estimates of price impact, all below the 12.82 cent level. There was no statistically significant CDS impact observed for RTDs in metropolitan data. The overall estimate for alcoholic drinks is driven by the measurement for beer, which accounts for the majority of volume in this category.

Regional data produced similar estimates of price impact to metropolitan data for soft drinks and fruit juice but there was no statistically significant price movement observed in water. The standard errors for the regional non-alcoholic data were slightly smaller than from the metropolitan dataset, owing to the larger sample size obtained by the sampling of stocked items in regional areas versus items purchased by participating consumers in the metropolitan market.

As was the case in the metropolitan market, there was no statistically significant CDS price impact observed for RTDs in the regional data. The estimated price impact for cider in the regional data was large, the only estimate in the study that exceeded the 12.82 cent level at the 0.05 level of statistical significance[3].

5.1 CDS impact as measured by CPI

The official Consumer Price Index (CPI) is released quarterly by the Australian Bureau of Statistics (Australian Bureau of Statistics *2021*). The CPI follows 87 expenditure classes that are priced over time in each of the 8 capital cities. Of these, the following have been analysed in this section:

[3] This means that if the true price increase was 12.82 cents, we would expect to observe movements at least as large as we observed in regional cider prices less than 5% of the time, if we repeated this sampling and estimation study many times.

1. Beer
2. Waters, soft drinks and juices
3. Alcoholic beverages
4. Spirits
5. Milk
6. Wine

The first two expenditure classes should be mostly made up of beverage containers that are eligible for the CDS. The third is a broader expenditure group that includes some eligible beverages. The fourth expenditure class includes RTD beverages but also straight spirit products. The last two expenditure classes are not CDS eligible (small flavoured milk which is CDS eligible would contribute little or no share to the CPI series for milk).

The CPI growth in these expenditure classes for Perth can be seen in Figure 5.2 alongside the CPI series for the same measures in other capitals. This figure shows that *beer* and *waters, soft drinks and juices* increase sharply after the September 2020 quarter whereas *milk* and *wine* have no noticeable increase beyond the CPI series for other states.

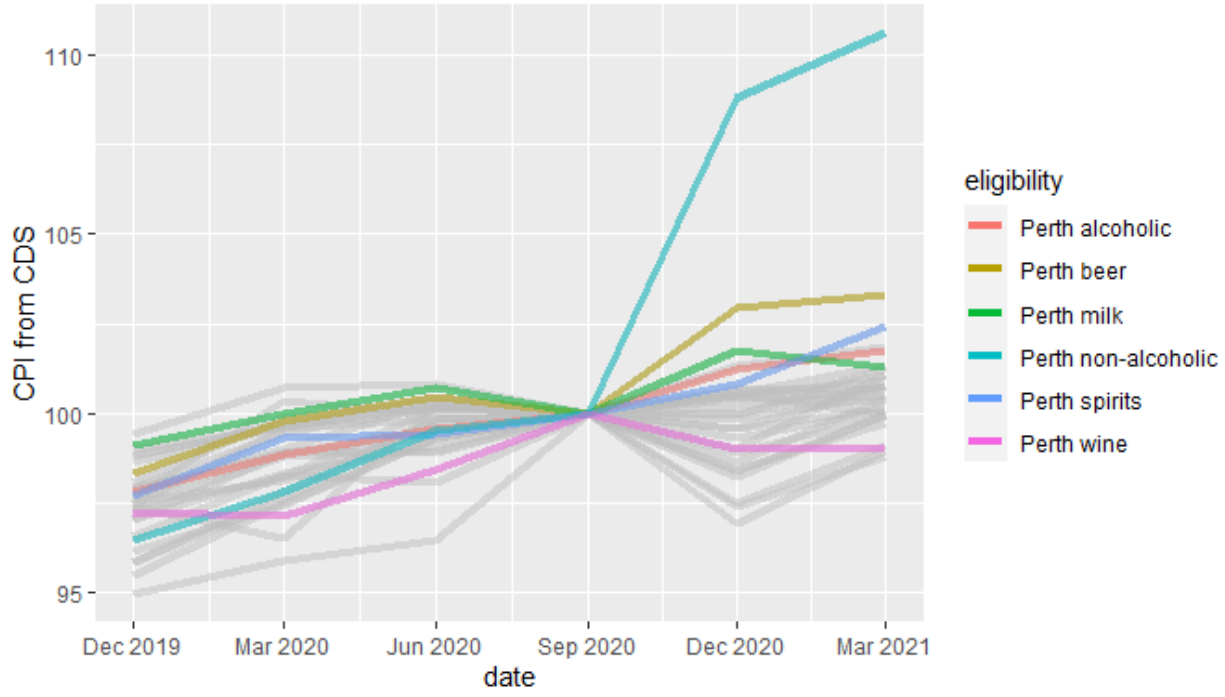

Figure 5.2: CPI series for studied expenditure classes in Perth. Other capital CPI series shown in grey. Series have been indexed to 100 at September 2020, the last publication before the introduction of the CDS.

As the CPI is is published as an index, we can look at the growth of prices in each of these expenditure classes from before 1st October 2020 to after. We do this by comparing the 4 quarters of data before this date and the 2 quarters currently available after. We can compare the growth in price in Perth to that of other capitals and from this estimate the impact of the CDS on Perth prices in percentage terms. That is, the growth in price in Perth is modelled as the growth in price in other capitals times the growth attributable to the introduction of the CDS. Applying this percentage impact to the median

beverage container price observed before the CDS introduction from the Invigor and Nielsen data, an estimate of the price impact in cents is calculated.

Table 5.5: Changes to CPI pre (4 quarters) and post (2 quarters) CDS introduction. Container price is median Perth price pre-CDS.

	CPI change Perth (%)	CPI change other capitals (%)	CDS impact (%)	Container price ($)	CDS impact (cents)
Alcoholic beverages	2.4	1.1	1.3	3.43	4.3
Beer	3.5	0.7	2.8	2.82	7.8
Milk	1.6	0.8	0.8	-	-
Spirits	2.6	1.2	1.3	-	-
Waters, soft drinks and juices	11.4	0.6	10.7	1.22	13.1
Wine	0.8	1.4	-0.6	-	-

The results, given in Table 5.5, show that the highest impacts on CPI are in the expected expenditure classes of *Beer* and *Waters, soft drinks and juices*. The impacts in terms of cents are not too different from those of our own analysis of retailer data. For beer, the impact is estimated to be 7.8 cents (compared to 8.3 cents from the analysis of Invigor data).

For the *Waters, soft drinks and juices* the impact is estimated to be 13.1 compared to the impact on non-alcoholic beverages from the analysis of Nielsen data of 10.4 cents.

6 Recommendations for 12 Month Analysis

To avoid bias from products that were only sampled before or after the introduction of the CDS, individual items were only kept in sample if they had prices recorded for at least 4 months prior to and 4 months after the CDS introduction. Table 3.3 shows the reduction in usable sample caused by imposing this data quality rule. With an additional 6 months of sample, there should be more items that meet this criteria, which will increase the sample size and improve accuracy of estimates. For items already in the sample, the additional time points also increases the effective sample size.

The increase in sample size may also allow for more flexible modelling options. For example, all covariates currently enter the models as linear terms but a non-linear relationship between price and, say, time or container size may become clearer with more data.

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Appendix

A Models for metro prices

The metro output from the linear models fitted to each dataset are given in this section. The parameter if interest, representing the estimate of price change attributable to the introduction of the CDS in WA, is *WA:WA_CDS* and in this output is expressed in dollars.

*Table 1 Metro soft drink model. *, **, ***' mean estimate is significantly different to zero at 0.1, 0.05 and 0.01 levels respectively.*

Observations	Residual Std. Error	R^2	Adjusted R^2
12,188	3.588	0.7268	0.7264

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	-0.5507953	6.246e-01	-0.8819	3.779e-01	
WA	-0.1949207	1.625e-02	-11.9934	5.903e-33	* * *
WA_CDS	-0.0366066	1.409e-02	-2.5980	9.389e-03	* *
stateQLD	-0.0444979	9.805e-03	-4.5381	5.730e-06	* * *
stateVIC	-0.1745691	9.944e-03	-17.5554	3.729e-68	* * *
product_classFlavoured_Milk	0.0126623	2.418e-02	0.5236	6.005e-01	
product_classMixers	-0.6600660	2.479e-02	-26.6220	8.024e-152	* * *
product_classRTD_Tea	0.4263860	2.858e-02	14.9165	7.095e-50	* * *
product_classSoftdrinks	-0.5801413	2.166e-02	-26.7894	1.169e-153	* * *
product_classSport_Drinks	-0.8933469	2.972e-02	-30.0594	1.495e-191	* * *
brand_classother	-0.3011203	9.543e-03	-31.5529	4.166e-210	* * *
brand_classtier 2	-1.0427334	1.318e-02	-79.1447	0.000e+00	* * *
retailer_classother	0.2770162	3.449e-02	8.0327	1.041e-15	* * *
retailer_classtier 2	-0.0474947	1.210e-02	-3.9251	8.716e-05	* * *
pack_classsingle	1.0873447	2.072e-02	52.4770	0.000e+00	* * *
container_sizeM	0.8499897	1.794e-02	47.3877	0.000e+00	* * *
container_sizeS	0.1330843	2.011e-02	6.6183	3.787e-11	* * *
time	0.0001137	3.406e-05	3.3402	8.398e-04	* * *
WA:WA_CDS	0.1044214	2.920e-02	3.5756	3.508e-04	* * *

*Table 2 Metro water model. *, **, ***' mean estimate is significantly different to zero at 0.1, 0.05 and 0.01 levels respectively.*

Observations	Residual Std. Error	R^2	Adjusted R^2
2,926	3.829	0.645	0.6436

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	0.533694	0.06361	8.3907	7.433e-17	* * *
WA	-0.186899	0.03653	-5.1164	3.316e-07	* * *
WA_CDS	0.038295	0.02010	1.9053	5.683e-02	
stateQLD	-0.004317	0.02221	-0.1944	8.459e-01	
stateVIC	-0.134083	0.02120	-6.3245	2.931e-10	* * *
product_classStillFunctional_Water	0.636351	0.02077	30.6436	5.374e-179	* * *
brand_classother	0.085241	0.03744	2.2770	2.286e-02	*
brand_classtier 2	-0.673924	0.03762	-17.9133	3.698e-68	* * *
retailer_classtier 2	-0.056514	0.02347	-2.4081	1.610e-02	*
pack_classsingle	1.044379	0.03921	26.6342	4.573e-140	* * *
container_sizeM	0.129353	0.03461	3.7375	1.895e-04	* * *
container_sizeS	0.242494	0.06251	3.8791	1.072e-04	* * *
WA:WA_CDS	0.107725	0.06670	1.6150	1.064e-01	

*Table 3 Metro fruit juice model. *, **, ***' mean estimate is significantly different to zero at 0.1, 0.05 and 0.01 levels respectively.*

Observations	Residual Std. Error	R^2	Adjusted R^2
1,144	1.104	0.947	0.9466

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	-0.1677586	8.642e-01	-0.1941	8.461e-01	
WA	-0.1034228	2.339e-02	-4.4219	1.073e-05	* * *
WA_CDS	-0.0459420	1.946e-02	-2.3606	1.841e-02	*
stateQLD	0.0032158	1.322e-02	0.2433	8.079e-01	
stateVIC	-0.0746748	1.428e-02	-5.2276	2.043e-07	* * *
brand_classother	1.0115470	2.050e-02	49.3357	1.575e-284	* * *
brand_classtier 2	-0.0981374	1.246e-02	-7.8749	7.936e-15	* * *
container_sizeS	-1.6213278	2.684e-02	-60.3994	0.000e+00	* * *
time	0.0001281	4.717e-05	2.7147	6.734e-03	* *
WA:WA_CDS	0.1194543	4.293e-02	2.7827	5.480e-03	* *

*Table 4 Metro beer model. *, **, ***' mean estimate is significantly different to zero at 0.1, 0.05 and 0.01 levels respectively.*

Observations	Residual Std. Error	R^2	Adjusted R^2
65,892	0.7775	0.6912	0.6911

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	-7.7153187	7.170e-01	-10.7611	5.530e-27	* * *
WA	0.0080266	8.849e-03	0.9071	3.644e-01	
WA_CDS	-0.1083309	1.268e-02	-8.5430	1.336e-17	* * *
materialglass	0.1480768	6.735e-03	21.9856	9.595e-107	* * *
product_classbeer-full strength other	0.2813922	7.696e-03	36.5655	8.255e-290	* * *
product_classbeer - low alc	-0.3737359	1.244e-02	-30.0344	7.505e-197	* * *
brand_class_fineLion	0.0164356	8.884e-03	1.8501	6.430e-02	
brand_class_fineother	0.0388409	7.622e-03	5.0956	3.486e-07	* * *
retailer_classwoolworths	0.1472959	8.705e-03	16.9211	4.298e-64	* * *
pack_class6<24	-1.3163665	9.235e-03	-142.5373	0.000e+00	* * *
pack_class24+	-2.4709335	8.829e-03	-279.8676	0.000e+00	* * *
ml_containers	0.0075362	6.776e-05	111.2232	0.000e+00	* * *
time	0.0005111	3.897e-05	13.1126	3.123e-39	* * *
WA:WA_CDS	0.0827075	1.354e-02	6.1092	1.007e-09	* * *

*Table 5 Metro cider model. *, **, ***' mean estimate is significantly different to zero at 0.1, 0.05 and 0.01 levels respectively.*

Observations	Residual Std. Error	R^2	Adjusted R^2
21,840	0.7695	0.705	0.7048

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	-9.7939129	1.214e+00	-8.069	7.429e-16	***
WA	0.0256187	1.766e-02	1.450	1.469e-01	
WA_CDS	-0.1216902	2.164e-02	-5.623	1.897e-08	***
stateQLD	0.0406332	1.564e-02	2.597	9.403e-03	**
stateVIC	-0.0175937	1.485e-02	-1.185	2.361e-01	
materialglass	0.4955139	1.286e-02	38.521	3.878e-314	***
product_classCider-other	0.4384981	1.251e-02	35.055	5.913e-262	***
product_classCider-pear	-0.2580632	1.882e-02	-13.713	1.269e-42	***
brand_class_fineLion	0.6449758	2.535e-02	25.439	1.036e-140	***
brand_class_fineother	0.4829203	1.481e-02	32.618	6.598e-228	***
retailer_classwoolworths	0.2576590	1.487e-02	17.330	7.830e-67	***
pack_class6<24	-1.8515118	1.480e-02	-125.140	0.000e+00	***
pack_class24+	-2.2475869	1.408e-02	-159.646	0.000e+00	***
ml_containers	0.0088645	1.458e-04	60.816	0.000e+00	***
time	0.0005631	6.599e-05	8.534	1.511e-17	***
WA:WA_CDS	0.0965127	2.357e-02	4.095	4.236e-05	***

*Table 6 Metro RTD model. *, **, ***' mean estimate is significantly different to zero at 0.1, 0.05 and 0.01 levels respectively.*

Observations	Residual Std. Error	R^2	Adjusted R^2
36,150	0.9975	0.4797	0.4795

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	-6.9176832	1.208e+00	-5.7254	1.040e-08	***
WA	0.0210179	1.755e-02	1.1973	2.312e-01	
WA_CDS	0.0485832	2.126e-02	2.2856	2.228e-02	*
stateQLD	0.0169749	1.543e-02	1.1000	2.713e-01	
stateVIC	-0.0390398	1.479e-02	-2.6403	8.287e-03	**
materialglass	0.0597066	1.348e-02	4.4303	9.437e-06	***
product_classRTD-other	-0.4540944	1.778e-02	-25.5443	1.177e-142	***
product_classRTD-rum	-0.4736952	1.845e-02	-25.6769	4.167e-144	***
product_classRTD-vodka	-0.4946546	1.498e-02	-33.0168	1.497e-235	***
brand_class_fineDiageo	0.7067366	1.994e-02	35.4423	1.672e-270	***
brand_class_fineother	0.3253205	1.767e-02	18.4130	2.288e-75	***
retailer_classwoolworths	0.0699377	1.358e-02	5.1518	2.594e-07	***
pack_class6<24	-1.6912046	1.490e-02	-113.4935	0.000e+00	***
pack_class24+	-1.9875090	1.262e-02	-157.4576	0.000e+00	***
ml_containers	0.0042476	1.193e-04	35.6118	4.935e-273	***
time	0.0006033	6.568e-05	9.1843	4.356e-20	***
WA:WA_CDS	0.0068974	2.417e-02	0.2854	7.754e-01	

B Models for regional prices

The regional output from the linear models fitted to the dataset are given in this section. The parameter if interest, representing the estimate of price change attributable to the introduction of the CDS in WA, is *WA:WA_CDS* and in this output is expressed in dollars.

*Table 7 Regional soft drink model. *, **, ***' mean estimate is significantly different to zero at 0.1, 0.05 and 0.01 levels respectively.*

Observations	Residual Std. Error	R^2	Adjusted R^2
15,066	0.6784	0.7112	0.7107

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	2.091595	0.03912	53.4604	0.000e+00	* * *
WA	-0.634557	0.06747	-9.4048	5.948e-21	* * *
WA_CDS	-0.009907	0.01501	-0.6599	5.093e-01	
stateQLD	-0.082116	0.01599	-5.1368	2.830e-07	* * *
stateVIC	-0.154723	0.01657	-9.3389	1.107e-20	* * *
remotenessOuter Regional Australia	0.004228	0.03339	0.1266	8.992e-01	
remotenessRemote Australia	-0.101191	0.03513	-2.8801	3.981e-03	* *
remotenessVery Remote Australia	0.313352	0.03674	8.5298	1.604e-17	* * *
product_classFlavoured_Milk	-0.466664	0.02652	-17.5981	1.240e-68	* * *
product_classiced tea / coffee	0.111342	0.02941	3.7854	1.540e-04	* * *
product_classMixers	-1.183204	0.03520	-33.6110	7.179e-239	* * *
product_classSoftdrinks	-1.032355	0.02246	-45.9738	0.000e+00	* * *
product_classSport_Drinks	-0.787941	0.03570	-22.0697	2.982e-106	* * *
brand_classother	-0.273370	0.01601	-17.0714	9.862e-65	* * *
brand_classtier 2	-0.874054	0.02773	-31.5222	3.001e-211	* * *
brand_classCoca-Cola	1.047633	0.03130	33.4742	5.141e-237	* * *
brand_classAsahi	0.887449	0.05182	17.1261	3.930e-65	* * *
retailer_classother	0.430047	0.03838	11.2054	4.997e-29	* * *
retailer_classtier 2	0.046994	0.01892	2.4838	1.301e-02	*
retailer_classMajor	-1.030960	0.04832	-21.3380	1.501e-99	* * *
retailer_classTier 2	-0.487737	0.04515	-10.8028	4.196e-27	* * *
pack_classsingle	1.031819	0.02186	47.2033	0.000e+00	* * *
pack_class1<6	2.217253	0.03537	62.6866	0.000e+00	* * *
container_sizeM	0.709228	0.01767	40.1364	0.000e+00	* * *
container_sizeS	-0.028577	0.02106	-1.3572	1.747e-01	
WA:WA_CDS	0.081071	0.02548	3.1820	1.465e-03	* *

*Table 8 Regional water model. *, **, ***' mean estimate is significantly different to zero at 0.1, 0.05 and 0.01 levels respectively.*

Observations	Residual Std. Error	R^2	Adjusted R^2
4,271	0.7773	0.6137	0.6119

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	1.054552	0.06055	17.4168	1.118e-65	* * *
WA	-1.023163	0.08799	-11.6283	8.622e-31	* * *
WA_CDS	0.006774	0.03516	0.1927	8.472e-01	
stateQLD	-0.071880	0.03940	-1.8246	6.813e-02	
stateVIC	-0.157374	0.03683	-4.2732	1.969e-05	* * *
remotenessOuter Regional Australia	-0.121775	0.05863	-2.0772	3.785e-02	*
remotenessRemote Australia	-0.294799	0.06249	-4.7173	2.467e-06	* * *
remotenessVery Remote Australia	0.054902	0.07443	0.7376	4.608e-01	
product_classStillFunctional_Water	0.422702	0.03003	14.0771	5.050e-44	* * *
brand_classother	-0.168047	0.04503	-3.7322	1.923e-04	* * *
brand_classtier 2	-0.618436	0.04635	-13.3415	8.307e-40	* * *
brand_classCoca-Cola	0.936661	0.06359	14.7289	6.270e-48	* * *
brand_classAsahi	0.704112	0.09671	7.2803	3.948e-13	* * *
retailer_classother	1.419816	0.04568	31.0801	2.770e-191	* * *
retailer_classtier 2	-0.234824	0.04230	-5.5519	2.997e-08	* * *
retailer_classMajor	-0.561862	0.04972	-11.3003	3.400e-29	* * *
pack_classsingle	0.984787	0.04171	23.6096	6.600e-116	* * *
pack_class1<6	1.617519	0.04851	33.3474	8.455e-217	* * *
container_sizeM	-0.130458	0.03282	-3.9752	7.148e-05	* * *
container_sizeS	-0.394169	0.04408	-8.9413	5.626e-19	* * *
WA:WA_CDS	0.031038	0.05163	0.6012	5.477e-01	

*Table 9 Regional fruit juice model. *, **, ***' mean estimate is significantly different to zero at 0.1, 0.05 and 0.01 levels respectively.*

Observations	Residual Std. Error	R^2	Adjusted R^2		
1,408	0.2451	0.9333	0.9325		
	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	2.083394	0.03136	66.43147	0.000e+00	* * *
WA	-0.750009	0.06868	-10.92061	1.077e-26	* * *
WA_CDS	-0.025942	0.01769	-1.46632	1.428e-01	
stateQLD	-0.010271	0.01964	-0.52290	6.011e-01	
stateVIC	-0.057773	0.01887	-3.06184	2.242e-03	* *
remotenessOuter Regional Australia	-0.055207	0.04156	-1.32829	1.843e-01	
remotenessRemote Australia	0.001267	0.04297	0.02949	9.765e-01	
remotenessVery Remote Australia	0.126453	0.04480	2.82241	4.834e-03	* *
brand_classother	1.016402	0.02319	43.83470	2.680e-264	* * *
brand_classtier 2	-0.126522	0.02448	-5.16792	2.712e-07	* * *
brand_classHienz	0.818584	0.05853	13.98662	1.093e-41	* * *
brand_classAsahi	0.265994	0.10824	2.45739	1.412e-02	*
retailer_classother	0.186876	0.03332	5.60779	2.469e-08	* * *
retailer_classtier 2	0.009126	0.03696	0.24694	8.050e-01	
retailer_classMajor	-0.147972	0.03055	-4.84359	1.418e-06	* * *
pack_class1<6	1.931740	0.08662	22.30108	1.990e-94	* * *
container_sizeS	-1.502413	0.02636	-56.98798	0.000e+00	* * *
WA:WA_CDS	0.137268	0.03009	4.56178	5.519e-06	* * *

*Table 10 Regional beer model. *, **, ***' mean estimate is significantly different to zero at 0.1, 0.05 and 0.01 levels respectively.*

Observations	Residual Std. Error	R^2	Adjusted R^2
50,889	0.7392	0.6893	0.6891

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	-5.6724364	7.372e-01	-7.69502	1.440e-14	***
WA	-0.1560665	4.766e-02	-3.27485	1.058e-03	**
WA_CDS	-0.0779672	1.272e-02	-6.12837	8.943e-10	***
stateQLD	-0.0023944	8.851e-03	-0.27052	7.868e-01	
stateVIC	0.0080133	8.311e-03	0.96413	3.350e-01	
remotenessOuter Regional Australia	-0.2604116	3.704e-02	-7.03003	2.091e-12	***
remotenessRemote Australia	-0.0888445	4.181e-02	-2.12479	3.361e-02	*
remotenessVery Remote Australia	0.0897587	5.172e-02	1.73545	8.267e-02	
materialglass	0.1442571	7.631e-03	18.90493	1.947e-79	***
materialunknown	0.2680889	2.469e-02	10.85881	1.941e-27	***
product_classbeer-full strength other	0.2699759	8.223e-03	32.83193	5.816e-234	***
product_classbeer - low alc	-0.3236512	1.223e-02	-26.45340	3.645e-153	***
brand_class_fineLion	0.0007620	9.371e-03	0.08131	9.352e-01	
brand_class_fineother	0.0246573	8.378e-03	2.94317	3.250e-03	**
retailer_classwoolworths	0.1316302	9.528e-03	13.81510	2.475e-43	***
retailer_classother	-0.0377989	3.547e-02	-1.06564	2.866e-01	
retailer_classhotel	0.4239193	3.393e-02	12.49529	8.940e-36	***
pack_class6<24	-1.3106750	1.057e-02	-124.00334	0.000e+00	***
pack_class24+	-2.4644873	1.018e-02	-242.15999	0.000e+00	***
ml_containers	0.0074372	7.879e-05	94.39506	0.000e+00	***
time	0.0004029	4.006e-05	10.05606	9.092e-24	***
WA:WA_CDS	0.0811737	2.590e-02	3.13463	1.722e-03	**

*Table 11 Regional cider model. *, **, ***' mean estimate is significantly different to zero at 0.1, 0.05 and 0.01 levels respectively.*

Observations	Residual Std. Error	R^2	Adjusted R^2		
11,013	0.8605	0.6455	0.6449		
	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	-10.675818	1.8327366	-5.8251	5.869e-09	***
WA	-0.056705	0.1224243	-0.4632	6.432e-01	
WA_CDS	-0.157004	0.0321617	-4.8817	1.066e-06	***
stateQLD	0.041247	0.0218508	1.8877	5.910e-02	
stateVIC	-0.031529	0.0207289	-1.5210	1.283e-01	
remotenessOuter Regional Australia	-0.265892	0.0991788	-2.6809	7.353e-03	**
remotenessRemote Australia	0.273076	0.1136946	2.4018	1.633e-02	*
remotenessVery Remote Australia	0.073589	0.1325387	0.5552	5.787e-01	
materialglass	0.516049	0.0209525	24.6295	2.009e-130	***
product_classCider-other	0.262681	0.0202696	12.9594	3.953e-38	***
product_classCider-pear	-0.171789	0.0314958	-5.4543	5.022e-08	***
brand_class_fineLion	0.519232	0.0425180	12.2121	4.454e-34	***
brand_class_fineother	0.293067	0.0246893	11.8702	2.662e-32	***
retailer_classwoolworths	0.406565	0.0292432	13.9029	1.421e-43	***
retailer_classother	-0.219999	0.0915082	-2.4041	1.623e-02	*
retailer_classhotel	0.991490	0.0857975	11.5562	1.034e-30	***
pack_class6<24	-1.821718	0.0194656	-93.5865	0.000e+00	***
ml_containers	0.009908	0.0002049	48.3423	0.000e+00	***
time	0.000595	0.0000996	5.9734	2.395e-09	***
WA:WA_CDS	0.230661	0.0634112	3.6375	2.765e-04	***

*Table 12 Regional RTD model. *, **, ***' mean estimate is significantly different to zero at 0.1, 0.05 and 0.01 levels respectively.*

Observations	Residual Std. Error	R^2	Adjusted R^2
20,267	1.073	0.4579	0.4573

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	-6.7871339	1.627e+00	-4.1707	3.049e-05	* * *
WA	0.4354063	6.994e-02	6.2254	4.898e-10	* * *
WA_CDS	0.0858974	2.832e-02	3.0334	2.421e-03	* *
stateQLD	0.0495197	2.032e-02	2.4365	1.484e-02	*
stateVIC	-0.0482877	1.964e-02	-2.4582	1.397e-02	*
remotenessOuter Regional Australia	-0.2484779	5.700e-02	-4.3593	1.311e-05	* * *
remotenessRemote Australia	0.4803755	6.676e-02	7.1952	6.456e-13	* * *
remotenessVery Remote Australia	-0.1490091	7.782e-02	-1.9149	5.552e-02	
materialglass	-0.0445763	2.128e-02	-2.0949	3.619e-02	*
product_classRTD-other	-0.4068700	2.677e-02	-15.1985	6.996e-52	* * *
product_classRTD-rum	-0.3775807	2.559e-02	-14.7539	5.222e-49	* * *
product_classRTD-vodka	-0.4389280	2.126e-02	-20.6423	1.056e-93	* * *
brand_class_fineDiageo	0.5926184	3.063e-02	19.3493	1.152e-82	* * *
brand_class_fineother	0.1985046	2.752e-02	7.2128	5.673e-13	* * *
retailer_classwoolworths	-0.1938631	2.031e-02	-9.5459	1.498e-21	* * *
retailer_classother	-0.6390313	6.042e-02	-10.5760	4.505e-26	* * *
retailer_classhotel	0.5994338	5.652e-02	10.6052	3.302e-26	* * *
pack_class6<24	-1.9463057	1.788e-02	-108.8390	0.000e+00	* * *
ml_containers	0.0076179	1.699e-04	44.8398	0.000e+00	* * *
time	0.0005564	8.846e-05	6.2898	3.243e-10	* * *
WA:WA_CDS	-0.0188311	4.564e-02	-0.4126	6.799e-01	