

# COMPETITION POLICY REVIEW

## DRAFT REPORT

### Submission

David P. Byrne, Nicolas de Roos and Caron Beaton-Wells\*

[byrned@unimelb.edu.au](mailto:byrned@unimelb.edu.au); [nicolas.deroos@sydney.edu.au](mailto:nicolas.deroos@sydney.edu.au); [c.beaton-wells@unimelb.edu.au](mailto:c.beaton-wells@unimelb.edu.au)

17 November 2014

#### 1. Scope of this submission

We welcome the opportunity to make a submission in response to the draft report of the Competition Policy Review (**CPR Draft Report**).

This submission is concerned with competition policy and law as it relates specifically to the fuel retailing sector, identified as a ‘key retail market’ in the CPR Draft Report (section 13.2, pp184-186).<sup>1</sup>

More broadly, the submission builds on the theme developed in the CPR Draft Report, as relevant to the context for the Review, regarding the significance of the ‘digital revolution’ for competition in Australian markets. In particular, the submission urges the Review panel to consider the potential of harnessing technology to enhance competition through greater consumer empowerment in retail petrol markets (and perhaps other retail markets) , consistent with the following observations in the CPR Draft Report:

*New technologies are transforming the way many markets operate, the way business is done, and the way consumers engage with markets. The internet has already had a significant impact on the Australian economy. Australians are typically fast adopters of new technologies (such as smart*

---

\*David Byrne is a Lecturer in the University of Melbourne’s Faculty of Business and Economics; Nicolas De Roos is a Senior Lecturer in the Faculty of Arts and Social Sciences (School of Economics) at the University of Sydney; Caron Beaton-Wells is a Professor in the Law School at the University of Melbourne. We acknowledge the funding of the Melbourne School of Government in support of the research referred to in this submission, and are grateful to Daniel Tiong for research assistance. The most-up-to-date academic working paper relevant to the research referred in the submission is Byrne, de Roos and Tiong (2014); it can be found at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2525085](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2525085).

<sup>1</sup> See also the discussion of ‘Competition Issues in Key Markets’ in the CPR Issues Paper dated 14 April 2014, pp42-43.

*phones), new applications and software tools. This has in turn encouraged internet service providers to extend and develop the infrastructure required to access internet services more fully.*

*New technologies are also driving changes in sectors such as energy and transport. For example, 'smart meters' allow consumers to access real-time information on pricing and usage of energy, while smart phone applications allow consumers to compare airfares in real time.*

*Technological innovation is lowering barriers to entry across a range of markets. The company Uber uses a smart phone application to connect users and providers of passenger vehicle services in direct competition with the taxi industry ... This is an example of digital technology disrupting traditional markets.*

...

*Today we see the emergence of new digital technologies with a proliferation of new applications and uses, including emerging trends such as collaborative consumption, or viewed slightly differently, new marketplaces (so-called 'sharing markets') developing outside traditional commercial channels.*

*The use of technology to foster new markets provides more consumers with access to what they want and need, potentially including lower-income consumers.*

*The pervasive presence of knowledge networks and the power of innovation to lift living standards mean that Australia's competition policies, laws and institutions must be fit for purpose for the digital age.<sup>2</sup>*

As is implicit in these observations, technology is transforming the extent to and ways in which information is transmitted and exchanged between market participants. Information is vital to competition, efficiency and innovation in the Australian economy.

On the demand side of markets (the focus of this submission), information about products and services, particularly their prices, enables buyers to compare rival offerings, make better choices and reduce search costs.<sup>3</sup> This, in turn, intensifies competition between sellers.

On the supply side, information about market conditions, volume of demand, level of capacity and investment plans of rivals assists sellers in planning and making efficient decisions. It helps firms to save costs by rationalising their inventories and improving investment decisions. Access to information also assists potential sellers in deciding whether or when to enter a market and in managing risks. Information sharing amongst sellers may facilitate benchmarking against best practices and encourage research and development.<sup>4</sup>

---

<sup>2</sup> CPR Draft Report, pp14-15.

<sup>3</sup> A substantial body of economic literature has examined the role of information in buyer search and decision-making behaviour (eg Stigler, 1961; Varian, 1980; Baye, Morgan and Scholten, 2006).

<sup>4</sup> Economic research has also examined the impact of information exchange between sellers on competition (eg Carlton, Gertner and Rosenfeld, 1997; Farrell and Gibbons, 1989; Kuhn and Vives, 1995; Vives, 2008). The comparative effects of greater access to information on the demand side of a market (with benefits for

However, conduct that involves the transmission or exchange of information by competitors in a market can also undermine competition by facilitating anti-competitive coordination between rivals. Access to information may assist competitors to reach anti-competitive agreements or understandings, either explicitly or tacitly. Information exchange may help to stabilise and thereby sustain existing collusive arrangements, in particular by enabling the parties to monitor, detect and punish deviations from the arrangement. Information exchange may also enable the parties to monitor potential entry to the market and coordinate their responses to potential entrants.

The CPR Draft Report notes the current action by the Australian Competition and Consumer Commission (ACCC) relating to information sharing between petrol retailers, through the website of Informed Sources.<sup>5</sup> It also deals with the provisions in the *Competition and Consumer Act 2010* (CCA) that relate to anti-competitive disclosure of information (provisions that currently apply only to certain aspects of the banking sector), and recommends that those so-called ‘price signalling’ provisions be repealed, and that s 45 of the CCA be extended to cover concerted practices (practices that would capture some forms of information sharing) which have the purpose, effect or likely effect of substantially lessening competition.<sup>6</sup>

This submission notes below that the primary focus concerning competition in the petrol sector to date has been on laws and enforcement action affecting the supply side (including information sharing amongst petrol retailers). The submission does not comment on the merits of these laws and actions,<sup>7</sup> but rather makes the argument that a supply side focus should be complemented by demand-side measures that facilitate competition through enhanced access to information by and, in that way, greater empowerment of, petrol consumers.

## **2. Background to this submission**

Petrol price levels and fluctuations are and have been for many years a source of substantial consumer concern and the subject of significant and sustained attention by policymakers and the ACCC. As pointed out in the CPR Draft Report, the fuel sector has been the subject of numerous

---

competition) and the supply side of a market (with potentially adverse effects for competition) have also been explored in recent literature (eg Schultz, 2005, 2009). There has also been some consideration of these issues in legal scholarship (eg Arquit, 1993; Hay, 2008).

<sup>5</sup> CPR Draft Report, p185.

<sup>6</sup> CPR Draft Report, p42, Draft Recommendation 24.

<sup>7</sup> For submissions on the price signalling provisions and the definition of a ‘contract, arrangement or understanding’, including its extension to cover concerted practices, see C Beaton-Wells and B Fisse, Submission to the Competition Policy Review, 14 April 2014, section 4.1; C Beaton-Wells and B Fisse, Submission on the Competition Policy Review Draft Report, XX November 2014.

reviews, and is monitored on an ongoing basis by the ACCC. It appears that this regulatory scrutiny has done little to dampen consumer concerns and the extent to which the sector is competitive and the factors bearing on its competitiveness continue to attract a divergence of opinion amongst stakeholders (as reflected in the range of viewpoints expressed in submissions to the CPR).

As pointed out in section 1 to this submission, much of the regulatory attention given to the sector to date has been supply-side oriented. As noted in the CPR Draft Report, in its 2007 inquiry into the price of unleaded petrol, the ACCC identified structural impediments to competition at the wholesale level of the market and identified options to improve competitiveness, such as ensuring access to fuel terminals.<sup>8</sup> At the retail level, the ACCC has been conscious to stem increases in concentration that would be likely to have coordinated effects – for example, in its opposition to the proposed acquisition by Caltex of Mobil retail outlets.<sup>9</sup> The ACCC has also focussed on behavioural dynamics on the supply side. It has brought actions alleging price fixing amongst retailers, albeit with limited success.<sup>10</sup> As noted by the CPR Draft Report, more recently, it has brought action relating to the Informed Sources service, and secured enforceable undertakings relating to the level of discounts available through the shopper docket schemes associated with the supermarket alliances.<sup>11</sup> Measures have been taken also by State governments, including through legislation to enhance transparency of terminal gate prices, the regulation of retail petrol licensing and the provision of subsidies in rural and regional areas.<sup>12</sup>

It may be trite but is important nevertheless to bear in mind that markets are two-sided and that both the demand and supply sides are crucial to competition. To ensure markets function

---

<sup>8</sup> See ACCC, *Petrol Prices and Australian consumers: Report of the ACCC Inquiry into the price of unleaded petrol* (2007), p202.

<sup>9</sup> See ACCC, *Caltex Australia Ltd – Proposed Acquisition of the Retail Assets of Mobil Oil Australia Pty Ltd, Public Competition Assessment*, 9 February 2010.

<sup>10</sup> In particular, the ACCC suffered high profile losses in its price fixing cases against petrol retailers in Ballarat and Geelong in 2005-2007. See *Apco Service Stations Pty Ltd v ACCC* (2005) 159 FCR 452; *ACCC v Leahy Petroleum Pty Ltd* (2007) 160 FCR 321. It was these losses that spawned much of the debate surrounding the definition of an ‘understanding’ in the cartel provisions, and ultimately led to the misguided price signalling provisions in the CCA (albeit, somewhat ironically, those provisions do not extend to the petrol sector). For background see C Beaton-Wells and B Fisse, ‘The Competition and Consumer Amendment Bill (No 1) (Exposure Draft) - A Problematic Attempt to Prohibit Price Signalling’ (2011) 39 *Australian Business Law Review* 28.

<sup>11</sup> CPR Draft Report, p185.

<sup>12</sup> See ACCC, *Petrol Prices and Australian consumers: Report of the ACCC Inquiry into the price of unleaded petrol* (2007), ch 6, pp81-88. The CPR Draft Report expresses concern about the competitive impact of some of this regulation (specifically as it relates to ethanol mandates): p186.

effectively, a two-sided (joined up) approach is required.<sup>13</sup> Competition policies, laws and enforcement actions need to be sensitive to the dynamics on both the demand and supply sides of markets, and to their interaction. On the demand side, informed and empowered consumers are key to the activation of competition, while on the supply side firms that are compelled or incentivised through competition to be efficient will deliver goods and services in the interests of consumers. The complementary nature of consumer and competition laws and enforcement is reflected in the object statement of the CCA,<sup>14</sup> and in the rationale for having a competition agency with responsibility for enforcing both.<sup>15</sup>

In its 2007 report, the ACCC acknowledged the significance of demand side transparency for competition in petrol markets (albeit its treatment of this issue was cursory relative to the treatment of supply side structures and dynamics).<sup>16</sup> It identified and considered various options for enhancing price transparency for consumers and, in particular, proposed that the adoption of a federal Fuelwatch scheme, similar to the scheme operating in Western Australia (WA), be examined as a possible option.<sup>17</sup>

The WA Fuelwatch scheme was introduced in the *Petroleum Products Pricing Amendment Act 2000* (WA). It constituted a legislative response to growing concerns about fuel prices, particularly the price differential between metropolitan and regional/country areas, and concerns about the frequent fluctuations in petrol prices in that state. The scheme aimed, amongst other things,<sup>18</sup> to increase competition at the retail level through remedying the information imbalance between fuel retailers and consumers. It was seen as material that while fuel retail chains mostly subscribed to Informed Sources, consumers did not have access to this or an equivalent service. Petrol prices fluctuated widely over short periods of time. There was a range of opinions as to what caused these periodic fluctuations. However, it was clear motorists felt disempowered and unable to take advantage of the low prices that recurrent petrol price cycles offered, because

---

<sup>13</sup> See, eg, OECD (2008); OFT (2009); Armstrong (2008); Sylvan (2006).

<sup>14</sup> Section 2 of the CCA provides that: 'The object of this Act is to enhance the welfare of Australians through the promotion of competition and fair trading and provision for consumer protection.'

<sup>15</sup> As recognised in the CPR Draft Report, pp288-290.

<sup>16</sup> See ACCC, *Petrol Prices and Australian consumers: Report of the ACCC Inquiry into the price of unleaded petrol* (2007), ch 15, section 15.1.

<sup>17</sup> See ACCC, *Petrol Prices and Australian consumers: Report of the ACCC Inquiry into the price of unleaded petrol* (2007), pp251-257.

<sup>18</sup> Measures directed at strengthening competition at the wholesale level were also introduced, including providing for the setting of a maximum price for fuel sold from declared terminals. Further, retailers were given the option to purchase up to 50% of each type of fuel that they sold through a supplier other than their primary supplier.

prices frequently changed and often increased by the time that customers attempted to buy fuel. In response, the Fuelwatch scheme imposed the obligation on fuel retailers to set their prices for the next day in advance, and to not change them for a 24h period. This price information is made available to the public, through a website ([www.fuelwatch.wa.gov.au](http://www.fuelwatch.wa.gov.au)) and a hotline, enabling them to take full advantage of the advertised prices.

Following the 2007 federal election win of the Australian Labor Party, a national Fuelwatch scheme, as explored in the ACCC's 2007 report, was proposed. The aim, as articulated in the National Fuelwatch (Empowering Consumers) Bill 2008 (Cth), was 'the creation of a new public good, in the form of fuel price information freely available to all members of the community'.<sup>19</sup> The proposal attracted considerable controversy – the econometric analysis provided the ACCC in support of the scheme was subject to much criticism and there were concerns expressed that the 24h consistency rule would lead to higher prices (because prices could not be adjusted in the usual competitive process) that would not be offset by more active and effective consumer search behaviour (based on the increased availability of price information).<sup>20</sup> Ultimately the Bill was defeated in the Senate. Since then, there appears to be little interest in reviving the proposal of a federal Fuelwatch scheme. Neither the CPR Issues Paper nor the CPR Draft Report canvas the option of such a scheme as a way of enhancing the competitiveness of retail petrol markets.

### **Summary of Findings**

This note presents new empirical research on the effects of the WA Fuelwatch scheme on retail petrol price dynamics. In contrast to previous static analyses by the ACCC and Harding (2008) that focus on the effect of Fuelwatch on unweighted average prices/margins, we keep with recent advances in the literature on the econometric analysis of retail petrol prices and estimate error correction models that account for the joint dynamics of retail prices and wholesale costs in the petrol industry.<sup>21</sup> Exploiting Fuelwatch as a 'natural experiment' that affects these dynamics, we aim to identify whether the scheme affected the transmission of wholesale cost shocks to retail prices. Motivated by predictions from search theory, and the emphasis of Fuelwatch in reducing consumer search costs in finding lowest-priced stations at a point in time or over time, we test for whether Fuelwatch mitigated the effects of 'rockets and feathers'/asymmetric pricing in WA markets.

---

<sup>19</sup> Explanatory Memorandum, National Fuelwatch (Empowering Consumers) Bill 2008 (Cth), 9.

<sup>20</sup> See, eg, Harding (2008).

<sup>21</sup> See, eg, Deltas (2008), Verlinda (2008), Lewis and Noel (2011).

In brief, our research shows that the search-cost reducing effects of the scheme reduced asymmetric pricing by petrol retailers. Before the scheme, retail prices in WA markets quickly adjusted upward in response to positive cost shocks and were relatively slower to adjust downward following negative shocks. Following the scheme this asymmetry in retail price adjustment disappeared. In contrast, we find price asymmetries in South Australian markets similarly exist, but, if anything, become more pronounced over the same sample period. This central finding is consistent with petrol markets in WA becoming more competitive under Fuelwatch.<sup>22</sup>

The demand-side results from Byrne and De Roos(2013) complement the key supply-side findings of this report.<sup>23</sup> The authors use web-traffic data from Fuelwatch (provided by the WA Government) to test for consumer search behaviour. They find stark evidence that consumers indeed engage with the site to find the lowest price station on a given day, and to make purchases on days where market-wide prices tend to be lower. Such (informed) demand behaviour can explain the collapse in pricing asymmetries in WA petrol markets following the 2001 Fuelwatch rollout.<sup>24</sup> In our view, the research findings strongly support the re-examination of a nation-wide Fuelwatch scheme as a measure that will enhance the competitiveness of these key markets in the Australian economy.

The remainder of the submission is structured as follows:

- economic theory relating to consumer search dynamics and asymmetric pricing is introduced (section 3);
- approach taken to reducing consumer search costs through the WA Fuelwatch scheme is outlined (section 4);
- data collected and methodology used in the research to measure the effects of the WA Fuelwatch scheme are summarised (section 5);
- econometric analysis conducted on the data is explained (section 6); and

---

<sup>22</sup> It is worth emphasising from the outset that our sample selection rules out the possibility that supermarket entry drives this result; the sample is truncated in 2003, before supermarket entry. The empirical results are robust to truncating the sample at earlier months in 2002.

<sup>23</sup> The paper is available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2427556](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2427556)

<sup>24</sup> The awareness of the public in WA about Fuelwatch adds further support to this claim. Our informal conversations with the Fuelwatch team indicate that the vast majority of consumers are aware of Fuelwatch and have used at some point.

- key research findings and their implications, specific to retail petrol markets and for retail markets more generally, are set out (section 7).

### 3. Economic theory relating to consumer search dynamics and asymmetric pricing

In his study of British petrol markets, Bacon (1991) concluded that retail prices “rise like rockets and fall like feathers.” This phrase summarised his finding that retail prices quickly increased in response to cost increases, and was slow to fall in response to (equal magnitude) cost decreases. This phenomenon, which is often referred to as *rockets and feathers pricing*, *asymmetric pricing*, or *asymmetric price responses* is prevalent in many retail markets (Peltzman, 2000). It has been of particular interest in the retail petrol industry.<sup>25</sup>

While such price dynamics naturally raise concerns about collusion<sup>26</sup>, a recent collection of papers by Yang and Ye (2008), Tappata (2009) and Lewis (2011) have proposed competitive, search-based explanations for asymmetric pricing. The underlying mechanisms in these models differ; however, they all yield the same equilibrium prediction that consumers search more in response to positive cost shocks than to negative shocks. This implies price elasticity is relatively larger around positive cost shocks, which causes firms to adjust retail prices more quickly in response to positive cost shocks than to negative shocks. That is, they engage in (competitive) asymmetric pricing.

An implication of this search-based explanation is that as search costs are reduced, and more consumers become more aware of price distributions, the asymmetry in retail price responses should decline. That is, reductions in search costs should result in more competitive outcomes that see consumers realise the benefits from falling costs in a similar ways that they are harmed by rising costs.

Internet-based price comparison websites, which have become increasingly popular in recent years, represent a technological innovation that reduces search costs. Indeed, websites that present retail price distributions and identify lowest-cost retailers to consumers correspond closely to the *clearinghouses* in theoretical models of consumer search. It follows from the above discussion that the introduction of such clearinghouses should help reduce asymmetric pricing.

---

<sup>25</sup> See Eckert (2013) for an overview of the literature on asymmetric pricing in the petrol industry.

<sup>26</sup> For example, see Cameron, Borenstein and Gilbert (1997).

#### 4. The approach taken to reducing consumer search costs through the WA Fuelwatch scheme

The empirical context for our research focuses on retail petrol markets in WA in the late 1990s and early 2000s, just before and after the implementation of Fuelwatch. The policy, which was formally rolled out in January 2001, aimed to create price transparency in WA petrol markets. In the language of classic search models (Varian, 1980), the policy aimed to reduce consumer search costs in obtaining information on station-level petrol prices at a point in time (*spatial search*) and over time (*temporal search*).

The specifics of the policy are as follows. Each day, petrol retailers in the state submit station-level prices to the WA government, primarily via web-based CSV uploads. The prices must be reported before 2pm on a given day, and they become effective at the stations at 6am the next day. The policy's "24-hour rule" requires stations keep their prices at their reported levels for 24 hours. With the data, the government collates the information and posts the station-level prices for today and tomorrow on its website at [www.fuelwatch.wa.gov.au](http://www.fuelwatch.wa.gov.au). The site provides rank-ordering of the prices and allows users to specify local geographies to help them find the lowest-priced stations at a point in time that is convenient for them.

There appears to be a high level of usage by consumers of the information available through the WA Fuelwatch scheme. Surveys conducted by the WA Department of Consumer and Employment Protection indicate that between 72-86% of survey respondents used the Fuelwatch website.<sup>27</sup>

How does Fuelwatch reduce search costs and enhance price transparency in practice? Figure 1 in the Appendix to this submission provides a snapshot that helps illustrate how the policy informs consumers of spatial and temporal price dispersion. The 'Today' price distribution shows most stations' prices are currently around the 159.9 cpl, yet there is spatial price dispersion as the two United-run stations have prices of 146.7 and 147.7 cpl. With the site, consumers do not have to physically shop around to find these details; they are available with a quick web search.

Furthermore, the 'Tomorrow' prices show that these two stations will jump their prices to 155.7 and 156.5 cpl tomorrow to effectively catch up with their rival's prices. This temporal price dispersion within the two United-run stations is quickly revealed through Fuelwatch, helping consumers to time their purchases so as to save 9 cpl on fuel.

---

<sup>27</sup> Quoted in Coalition Senator's Dissenting Report, *Cth Senate Economic Report*, above n 36, 57, see generally 56. Our informal conversations with the Fuelwatch team reaffirmed these figures; at least 80% of surveyed consumers in WA claim to have used Fuelwatch at some point.

The value of Fuelwatch in helping consumers search for deals is further enhanced by the fact that Perth, like all Australian cities, exhibit price cycles, where prices infrequently experience large price jumps (like that highlighted in Figure 1), followed by periods of daily price undercutting that are typically a week in duration.<sup>28</sup> Price cycles generate large amounts of temporal price dispersion within stations' over time, as well as spatial price dispersion as stations imperfectly coordinate on price jumps and undercuts day-to-day.<sup>29</sup>

## 5. Data

The main dataset for the analysis consists of retail prices and a proxy for wholesale costs in Western Australian petrol markets.<sup>30</sup> For these markets, we collected historical monthly retail price data from the Australian Institute of Petroleum (AIP) for five markets (Albany, Bunbury, Kalgoorlie, Mandurag, Perth) for a sample period of April 1998 – March 2003. The sample is truncated in 2003 so as to avoid including subsequent data points in 2003 and beyond that saw the entry of supermarkets into the Australian petrol industry.<sup>31</sup>

We also collected terminal gate prices (TGP) from the AIP, which we use to proxy for wholesale costs as the market level. Regardless of the differences in wholesale cost levels across retail markets (perhaps due to shipping costs or the prevalence of majors that realize cost discounts), what is critical for our study is that the time series in costs is well-identified. As various ACCC petrol reports and others have discussed<sup>32</sup>, much of the time series variation in costs will be driven by the Tapis crude oil pricing benchmark from Singapore. We have verified this is indeed the case; in particular that the Tapis series moves in lock-step with TGPs. This common source of cost variation across retail markets should thus be expected to be the main driver of monthly retail price fluctuations. This implies TGPs are a relevant proxy for monthly cost fluctuations and shocks, and as such are valid for identifying asymmetric price responses empirically.<sup>33</sup>

---

<sup>28</sup> Price cycles in Australia have been studied at length. See, for example, ACCC (2007), Wang (2009), De Roos and Katayama (2013). For an international perspective on price cycles, see Lewis (2011) (U.S.), Byrne, Leslie and Ware (2014) (Canada) and Foros and Steen (2013) (Norway).

<sup>29</sup> See Lewis (2011) and Byrne, Leslie and Ware (2014) for analyses of the effect of price cycles on temporal and spatial price dispersion.

<sup>30</sup> To ensure transparency with our empirical research, Byrne will be making all publicly available data used in this study readily available on his website. Any further data-related questions can be immediately directed via email to byrned@unimelb.edu.au.

<sup>31</sup> Our truncation choice for the end of the sample does not affect any of our quantitative results below.

<sup>32</sup> For example, ACCC (2007) or Wang (2009).

<sup>33</sup> We should note that in practice, we have rich daily data on and Tapis prices and AUD/USD exchange rates dating back well before April 1998 (the first year market-level retail price data are publically available from AIP), however the publically available data from AIP on daily TGP prices only goes back to January 1, 2004. We therefore “backcasted” the daily TGP series using the Tapis prices and exchange rates, and aggregated up

Our econometric analysis also used monthly retail price and TGP data for South Australian markets. We similarly collected this information from the AIP; in total, we have retail price data for eight markets (Adelaide, Ceduna, Mount Gambier, Murray Bridge, Port Augusta, Port Pirie, Renmark, and Whyalla).

We provide plots of the raw data for the Western Australian markets in Figure 2 of the Appendix. The plot shows how retail prices track closely across the different markets, and that they collectively track with the TGP. The level differences in prices across Perth and the more regional markets likely reflects differences in transportation costs from wholesale supply, and differences in the presence of petrol majors in the local markets who receive volume discounts for their wholesale purchases.<sup>34</sup>

## 6. Econometric analysis

To investigate asymmetric price responses and the role of Fuelwatch, we estimated the following asymmetric error correction model:<sup>35</sup>

$$\begin{aligned} \Delta p_{it} = & \sum_{j=0}^2 [\beta_{1j}^+(1 - I\{f_{it}\}) * \Delta c_{it}^+ + \beta_{1j}^-(1 - I\{f_{it}\}) * \Delta c_{it}^-] + \sum_{j=1}^2 [\gamma_{1j}^+(1 - I\{f_{it}\}) \\ & * \Delta p_{it}^+ + \gamma_{1j}^-(1 - I\{f_{it}\}) * \Delta p_{it}^-] + \sum_{j=0}^2 [\beta_{2j}^+ I\{f_{it}\} * \Delta c_{it}^+ + \beta_{2j}^- I\{f_{it}\} \\ & * \Delta c_{it}^-] + \sum_{j=1}^2 [\gamma_{2j}^+ I\{f_{it}\} * \Delta p_{it}^+ + \gamma_{2j}^- I\{f_{it}\} * \Delta p_{it}^-] + \theta z_{it} + \epsilon_{it} \quad (1a) \end{aligned}$$

---

the corresponding TGP series to the monthly level (e.g., the time frequency for our analysis, which is determined by the frequency of the AIP retail price data). We have verified through in-sample and out-of-sample forecasts in the Appendix of Byrne, de Roos and Tiong (2014) that doing so is appropriate given the data limitation, and especially given the dominance of the Tapis price series in predicting TGPs. We refer the interested reader to this paper for details.

<sup>34</sup> Given this, measures of the price-cost margin between retail prices and TGP are a very crude measure of profits at the market-level. To reiterate, however, the key for our dynamic models below is not about the levels of prices and costs, rather it is the dynamic co-movements in these variables. Given the dominance in the Tapis price series in driving these co-movements, the aggregate retail price and TGP data will provide valid information on asymmetric pricing.

One may also note that in the figure the TGP is slightly lower than the retail prices for Perth and Mandurah for certain parts of the sample. This likely reflects some forecast error in the *levels* of prices from our backcasting of TGPs (see footnote 33). As we have noted, however, our TGP estimates track very closely with the *changes* TGPs through in-sample and out-of-sample testing in Byrne, de Roos and Tiong (2014), which is what is critical for properly identifying asymmetric passthrough. Moreover, if there are any systematic biases introduced by our forecasts for our results, then we should observe such biases for both Western Australian and South Australian markets below.

<sup>35</sup> The model is similar to those used in Deltas (2008) and Lewis and Noel (2011).

$$z_{it} = p_{it-1} - \phi c_{it-1} + \mu_i \quad (1b)$$

where  $p_{it}$  and  $c_{it}$  are the average retail and wholesale (TGP) price in market  $i$  in month  $t$ ,  $\Delta p_{it} = p_{it} - p_{it-1}$  and  $\Delta c_{it} = c_{it} - c_{it-1}$ . The model allows lagged wholesale costs and retail prices to effect current retail prices with a two month lag. The + and – superscripts on the  $\beta$ 's and  $\gamma$ 's allow for asymmetric price adjustment to positive and negative lagged cost and price changes. The indicator variable  $I\{f_{it}\}$  equals one if market  $i$  is under the Fuelwatch policy in month  $t$ . Hence, the specification nests separate asymmetric retail price adjustment models for Fuelwatch and non-Fuelwatch market-years. In equation (1b),  $\mu_i$  is a market  $i$  fixed effect and  $z_{it}$  is the error correction term; this corresponds to the residuals from a regression of  $p_{it}$  on  $c_{it}$  and market fixed effects. Finally, the error correction coefficient in equation (1a) is denoted by  $\theta$ .

The coefficients of the error correction model are not of themselves overly interesting. Rather, we followed the common practice of studying the shape of the impulse response functions implied by the model to equal-magnitude positive and negative cost shocks. Asymmetric pricing exists if retail prices converge to their long-run levels faster for positive shocks than negative ones. Since the specification in (1a) nests error correction models for Fuelwatch and non-Fuelwatch market-years, we can econometrically assess with this model whether Fuelwatch had an effect on pricing asymmetries. If the policy was effective in reducing search costs, causing firms to adjust their pricing strategies, then we should see a reduction in pricing asymmetries following the policy.

We estimated error correction models for WA markets and markets in its neighbouring state of South Australia (SA), for pre- and post-Fuelwatch time periods. By looking at the within-state change in price asymmetries between these periods should give an indication of the policy effects. The SA estimates effectively serve as a 'placebo test': Fuelwatch was not enacted in otherwise similar SA markets, and hence we should not see a change in pricing asymmetry in these markets pre- and post-Fuelwatch.

The error correction model parameter estimates for WA and SA are presented in Table 1 and the impulse response functions are depicted in Figures 2 and 3. The left panel of Figure 2 shows markets that are not subject to Fuelwatch exhibit strong, statistically significant pricing asymmetries: 80% of a 1 cpl positive cost shock is passed through to retail markets in the month the shock is realised, while only 45% of a 1 cpl negative cost shock is passed through. The right panel tells a completely different story for markets under the policy. The price responses to 1cpl positive and negative cost shock exhibit not statistically or economically significant differences under the policy. The placebo estimates in Figure 3 for SA markets show, if anything, that pricing asymmetries are growing over the sample period.

While Fuelwatch was implemented in January 2001, policy effects may have emerged before or after this time period, depending on whether firms anticipated the policy or had delayed reactions to changes in consumers' search behaviour. To allow the data to tell us when policy effects started to emerge, we estimated error correction models for different time periods pre- and post-policy implementation. Specifically, we estimated models using a two-year rolling window starting from the first month in the sample (e.g., the first subsample is March 1998 – March 2000). We then shifted the subsample window ahead a month and re-estimate the error correction model each time we do so. We continued to estimate models until the last month of the subsample window reaches March 2003, the last sample month (e.g., the last subsample is March 2001-March 2003). For each error correction model, we computed impulse response functions to positive and negative 1cpl cost shocks.

Figure 4 in the Appendix depicts the results from our rolling window estimates. For the sake of brevity in exposition, for each we present the difference in the impulse response functions for positive and negative cost shocks for month  $t=0$  after the cost shock (e.g., the contemporaneous effects where the asymmetries in price response are largest in Figure 2) for each rolling window error correction estimates. The results for WA show a large, immediate drop in asymmetric pricing in the month that Fuelwatch was implemented. Pricing asymmetries are approximately 0.4 cpl before the policy (which recall from Figure 2 implies negative cost shocks are passed through half as fast as positive shocks). There is a permanent level shift downward however in pricing asymmetries following the policy as the differences in impulse responses become statistically insignificant. The SA markets show, in contrast, that pricing asymmetries are statistically and economically significant in the post-Fuelwatch period.<sup>36</sup>

## 7. Summary of findings and implications

Taken together, the empirical findings of our research are consistent with policy effects where retailers become more hesitant to immediately pass through cost increases to retail prices, and more aggressive in cutting retail prices in response to falling costs. That is, Fuelwatch appears to have had a meaningful search-cost reducing effect that results in firms exercising less market power in WA's petrol markets.

An immediate implication of these results in the context of the petrol industry, we believe, is clear: a national Fuelwatch scheme should be revisited. Contrary to views expressed in the 2008

---

<sup>36</sup> Interestingly, there is a drop in pricing asymmetries in SA markets around the time of the Fuelwatch introduction. This may have arisen from stations' uncertainty surrounding Fuelwatch at the time.

debate over the scheme, a Fuelwatch policy is relatively costless to run<sup>37</sup>, lowers dynamic margins, and sees consumers realise the benefits of falling costs *faster* than in a world without Fuelwatch.<sup>38</sup>

We should emphasise that WA government involvement in implementing an online price clearinghouse that includes all station-level prices, as well as a 24-hour rule, is crucial. This enables Fuelwatch to provide effectively real-time and relevant information on current and future petrol prices to empower consumers and enhance competitive pressure on petrol retailers in setting prices. Privately-run petrol price reporting such as Motormouth and NRMA, which largely provide historical/retrospective data, are likely to be substantially less effective in generating benefits for consumers. Given the rapidity with which prices change in the petrol market, price data that is just one day old is going to contain little value for consumers in making informed purchases.

Beyond the petrol industry, we believe that web-based price clearinghouses should, in general, be promoted and fostered in retail markets more generally. The findings of our study provide rare empirical evidence<sup>39</sup> on the substantive impact of these mechanisms for making demand more sensitive to price differences across firms and over time, and for stimulating competition among firms.

Any industry where consumers face difficulties in getting information on multiple competitors prices at a point in time, forecasting price changes over time (like petrol), and in comparing the relative attractiveness of products and prices across companies, stand to realise such gains from clearinghouses. Various major industries that have a significant effect on consumer wallets share these characteristics; to name a few, petrol, banking, insurance, retirement savings, retail electricity.

---

<sup>37</sup> Our discussions with the WA government indicate that since the initial start-up of Fuelwatch, it has taken one person to manage the price reporting system, and that station-level price reporting is effectively automated with virtually no compliance issues.

<sup>38</sup> A key distinction between the econometric approach presented here and the previous analyses from 2007-2008 surrounding the national Fuelwatch policy is the emphasis on price dynamics. Previous analyses have focused on the effect of Fuelwatch on static price-cost margins. As we show, once price-cost dynamics are accounted for the effect of Fuelwatch on pricing becomes much clearer. The usefulness of dynamic pricing models in this paper echoes that from related work by Deltas (2008), Verlinda (2008) and Lewis and Noel (2011) who similarly implement error correction models to study relationships between market structure and retail price dynamics.

<sup>39</sup> Brown and Goolsbee (2002) is a notable exception. They also find the use of price clearinghouses results in more competitive pricing in the context of term insurance markets.

With proper incentives, private companies could provide clearinghouses instead of the government. As discussed, what is critical is that the data be timely and relevant. Independence is also important since competitors in the listed industries have an incentive to obfuscate their prices and products to maintain market power (Ellison and Wolitzky, 2012; Ellison and Ellison, 2009). That is, competitors in the market should not be relied upon to provide price transparency. A good example in the petrol context of such a private clearinghouse comes from GasBuddy ([www.gasbuddy.com](http://www.gasbuddy.com)) from North America. Their main revenue source appears to be advertising, though they have recently started selling the data collected by the website (like a market research company would sell). Empirical evidence from Byrne, Leslie and Ware (2014) suggest that this site, like Fuelwatch, is effective in reducing consumer search costs.

WA's efforts in successfully implementing and promoting Fuelwatch should be seen as a model example of the pro-competitive effect of price clearinghouses. Empowering demand with information technology can indeed discipline supply.

## References

Armstrong, M. (2008): ‘Interactions between Competition and Consumer Policy’ 4 *Competition Policy International* 97

Australian Consumer and Competition Commission (2007): “Petrol Prices and Australian Consumers.” Report of the Australian Competition and Consumer Commission Inquiry into the Price of Unleaded Petrol, 280 pages.

Bacon, R. W. (1991): “Rockets and Feathers: The Asymmetric Speed of Adjustment of UK Retail Gasoline Price Changes,” *Energy Economics*, 13(3), 211-218.

Baye, M. R., Morgan, J., and P. Scholten (2006): “Information, Search, and Price Dispersion.” In Hendershott, T. (Eds.): *Handbook on Economics and Information*.

Brown, J.R., and A. Goolsbee (2002): “Does the Internet Make Markets More Competitive? Evidence from the Life Insurance Industry,” *Journal of Political Economy*, 110(3), 481-507

Byrne, D. P., and N. de Roos (2014): “Search and Stockpiling in Retail Gasoline Markets.” mimeo, University of Melbourne.

Byrne, D. P., de Roos, N., and D. Tiong (2014): “The Internet, Search and Asymmetric Pricing: A Natural Experiment in Retail Gasoline.” mimeo, University of Melbourne.

Byrne, D. P., Leslie, G.W. and R. Ware (2014): “How Do Consumers Respond to Gasoline Price Cycles?” *The Energy Journal*, forthcoming.

Borenstein, S , Cameron, C..A., and R. Gilbert (1997): Do Gasoline Prices Respond Asymmetrically to Crude Oil Price Changes?,” *Quarterly Journal of Economics*, 112(1) 305-339.

Deltas, G. (2008): “Retail Gasoline Price Dynamics and Local Market Power,” *Journal of Industrial Economics*, 56, 613-628.

de Roos, N., and H. Katayama (2013): “Gasoline Price Cycles Under Discrete Time Pricing,” *Economic Record* 89(3): 175–193.

Eckert, A. (2013): “Empirical Studies of Gasoline Retailing: A Guide to the Literature,” *Journal of Economic Surveys*, 27(1), 140-166.

Ellison, G., and S. Fisher Ellison (2009): “Search, Obfuscation, and Price Elasticities on the Internet,” *Econometrica*, 77(2), 427-452.

Ellison, G., and A. Wolitzky (2012): “A Search Cost Model of Obfuscation,” *RAND Journal of Economics*, 43(3), 417-441.

Foros, O., and F. Steen (2013): “Vertical control and price cycles in gasoline retailing,” *Scandinavian Journal of Economics* 115(3): 640–661.

Lewis, M. S. (2012): “Price Leadership and Coordination in Retail Gasoline Markets with Price Cycles,” *International Journal of Industrial Organization* 30(4): 342–351.

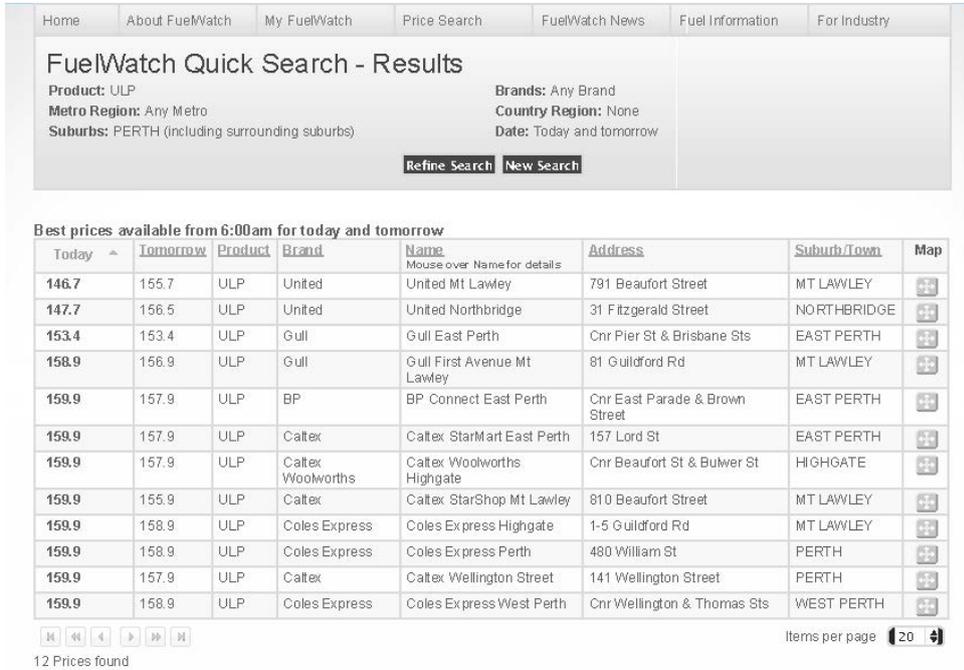
Lewis, M. S., and M. D. Noel (2011): “The Speed of Gasoline Price Response in Markets with and without Edgeworth Cycles,” *The Review of Economics and Statistics*, 93(2), 672-682.

- OECD (2008): *The Interface between Competition and Consumer Policies*, OECD Roundtables.
- OFT (2009): 'Joining up Competition and Consumer Policy The OFT's approach to building an integrated agency.'
- Peltzman, S. (2000): "Prices Rise Faster than They Fall," *Journal of Political Economy*, 108(3), 466-502
- Stigler, G. (1961): "The Economics of Information," *Journal of Political Economy*, 69(3), 213-225.
- Sylvan, L. (2006): 'The Interface between Consumer Policy and Competition Policy' (Speech delivered at the 2006 Consumer Affairs Victoria Lecture, 2006) 8–9.
- Tappata, M. (2009): "Rockets and Feathers: Understand Asymmetric Pricing," *RAND Journal of Economics* 40(4): 673–687
- Varian, H. (198): "A Model of Sales," *American Economic Review*, 70(4), 651-659.
- Verlinda, J. (2008): "Do Rockets Rise Faster and Feathers Fall Slower in an Atmosphere of Local Market Power? Evidence from the Retail Gasoline Market," *Journal of Industrial Economics*, 56(3), 581-612.
- Wang, Z. (2009): "(Mixed) Strategies in Oligopoly Pricing: Evidence from Gasoline Price Cycles Before and Under a Timing Regulation," *Journal of Political Economy*
- Yang, H., and L. Ye (2008): "Search with Learning: Understanding Asymmetric Price Adjustments," *Rand Journal of Economics*, 39(2), 547–564.

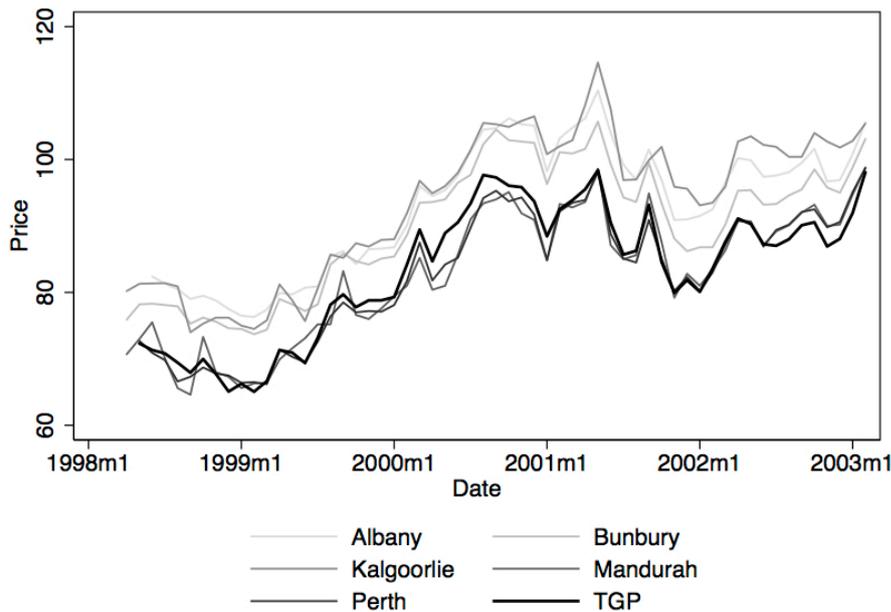
# Appendix

## Figures

**Figure 1: Fuelwatch Sample Screenshot**

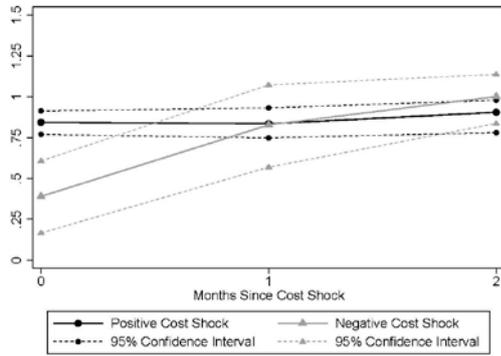


**Figure 2: Retail Prices and TGPs in Western Australia**

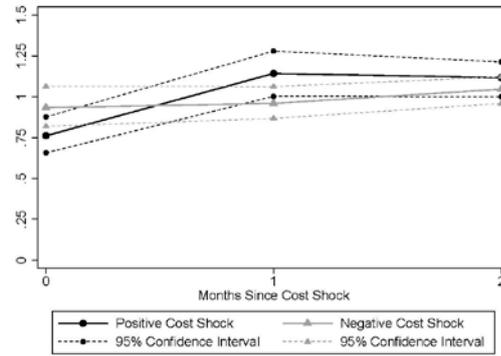


**Figure 3: Retail Price Responses in Western Australia**  
(cost shock = 1cpl)

Panel A: Pre-Fuelwatch

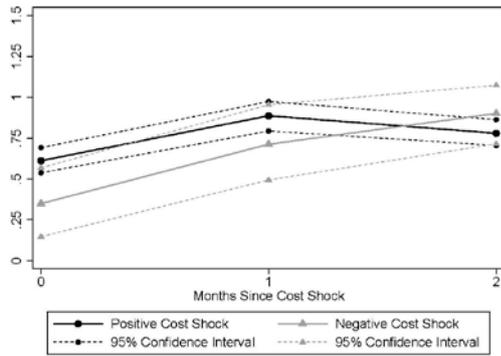


Panel B: Post-Fuelwatch

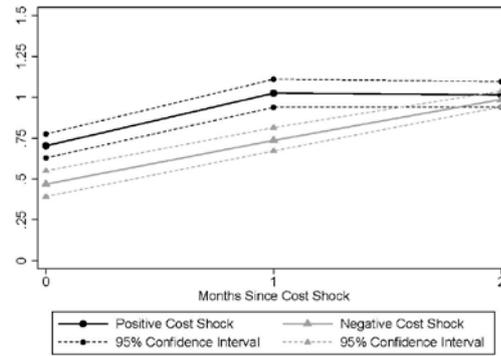


**Figure 4: Retail Price Responses in South Australia (Placebo)**  
(cost shock = 1cpl)

Panel A: Pre-Fuelwatch

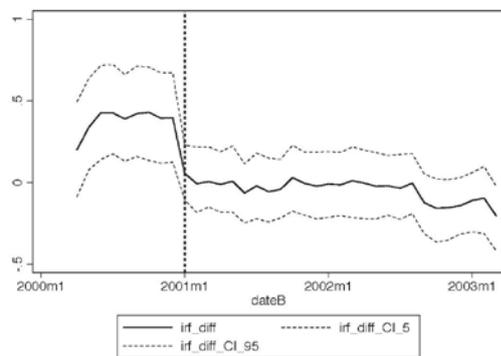


Panel B: Post-Fuelwatch

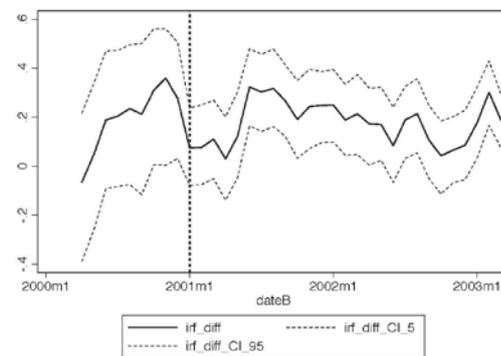


**Figure 5: Time-Varying Fuelwatch Effects, WA and SA**  
(cost shock = 1cpl, rolling window = 24 months)

Panel A: Western Australia



Panel B: South Australia (Placebo)



## Tables

Table 1: Baseline Error Correction Model Estimates

	Western Australia	South Australia
$\beta_{10}^+$	0.843** (0.078)	0.759** (0.063)
$\beta_{11}^+$	0.347** (0.123)	0.14 (0.093)
$\beta_{12}^+$	0.151 (0.12)	-0.059 (0.08)
$\beta_{20}^+$	0.762** (0.073)	0.555** (0.06)
$\beta_{21}^+$	0.351* (0.138)	0.478** (0.096)
$\beta_{22}^+$	0.188 (0.145)	0.073 (0.099)
$\beta_{10}^-$	0.390** (0.141)	0.603** (0.109)
$\beta_{11}^-$	0.204 (0.17)	0.695** (0.135)
$\beta_{12}^-$	0.143 (0.153)	0.101 (0.136)
$\beta_{20}^-$	0.934** (0.07)	0.659** (0.057)
$\beta_{21}^-$	0.153 (0.137)	0.302** (0.076)
$\beta_{22}^-$	-0.097 (0.124)	0.220** (0.075)
$\gamma_{10}^+$	-0.511** (0.11)	-0.084 (0.083)
$\gamma_{11}^+$	-0.187 (0.111)	-0.059 (0.047)
$\gamma_{20}^+$	-0.09 (0.113)	-0.051 (0.084)
$\gamma_{21}^+$	-0.221 (0.116)	-0.194* (0.083)
$\gamma_{10}^-$	0.069 (0.129)	-0.677** (0.062)
$\gamma_{11}^-$	-0.205 (0.121)	-0.17 (0.089)
$\gamma_{20}^-$	-0.189 (0.126)	-0.335** (0.085)
$\gamma_{21}^-$	0.156 (0.11)	-0.036 (0.07)
$\theta$	-0.289** (0.048)	-0.228** (0.034)
R-Squared	0.787	0.645
Observations	270	812

**Notes:** Standard errors in parentheses. \*\* and \* indicated statistical significance at the 1% and 5% levels.