FINAL REPORT

Monitoring the impacts of the NSW Container Deposit Scheme

Prepared for
Independent Pricing and Regulatory Tribunal of NSW (IPART)

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THE CENTRE FOR INTERNATIONAL ECONOMICS
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Executive summary

The NSW container deposit scheme (CDS), called 'return and earn' started providing refunds for containers on 1 December 2017. The NSW scheme operates by providing a 10-cent refund to consumers who return an eligible container to a collection depot. The CDS covers most beverage containers between 150 millilitres and 3 litres that are sold in NSW.

IPART have been asked by the NSW Government to examine the impact of the scheme. IPART's draft terms of reference have been publicly released for consultation, and state that

> IPART is to monitor:
>
> 1. the effect of the Container Deposit Scheme on prices of beverages supplied in a container;
>
> 2. the performance and conduct of suppliers; and
>
> 3. any other market impacts on consumers that arise from the commencement of the Scheme, for the period from 1 November 2017 to 1 December 2018 (monitoring period).

IPART has asked the CIE to provide advice to inform how IPART should monitor the impacts of the NSW container deposit scheme (CDS). This includes:

- providing an overview of the NSW beverage sector
- providing an understanding of the CDS and how it would be expected to impact on the market for beverages
- identifying the rationale for price (or other) monitoring and what this means for the key types of data to collect
- identifying possible data sources.

The market for beverages

The CDS covers 310 first suppliers and 5912 registered containers, as of the date of data provided to IPART by the NSW EPA. Under the scheme, first suppliers are defined as those who are responsible for supplying beverages into the state. A first supplier can have any role in the supply chain including:[1]

- Manufacturers who produce and bottle beverages in NSW
- Wholesalers responsible for the delivery of beverages into NSW

Retailers located in NSW responsible for the delivery of beverages into NSW as well as retailers outside of NSW who sell to consumers in NSW (via online, etc…).

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1 NSW EPA, NSW First Supply Approach

Suppliers of beverages that use containers covered by the CDS must register each individual beverage product supplied into NSW. The container types covered by the scheme are predominantly glass, PET and aluminium.

The beverage sector covered by the CDS can be broadly broken down into alcoholic and non-alcoholic beverages and different types of retailers (table 1). Slightly less than 60 per cent of CDS products by manufactured value are expected to be non-alcoholic beverages, with the remaining 40 per cent alcoholic beverages such as beer and ready to drink spirits. Supermarkets and liquor retailers together are estimated to constitute over half of the revenue from the sale of beverage types covered by the CDS. Product consumed at the point of sale (cafes, licensed venues) comprise about one quarter, with the remainder in smaller retail outlets such as convenience stores and export of product manufactured in NSW.

1 CDS beverages by sector NSW, based on manufacture and import value

Sector	Revenue	Share of revenue
	$m	Per cent
Alcoholic beverages	1 385	42%
Liquor retailers	721	22%
Licensed venues	425	13%
Other (exports)	239	7%
Non-alcoholic beverages	1 933	58%
Supermarkets	1 206	36%
Consumed at point-of-sale (e.g. cafes)	504	15%
Other (on-line, convenience stores)	222	7%

Note: Revenue shares and revenue numbers are calculated as the shares of manufactured and imported beverages supplied to each sector. The revenue is the revenue for the manufacturer and import cost, and does not include wholesale and retail margins. Wine and spirits have been excluded.

Source: The CIE, based on data from MCAAY & Curtin University: A guide to the alcohol industry, major alcohol companies in Australia: producers and distributors and IBISWorld.

The sector uses different supply chains depending on the scale of the businesses. Larger retailers tend to source product directly from manufacturers, while smaller retailers use wholesalers as intermediaries. Pricing at all levels of the supply chain can be highly variable, with different prices for different retailers (particularly depending on amount purchased) and price variation for consumers depending on the type of retailer (e.g. convenience store versus supermarket) and the specials offered.

The overview of the beverage sector suggests the following implications for monitoring the impacts of the CDS.

- The beverage supply sector should be presumed to be competitive, in the sense that this is not an industry with obvious natural monopoly characteristics and for which past inquiries have not revealed competition concerns
- The price pass-through to consumers, and which part of the supply chain bears any impacts not passed through, may differ across products and across retailers because of greater or lesser demand responses, and different levels of bargaining power

- The CDS may have different impacts on larger versus small businesses, to the extent that there are fixed compliance costs or financing costs
- Measuring the impacts within the supply chain will be complicated, because of different supply chain structures depending on the scale of the businesses involved and the differentiation of prices to different retailers.

The types of impacts expected from the CDS

The CDS imposes a direct cost on businesses that supply beverages in a container into NSW. This cost has been set to recover the refunds expected to be paid to customers and administrative costs of the scheme. The initial amount of the cost imposed is 11-14 cents. From a consumer's perspective, this will be partially offset by the amount of the value that consumers place on the returnable container. For some people or businesses this will be close to 10c, which is the value of the refund, but for many people this will be much less due to the travel/transaction costs associated with returning the container. It would be expected that on average this value would be small, and possibly close to zero.

The CDS acts in the first instance in the same way as an indirect tax. The two primary impacts expected would be that prices rise for consumers, by some share of the amount of the CDS charge, and the quantity of beverages consumed falls in general and people substitute to products less impacted by the CDS. The extent to which an indirect tax can be passed through to consumers depends on a wide range of factors. Previous studies of indirect taxes suggest that 100 per cent pass through is a possible outcome, but a wide range of outcomes (from 0 per cent to 150 per cent pass through) are also possible. These studies also suggest that the pass-through could vary by manufacturer or product type.

As a general rule, the share of the CDS passed through to consumers of beverages will be higher where:

- demand for the product is not very responsive to price
- supply of the product is highly responsive to price

Market structure will also influence the share of the tax that is passed through to consumers. While in general, firms that will exhibit market power are less likely to pass through the full tax, the impact of market power on tax pass through is quite sensitive to the form of market power (table 2).

2 Pass through of taxes under different theoretical market structures

Market structure	Incidence of taxes
Perfect competition	Full pass through, or less than full pass though, depending on supply and demand elasticities
Monopolistic competition	Full pass through
Bertrand Duopoly	The same as perfect competition
Cournot Duopoly	Less than full pass through, full pass through or greater than full pass through are all possible
Monopoly	Less pass through than under perfect competition

Source: Institute of Fiscal Studies 2011. 'A retrospective evaluation of the elements of the VAT system: full report to the European Commission', page. 286.

There may also be less obvious impacts from the CDS, such as:

- whether consumers substitute away from products that are covered by the CDS, and
  - consume more beverages that aren't covered by the CDS, such as wine and bottled spirits
  - substitute into beverages that are covered by the CDS, but have a lower average tax rate (such as switching to larger bottles of water)
  - just consume fewer beverages.
- whether consumers near the border shift beverage purchases to stores outside of NSW to avoid the CDS
- whether the scheme favours larger businesses over smaller businesses (either implicitly or explicitly) because of difference in the compliance costs faced by beverage producers, and
- whether the role of Woolworths as a major supplier of collection depots has a meaningful impact on competition in this sector.

Measuring the impacts of the CDS

IPART's terms of reference potentially require three different monitoring tasks.

1 The primary task is to measure the impacts of the CDS on the prices that consumers pay for beverages in a container (as covered by the CDS).
   - Studies on the incidence of indirect taxes provide the best methodological framework for measuring the price impact of the CDS. Within this field, the most common technique is the so-called difference in difference methodology. This is based on comparing the price change of products covered by the NSW CDS with a suitable comparison group, such as the same product in Victoria.
   - This requires collecting data on retail prices in NSW and other states from Dec-2016 onwards, with a higher level of frequency likely to make it easier to identify the impacts of the CDS
   - The general increase in prices for beverages supplied in a container will have to be measured. Whether or not there is a need to measure price changes at a more disaggregated product level is not clear

2 A secondary task is to monitor the performance and conduct of suppliers
   - This can be informed to some degree by analysis of retail prices at the product and retailer level, although this would not establish price impacts within the supply chain. The supply chains differ across products and retailers. Larger retailers and manufacturers tend to establish direct relationships, with small businesses using wholesalers as intermediaries. Establishing price impacts within the supply chain in a comprehensive way will be very difficult
   - Monitoring of performance could be conducted through either a survey of suppliers or a complaint system, with a standard data template for complainants. This could be used to report on areas in the supply chain where complaints are concentrated

3 A further task is to monitor any other market impacts on consumers. Our recommendation is that this would primarily be monitoring changes in sales quantities to understand how consumers have changed their behaviour in response to the CDS. We would not expect that IPART would wish to monitor consumer aspects around their disposal of a container.
   – Changes in quantities may take time to emerge and may not be realised within IPART's monitoring period
   – Exchange for Change will have access to data on container quantities from before the operation of the scheme and after the operation of the scheme, which will serve as a good (and free) source of data on sales quantities. This would not cover changes in other states as a counterfactual
   – If IPART wanted to delve deeper into this it could seek scanner data from supermarkets and other retailers

Data sources for undertaking the measurement task

The primary task of measuring changes in prices can be applied with many data sets.

- ABS price series can give a good general idea of what is happening, and is high quality and free. Its main drawbacks are that it is low frequency (quarterly), does not go to a product level and is not timely (data is provided with a one month delay). Special requests can improve on the public data at a cost.
- Scanner data from major supermarkets and liquor retailers could provide product and store level information on price impacts of the CDS. This includes point-of-sale information such as price, sale and quantity information on all beverages sold at supermarkets and liquor retailers.
- There are a number of private data providers that collect retail data on the beverage sector. This data would provide a greater product level and retailer disaggregation than the ABS is likely to release

A summary of the data sources aligned to IPART's terms of reference are shown in table 3.

3 Summary of focus of data efforts

IPART terms of reference	Recommended data source	Secondary data sources by order of preference
Effect on prices of beverages	ABS Consumer Price Index components and special data request	Scanner data from supermarkets and major retailers Private data aggregators
Performance and conduct of suppliers	Complaints system, with standardised template	Survey of suppliers
Other market impacts on consumers	Exchange for change data on containers sold by product and first supplier	Scanner data from supermarkets and major retailers

Source: The CIE.

Other issues

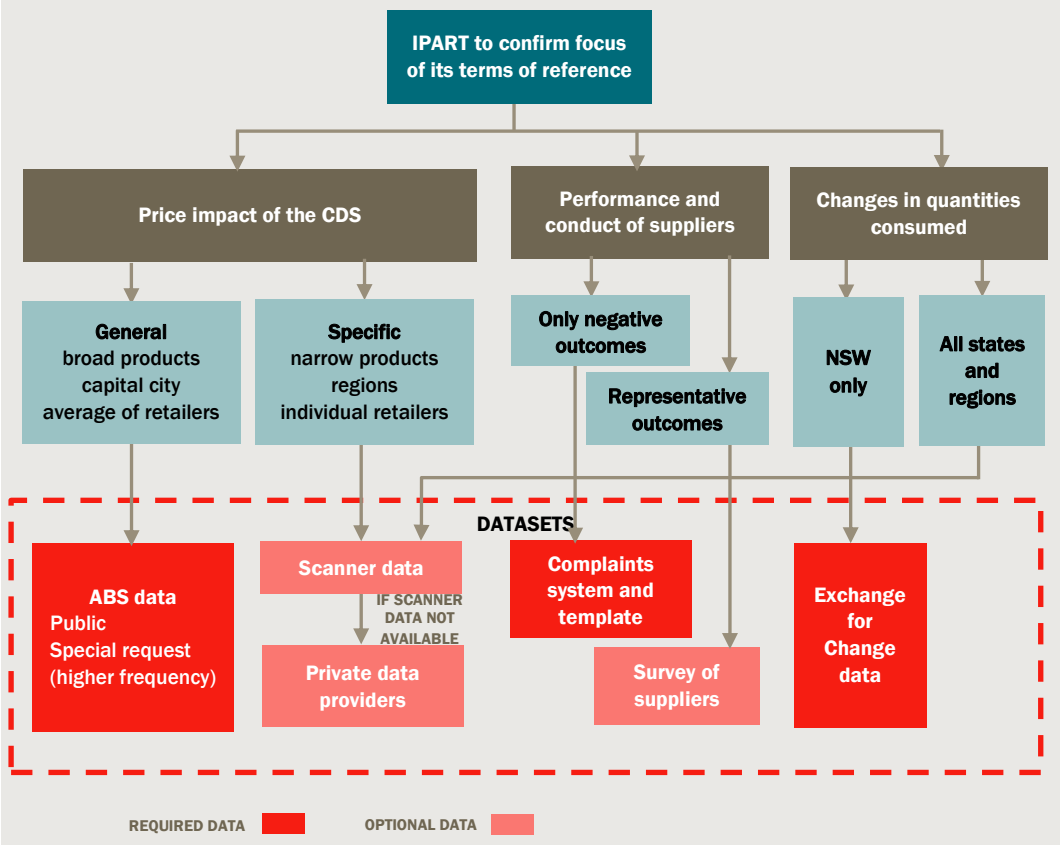
The data collection exercises above are likely to miss some parts of the beverage sector, particularly beverages supplied for consumption at the point of sale, such as cafes and hotels. Covering this group would require a special purpose survey of owner/managers in this sector, which would be expensive, and wouldn't be directly comparable to the other data.

The data collective above would also (intentionally) not consider detail about how the CDS impacts on people outside of the impact on beverage prices and sales. For example, the share of people who gain value from the CDS through returning containers and the size of this value (refund less costs of returning), whether impacts are different for households in different locations or income levels. Doing this would require a special purpose survey of consumers. We would recommend that this is outside of the scope of the requirement in IPART's terms of reference to consider "any other market impacts on consumers".

Next steps

Our recommendations for the next steps are as shown in chart 4. This is based on IPART deciding on how it views its terms of reference and then which datasets will support the different aspects of IPART's terms of reference.

4 Next steps



Data source: The CIE.

1 Overview of the beverage industry in NSW

The NSW beverage market has an annual turnover of around $5.5 billion, with around 75 percent of this industry covered by the CDS. The structure of this industry provides context for how the CDS will change the beverage market and the types of challenges to be faced in monitoring of prices, particularly through the supply chain.

Number of companies and products covered by the CDS

The CDS requires that 'first suppliers' into NSW enter into a supply agreement with the Scheme coordinator, and gain approval for each beverage container type. First suppliers are defined as those who are responsible for supplying beverages into the state. A first supplier can have any role in the supply chain including:[2]

- Manufacturers who produce and bottle beverages in NSW
- Wholesalers responsible for the delivery of beverages into NSW
- Retailers located in NSW responsible for the delivery of beverages into NSW as well as retailers outside of NSW who sell to consumers in NSW (via online, etc…).

There are over 300 first suppliers with supply agreements, who together cover almost 6000 registered containers.

Broad product categories for analysis

For the analysis below, we have typically broken the beverage sector into two distinct components:

- alcoholic beverages — wine, beer and spirits
- non-alcoholic beverages — all other products.

Supply chain for the beverage sector

The supply chain for beverages comprises three potential components.

- A manufacturer, who produces the beverage
- A wholesaler, who takes the beverage from a manufacturer to a retailer
- A retailer, who sells the beverage to a consumer either to be consumed elsewhere (such as a supermarket) or for consumption at the point of sale (such as a café or hotel).

2 NSW EPA, NSW First Supply Approach

The supply chain for beverages operates in different ways depending on who the retailer and supplier are. Smaller companies will often use intermediaries (wholesalers) while larger companies (both retailers and manufacturers) will be more likely to have direct relationships between manufacturers and retailers.

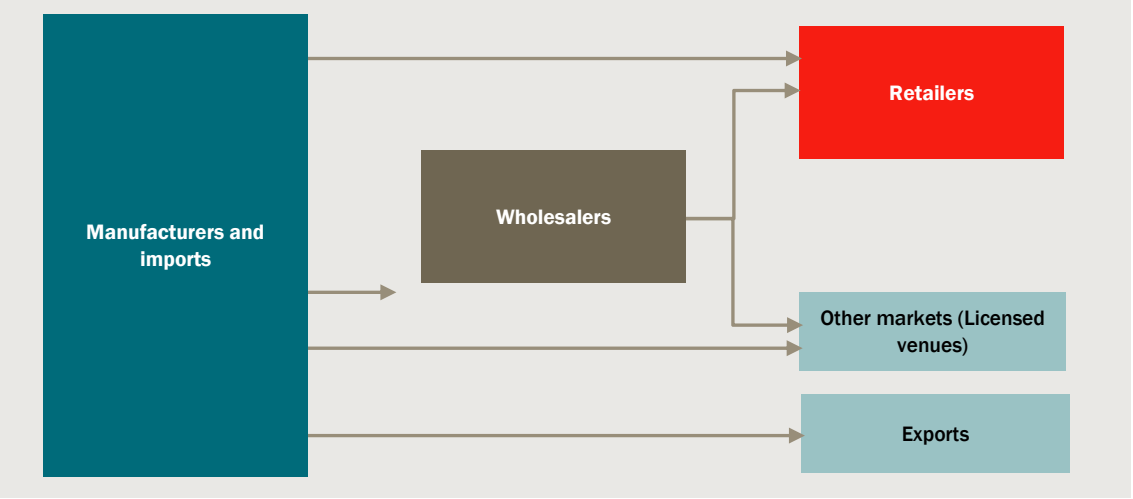
A key trend in the beverage industry is the changing nature of interaction between different members of the supply chain. The relative larger size of major retailers and supermarkets operated by Woolworths and Wesfarmers has enabled them to exert their influence on the supply chain. Consequently, the role of wholesalers has been diminished, particularly so in the non-alcoholic beverage market, with large retailers forming supply agreements with manufacturers directly and for a more competitive price. This phenomenon is known as wholesale bypass.[3]

Supply chain for alcoholic beverages

The movement of product through the alcoholic beverage supply chain is shown in chart 1.1.

- Large retailers with strong bargaining power can bypass liquor wholesalers and achieve favourable price agreements with manufacturers directly.
- Exports mainly comprises wine and some spirits.
- A portion of beverages is directly supplied by manufacturers to places such as licensed venues, which include pubs and bars. This also includes a higher proportion of supply from smaller manufacturers of craft beers.
- manufactured beverages are also supplied to wholesalers who in turn supply mostly to licensed venues and liquor retailers.

1.1 Alcoholic beverage supply chain



Data source: The CIE

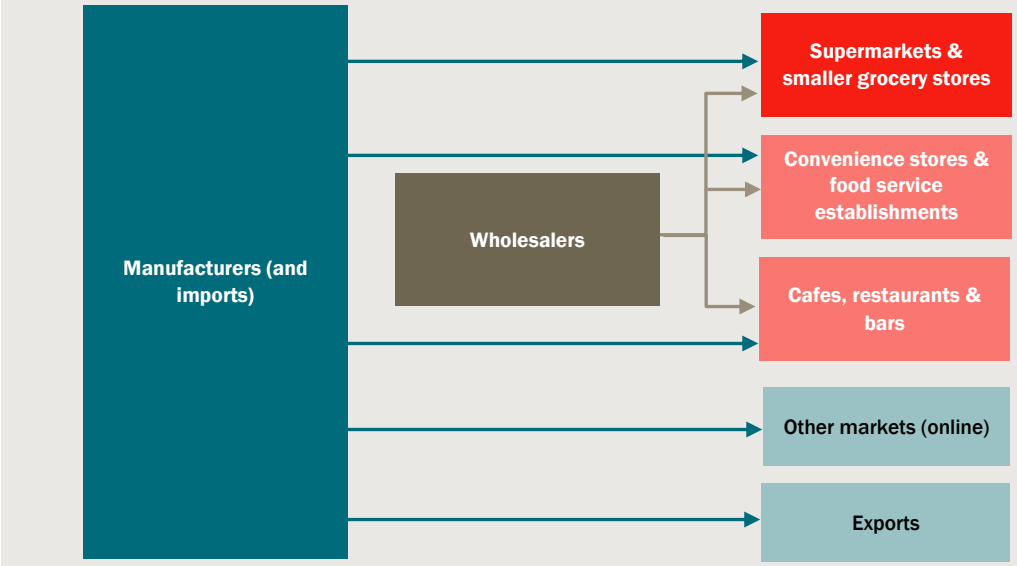
3 IBISWorld F3606a Liquor Wholesaling in Australia: Market research report

Supply chain for non-alcoholic beverages

The pattern differs for non-alcoholic beverages. The relationship between manufacturers of non-alcoholic beverages and large supermarkets is much more pronounced. Wholesalers mainly supply to smaller grocery stores, convenience stores and other establishments such as cafes, restaurants and bars (chart 1.2).

- Approximately half of non-alcoholic beverages are supplied directly from manufacturers to retailers (namely the larger supermarkets).
- Beverages are also sold to other markets including online markets directly from the manufacturer.
- Non-alcoholic beverages are supplied from manufacturers to wholesalers (although to a lesser degree). Of this proportion, most is supplied to convenience stores and food service establishments. The highly fragmented nature of this part of the industry favours wholesale supply arrangements as individual market participants are mostly too small to negotiate directly with manufacturers.

1.2 Non-alcoholic beverage supply chain



Data source: The CIE.

The sections below set out the industry structure in each of the components of the supply chain — manufacturing, wholesaling and retailing.

Beverage manufacturing in NSW

Beverage manufacturing in NSW is significant and represents over $3.3 billion in terms of revenue as of 2016-17.[4] The market has been concentrated largely to manufacturers such as Coca-Cola Amatil, SAB Miller Beverage Investments, Lion and Asahi Holdings

4 CIE calculations, IBISWorld G4123 Liquor Retailing in Australia

which together, comprise over 70 per cent of the market share of beverage manufacturing in the state (chart 1.3).[5]

1.3 Market share of CDS qualifying beverage manufacturers NSW

Beverage manufacturer	Market share	Revenue (2016-17)
	Per cent	$ millions
Coca-Cola Amatil	28	921
Other manufacturers	22	735
SAB Miller Beverage Investments PTY Limited	16	516
Lion Pty Limited	16	515
Asahi Holdings (Australia) Pty Ltd	14	477
Coopers Brewery Limited	2	63
Diageo Australia	1	46
Heinz Wattie's Pty Ltd	1	45
Total	**100**	**2397**

Source: The CIE based on data from MCAAY & Curtin University: A guide to the alcohol industry, major alcohol companies in Australia: producers and distributors

The market structure for beverage manufacturing differs by type of beverage, as set out below.

Alcoholic beverages

Alcoholic beverages represent a broad market with a variety of products. There are three broad product groups for alcoholic beverages — beer, wine and spirits — comprising about a third of consumption by value each (table 1.4).

1.4 Alcoholic beverage consumption in NSW

Alcoholic beverages	Share of consumption	Value
	Per cent	$ Million
Beer	36.5	1 444
Spirits (including ready to drink (RTD) – only RTD is covered by CDS)	33.5	1 325
Wine (not covered by CDS)	26.2	1 036
Other	3.8	150
Total	**100**	**3955**

Note: Consumption values are higher than manufacturing values. This is due to the value-added process associated with wholesaler and retail service margins (and taxes) that apply to final retail values.

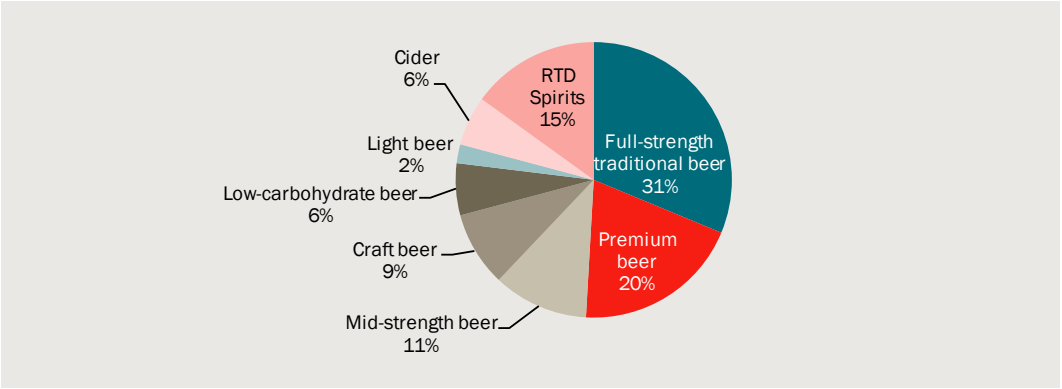
Source: The CIE based on data from MCAAY & Curtin University: A guide to the alcohol industry, major alcohol companies in Australia: producers and distributors.

The containers used for wine are not covered by the CDS. In terms of the product breakdown of CDS qualifying alcoholic beverages, most of supply (based on a

5 These companies are also responsible for administering the CDS under the Exchange for Change consortium.

manufactured value basis) in NSW is in the form of beer. As can be seen by chart 1.5, the beer market can be further broken down into components.

1.5 CDS qualifying alcoholic beverages (manufactured in NSW)



Note: Based on the revenue shares of manufactured beverages in NSW. Precise quantity data on units are not available at the time of calculation.

Data source: The CIE based on data from MCAAY & Curtin University: A guide to the alcohol industry, major alcohol companies in Australia: producers and distributors.

Beer

The concentration in beer manufacturing is high as Australia's two largest brewers, Carlton and United Breweries (CUB) and Lion, which are foreign owned, account for over 80 per cent of total industry revenue in 2016-17.[6] The largest Australian owned brewery is Coopers Brewery, which accounts for 5.3 per cent of market share. However, competition is increasing and is coming from major liquor retailers such as Woolworths and Wesfarmers.

The remainder of the beer industry is characterised by boutique or 'craft' breweries, of which 400 are expected to be in operation across Australia as of 2016-17. This segment has grown strongly over the past 5 years and is encouraging more market entry due to consumer preferences shifting towards a high quality and differentiated beer product. Craft breweries do face difficulty in the market however, with dominant brewers such as Lion and CUB incentivising pubs to reserve most of their beer taps for their own products in exchange for equipment and rebates.

Glass containers used to bottle beer is the most prevalent of the alcoholic beverages that qualifies for the CDS scheme.

Beer manufacturers downstream markets include:

- retailers
- wholesalers
- other (licensed venues)

6 MCAAY & Curtin University: A guide to the alcohol industry, major alcohol companies in Australia: producers and distributors.

Wine (not covered by CDS)

Wine production exhibits low market concentration. The four largest Australian wine producers: Treasury Wine Estates, Accolade Wine, Pernod Ricard and Casella Wine account for approximately 37 per cent of industry revenue as of 2016-17.[7] Whilst wine production occurs in NSW, wine containers are not covered by the scope of the CDS.

NSW wine manufacturer downstream markets include:

- export markets
- wholesalers
- retailers
- other markets

Spirits

Spirit manufacturing is moderately concentrated. The largest manufacturers are Diageo Australia, Independent Distillers (Asahi Holdings), Coca-Cola Amatil and SABMiller, which together account for over 50 per cent of industry revenue as of 2016-17.[8] Spirits account for a large amount of imports, although this is mainly in the form of bulk-condensed form of alcohol which is later diluted and used in manufacturing. Approximately half of spirit consumption is in the form of 'ready to drink' (RTD) beverages, which are bottled in CDS qualifying glass containers.

NSW spirit manufactures downstream markets include:

- retailers
- wholesalers
- other (e.g. licensed venues)
- exports

Non-alcoholic beverages

Non-alcoholic beverage manufacturing is highly concentrated. Over 90 per cent of market share belongs to two major manufacturers, Coca-Cola Amatil Limited and Asahi Holdings (Australia) Pty Ltd. These manufacturers have market prominence across the different product types. There is a large variety of non-alcoholic beverage types. Of most prominence is cola-flavoured carbonated drinks (37 per cent) and other flavoured carbonated drinks (17 per cent) (chart 1.6).

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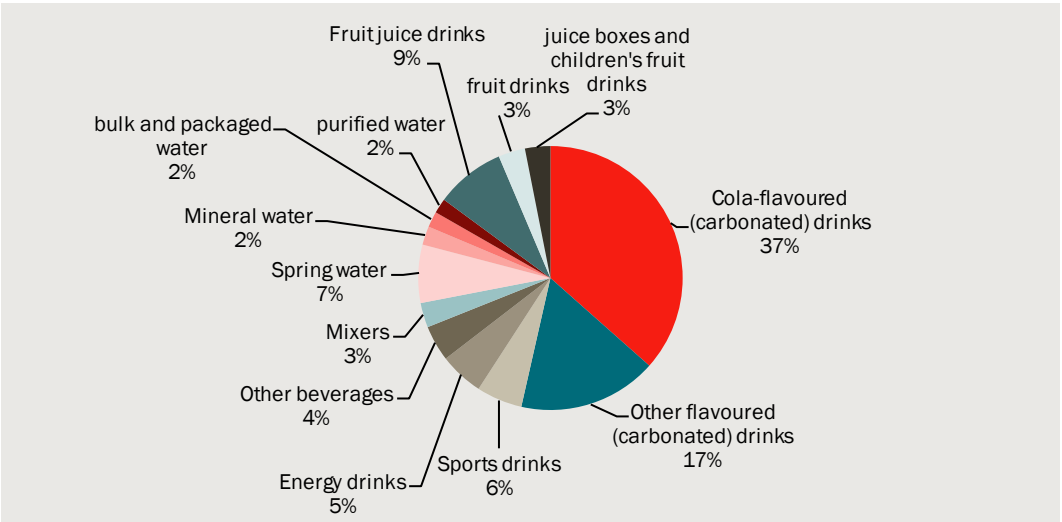
7 MCAAY & Curtin University: A guide to the alcohol industry, major alcohol companies in Australia: producers and distributors.

8 MCAAY & Curtin University: A guide to the alcohol industry, major alcohol companies in Australia: producers and distributors.

1.6 CDS qualifying non-alcoholic beverages (manufactured in NSW)



Note: Based on the revenue shares of manufactured beverages in NSW. Precise quantity data on units are not available at the time of calculation.

Data source: The CIE, Australian Beverages: Refreshing our economy – the economic contribution of the Australian beverage industry

Soft drinks

Soft drink manufacturing in NSW is worth almost $2 billion as of 2016-17.[9] The market is highly concentrated with the two largest manufacturers: Coca-Cola Amatil and Asahi Holdings. Other manufacturers are small, resulting in a competitive market outside of the two dominant manufacturers. The growing popularity of private label soft drinks sourced by larger retailers is offsetting the degree of market concentration in the industry.

NSW soft drink manufacturers downstream markets include:

- supermarkets
- soft drink wholesalers
- grocery wholesalers
- other markets

Bottled water

Much like soft drink manufacturing, bottled water is highly concentrated to the same two manufacturers: Coca-Cola Amatil Limited and Asahi Holdings (Australia) Pty Ltd, the dominant companies in the non-alcoholic beverage manufacturing industry.[10] Whilst inherently a homogeneous product, bottled water is differentiated by brand.

NSW bottled water manufacturers downstream markets include:

- super markets and grocery stores
- convenience stores

9 CIE Calculations, IBISWorld C1211A Soft Drink Manufacturing in Australia

10 IBISWorld C1211B Bottled Water Manufacturing in Australia

- pubs, bars, restaurants and cafes
- households and businesses
- other

Fruit Juice drinks

Fruit juice manufacturing market share is concentrated to four major manufacturers. These are: Lion Pty Ltd, Asahi Holdings (Australia) Pty Ltd, Heinz Wattie's Pty Ltd and Coca-Cola Amatil Limited. Together these companies represent over 70 per cent of industry market share.

NSW fruit juice manufacturers downstream markets include:

- supermarkets
- speciality wholesalers
- grocery wholesalers
- other retailers
- export markets

Beverage wholesalers in NSW

Beverage wholesaling in NSW differs markedly across the beverage types. Alcoholic beverage wholesaling is highly concentrated, whilst non-alcoholic beverages is highly fragmented, with a large number of firms and no market leaders (chart 1.7).

1.7 Market share of beverage wholesalers in NSW

Beverage wholesalers	Market share	Revenue
	Per cent	$ Millions
Alcoholic beverage wholesalers		1 807
Metcash Limited	62	1 115
Independent Liquor Group	6	107
Other Liquor wholesalers	32	586
Non-alcoholic beverage wholesalers		1 493
Total		**3300**

Source: The CIE, IBISWorld, Company annual reports

Alcoholic beverage wholesalers

Liquor wholesaling is highly concentrated, with two major wholesalers Metcash Limited and Independent Liquor Group (ILG) comprising 62 percent and 6 per cent market share each. The remainder of this industry comprises smaller, non-employing wholesalers that focus on smaller geographic areas or specialised product groups.

A key feature of this industry is the competition from major liquor retailers. Larger retailers have strong buying power which enables them to bypass wholesalers and source products directly from manufacturers. This competition has placed downward pressure on wholesale margins. In general, the largest wholesalers have existing contracts to distribute the major liquor brands hence why smaller wholesalers focus more on niche product.

NSW alcoholic beverage wholesaler downstream markets include:

- licensed venues
- retail liquor stores
- supermarkets.

Non-alcoholic beverage wholesalers

The broader wholesaling market for non-alcoholic drink is highly competitive. There are a large number of market operators (approximately 1900) in NSW, each with a small market share. Unlike alcoholic beverage wholesalers, which have experienced pressure on margins as a result of larger supermarkets and retailers bypassing the supply chain, this does not affect the non-alcoholic wholesaling industry.[11] Major supermarkets such as Woolworths and Coles have not been major buyers from this industry for several decades, essentially leaving wholesalers operating in a market that no longer competes with large retailers.

NSW non-alcoholic beverage wholesalers' downstream markets include:

- food-service establishments
- smaller supermarkets and grocery stores
- business and government institutions
- convenience stores and service stations

Beverage retailers in NSW

Alcoholic beverage retailers

Liquor retailing is a highly concentrated industry, with Woolworths and Wesfarmers comprising 44 per cent and 18 per cent market share each. These retailers have exerted their buying power across the supply chain, often bypassing liquor wholesalers to achieve more favourable supply arrangements with manufacturers directly.[12] Price competition between the large retailers has also reduced margins and placed competitive pressure on smaller retailers. To compete, smaller independent retailers have formed retail banner groups, which grant these market players collective bargaining power to achieve lower wholesale prices and greater marketing possibilities.

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11 IBISWorld F3609 Soft Drink and Pre-packaged Food Wholesaling in Australia

12 IBISWorld G4123 Liquor Retailing in Australia

Retail trade has increased in trend terms growing at an average rate of 2.1 per cent per year since 2010 and reaching over $3 billion by the end of 2016 (chart 1.8).

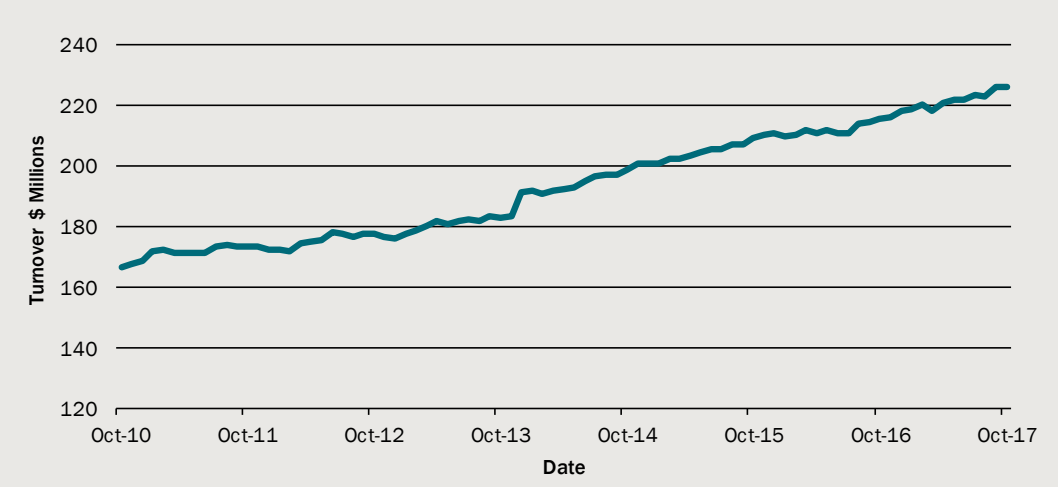
1.8 Monthly retail turnover for alcoholic beverages NSW

Data source: ABS Retail Trade, Australia Oct 2017

Non-alcoholic beverage retailers

Non-alcoholic beverage retailers comprise the large, concentrated supermarkets which are dominated by Woolworths, Wesfarmers, ALDI Stores and Metcash. These retailers have a strong market presence across Australia and NSW and are the primary outlets for non-alcoholic beverages by volume.[13] Retail trade for non-alcoholic beverages in the supermarket sector has grown by 4.2 per cent a year on average since 2010 and reaching $2.5 billion by the end of 2016 (chart 1.9).

1.9 Monthly retail turnover for non-alcoholic beverages (major supermarkets) NSW



Note: Calculated by taking the 2016-17 proportion of beverage sales of 8.2 per cent of the total supermarket retail turnover in NSW.
Data source: ABS Retail Trade, Australia Oct 2017

13 IBISWorld G4111 Supermarkets and Grocery Stores in Australia

The next tier of retailing comprises food service establishments and smaller convenience stores and service stations. The largest market share concentration belongs to Metcash and 7-Eleven Stores. Retailers in this category primarily source supply from wholesalers and therefore face additional costs compared to supermarkets with superior bargaining power.

Beverage pricing policies

Beverage pricing in Australia is a complex and non-transparent process. In general, it is not always possible to identify how the unit price of a beverage changes across the supply chain and this has to do with the nature and size of the different market participants across the industry. As previously illustrated, the structure of the supply chain is quite different across the beverage market, which leads to different interactions between buyer and seller.

The final sale price of a beverage will be influenced by the buying conditions faced by a retailer, which also vary depending on how far upstream the supply is sourced. Larger retailers such as supermarkets and supermarket run liquor chains can obtain favourable price agreements due to higher volumes. Pricing structures may differ on a contract by contract basis, and these pricing agreements are not readily observable by third parties. Ongoing relationships between supplier and retailer can lead to complex arrangements such as discounts and rebates, making the true purchasing cost in any one period variable and difficult to determine. Typically, the larger retailers are able to sell alcohol at a discount compared to smaller retailers as a result of these deals.

Retail prices for beverages can also fluctuate for individual retailers, with specials and promotions that either discount individual items or offer combinations of items for a discount. Larger supermarkets and retailers often do not openly price discriminate across different geographic regions in the form of national pricing policies, although indirect price discrimination may occur in the form of specials and different product offerings across different regions. Specials and promotions can occur on a daily basis and this is observed by the fact that many private data providers that monitor retail prices offer real-time, geographic specific updates on beverage prices and promotions.

Some retailers may retain policies that harmonise prices.

- Aldi noted in 2014 that it was the only supermarket to offer a national pricing policy.[14] It appears that Coles had previous had a national pricing policy. A national pricing policy would change the impacts of a CDS
  - retailers are making a decision to charge different margins in different states if they adopt a national pricing policy, and the CDS becomes another cost difference between states
- Some retailers use standardised prices, (for example, the $2 shop), which provide for easier communication of prices to consumers. Where these types of retailers offered

14 Aldi 2014, Submission to the Competition Policy Review, http://competitionpolicyreview.gov.au/files/2014/06/Aldi_Stores.pdf.

beverages, this would also change how the costs of a CDS were recovered from consumers

- retailers are making a decision to charge different margins for different products if they adopt a simpler pricing policy, and the CDS becomes another cost difference between products.

Competition in the beverage sector

There have been various issues raised about competition over the past decade that relate, at least in part, to the beverage sector.

- In 2008, the ACCC undertook a Grocery Inquiry, largely related to the high combined market share of Coles and Woolworths. Its conclusion was that competition was 'workable'.[15]
- The 2015 Harper Review noted that competition had intensified in the supermarket sector and that few concerns had been raised about prices charged to consumers by supermarkets. It noted that removing barriers to entry and other regulatory barriers would strengthen competition in the supermarket sector. This includes removing restrictions on retail trading hours and improving zoning arrangements so that land did not become a barrier to competition.[16]
- Issues around competition and market structure in the supermarket sector have also raised concerns around the relationship between suppliers and major supermarkets, and particularly of an imbalance of bargaining power. This has led to the introduction of the Food and Grocery Code of Conduct introduced in 2015, and other inquiries by the ACCC (such as into milk).[17]
- The ACCC released the results of in-depth investigation into the contracts of Carlton United Breweries (CUB) and Lion Pty Limited, around their use of market power to restrict access to licensed venues. It did not find any issues that would substantially lessen competition in any of the markets we investigated.[18]
- Others have noted that while there are high fixed costs in the supermarket sector, the two major players appear to act to provide a competitive environment.[19]

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15 ACCC Grocery Inquiry, https://www.accc.gov.au/about-us/consultations-submissions/public-consultations/grocery-inquiry-2008

16 Harper, I., P. Anderson, S. McCluskey, M. O'Bryan 2015 (The Harper Review 2015), *Competition Policy Review,* Final Report, March.

17 See Beaton Wells, C. J. Paul-Taylor 2017, *Codifying supermarket-supplier relations: A report on Australia's foods and grocery code of conduct,* September, http://law.unimelb.edu.au/__data/assets/pdf_file/0006/2463135/Deidentified-draft-Code-Report-with-chapter-breaks_LATEST_010917.pdf

18 ACCC media release, 13 July 20217, https://www.accc.gov.au/media-release/accc-releases-findings-of-beer-taps-investigation

19 Samuel, G. and S. King 2013, "Power without glory? Supermarket competition in Australia", https://www.monash.edu/news/opinions/power-without-glory-supermarket-competition-in-australia.

Given the above, the beverage supply sector should be presumed to be competitive, in the sense that this is not an industry with obvious natural monopoly characteristics and for which past inquiries have not revealed competition concerns.

Implications for monitoring the impacts of the CDS

The different supply chains structures and scale across the beverage sector suggests possible areas to consider price impacts.

- The beverage supply sector should be presumed to be competitive, in the sense that this is not an industry with obvious natural monopoly characteristics and for which past inquiries have not revealed competition concerns
- The price pass-through to consumers, and which part of the supply chain bears any impacts not passed through, may differ across products and across retailers because of greater or lesser demand responses, and different levels of bargaining power
- The CDS may have different impacts on larger versus small businesses, to the extent that there are fixed compliance costs or financing costs
- Measuring the impacts within the supply chain will be complicated, because of different supply chain structures depending on the scale of the businesses involved and the differentiation of prices to different retailers.

2 The NSW Container Deposit Scheme

The NSW Container Deposit Scheme, known as 'return and earn', started accepting refunds on the 1st of December 2017. This followed similar schemes that have operated in South Australia (since 1977) and in the Northern Territory (since 2012). Similar schemes are also planned to commence in Queensland and the ACT in 2018, and in Western Australia in 2019.

The NSW CDS operates under the Waste Avoidance and Resource Recovery Amendment (Container Deposit Scheme) Act 2016 No 57.

The roles of key organisations in the CDS

The NSW Environmental Protection Authority (EPA) is the primary agency responsible for regulating the CDS. This role included designing how the scheme would operate, as well as appointing a Scheme Administrator and a Network Operator to manage the day to day operations. During the scheme, the EPA retains a number of regulatory oversight functions.

For the first seven years of the scheme, the CDS will be administered by Exchange for Change which is a consortium of Asahi, Carlton & United Breweries, Coca-Cola Amatil, Coopers Brewery and Lion. This role was appointed by the EPA following a competitive tendering process. Together, these firms have a market share of around 75 per cent of manufacturing in NSW. This role involves calculating and collecting the levy charged to producers, as well as paying refunds to collection points that receive containers. Exchange for Change are paid an administration fee which is funded through CDS 'supplier contributions'.

TOMRA-Cleanaway have been appointed as Network Operator for the first 5 years of the CDS (also the result of a competitive tendering process), which means that they are responsible for developing the network of collection points. In some cases, they will build and operate these collection points themselves, while in others they will contract other organisations to collect the containers on their behalf. This role also includes contracting with recycling companies to take the collected containers. Some material will have a positive price, and so this can be used to offset some of the network operation costs. In other cases, such as the case of recycled glass bottles, they may have to pay the recycling company a gate fee to accept the materials. The net cost of TOMRA-Cleanaway is charged as a network fee and is also recovered through the levy.

Coverage of the scheme

The NSW scheme will operate by providing a 10-cent refund to consumers who return an eligible container to a collection depot. It includes beverages that are produced outside NSW and sold in NSW, and does not include containers produced in NSW and sold outside NSW. While the CDS covers most beverage containers between 150 millilitres and 3 litres that are sold in NSW,[20] it excludes:

- plain milk or milk substitutes
- flavoured milk greater than 1 litre
- pure fruit and vegetables juices greater than 1 litre
- glass bottles for wine and spirits
- wine and water casks greater than 1 litre
- wine sachets greater than 250 millilitres
- cordials, concentrated fruit juice and vegetable juice
- registered health tonics

The scheme also requires that containers be 'empty, uncrushed, unbroken and with the original label attached'. It is unclear what proportion of containers will be ineligible for the scheme due to this condition. In particular, it is unclear what proportion of litter collected will meet these requirements.

Refunds to consumers

Consumers are able to claim a ten-cent refund when they take a container to an eligible collection point. When the scheme commenced operation on 1 December, there were more than 200 collection points operating across NSW, and this number is intended to increase to over 500 once the CDS is fully mature. CDS collection points include reverse vending machines, local shops, depot sites and existing recycling centres. Refunds collected via reverse vending machine can be transferred to a bank account via PayPal, delivered as a Woolworths voucher, or donated to a listed charity, while containers returned to other collection points can be redeemed for cash.

The CDS will run alongside the existing kerbside recycling system. Consumers who recycle containers through household recycling bins will not receive a refund under the scheme, but Material Recycling Facilities (MRFs) are able to claim this amount, along with an additional fee to cover their costs. The revenue collected by MRFs will be shared with the local councils based on a negotiated position.

20 The consultation RIS estimates that the scheme will cover 99.6 per cent of containers between 150mL and 3L that are used in NSW.

Levy charged on first suppliers

The refunds will be funded by a levy on all first suppliers. The fee charged to first suppliers includes:[21]

- the costs of refunds paid to customers
- the costs of refunds paid to MRFs for containers collected in the kerbside recycling system
- network fees to be paid to the network operator TOMRA-Cleanaway (which are determined by competitive tender and offset by the value of the collected recyclable materials)
- an administration fee paid to the scheme coordinator Exchange for Change (determined by competitive tender)
- a scheme compliance fee paid to the EPA.

The fees paid by each first supplier are determined by summing the five components above, and then dividing this by the share of eligible containers sold by the supplier (if a supplier sells 10 per cent of eligible containers under the scheme, they are billed for 10 per cent of the total scheme costs). In the first three invoices, this fee is estimated based on the historic number of containers supplied, which will then be retrospectively adjusted using actual container volumes and market shares. A different fee is charged for different materials types, but there is no further difference in fees based on factors such as geographic location, likelihood that a product is recycled, or likelihood that a product enters the litter stream.

Exchange for Change have published the supplier contributions for the first three months of the scheme. These fees come down over this period to represent a one-off effect that people might be hoarding containers before the start of the scheme. As a result, the fees for the third period are more likely to represent the long-term levy placed on containers.

2.1 Supplier contribution charges for the first 3 months of the scheme

	December - 17	January - 18	February - 19
	Cents per container	Cents per container	Cents per container
Aluminium	13.54	12.24	10.94
Glass and steel	14.07	12.72	11.36
Plastic	13.78	12.45	11.13
Liquid paperboard	14.42	13.03	11.64

Source: Estimated costs and methodology from the NSW EPA website: http://www.returnandearn.org.au/suppliers

The levy for the first period is calculated assuming a 100 per cent return rate, which means that of the deposit of around 14 cents, 10 cents from each bottle is being returned either to a consumer or a MRF. Fixed administrative fees (including the fees for Exchange for Change and the NSW EPA) are around equal to 0.53 per container. The

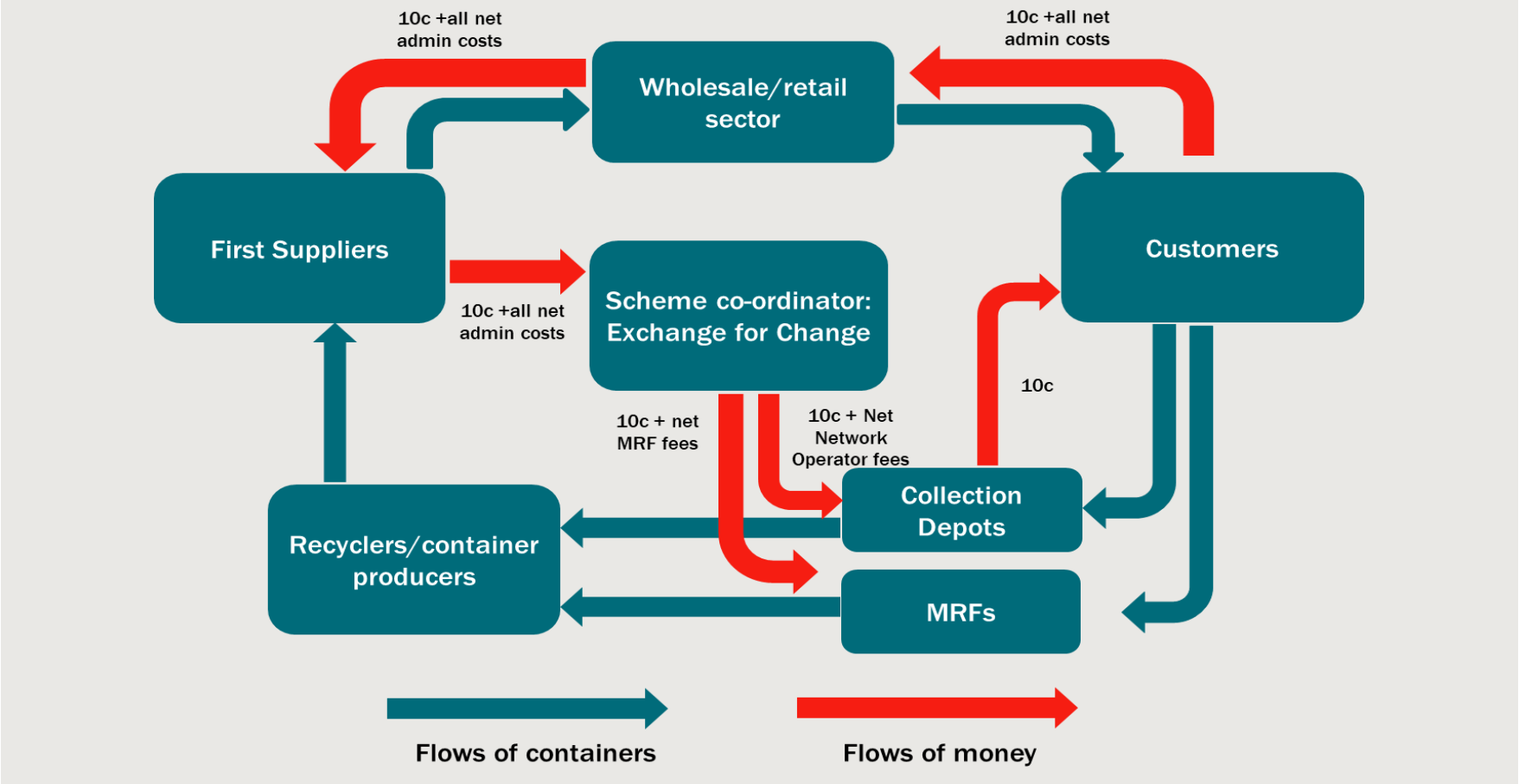
21 Calculated from the sensitivity tables from the Source: Estimated costs and methodology on the NSW EPA website: http://www.returnandearn.org.au/suppliers

remaining 3.5 cents per container are paid as a net administrative cost to TOMRA-Cleanaway and MRFs.

The levy for the third period is calculated using an assumed recovery rate of 80 per cent, which similar to the recycling rate achieved in South Australia. However, it is unlikely that this rate of recycling will be achieved by NSW in the short-medium term, and therefore the levy is likely to decrease further after this period.

The flows of containers and bottles between different parties in the CDS is shown in figure 2.2.

2.2 Flow of containers and money in the CDS



Note: This assumes a full pass-through of all costs to consumers

3 Theoretical implications of the CDS

The container deposit scheme (CDS) operates as a combination of a tax on suppliers of beverages, along with a refund paid to consumers who return a container. However, the ultimate incidence of the CDS depends on the extent to which producers are able to pass through the cost of the CDS levy to consumers. This chapter discusses the incidence of the CDS in a theoretical framework, with a focus on the importance of the elasticity of supply and demand, whether suppliers with market power are more likely to pass through the charge, and the extent to which consumers are likely to value the refund.

Approaching the CDS in a theoretical framework provides some insight as to how different parties are likely to respond to the CDS, as well as guidance on where the IPART price monitoring regime should focus its attention.

The incidence of the CDS in a supply and demand framework

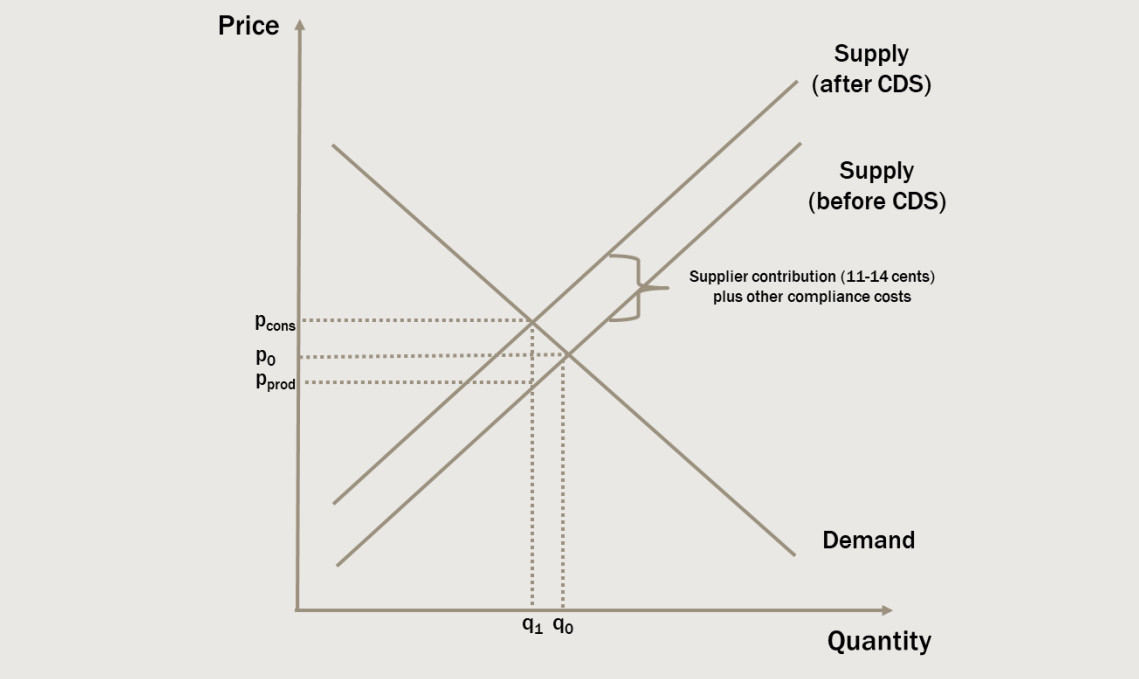
The simplest way to display the incidence of the CDS is to use a simple supply and demand framework. This discussion will start by looking only at the producer tax, and then the consumer refund is introduced in the following section.

In this framework, the demand curve represents the quantity of container beverages that would be purchased at various prices, while the supply curve represents the quantity that producers would be willing to sell at each price. Market equilibrium occurs where the supply and demand curves intersect.

In this framework, a tax can be represented as a shift in the supply curve (chart 3.1). This shift includes the levy (around 14 cents per container in the first period, reducing to around 11 cents per container in the third period), as well as other compliance and administration costs associated with the scheme.

This increases the equilibrium price and reduces the equilibrium quantity of containers in the market. Consumers bear P_{cons}-P_0 of the tax, while producers bear P_0-P_{prod}.

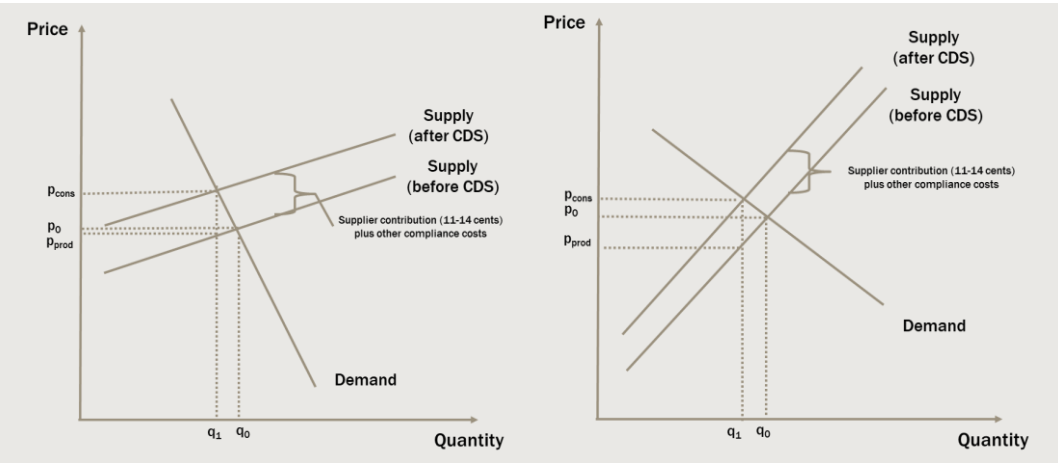
3.1 The demand-supply system



Data source: CIE illustration

In this framework, the main determinant of whether the tax is borne by producers or passed through to consumers is the elasticity of supply and demand.[22] (In the diagrams, a flat supply or demand curve is elastic, while a steep supply or demand curve is inelastic). This can be clearly seen in figure 3.2. In the left-hand panel, supply is elastic (flat) and demand is inelastic (steep) and as a result, consumers end up bearing most of the burden of the tax. In the right panel, demand is relatively elastic, while supply is inelastic, and producers end up bearing the tax.

3.2 The CDS is more likely to fall on the inelastic side of the market



Data source: CIE Illustration

22 This can be shown formally, where the share of a tax borne by consumers is equal to $E_S/(E_S+E_D)$, while the share borne by producers is equal to $E_D/(E_S+E_D)$.

What effects supply and demand elasticities?

Demand elasticities are largely determined by the availability of substitutable products. For instance, when entering a food court, the elasticity of demand for any one shop is likely to be high, because the other stores are close substitutes. On the other hand, the elasticity of demand for a life-saving medicine is likely to be very low as there is no available substitute. The elasticity of demand for addictive substances is also typically very low, so to the extent that some consumers are addicted to alcohol, they are unlikely to change their behaviour. On the other hand, if bottled water is easily substituted for tap water, then the elasticity of demand will be high.

The elasticity of supply is determined by the costs of production. Where a product is using scarce resources (such as beach front houses), then supply will be relatively inelastic, while manufactured products that benefit from economies of scale typically have flat or downward sloping supply curves.

Beverage manufacturing fits this description, and so it is likely that the supply curve for this industry is relatively flat. This means that the market will similar to the diagram on the left of figure 3.2, and that producers are likely to pass through the majority of the CDS to consumers.

The impact of the CDS refund

The previous discussion has focused only on the producer levy, and ignored the impact of the refund portion of the CDS. The consumer refund will increase the value that consumers will place on a beverage covered by the CDS. This is because after consuming the drink, they have the option of returning it for a 10-cent refund.

- For some people, claiming this refund will be convenient and easy (if they live very close to a collection depot), and this group will value the empty container at close to 10 cents
- Some other people will never return a container, and instead choose to recycle through the kerbside recycling system. For these people, the increased value of the can is 0 cents
- Finally, many people will choose to return some containers (they might return the ones they drink at home, but not the ones that they drink away from home). They may also face some costs in returning the containers, such as storage costs, and driving the containers across town. For this group, the valuation will be between 0-10 cents per can.

The net change in demand from consumers is the average across these group. This will be somewhere between 0-10 cents based on the average return rate of containers, although it is likely to be closer to zero.[23] A worked example of this is shown in box 3.3.

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23 Utilisation forecasts have used an assumption of 80% recovery, of which half goes through the kerbside. This puts an upper bound of a 4-cent consumer valuation per can, which will be decreased further by storage and transportation costs.

3.3 Worked example of the value to consumers

The value to consumers of the refund will reflect the share of consumers who deposit containers directly and the costs of their doing so. For example, suppose:

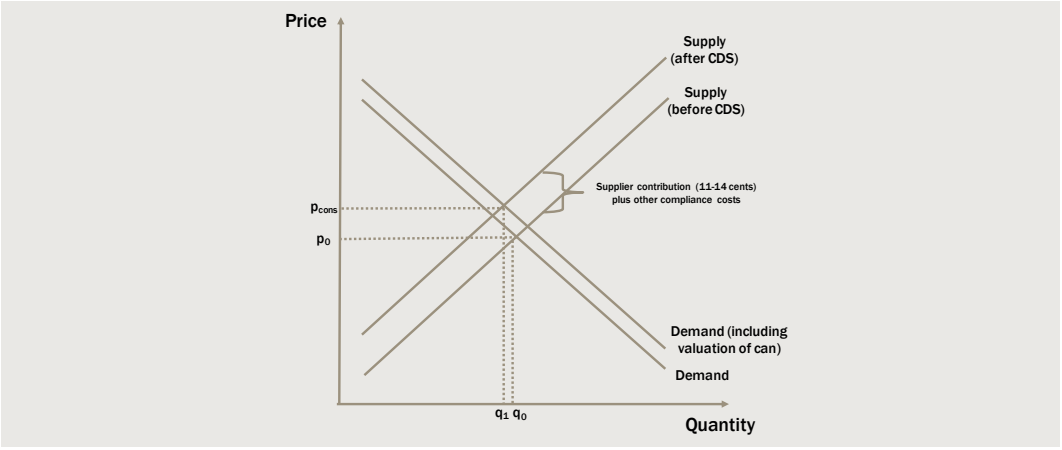
- that the refund for a container was 10 cents
- that 80 per cent of containers were given a refund, similar to expectations of NSW EPA
- of this 80 per cent, one quarter were deposited by consumers of beverages directly and three quarters were deposited through other mechanisms (MRFs, litter collectors, commercial recycling)

This would mean that on average, a purchaser of a beverage is expecting a refund of 2 cents from the CDS.

Further suppose that for people depositing containers, the average cost of doing so is 1 cent (in transport and storage). This would then mean the average value increase for consumers of beverages would be 1 cent. This would be reflected as an increase in the demand for beverages by this amount, presuming this was spread equally across the demand curve.

Within the supply and demand framework, this can be represented as an increase in demand, as in figure 3.4. The increase in demand (represented by a rightward shift in the demand curve) will likely be fairly small if few containers are deposited directly by households and there are material costs for these households to deposit containers (such as transport and time costs). Note that this shift in demand is less than the increase in price caused by the CDS levy, and as a result, the total quantity of drinks is lower after the introduction of the CDS ($q_1 < q_0$).

3.4 The CDS may shift the demand curve as well



Data source: CIE Illustration

Because the CDS refund results in a small increase in demand, the CDS will have a larger impact on prices and a smaller impact on quantity than if the scheme was just composed of a tax on supply. In effect, the shift in demand makes consumers less elastic

(they change their consumption decisions less when the price changes). As inelastic demand is a key determinant of whether the tax is passed through to consumers, the consumer refund makes it more likely that the tax on suppliers will be passed through to consumers.

Does market power influence the expect level of pass-through?

The degree of market concentration can also effect how much of the CDS charge will be passed through to consumers. In general, a greater degree of market power will imply a smaller proportion of the tax is passed through to consumers. This occurs because in the absence of a tax a monopolist will be able to charge a higher price than in a competitive market, and a tax reduces the ability of a supplier to extract monopoly rent. In other words, some of the incidence of the tax falls on the monopolist's markup.

This concept is shown formally for the case of a pure monopolist in appendix B. However, as shown in table 3.5, different market structures will result in differing levels of pass-through, and it is therefore difficult to predict from first principles how the market structure of the beverage industry will impact the way that the CDS levy is passed through the supply chain.

3.5 Pass through of taxes under different theoretical market structures

Market structure	Incidence of taxes
Perfect competition	Full pass through, or less than full pass though, depending on supply and demand elasticities
Monopolistic competition	Full pass through
Bertrand Duopoly	The same as perfect competition
Cournot Duopoly	Less than full pass through, full pass through or greater than full pass through are all possible
Monopoly	Less pass through than under perfect competition

Source: Institute of Fiscal Studies 2011. 'A retrospective evaluation of the elements of the VAT system: full report to the European Commission', page. 286.

Larger suppliers may also be better placed to handle the administrative costs of the CDS. For instance, where there is a one-off fixed cost of understanding and complying with the scheme, larger suppliers will be able to spread this cost across a larger product base. Therefore, it is possible that the impact on smaller manufacturers will be different to larger players.

A potentially important outcome of the IPART price monitoring project would be to determine whether the impact of the CDS is different for large and small suppliers

Menu costs and 'lumpy' price changes

Retailers don't tend to move prices smoothly. Instead, they often leave prices at a round figure such as '$2.99' or $3, before making a jump to the next round figure such as $3.50 or $4. This type of behaviour is particularly common in bars, cafes and restaurants, but is uncommon in the wholesaling part of the supply chain.

This means that when the CDS is introduced, some retailers may not immediately increase their prices, which would mean that at least in the short term they bear the full incidence of the CDS. However, for some producers and retailers, this may be enough to push them up to the next price point. For these retailers, it will appear as though the tax has been overshifted.

This issue is observed in the context of the alcohol spirits market in Connecticut by Conlon and Rao (2016).[24] They argue that the best way to understand this issue is to measure price incidence at different points in time, as over longer time periods these short-term pricing frictions are less likely to influence results.

Impact of the CDS on other markets

Substitution between products

The CDS will change the relative prices of different goods and services, and is likely to change the mix of products that people consume. This impact falls into three main categories:

- Where products that are covered by the CDS are substitutable with products outside the scheme, some customers will shift their consumption to products outside the scheme. For instance, some people may drink less beer and drink more wine.[25]
- Where different products in the scheme have a different proportional tax rate, people may substitute to the product with the lower effective price increase. For instance, people may stop buying 24 packs of bottled water, and buy larger bottles instead.
- People may simply buy fewer container beverages following the introduction of the scheme, and instead purchase any other product or save their money.

Each of these issues is key measure of the impact of the CDS. Data sources and empirical techniques that can be used to estimate these effects are included in chapter 5 of this report.

The impact of the CDS at the NSW border

At the commencement of the NSW CDS, South Australia and the Northern Territory were the only other Australian jurisdictions operating a container deposit scheme. This means that people living near the NSW border in towns such as Albury-Wodonga and Tweed Heads/Coolangatta will face an incentive to:

- Buy any container drinks outside of NSW
- Return drinks to collection depots within NSW

Where producers in NSW are directly competing with suppliers in another jurisdiction, this will put them at a competitive disadvantage. It may also result in people spending

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24 Conlon, C. and Rao, N. 2016, Wholesale Prices, Retail Prices and the Lumpy Pass-Through of Alcohol Taxes, working paper.

25 This is a very similar issue to consumers buying products from across the NSW border, which is discussed below.

time and money to cross the border to get the drinks from outside of NSW, which is a direct efficiency cost of the CDS. Finally, it will result in NSW subsidising recycling from people in other states which has a budgetary cost to NSW.

The impact of border issues is directly related to how much cross border substitution occurs. If very few people behave in this way then it is not important, but if there is a lot of cross border traffic, then it may need to be addressed as the scheme develops.

In order to measure this extent of cross border substitution, it would be necessary to have price and sales data at the store/postcode level and compare these series both at the start of the CDS, and at the time that similar schemes start in Queensland and the ACT. This is discussed further in chapter 5.

The impact of the CDS on competition between grocery retailers

One novel feature of the NSW is the role of Woolworths as a provider of collection depots. Woolworths are aiming to provide collection points in 180 of their stores across NSW. Further, CDS refunds are able to be redeemed as a voucher in Woolworths stores. It is unclear whether this will result in:

- The pass through of the CDS levy being higher/lower in Woolworths stores
- Any measurable increase in Woolworth's market share as people incorporate returning cans into a weekly shopping trip.

In order to estimate these impacts, it would be necessary to have price and quantity data for Woolworths and another comparable retailer. These data sources are discussed further in chapter 5.

Impact on the market for container materials

It is expected that the CDS will increase recycling rates for all container types covered by the scheme. In turn, this will increase the quantity and reduce the price of recyclable materials such as glass, plastic and aluminium and in doing so reduce the price of new container packaging. However, this effect is likely to be very small as:

- the price of raw materials such as crushed bottles is only a small component of the costs of a new bottle
- there is an engineering constraint in some recycling practices that limit the amount of recycled materials that can be used
- The price of new containers is heavily driven by the cost of importing containers
- The market for new containers is dominated by players with large market shares, who may capture any reduction in input costs rather than passing them through the supply chain

Therefore, impacts in this part of the market should not be a priority for IPART's price monitoring activities.

4 A price monitoring framework

IPART's draft terms of reference have been publicly released for consultation. This states that

> IPART is to monitor:
>
> 1. the effect of the Container Deposit Scheme on prices of beverages supplied in a container;
> 2. the performance and conduct of suppliers; and
> 3. any other market impacts on consumers that arise from the commencement of the Scheme, for the period from 1 November 2017 to 1 December 2018 (monitoring period).

IPART's terms of reference are broad. However, two distinct components can be separated. Firstly, price monitoring needs to be able to inform a general question about the impact of the CDS on prices of beverages supplied in a container. Secondly, price monitoring needs to inform a specific question about price changes for individual suppliers.

The terms of reference also potentially include monitoring of market changes outside of price, such as quantities and market shares. This would expand the monitoring project to sales data.

What unintended consequences could price monitoring identify?

The monitoring of prices could identify a range of potential negative or unintended consequences (table 4.1).

4.1 Possible unintended consequences of the CDS and their price impacts

Unintended consequence	How revealed in prices or other metrics
Price gouging	Price increases are higher than the costs of the CDS to industry
Margin squeeze	Price increases are lower than the costs of the CDS to industry
CDS deters consumers	Reduction in overall sales relative to what would otherwise have occurred
Uneven playing field	Price pass-through differs systematically for different suppliers, or market share changes systematically for different suppliers

Source: The CIE.

Prices at what point in the supply chain

Prices could be measured at different points in the supply chain:

- the price charged by the manufacturer (where they are the first supplier) to either a wholesaler or retailer — the factory gate price
- the price charged by the wholesaler to the retailer — the wholesale price, or
- the price charged by the retailer to the consumer — the retail price.

In practice, the prices can be more complicated than this because of incentive payment systems that operate through the supply chain.

The terms of reference are not clear about which prices IPART is intended to monitor.

For the general objective of understanding increases in the price of beverages supplied in a container from the CDS, the retail price is the most intuitive measure. The retail price will capture the overall impact of the CDS regardless of when product first enters NSW.

The specific question about prices for individual suppliers implies measuring a price within the supply chain. This would mean measuring the factory gate price or the wholesale price.

Identifying a general increase in retail prices

Measuring a general change in prices

There is a well defined methodology for measuring changes in prices of goods and services employed by the ABS as part of developing the Consumer Price Index and Producer Price Index. This involves:

- sampling different products and retailers at particular points in time
- combining prices measured for individual products and suppliers into a price index for a group of products. For example, non-alcoholic beverages is a sub-group of the CPI.

4.2 Concepts and sources used by the ABS to construct price indices[26]

The price change across a group of products is an aggregate of the prices in one period versus the prices in another, with weights for each product. Mathematically, this is represented as:

$$\Delta P = \sum_i P_i^1 . w_i \Big/ \sum_i P_i^0 . w_i - 1$$

Where P are prices in period 0 and 1, for products I, and w are weights applied to each product.

Note that the ΔP above is represented as a percentage change. Because the CDS applies as a fixed cost per container, rather than a percentage increase, this could be specified as a change in prices in cents per container instead.

Different types of indices use different weights applied to the prices.

The ABS uses a combination of transaction data (25 per cent) and point in time price sampling (75 per cent) to compile the CPI. For example, for a specific set of retail suppliers of a product, the ABS will compile price changes from either transaction data or point in time price sampling. The results are then averaged at the elementary level. A simple average is used across items within the same product (for example, medium chocolate bars) and the sample is constructed to be representative of the share of the market from different suppliers.

In constructing the sample of retail suppliers, the ABS will tend to use a larger sample where:

- the product class makes up a higher share of the expenditure of households
- there is more heterogeneity in the products within the class
- there is a more price variation across different suppliers of the same product.

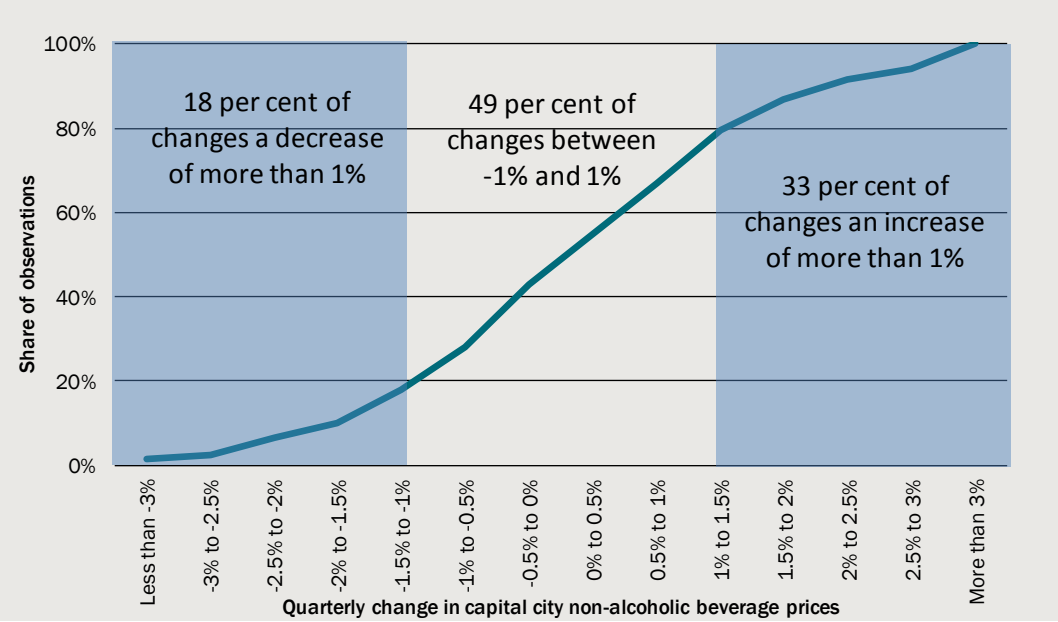
Identifying the counterfactual and the impact of the CDS

IPART is required to go beyond measuring the general change in prices of beverages in a container and to identify the change that is from the effect of CDS. Prices will be influenced by many other factors. The degree of variation in prices can be seen in ABS price measures. On average, the absolute change for a quarter from 2008 to 2017 is 1.2 per cent. The distribution of changes is shown in chart 4.3. The largest quarterly movement was an increase of 5 per cent in one quarter, while the smallest quarterly movement was a decrease of 5 per cent in one quarter. About one third of changes are an increase above 1 per cent, and another one fifth a decrease of more than 1 per cent.

26 ABS 2016, Consumer Price Index: Concepts, sources and methodology, Information Paper.

To put this general variation into perspective, a 10 cent increase for a beverage costing $2.50 would be a 4 per cent increase. Hence it would be relatively rare to see a change of this order of magnitude (about 3 per cent of the time historically for a quarterly change).

4.3 Quarterly change in ABS capital city non-alcoholic beverage prices



Data source: ABS Consumer Price Index XXX.

A general model for measuring the impact of the CDS can be developed as follows.

$$P_{b,t,r} = \sum_{z=1\ldots n} \beta^{z}_{b,t,r} Z_{b,t,r} + \beta^{CDS}_{b,r} . C_{b,t,r}$$

Where:

- $P_{b,t,r}$ is the price of a beverage for beverage product b, time period t and region r
- z is a set of factors that influence the price of a beverage. This could include dummy variables for each region and time period
- $\beta^{z}_{b,t,r}$ is the impact of the factor z on the price of a beverage. This impact could vary with the product, over time or across regions
- β^{CDS}_{r} is the proportional impact of a CDS fee on prices, which has been allowed to vary by region or product
- $C_{b,t,r}$ is the CDS charge to the industry (such as 14 cents per container) for each product, at each point in time and for each region. This would equal 0 where no CDS is in place.

Under this model, if β^{CDS}_{r} is equal to 1, then there has been full pass through of the CDS charge to the industry to the retail price. If β^{CDS}_{r} is less than 1 then there has been less than full pass through to the retail price. If β^{CDS}_{r} is greater than 1 then there has been more than full pass through to the retail price.

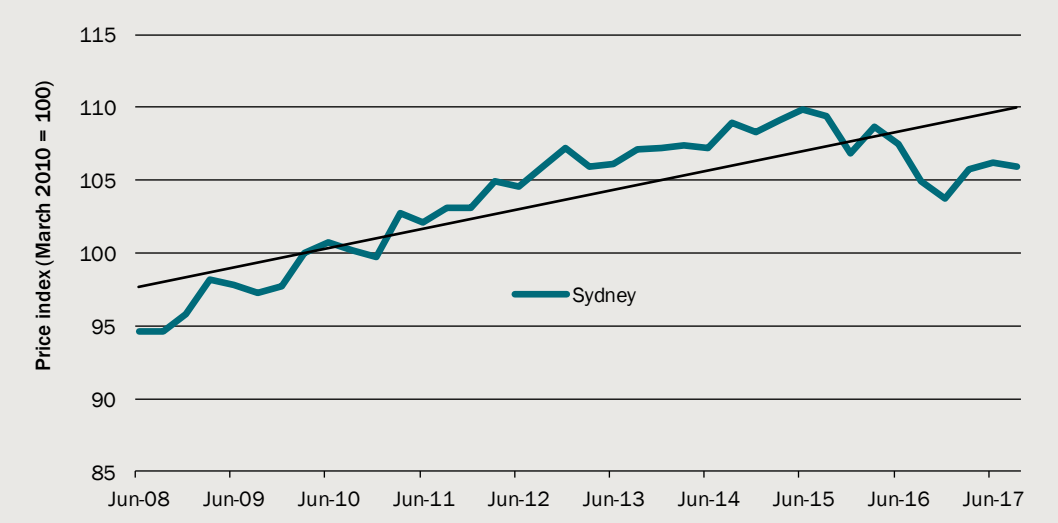
This generic model can be substantially simplified, depending on what other factors are assumed to impact on prices. For example, the impacts of the CDS could be identified by:

- changes in the trend in beverage prices over time — for example, if prices in NSW had increased by 2 cents per beverage every year and then increased by 10 cents in the year after the CDS, then the impact of the CDS under this method would be an 8 cent increase
- changes in prices in NSW relative to changes in prices in other jurisdictions that have not implemented the CDS. For example, suppose that prices in NSW increased by 10 cents, and prices in Victoria increased by 3 cents. This would then suggest the impact of the CDS was a 7 cent increase
- changes in prices in NSW for beverage that are covered by the CDS versus those that are not. For example, suppose a pure fruit product (above 1L) had a price increase of 5 cents, while a soft drink had a price increase of 10 cents, then, under this method, the impact of the CDS would be a 5 cent increase.

Looking at aggregated data on beverage prices from the ABS can give a view as to which types of simplifications are most appropriate.

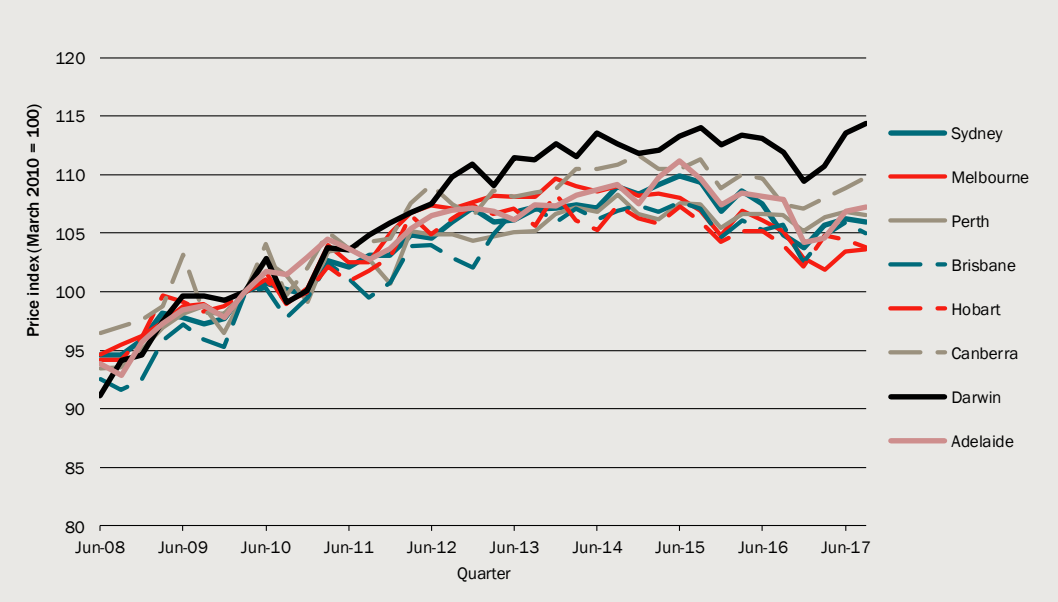
- The use of a time trend is likely to give some indication of the counterfactual, although probably not a very good measure. The Sydney non-alcoholic beverage CPI is shown in chart 4.4. There have been periods of relatively consistent price trends. However, across the period 2008 to 2017, there have also been large reversals and considerable volatility.
- The use of comparisons across states is likely to be a better measure of the counterfactual. The price movements across states for non-alcoholic beverages tend to move together (chart 4.5). The average correlation between states non-alcoholic beverages prices is 0.5.
  - Once the relationship between Sydney and Melbourne price movements is allowed for, a time trend becomes an insignificant explanator of Sydney prices. This indicates that the other states movements in prices will contain all the information of a time trend and more, making the use of a time trend as the counterfactual a less useful method than using interstate price changes
- We have not tested the extent to which we can add structural explanators for price movements to provide additional explanatory power. Possible structural factors, in addition to product and time fixed effects, could include:
  - prices of inputs such as sugar, milk, glass, aluminium, fruit
  - retail sector wages
  - taxes and government charges, such as alcohol taxes and the CDS

4.4 ABS CPI for non-alcoholic beverages, Sydney



Data source: ABS Consumer Price Index.

4.5 ABS CPI for non-alcoholic beverages, all states



Data source: ABS Consumer Price Index.

Other types of counterfactuals, such as beverages not captured by the CDS, are not likely to be useful for establishing a robust counterfactual. To be a good counterfactual these products would have to:

- not be substitutes for products covered by the CDS
  - if these products are substitutable with products covered by the CDS, then the change in their prices may in part reflect the impact of the CDS
- face the same underlying cost drivers as products covered by the CDS. This is not likely to be the case for the main products not covered by the CDS, such as milk and wine.

Which retailers should be covered?

The retailers that should be covered should be representative of where people are purchasing beverages. This is the same concept as the ABS CPI. For example, if 80 per cent of beverages were purchased from supplier A and 20 per cent from supplier B, then supplier A prices should be weighted either explicitly (by giving its average price an 80 per cent weight) or implicitly (by sampling it four times as much as supplier B).

Which products should be covered?

The products used in constructing a general measure of the change in beverage prices should reflect their share of household expenditure. For example, if soft drink comprised 80 per cent of household expenditure on beverages supplied in a container and fruit drinks 20 per cent, then these would be the weights used in the general price measure.

Note that there are many technicalities in which weights are used for measuring price changes.[27] These will not be of material relevance to IPART as it is monitoring over a very short period where quantity shares for different products are unlikely to change much over the period.

Identifying specific supplier price changes

Identifying specific supplier price changes is a very different task to that set out above. This may be considered to be outside of the terms of reference, or something to be investigated if general price increases appear excessive. It involves:

- understanding changes for each supplier and potentially purchaser, rather than in aggregate
- measuring prices between businesses rather than retail prices

To consider the complexity of this task, there are ~6000 products that have been registered as part of the CDS. Each product will be sold to multiple businesses. So, if each product was sold to only 10 different businesses then there would be 60 000 prices. Within this, IPART could identify where product prices increased by different amounts over the time period covered by the CDS. For example, suppose:

- 20 per cent of prices increased by less than half of the CDS charge
- 60 per cent increased by between 0.5 and 1.0 times the CDS charge, and
- 20 per cent increased by more than 1.0 times the CDS charge.

In this case, the focus would be on the tails of this distribution, and which types of suppliers and purchasers are in these tails.

This analysis would provide some information about the types of supplier relationships where price changes are different to expected — for example, smaller purchasers facing

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27 Such as Laspeyres Indices, Paasche indices and combinations of these. See ABS 2016, Consumer Price Index: Concepts, sources and methodology, Information Paper for more discussion.

different price increases to larger purchasers, or one particular supplier increasing prices more than the CDS. This would point to areas of unintended consequences. However, a specific investigation would be required to conclude anything about a supplier's conduct.

An alternative approach would be to monitor prices only where a specific complaint was made. In this case, IPART would develop a template for data surrounding a complaint. This could indicate how many complaints were for excessive increases purporting to be because of the CDS.

Identifying changes in market shares

Changes in market shares can be measured by analysing data on the sales of different products, from different suppliers and through different retailers. This would involve:

- identifying the amount of sales in either units or dollars for different products, from different suppliers and through different retailers
- understanding whether this had changed because of the CDS in any systematic manner.

The issues to be addressed would be very similar to those for considering price changes and attributing these to the CDS. Most importantly, what would the counterfactual have been in the absence of the CDS.

Note that we understand that Exchange for Change would collect data on sales from first suppliers as part of billing for the CDS. This would identify part of the changes in market share (by product and supplier) but would not identify whether there are changes occurring in the shares of the retail market for different retailers. Given that this data should be readily available, IPART should consider it. However, given that changes in market shares are likely to occur over a long time period, and that the CDS data does not cover market shares in other states, there will be a limit to what can be done with this data alone.

If IPART wishes to understand the impact of the CDS on market shares, it may be necessary to collect data from other sources, such as retail scanner data. This is discussed further in the following chapter.

Coverage of beverages

The collection of prices will clearly need to cover beverages to which the CDS applies.

The price impacts of the CDS may flow through to other products as well, either because of the behaviour of suppliers or because purchasers substitute to other products. Hence prices should also be collected for beverages that are not subject to the CDS, such as wine.

Time period for price monitoring

IPART's terms of reference note that the time period for price monitoring is from the 1st of November 2017 to the 1st of December 2018. They also note IPART should have regard to changes prior to November 2017. This means that prices should be collected across this time period, at a minimum.

The cost impost on the beverage industry will not remain constant over this period. This suggests that prices should consider the extent to which initial CDS charges impact on prices and subsequent changes to CDS charges also impact on prices.

The frequency of reporting of prices will also be important to identifying the impacts of the CDS. Higher frequency data, such as daily or weekly, will be more likely to show the effect of the CDS than data covering quarters, because there will be fewer other factors impacting on prices.

Recommendations

4.6 Recommendations about data to be collected

Retail price data should be collected to:

- cover NSW and other states, and ideally regions within NSW, to enable impacts to be estimated using changes in other states as a counterfactual
- cover a time period from before and after the introduction of the CDS — December 2016 to December 2018 would be sufficient
  - a longer period will be marginally more valuable than one beginning in December-2016, but would not be critical
- be as high frequency as possible to more easily remove non-CDS related price changes
- cover beverage products that are impacted by the CDS and those that are not, such as wine

Within-supply chain price monitoring could be achieved in two ways:

1 Through seeking information about price changes purporting to be because of the CDS at the point at which complaints are made. This could use a standard template issued to complaints to record price data.

2 Through detailed monitoring of all prices between suppliers and wholesalers and retailers.

Which of these is preferable will depend on feasibility of obtaining data and cost.

Detailed monitoring of other market impacts, particularly changes in sales quantities, will likely be more difficult to identify and attribute to the CDS, and may occur over a longer period than the monitoring period. This analysis should be dependent on the extent to which comparable sales data can be obtained for NSW versus other states.

5 Possible data sources for measuring the impacts of the CDS

There are a large number of potential data sources for measuring the price impacts and other impacts of the CDS. This chapter sets out how we have characterised these to enable comparison and then applies this to each possible data set.

Characterising the data available

The available datasets can be divided into two broad groups — datasets on prices and datasets on sales. Within each of these datasets, we collect information about what the datasets cover (table 5.1 and table 5.2) — this is information such as time period, frequency, products, retailer coverage and timeliness.

5.1 Characterising datasets of prices

Attribute	Assessment options
Point in supply chain	Retail, wholesale, factory gate
Level of product disaggregation	Number of product categories, or product break-downs
Geographic coverage	NSW and other states, regional disaggregation within NSW
Retailer coverage	Coverage of major retailers, all retailers, for consumption at home, for consumption on premises, online prices only
Time period	Start and end date of data
Frequency	Daily, weekly, monthly, quarterly
Timeliness	Time delay before data is available
Retailer disaggregation	Whether data is provided for individual retailers or in aggregate

Source: The CIE.

5.2 Characterising datasets of sales

Attribute	Assessment options
Point in supply chain	Retail, wholesale, factory gate
Level of product disaggregation	Number of product categories, or product break-downs
Geographic coverage	NSW and other states, regional disaggregation within NSW

Attribute	Assessment options
Retailer coverage	Coverage of major retailers, all retailers, for consumption at home, for consumption on premises, online prices only
Time period	Start and end date of data
Frequency	Daily, weekly, monthly, quarterly
Timeliness	Time delay before data is available
Retailer disaggregation	Whether data is provided for individual retailers or in aggregate

Source: The CIE.

We also make an assessment of how each data source aligns to IPART's terms of reference, and other factors such as cost and confidentiality (table 5.3).

5.3 Characterising datasets against IPART's terms of reference and other factors

Attribute	Assessment options
IPART's terms of reference	
Effect of the CDS on prices of beverages supplied in a container	Yes/No
The performance and conduct of suppliers	Yes/No
Any other market impacts on consumers	Yes/No
Other	
Cost	$
Confidentiality	Any issues noted

Source: The CIE.

The possible datasets

The set of possible datasets that could be used to answer IPART's terms of reference fall into five categories.

- Official price estimates that are either public or provided based on a special request from the Australian Bureau of Statistics
- Market information collected from private data businesses,
- Market information collected directly from market participants by IPART
- Information collected by IPART through surveys
- Information returned to IPART from market participants in response to concerns about CDS issues

The datasets considered within these categories is shown in table 5.4.

5.4 Range of datasets

Dataset	Details
Official price estimates	
ABS Consumer Price Index components	Components are published quarterly, and more detailed information can be provided by the ABS through special requests
ABS Producer Price Index components	Components are published quarterly, and more detailed information can be provided by the ABS through special requests
Private data businesses	
Spotlite	Online high-frequency price tracking
IBISWorld	Industry research including market share analysis and sales data across the supply chain
Liquor Merchants Association of Australia	Price tracking for promotions and sales as well as more detailed market share analysis.
Frugl	Online high-frequency price tracking for major supermarkets across Australia
ACNielsen	Electronic point-of-sale tracking of major retailers including price, sales volume measures and market share
Information directly from market participants	
Exchange for Change market data	Container numbers for each first supplier for each product, and the supplier contribution paid by each supplier
Scanner data from supermarkets and liquor retailers	Electronic point-of-sale data covering price, promotion and sales volumes across all retail outlets in Australia
IPART surveys	
Survey of consumers	Survey to understand overall impacts on households of the CDS
Survey of businesses (hospitality sector)	Survey to understand impacts on beverages consumed at the point of sale, which will not be well covered by other sources
Survey of retailers/wholesalers	Survey to understand impacts within the supply chain, as a more representative view of behaviour of the performance and conduct of suppliers
Information submitted in response to CDS	
Complaints data to IPART	Template to be submitted by those with complaints indicating price changes or other changes attributed to the CDS

Source: The CIE.

A summary of the advantages and disadvantages of the different types of data is set out below.

ABS data

The ABS actively collect and maintain a large sample of prices for goods and services produced and consumed in Australia, including alcoholic and non-alcoholic beverages. The ABS use these data to compile price indexes, which measure the change in prices over time. Although individual prices themselves are not published, an index number takes the form of a price relative, which indicates the magnitude by which prices have changed compared to an earlier point in time.[28] There are two relevant publications that measure price change for beverages.

Consumer Price Index (CPI)

The Consumer Price Index (CPI) measures quarterly changes in the price of a 'basket' of goods and services which account for a high proportion of expenditure by the CPI population group (i.e. households).[29] The basket of goods and services includes beverages and the CPI published series includes two quarterly price indexes for alcoholic beverages and non-alcoholic beverages. This in turn breaks down as follows in publicly available data:

- non-alcoholic beverages is broken into two components — 'coffee, tea and cocoa' and 'waters, soft drinks and juices'
- alcoholic beverages is broken into three components — 'spirits', 'beer' and 'wine'

The CPI provides a robust and high-level coverage of beverage price behaviour across Australian capital cities. Although the CPI is low frequency, being quarterly, the underlying data and methods used for price measurement are among the highest quality in Australia and are therefore well suited for measuring the broader impacts of the CDS.

Producer Price Indexes (PPI)

The Producer Price Indexes (PPI) measure quarterly changes in the prices of goods and services bought and sold by producers in Australia across all industries. Price change is estimated on an input basis (which measures the change in prices paid for goods and services by businesses, typically for inputs into the production process) and an output basis (which measures the change in the prices received for goods and services sold). For the purposes of measuring beverage prices, an output PPI which measures the change in the prices received by beverage manufacturers would be of relevance. This series will, at a broad level, identify whether manufacturers are charging higher prices compared to earlier points in time for beverages around the time when the CDS was implemented. Much like the CPI, this data series is quarterly and therefore relatively low frequency. The benefit of using these series in conjunction with the CPI however, is the broader whole-economy coverage of price inflation, linking changes in manufacturing prices to changes in consumer (retail) prices.

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28 ABS 2016, Consumer Price Index: Concepts, sources and methodology, Information Paper

29 ABS 2016, Consumer Price Index: Concepts, sources and methodology, Information Paper

Unlike the CPI, the PPI series are produced on an industry wide basis at the Australian level as opposed to state level. A state by state breakdown can be obtained through a special request made to the ABS to provide re-configured data.

Customised data series

The volume and quality of data collected by the ABS typically allows for more than one way of configuring and producing statistics. In situations where published outputs do not meet the specific information requirements of users, the ABS will allow for the construction of special series, typically for a fee.

Of relevance would be a finer breakdown of the CPI and PPI indexes. Since price indexes are built from the product level and aggregated into broader beverage product categories, it is possible to represent price behaviour by specific beverage types for example, beer and wine across premium and discount varieties. The information collected by ABS includes point-of-sale scanner data, which includes information on sales and quantities for different products. A special series request can therefore involve measuring price change across specific beverage types as well as a quantity series. Together, this information would offer insight into potential consumer substitution between beverage types as a result of price change. The level of detail that the ABS would make available would need to be tested through discussions with them.

Survey data

A well-designed survey could be used to complement other primary data sources discussed in this chapter. Surveys have the advantage that they can be used in sectors where it would otherwise be difficult to collect information (such as the restaurant, bar and café industry). They can also be used to identify intentions (such as whether people would like to use the CDS but don't have access to a collection point). Finally, a survey can be used to determine how the CDS impacts different parts of the population, and can therefore be used to determine the distributional impact of the scheme.

On the other hand, survey data is generally based on information that is recalled by the survey participant, and will therefore be less accurate than data that is directly observed. This makes it unclear how data from a survey could be used with data from other sources. Survey data is also generally more expensive than other data as it must be directly collected.

Given these issues, a special purpose survey should only be used where they provide insight to an area of high priority for IPART, and other data sources are not available.

There are three different groups that could be surveyed as part of the IPART price monitoring process. Households, the hospitality industry, and beverage distributers and wholesalers. These surveys are different enough in purpose and design that they must be considered separately.

Survey of households

A survey of households could be used to identify the overall impact on households from the CDS, by measuring the value and costs of making product returns. For instance, a survey could identify whether returning containers through the CDS was more common amongst higher or lower income households, or among young or old households, or households in different regions. Along with the pricing impacts estimated from other data sources, this could be used to calculate the distributional impact of the CDS.

A survey could also be used to identify where the returned containers were coming from. For instance, it could show whether the containers are coming from drinks consumed at home, or from drinks consumed away from home. It could also be used to identify whether the containers are being returned by people who consume the drink, or are collected by another party before being returned.

Finally, a survey can be used to identify the main factors that determine whether or not people partake in the CDS. For instance, it could identify how far people are willing to travel to a collection depot, and whether people are just as happy to receive a refund through the reverse vending machines as they are to collect cash from another collection point. Information on travel time could also be used to estimate what proportion of the refund is a net gain to consumers, and what proportion is lost through transaction costs.[30]

Surveys can be run through a variety of formats, including face-to-face surveys, telephone surveys, mail out surveys and internet based surveys. In this case, an internet panel survey would be the most cost-effective mechanism. Survey companies would charge around $20 000 for a survey of 1000 people.

Our view is that the above information is outside of IPART's scope and a consumer survey would therefore not be required.

Survey of businesses

A business survey could be used to understand the behaviour of bars, cafes and restaurants. This survey would be comprised of two separate components.

The first component would look at the recycling habits of businesses. For instance, it would determine whether businesses keep containers on site and return them for the deposit. It would also ask whether businesses have incurred significant costs (such as making a staff member drive to a collection depot) or had to make significant changes to their business practices to collect these deposits (for instance, does a business that used to crush glass bottles on site now keep them whole to collect the deposit). Finally, the survey could be used to identify barriers that are stopping businesses from collecting deposits through the CDS.

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30 This issue is discussed in chapter 3. For instance, if someone drives 15 minutes to return 200 containers, they will receive $20, but they may value their time at $10, which would mean that half of the value of the refund is lost in travel costs.

The second part of the survey would cover the way that these businesses have changed their prices in response to the CDS. For instance, it might ask:

- whether invoices from their suppliers come with a specific cost listed for the CDS contribution
- whether they have directly increased their prices in line with this increase in costs

Other data sources listed in this chapter are unlikely to cover drinks sold in bars, cafes and restaurants, and so this is the best way to observe pricing behaviour in this industry.

This survey would need to be conducted with small business owners and managers, and would therefore not be possible to conduct using an on-line panel. In this case, it would be more appropriate to use a phone based survey, with an indicative cost of around $20 000 for a survey of 200 businesses.

Our view is that the above information is not a critical component of IPART's terms of reference and this is therefore not recommended.

Survey of wholesalers, manufacturers and retailers

As discussed in chapter 1, prices charged in the beverage market are often negotiated on a bilateral basis, and are generally not made public. Therefore, it will be difficult to observe what is happening in this part of the market using publicly available data sources.

If IPART wishes to monitor the pricing behaviour from participants in this part of the supply chain, it will be necessary to survey them directly. However, this would be a challenging exercise. As each contract is negotiated directly, it means that there is a very large number of prices that would need to be observed.

This could be used as a means of providing a less biased understanding of impacts across the supply chain than would be provided by data on complaints.

Data from private data businesses

Private data providers often collect and monitor prices from major retailers. This typically includes prices collected online, from newspaper and magazine advertisements and in some instances, point-of-sale scanner data. Depending on the provider, price coverage can be very high frequency (hourly updates) and cover thousands of beverage products at the postcode level. Because data is monitored at the product level, private providers can offer a detailed product taxonomy which specifies all characteristics of a product and the circumstances under which it is sold (such as a special promotion or discount).

Some providers (such as Nielson) do offer point-of-sale data, based on a sample of households, through scanning of products and entering the price.

Data from market participants

The best data source from private providers would be point-of-sale scanner data. Major supermarkets such as Woolworths and Coles maintain vast databanks of all sales and

transactions that occur in every outlet across the country. This would comprise one of the most rich and detailed datasets to be used for price and quantity monitoring, if they can be acquired.

We have not been able to contact these companies. Other companies use their data, such as Quantium.

Complaints data

IPART could seek to standardise complaints data about price changes from the CDS to enable this to be reported. This would:

- include developing a template to capture and verify complaints data. This would cover the size of the participant, which part of the supply chain they were in, the price change, evidence about attribution to the CDS, the supplier, the product, wholesaler or retailer against who the complaint is made and the region
- allow IPART to systematically report on complaints — for example, 75 per cent of complaints were from small manufacturers, 60 per cent of complaints were in regional areas.

Such a system would need to be set up quickly because the CDS has already started and businesses would be most likely to complain at the point of prices changing.

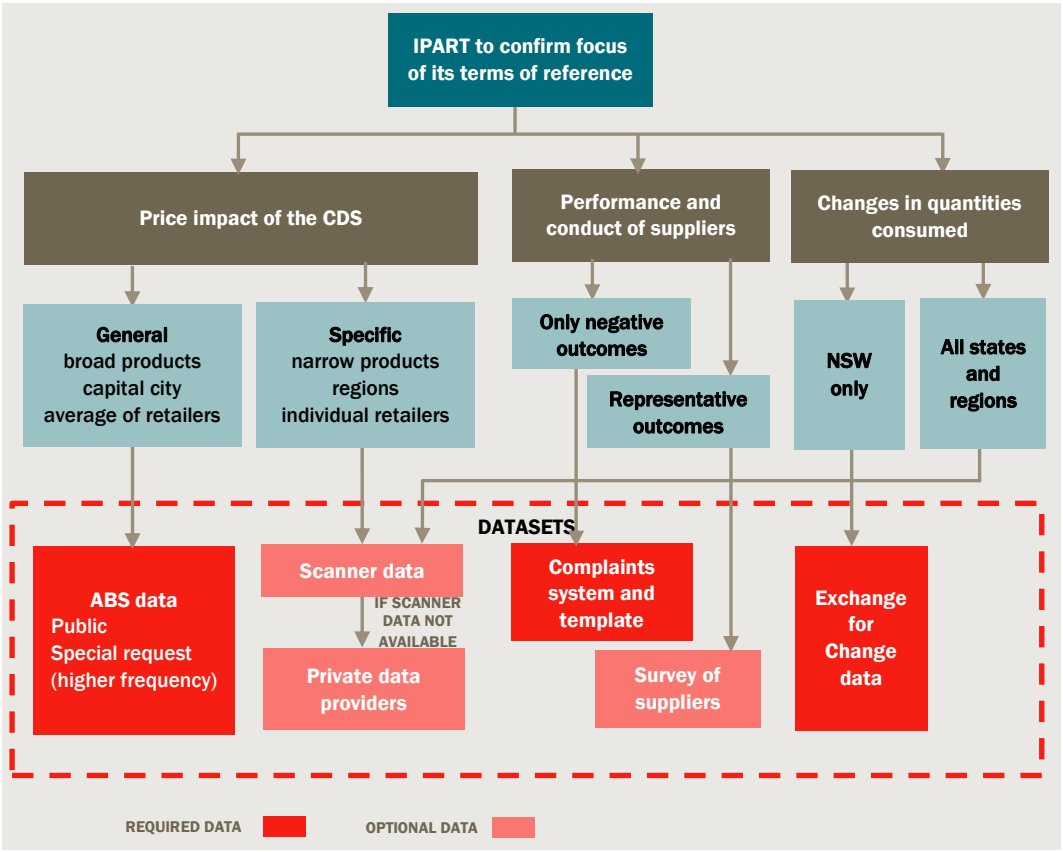
Information on each dataset

See attached spreadsheet, which contains details of the datasets.

Next steps

Our recommendations for the next steps are as shown in chart 5.5. This is based on IPART deciding on how it views its terms of reference and then which datasets will support the different aspects of IPART's terms of reference.

5.5 Next steps



Data source: The CIE.

A Literature review of indirect tax incidence studies

A large number of studies exist that attempt to estimate the incidence of indirect taxes. While the CDS is not a traditional tax, the techniques used in these studies can be applied to understand how the CDS will impact the market for bottled drinks.

This appendix contains a short literature review of recent articles from this literature. It focuses on 'difference-in-difference' studies, which is the main technique used in the literature. These studies come from top international economics journals, as well as international policy organisations such as the International Monetary Fund[31] and the Institute for Fiscal Studies.[32]

This methodology has been used to estimate the incidence of taxes on specific items such as cigarettes, alcohol and tobacco, and changes to value added taxes, including changes to the base rate, as well as reclassification of items between categories with different VAT rates.

This review has two main purposes:

- to identify key results and trends in the literature to guide what we might expect when estimating the incidence of the CDS.
- to identify econometric design options that can be used to estimate the incidence of the CDS.

Estimated pass-through of indirect taxes

A key question of interest in understanding the impact of the CDS is knowing how much of the supplier charge will be passed through to consumers. As discussed in chapter 3, this will depend crucially on the elasticity of supply and demand in the market.

While the CDS has some key design differences to a standard indirect tax, it is still informative to consider what proportion of taxes have been passed through to consumers in other situations. Table A.1 shows the proportion of taxes passed through to consumers from a number of tax incidence studies.

31 International Monetary Fund (Benedek, D. De Mooij, R. Keen, M. and Wingender, P.) 2015, 'Estimating VAT Pass through', IMF working paper.

32 Institute of Fiscal Studies 2011. 'A retrospective evaluation of the elements of the VAT system: full report to the European Commission'.

A.1 Estimated pass-through from various tax incidence studies

Study	Type of reform	Amount of pass-through
International Monetary Fund (2015)[33]	VAT reforms between 1999 and 2013 using the Harmonized Index of Consumer Prices	40% average pass-through, with close to 100% pass-through for standard rate changes, 30% pass-through from changes to concessional rates, and zero pass-through from reclassification
Kosonen, (2015) [34]	VAT reduction on hairdressing services	Around half of the tax is passed through
Doyle and Samphantharak (2008)[35]	The temporary removal of a 5% gas tax	Prices drop 3% when the tax is removed, and increase by 4% when the tax is reinstated
Benzarti et al. (2017)[36]	VAT changes in the EU from 1996 to 2015	50% of firms pass through the full costs, while 25% pass through nothing
Poterba (1996)[37]	Impact of state and local taxes on prices of clothing and personal care items	Full shifting of taxes onto consumers
Carobnnier (2005)[38]	Changes in the VAT rate of cars and housing repair services	Consumers bear 57% of the impact of the car changes, and 77% of the housing repair tax
Copenhagen Economics (2007)[39]	8 cases studies of VAT reforms in Sweden, Italy, Portugal and Ireland	Large pass-through (80%-160%) for books, footwear and periodicals, and small pass-through (0-20%) for beverages and hairdressers.
Alm et al. (2008)[40]	Gasoline excise tax pass through from 1984-1999	Pass-through close to 100%
Harju et al. (2015)[41]	VAT changes on the restaurant industry	Pass-through close to 100% for chain stores, whereas the majority of independent restaurants left prices unchanged

33 International Monetary Fund (Benedek, D. De Mooij, R. Keen, M. and Wingender, P.) 2015, 'Estimating VAT Pass through', IMF working paper.

34 Kosonen, T. (2015). More and cheaper haircuts after VAT cut? on the efficiency and incidence of service sector consumption taxes. Journal of Public Economics 131, 87-100.

35 Doyle, J. and Samphantharak, K. 2008, '$2.00 gas! Studying the effects of a gas tax moratorium'. Journal of Public Economics 92(3), 869-884.

36 Benzarti, Y. Carloni, D./ Harju, J. and Kusonen, T. 2017 'What Goes Up May Not Come Down: Asymmetric Incidence of Value Added Taxes' NBER Working Paper No. 23849.

37 Poterba, J. M. 1996, 'Retail Price Reactions to Changes in State and Local Sales Taxes', National Tax Journal, 49/2, 165 - 176.

38 Carbonnier, C., 2005, 'Is Tax Shifting Asymmetric? Evidence from French VAT Reforms', 1995-2000, Paris-Jourdan Sciences Economiques, WP 2005-34.

39 Copenhagen Economics 2007, 'Study on reduced VAT applied to goods and services in the member states of the European Union' - Final Report, Study on behalf of DG TAXUD.

40 Alm, J., Sennoga, E. and Skidmore, M. 2009, Perfect Competition, Urbanization, and Tax Incidence in the Retail Gasoline Market, Economic Inquiry, 47/1, 118 - 134.

41 Harju, J., Kusonen, T. and Skans, O. 2015, 'Firm Types, Price Setting Strategies and Consumption Tax Incidence', CESINFO Working Paper No. 5654.

The range of results in the studies above show that the pass-through of a tax can vary significantly depending on the characteristics of the market being studied and the design of the tax. It shows that low pass-through or overshifting (pass-through greater than 100 per cent) are relatively common. This further emphasises the need to estimate the incidence of the CDS empirically.

Other general insights from the literature

- Tax incidence is not likely to be symmetric, with firms more likely to raise prices in response to a tax increase than they are to lower prices in response to a tax decrease. (Benzarti et al. 2017, and Benedek et al. 2015)
- The extent of pass-through can vary significantly between industries (Carbonnier 2007)
- The extent of pass-through can depend crucially on the market structure, with larger chain stores more likely to have a full pass-through of indirect taxes than smaller stores (Harju et al. 2015)
- Different parts of the market may be more or less competitive. For instance, highly visible prices advertised in catalogues or on billboards have may have different dynamics than less visible prices (Kosonen 2015)
- Pass-through is much higher for changes in the headline tax rate, than for reclassification of items, or for changes in concessional rates (IMF 2015)

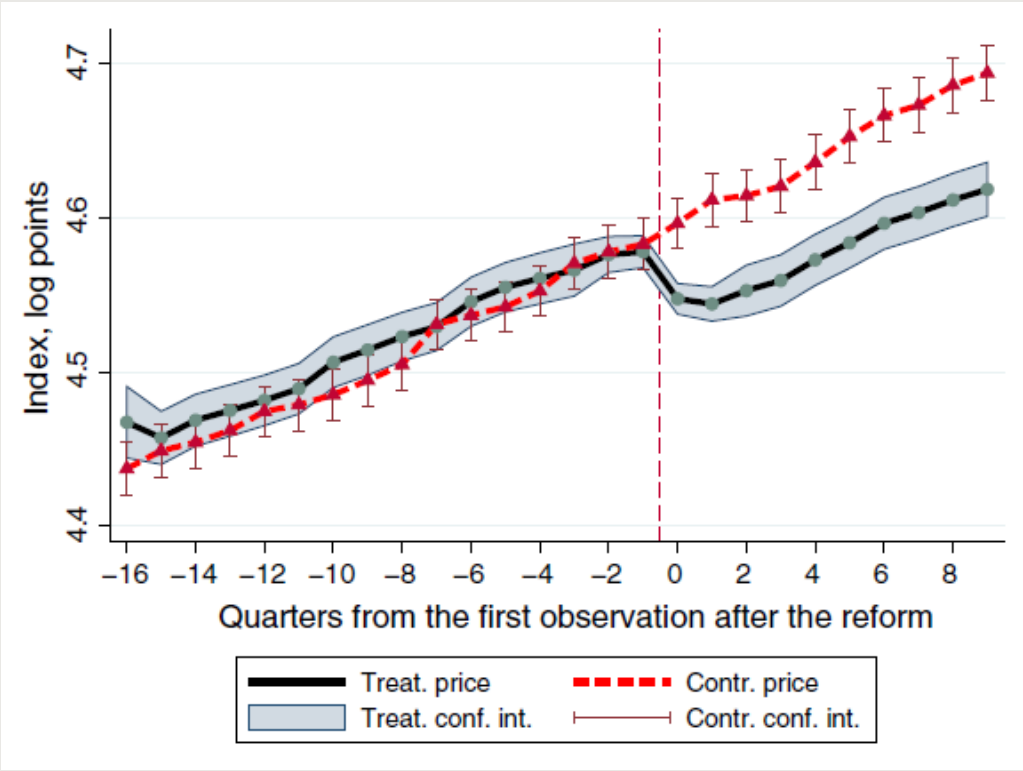
Study design options

The majority of the papers discussed above use some form of difference-in-difference design. The intuition behind this approach is to compare the observed price of interest with the price of a suitable control group. This control group might be a similar item (comparing items covered by the CDS with drinks not covered by the CDS), or the same item in another region (compare a can of soft drink in NSW with the same brand of soft drink in Victoria).

In either case, the approach is built on the assumption of common trends, which means that it is assumed that in the absence of the CDS, both prices would have moved in the same way. For instance, in the case of soft drinks, an increase in the price of manufacturing inputs (such as sugar or aluminium), would have a similar effect on the cost of drinks in NSW and Victoria.

The approach generates intuitive graphical results such as this chart (taken from Kosonen, (2015)). The chart shows an index of prices for hairdressing and beauty services (the black line) that were subject to a reduction in the Finnish Value Added Tax (VAT), along with a control group of labour intensive services (beauty salons, days spas, massage services, physiotherapists, dry cleaning and repair services) for which the VAT didn't change (the red line). The chart shows that before the VAT change, both groups had prices that moved together, which suggests that this is a good choice of control group. After the VAT reduction, the price of hairdressing clearly falls relative to the control group, and this fall is used to estimate the tax incidence of the change in VAT.

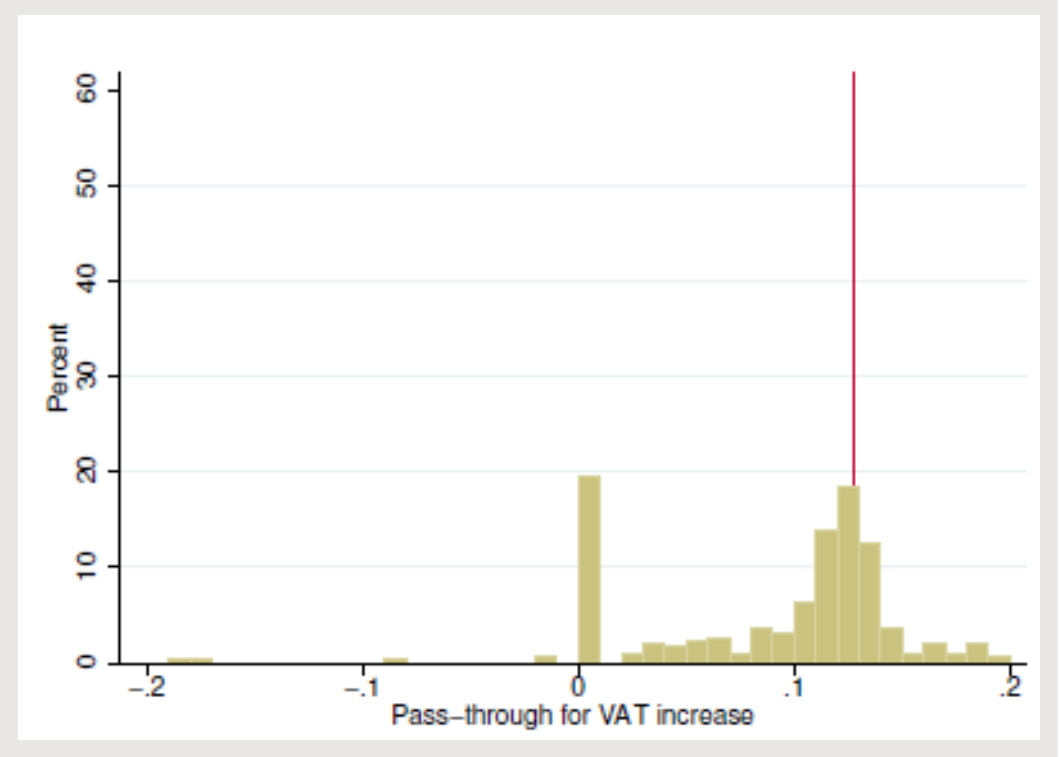
A.2 An example of graphical results from a differences-in-differences study



Data source: Kosonen, T. (2015). More and cheaper haircuts after VAT cut? on the efficiency and incidence of service sector consumption taxes. Journal of Public Economics 131, 87-100.

The difference-in-difference approach can also show the variation in pass-through from different firms and for different products. For example, the following chart (from Benzarti et al. 2017) shows the distribution in tax pass-through for haircuts following an increase in the VAT rate on these services from 9-23 per cent. It shows that around half of all firms have increased their costs by around the full amount of the tax, but a significant share of firms have made no change.

A.3 An example of how the variety of responses to the CDS can be presented



Data source: Benzarti, Y. Carloni, D./ Harju, J. and Kusonen, T. 2017 'What Goes Up May Not Come Down: Asymmetric Incidence of Value Added Taxes' NBER Working Paper No. 23849.

Formalising the graphical results

A strength of this empirical approach is that the intuitive graphical results presented above can be formalised in a regression framework. This should be seen as a formal extension of the graphical approaches above, rather than a different type of analysis.

Analysing the result in a regression framework is important for two reasons. The first reason is that it allows for the estimation of standard errors and confidence intervals, which means that it is possible to state how accurate the results are, and whether the observed changes in price are due to the CDS, or could just be the result of other factors that influence market prices.

The other advantage of the regression framework is that it provides the option of including other explanatory variables that may influence market prices. This may be particularly useful if there is another strong factor that is influencing prices during this period. In the papers reviewed, it was common to present the results without controls, and then with different combinations of controls to test how robust the results were to different assumptions.

Other technical details

The studies considered in this review provide a useful empirical framework for estimating the incidence of the CDS. They also encountered some technical issues, and the responses to these issues may prove useful in estimating the impact of the CDS.

- ***The appropriate time frame over which to observe the incidence of the CDS.*** Some prices may change before the start of the CDS, and some may take a while to adjust after the CDS has been introduced. Therefore, care must be taken when comparing prices before and after the reform. In response to this concern, the IMF estimates this impact using different time windows.
- ***Correlation amongst error terms.*** This is a technical issue that can occur in difference-in-difference designs that can result in studies that assert too much confidence in the accuracy of the results.[42] The standard response to this issue is to cluster standard errors where error terms may be correlated. In some studies, an alternate method know as a nonparametric permutation test is used, which calculates a treatment effect using a range of placebo variables (such as estimating the treatment effect using an unrelated product) and comparing the main set of results with the results from the placebo tests.

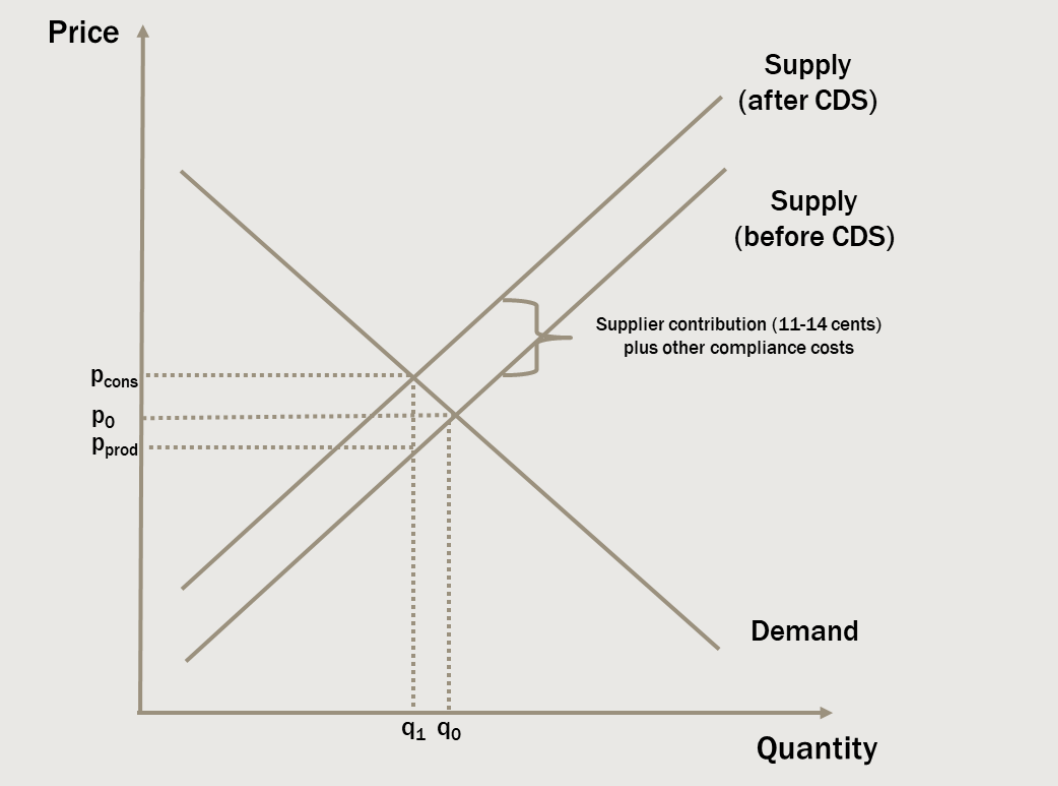
42 Bertrand, M., Duflo, E. & Mullainathan, S. 2004. 'How Much Should We Trust Differences-in-Differences Estimates?' The Quarterly Journal of Economics, MIT Press, vol. 119(1), pages 249-275.

B Formal analysis of tax incidence

Chapter 3 of this report discusses the incidence of the CDS using supply and demand diagrams. This appendix is designed to complement that chapter by formally deriving some of the key results.

We start with the standard supply and demand diagram used in chapter 3.

B.1 A standard supply and demand diagram



Data source: CIE Illustration

Assume that the demand and supply can be denoted by:

$$p_d = a - bq$$

$$p_s = c + dq$$

where p_s and p_d are supplier price and consumer price, respectively; q is the quantity demanded or supplied; $a, b > 0$, $c < a$ and $d \geq 0$ are parameters. The market equilibrium (that is demand equals supply) implies:

$$p_0 = p_s = p_d = \frac{ad + bc}{b + d}$$

$$q_0 = \frac{a - c}{b + d}$$

The charges to suppliers shift the supply curve up – the cost of production is now higher (this includes the cost of the deposit plus all other administration costs) for any quantity of production. The new equilibrium price and quantity are now p_{cons} and q_1 respectively. It can be seen that, with the charges implied by the CDS, demand is lower and price is higher.

It can also be seen from the chart that the change in price, $p_{cons} - p_0$, is less than the full cost of the levy, meaning that part of the charge is borne by the supplier.

More formally, the new supply curve becomes

$$p_s^1 = c + c_1 + dq$$

while the demand curve does not change. The new equilibrium price for consumer becomes

$$p_{cons} = \frac{ad + bc + bc_1}{b + d} > p_0$$

And the new quantity is

$$q_1 = \frac{a - c - c_1}{b + d} < q_0$$

The incidence of the charge c_1 on consumer is

$$p_{cons} - p_0 = \frac{bc_1}{b + d} < c_1$$

while the incidence on supplier is

$$p_0 - p_{prod} = p_0 - (p_s^1 - c_1) = \frac{dc_1}{b + d} < c_1$$

The exact amount borne by consumers and suppliers, or the incidence of the charge, is determined by the elasticities of supply and demand. Specifically, the share borne by consumers is equal to:

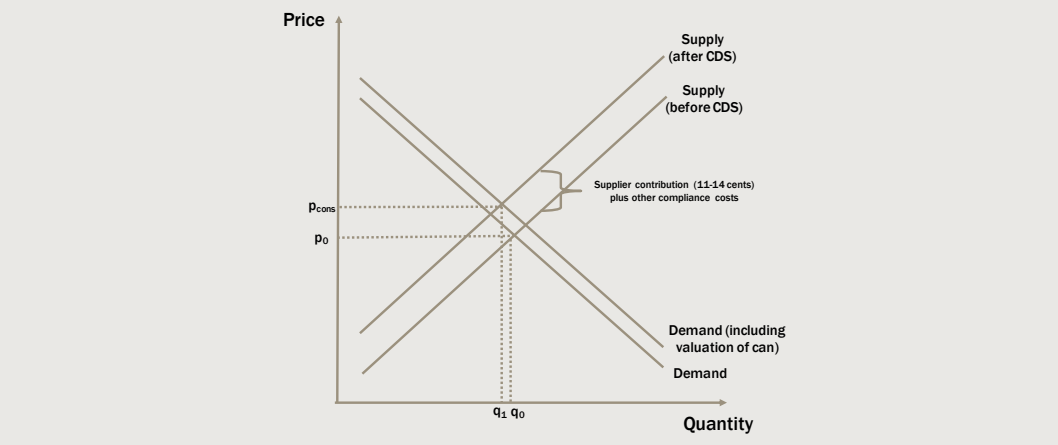
$$Consumer\ share\ of\ tax = \frac{\varepsilon_S}{\varepsilon_D + \varepsilon_s}$$

$$Producer\ share\ of\ tax = \frac{\varepsilon_D}{\varepsilon_D + \varepsilon_s}$$

Incorporating the value of the deposit

The value of a scheme deposit to consumers can be incorporated into this framework as a shift in the demand curve

B.2 The CDS may shift the demand curve as well



Data source: CIE Illustration

More formally the new demand and supply system could be denoted as:

$$p_d^1 = a + a_1 - bq$$

$$p_s^1 = c + c_1 + dq$$

where $0 \leq a_1 \leq 10$ is the net value consumers place to containers, other variables and parameters are the same as before. The new equilibrium quantity is

$$q_1 = \frac{a + c_1 - c - c_1}{b + d} < q_0$$

and the price paid by consumers is:

$$p_{cons} = \frac{ad + da_1 + bc + bc_1}{b + d} > p_0$$

The price received by producers net of charges is

$$p_{prod} = p_{cons} - c_1 = \frac{ad + da_1 + bc - dc_1}{b + d}$$

As a result, the incidence of CDS charge on consumers is

$$p_{cons} - p_0 = \frac{da_1 + bc_1}{b + d}$$

and the incidence on suppliers is

$$p_0 - p_{prod} = \frac{dc_1 - da_1}{b + d}$$

It can be seen that the incidence on consumers is now higher, and the incidence on suppliers is lower, by the amount of $\frac{da_1}{b+d}$. This is in turn due to the fact that the consumers now value containers more than before.

Tax incidence under a monopoly supplier

The monopolist supplier has the market power to set the quantity supplied to the market such that its profit can be maximized:

$$\max_q \ (a - bq)q - (c + dq/2)q$$

The first order condition of this maximisation problem suggests

$$q_0^m = \frac{a - c}{2b + d}$$

which is less than the quantity supplied in the perfectly competitive market. he monopolistic price is

$$p_0^m = p_{d0}^m = \frac{ad + ab + bc}{2b + d}$$

It can be shown that the monopolistic price is higher than the competitive price:

$$p_0^m - p_0 = \frac{b^2(a - c)}{(2b + d)(b + d)} > 0$$

On the other hand, the monopolistic supplier's marginal cost to supply the quantity q_0^m is only

$$p_{s0}^m = \frac{2bc + ad}{2b + d}$$

and it enjoys a profit margin of

$$\pi_0 = p_{d0}^m - p_{s0}^m = \frac{b(a - c)}{2b + d} > 0$$

With the introduction of CDS, the monopolistic supplier's profit maximisation problem becomes:

$$\max_q \ (a - bq)q - (c + c_1 + dq/2)q$$

and the new first order condition suggests:

$$q_1^m = \frac{a - c - c_1}{2b + d}$$

$$p_{cons}^m = \frac{ad + ab + bc + bc_1}{2b + d}$$

Consumers face a higher price, and the incidence on consumers is

$$p_{cons}^m - p_0^m = \frac{bc_1}{2b + d}$$

For the monopolistic supplier, its price received net of charge is

$$p_{prod}^m = p_{cons}^m - c_1 = \frac{ad + ab + bc - bc_1 - c_1 d}{2b + d}$$

This implies a change of

$$p_{prod}^{m} - p_{d0}^{m} = \frac{-bc_1 - c_1 d}{2b + d}$$

That is, the incidence of the charge on the supplier is

$$\frac{bc_1 + c_1 d}{2b + d}$$

It can be seen that, the consumers' incidence of the CDS charge under the monopolistic supply case is in fact lower that the incidence under the competitive supply case. Accordingly, the incidence on the supplier is higher. This is due to the fact that under the monopolistic case, the introduction of CDS reduces the supplier's profit margin as well:

$$\Delta\pi = (p_{cons}^{m} - p_{s1}^{m}) - (p_{d0}^{m} - p_{s0}^{m}) = -\frac{bc_1}{2b + d}$$

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