concept economics

REPORT

FUELWATCH: SUBMISSION TO THE SENATE ECONOMICS COMMITTEE

Prepared for:
Senate Economics Committee

Prepared by:
Concept Economics

Date: 8 August 2008
Project code:

Concept Economics:
27 Jardine Street,
PO Box 5430 Kingston
ACT 2604 Australia

For further information on this report, please contact the project manager of this report on +61 2 6126 5000 or email shirleycarpenter@concepteconomics.com.au.

Table of contents

EXECUTIVE SUMMARY

1 Introduced initially in Western Australia in January 2001, FuelWatch requires service stations to each day publicly commit to prices being maintained for the following 24-hours.

2 On 15 April 2008, the Australian Government announced its intention to proceed with a national FuelWatch scheme. At the time and subsequently, various official statements have promoted the view that FuelWatch:

- leads to lower petrol prices:
- provides beneficial effects on the competitive dynamics of the petrol market; and
- benefits all consumers by removing intra-day price volatility thus lowering search costs for consumers.

3 Far from generating these sorts of benefits our analysis suggests that a scheme like FuelWatch could harm certain sectors of society. This is because we found that while FuelWatch had no significant effect on average service station margins in Perth it altered the distribution of retail prices across postcodes in Perth. In particular, we found that under FuelWatch, Perth had fewer stations with very low petrol prices and more stations with high petrol prices.

4 Where a scheme like FuelWatch reduces the number of petrol stations offering very low prices, it would seem to especially disadvantage price-conscious consumers with relatively low search costs such as pensioners and the disadvantaged. At the same time, by inducing some petrol stations to set relatively high prices, presumably aimed at those consumers who have high search costs or little ability to search, it increases the risk that those consumers will pay much higher prices.

5 Because of unintended effects such as those just outlined we could not conclude that consumers as a whole would be no worse off under a scheme like FuelWatch. In this submission we present the analysis we undertook which leads to this conclusion.

6 Our analysis consisted of two streams of work. In the first stream of work we attempt to replicate, and then extend, the ACCC's analysis of the difference in retail service station margins in Perth and the Eastern state capitals.

7 In the second stream of work we examine the distribution of daily petrol prices by postcode in Perth and Sydney. We also estimate a statistical model to explain how daily petrol prices are determined at a postcode level in Perth and Sydney. We then use this model to predict what daily petrol prices would have been in Perth postcodes in 2007 with and without FuelWatch.

8 The petrol price data used in our analysis was provided by Informed Sources. We requested from the ACCC the data they had used; this request was refused. We also requested that the ACCC provide us with the details of the models they had estimated, including the standard tests of statistical significance. This too was refused. Combined, the authors of this Submission have over 90 years of experience in economic analysis. This is the first time we have heard of a body such as the ACCC refusing to disclose the

significance tests for results on which it has relied and expects the public to rely. No explanation has been given by the ACCC for its failure to disclose these tests.

9 Our analysis of retail service station margins on petrol sales between Perth and the eastern state capitals was designed to replicate as closely as we could the ACCC's analysis of FuelWatch. The ACCC analysis looks for periods of time in the data when the calculated difference in margins is lower on average over the period in question than it was on average prior to the introduction of FuelWatch. Such a period is known as a structural break in the data.

10 The ACCC documented its margin in its December 2007 report and noted that visual inspection of the calculated weekly margin revealed two clusters of lower margins: one around December 2000, just prior to the introduction of FuelWatch, and the other around July 2004, which was close in time to the entry of Coles into the Perth market.

11 Despite identifying a possible structural break around July 2004, the ACCC did not simultaneously test for a FuelWatch effect and for other factors that could cause structural breaks, such as the entry of Coles into the Perth market.

12 We recalcalculated the ACCC margin as best we could and then re-estimated the ACCC's model. The estimation of a model with only a structural break that represents the introduction of FuelWatch yielded results similar to those found by the ACCC. That is, FuelWatch on its own (or some other factor at the posited date) was found to have a significant negative effect on the margin in Perth relative to the margin in the eastern state capitals.

13 However, when we re-estimated the ACCC model with both a FuelWatch effect and an effect for the possible structural break in July 2004, we found that the ACCC's FuelWatch effect vanished but the structural break in July 2004 was highly significant.

14 This result suggests that FuelWatch did not have any significant effect on petrol prices in Perth. Rather, the negative FuelWatch effect found by the ACCC in its December 2007 study resulted from the failure of the ACCC to test simultaneously for a FuelWatch effect and for other possible structural breaks, such as the entry of Coles in the Perth market.

15 In the second stream of work we conducted further statistical analysis to examine the possible effect of FuelWatch on the structure of retail petrol prices using daily prices by postcode in Perth and Sydney for the 2007 calendar year and for the 2000 calendar year in Perth (pre-FuelWatch).

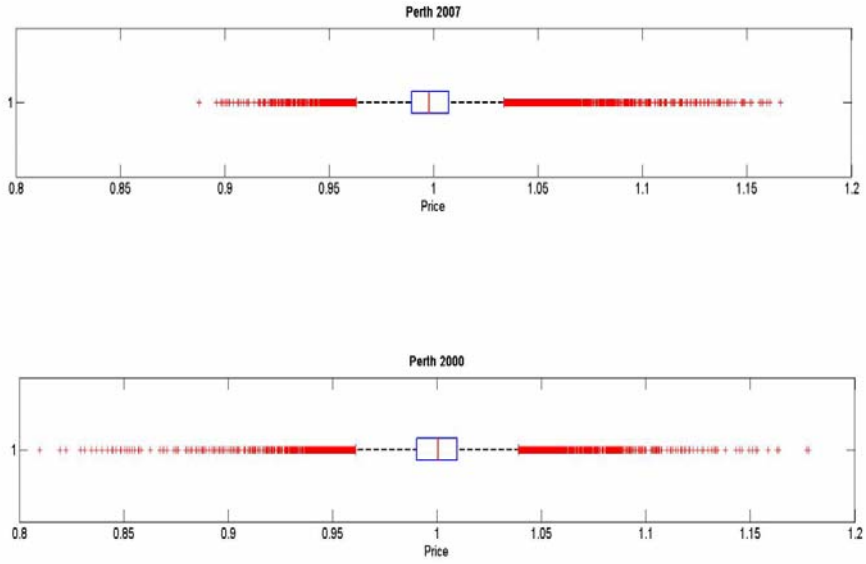
16 Price series were converted into daily mean price deviations for each market, with the price in each postcode divided by the mean price of the relevant capital city for each day. We summarise the data we used in terms of what are known as "box and whisker plots" as shown in Figure 1. In a box and whisker plot the "box" contains prices for postcodes for the inter-quartile range (containing 75% of all observations) and the "whiskers" show the outlying deviation in daily prices by postcode.

17 Perth in 2000 had relative large left and right whiskers indicating a wide variety of postcodes with relatively high and relatively low retail petrol prices (Figure 1). In the 2007 data we found that the left whisker had been trimmed significantly (Figure 1). We asked the question:

> Could the observed changes in the structural characteristics of the Perth market in 2007 plausibly reflect features of the FuelWatch scheme? In particular, does the elimination of within day competition under FuelWatch alter the process of price competition and the distribution of prices?

18 To help answer this question we estimated a spatial model of Perth retail petrol prices by postcode for a period prior to the introduction of FuelWatch. As explained in paragraph 116 of this submission the spatial model for the pre-FuelWatch period allows petrol prices in a postcode to be influenced by past prices in the postcode and by current and past prices in neighbouring postcodes.

Figure 1: Box and whisker plots of mean daily price deviations in Perth



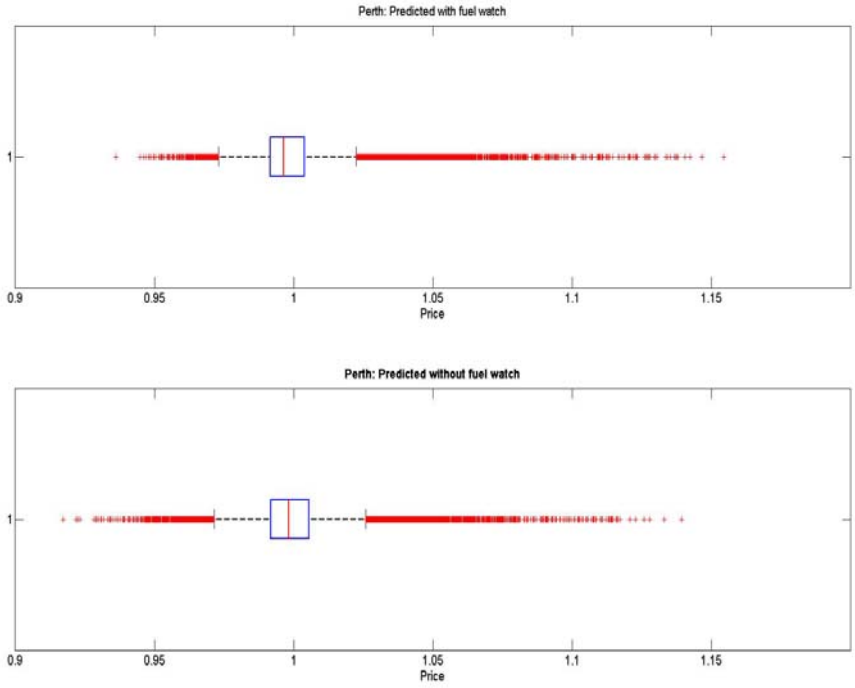
19 We then used the estimated spatial model of Perth petrol prices to predict what petrol prices would have been had the estimated market structure in Perth 2000 been imposed on the Perth 2007 market. That is, the estimated coefficients from Perth 2000 were used to predict what would have occurred in Perth 2007 if FuelWatch had not been in place.

20 The results are presented in Figure 2 in terms of box and whisker plots. The calculations indicate that FuelWatch did not have a significant impact on the average market price in Perth in 2007. However, according to the results from the spatial model, FuelWatch led in 2007 to fewer lower priced locations in Perth and to a greater number of higher prices locations. At the same time, a large number of locations are estimated to have slightly lower prices in the centre of the distribution.

21 It is the predicted changes in the distribution of petrol prices in Perth that are attributed to FuelWatch that led us to conclude that a scheme like FuelWatch could have unintended

and adverse effects on sections of consumers. These adverse consequences may be especially pronounced for pensioners and the disadvantaged. It is to be regretted that the ACCC, with its superior access to data, did not investigate these consequences.

Figure 2 Box and whisker plot of modelled pre and post FuelWatch prices, Perth 2007



22 We also note, though we have not had the time or resources to explore this issue quantitatively, that FuelWatch may well distort, rather than enhance, the competitive process. In particular, it seems likely that FuelWatch will advantage larger players, who operate multiple sites, relative to smaller independents.

23 Given our findings, we explore in this submission options, other than FuelWatch, which could achieve the Governments stated objectives of increased price transparency and reduced consumer search costs without the risk of adverse consequences.

24 One possible option would be a system of voluntary notification by petrol stations of maximum prices. This would offer many of the advantages of a scheme to improve consumer information, but without the costs of FuelWatch in terms of administration, compliance and market distortion. Under such a system, petrol stations would have the option of setting a maximum price for the day and motorists would be assured that if they chose to fill up on a given day at a given location they would not pay more than that price. A sensible policy approach would be to trial this option for (say) a year, assess its effects (if any) and then, if and only if it had clearly failed to meet the policy objectives, move to a scheme based on compulsion.

25 Such an approach would, in our view, be far more consistent than the proposed FuelWatch scheme with the Government's stated commitment to choose, when intervening in markets, the approach that is most light touch, and hence "least restrictive" of competition. By giving such an approach an initial year in which to operate, the Government would allow a chance

for a more light touch approach to succeed, rather than going directly to what seems like a very intrusive form of regulation whose potential costs are, as of yet, poorly understood.

26 This submission was prepared with assistance from Informed Sources, which provided data, and from Woolworths, who assisted with data acquisition and support costs. However, over 70 per cent of the costs involved in the preparation of this Submission were borne by Concept Economics, and the views expressed in this Submission are strictly those of the authors.

1. INTRODUCTION

27 The Australian Government's decision to legislate for a national FuelWatch scheme amounts to one of the most intrusive extensions of regulation in Australia in recent years. It would affect a large industry of significance to almost every Australian.

28 Few consumer markets in Australia are as subject to regular, close scrutiny as that for petrol. Governments in Australia have a long history of involvement in petrol and petrol pricing, including via various forms of price monitoring and, in the wake of moves toward deregulation in 1998, numerous public inquiries and reports. Indeed, the Australian Competition and Consumer Commission chairman has identified no less than 46 inquiries into petrol in Australia.[1]

29 The most recent such inquiry was a six-month study by the ACCC into the price of unleaded petrol in Australia. In its December 2007 report, the ACCC concluded that the unleaded petrol industry in Australia is 'fundamentally competitive' with 'no obvious evidence of price fixing or collusion between the major participants in the industry'.[2]

30 It was found that by international standards Australian unleaded petrol prices are not high, though the level of government involvement in petrol and petrol pricing 'seems quite unusual by international standards, certainly for OECD countries'.[3] Echoing earlier reports and studies, the ACCC concluded that the fundamental pricing of petrol is dictated by international factors: the price of crude oil, the US/AUS exchange rate and the international market for the refining of petrol.

31 The ACCC did raise concerns about an imbalance in pricing transparency between sellers and buyers of petrol and the possible effects on market dynamics and consumer welfare. This was seen as allowing sellers to react more quickly than buyers to movements in petrol prices with negative effects on competition and consumer search costs.

32 At the same time, the ACCC report concluded: (1) that there is 'a significant degree of price competition at the retail level'; (2) that retail margins are 'relatively small' and 'have remained broadly constant over the last four years' (falling with increased competition from the supermarkets between 2003-04 and 2004-05, before increasing in 2006-07); and (3) that 'the existence of price cycles does not provide any evidence of a lack of retail competition'.[4]

33 Against this backdrop, the move towards a form of national petrol price regulation is a radical and unjustified departure from the approach to competition policy of successive governments for the better part of two decades. Underpinning that past approach has been the principle that restrictions on competition should only be imposed where there is a clear and well-established case that the benefits of restrictions on competition exceed the costs,

---

1 Mr Graeme Samuel, Chairman, ACCC, *Committee Hansard*, Senate Standing Committee on Economics, Budget Estimates, 5 June 2008, p. E7.

2 Australian Competition and Consumer Commission (2007), *Petrol Prices and Australian Consumers*, Canberra, December, p. v.

3 Ibid., p. 2.

4 Ibid., pp. 15-16.

and where there are no less restrictive alternatives that meet the policy objective being pursued.

34 This submission examines the claims made in support of FuelWatch by the Australian Government and by the ACCC. Notwithstanding some confusion and inconsistency surrounding the case for FuelWatch, three central propositions have been advanced in the public debate. They are as follows:

1. FuelWatch has resulted in a fall in relative petrol prices in Western Australia and its implementation nation-wide will put downward pressure on prices;

2. By correcting for an imbalance in price transparency, FuelWatch ensures a significant shift in 'market power' from 'big oil' sellers to 'Mum and Dad' buyers of petrol, with beneficial effects on the competitive dynamics of the petrol market (even though the evidence suggests the market is competitive); and

3. Consumers have a strong preference for more s fuel prices and by removing intra-day price volatility FuelWatch benefits *all* classes of consumers via lower search costs.

35 Far from supporting these claims, this submission finds that:

a. Based on the empirical evidence from Western Australia, FuelWatch has no discernible effect in lowering prices;

b. The ACCC analysis which concludes that FuelWatch led to lower price margins in Perth relative to the eastern state capitals is flawed on multiple grounds;

c. The market dynamics arising from FuelWatch price regulation are likely to be more complex than those advanced by the Government and the ACCC, with larger, multi-site operators likely to be advantaged relative to smaller, independent operators;

d. FuelWatch is likely to alter the distribution of prices in ways that will harm some consumers, including both more price-conscious consumers with relatively low search costs and those consumers with the highest search costs (and who are therefore most vulnerable to high prices);

e. Survey evidence on consumer preferences is, at best, equivocal about the net benefits of schemes such as FuelWatch that prevent petrol stations from reducing prices during the day;

f. Given the ACCC's finding that petrol retailing is a competitive market, FuelWatch sets a bad precedent by regulating where no economic problem has been identified; and

g. FuelWatch is entirely inconsistent with the Australian Government's commitment to deregulation and to 'best practice regulation' which requires rigorous and transparent cost-benefit analysis that includes consideration of policy alternatives that may be less restrictive and less costly.

36 In short, the case for a national FuelWatch scheme has yet to be made. Any alleged benefits, especially in terms of price effects, rest on shaky empirical foundations. In addition, there are substantial risks that the proposed regulation will harm industry competition and consumers.

2. ALLEGED PRICE EFFECTS OF FUELWATCH

37 Introduced initially in Western Australia in January 2001, FuelWatch requires service stations to publicly commit to prices to be maintained for the following 24-hours.

38 Under the so-called 24-hour rule, fuel retailers must notify the Western Australian Department of Consumer and Employment Protection by 2 pm of the following day's fuel prices. Retailers must then charge the notified prices from 6am the next day for 24 hours, removing intra-day volatility in petrol prices. Petrol prices are published on the FuelWatch website and reported in the media to provide consumers with price information.

39 On 15 April 2008, the Australian Government announced its intention to proceed with a national FuelWatch scheme. At the time and subsequently, various official statements have promoted the view that FuelWatch leads to lower petrol prices. The statements were based principally on the results of some econometric work undertaken by the ACCC for its 2007 petrol price inquiry. As recently as 30 May 2008, ACCC Chairman Graeme Samuel highlighted these results in the following terms:[5]

> *To make a rigorous assessment of the effects of FuelWatch on retail prices in Perth taking account issues such as price cycles, the ACCC compared the price of unleaded petrol in Perth before and after the introduction of FuelWatch.* ***The ACCC's analysis revealed that since FuelWatch, Perth's weekly average price had decreased by 1.9 cents per litre.***

40 Prime Minister Kevin Rudd has described the ACCC's econometrics as the main 'evidentiary basis' for Federal Cabinet's decision to introduce a national FuelWatch scheme.[6] On 27 May 2008, the Government moved a motion in the House of Representatives highlighting 'the **downward pressure in prices** as a result of introducing FuelWatch with an independent analysis conducted by the ACCC concluding that petrol prices were on average 1.9 cents per litre less under Western Australia's FuelWatch Scheme'.[7]

41 The foundation for these claims is the material set out in Appendix S of the ACCC's December 2007 report into petrol prices based on an examination of the difference in price that occurred in Perth relative to capital cities in the eastern states (Adelaide, Brisbane, Melbourne and Sydney) before and after the introduction of FuelWatch.

42 Using pricing information supplied by Informed Sources and Platts, the series tested was a measure of price margin that removes a number of factors from the retail price that were seen as beyond the scope of Fuelwatch to affect (such as net taxes, fuel quality premiums and ex-refinery petrol prices). The ACCC margin is calculated as:

> *Price margin = (Retail price – lagged Mogas95 price – net taxes – fuel quality premium) Perth - (Retail price – lagged Mogas95 price – net taxes – fuel quality premium) Average of eastern capitals*

---

5 Graeme Samuel, 'Steering motorists to the right price', *The Age*, 30 May 2008; emphasis added.

6 Matthew Franklin, 'Kevin Rudd twisted ACCC advice', *The Australian*, 28 May 2008.

7 Assistant Treasurer and Minster for Competition Policy and Consumer Affairs Chris Bowen, 'Nelson and Turnbull stand in the way of motorists benefiting from FuelWatch', Press release, 27 May 2008; emphasis added.

43 The ACCC margin allowed for lagged Mogas prices, net taxes and changes in indicative fuel standard premiums. The Mogas price was lagged by one week to reflect the typical lag seen between the affect of changes in Mogas on domestic retail petrol prices. The data series extended from 1 August 1998 to 8 June 2007. The ACCC did not go back before 1 August 1998 due to the major deregulation of petrol prices at that time.

44 Three data series were tested using this price margin. The primary data series used weekly averages of prices to remove some of the effects of the price cycle. A monthly average series was also calculated to ensure that any apparent move from typically weekly to typically fortnightly cycles in Perth did not unduly affect the results. In addition, a 'weekly minimum' series was calculated as a measure of the low point of the week's prices. This was seen as representing the option available to the most price conscious consumers.

The tests assumed a structural break on 2 January 2001 with the results reported in Table 1.[8]

Table 1: ACCC econometric results (initial results, December 2007)

Structural break test for relative price margin, cpl, August 1998 to June 2007		
Series	Average (August 1998 to December	Change in average (January 2001 to June 2007)
Weekly average	(0.002)	-1.92 (0.000)
Monthly average	0.88 (0.001)	-1.86 (0.000)
Weekly minimum	0.30 (0.277)	-0.90 (0.003)

Source: ACCC (2007), Petrol Prices and Australian Consumers, p. 377.

45 The claim that FuelWatch resulted in a fall in Perth petrol prices by around 1.9 cpl is based on the weekly average series results.

46 There are, however, several problems both with the ACCC analysis. One no example is the failure to test simultaneously both for a FuelWatch effect and an effect from the entry into the Perth market of the major supermarket chains.

47 As the ACCC noted in its December 2007 report, visual inspection of the weekly average data suggests that the price margin before around May 2000 is higher than it is after around May 2000. It also highlighted two clusters of lower values: one around December 2000 and the other around July 2004, which was close in time to the entry of Coles into the Perth market. Despite identifying this possible structural break is the series, the ACCC did

[8] The ACCC proceeded on the basis that no deterministic trend was indicated or assumed. The simplest possible test was undertaken, with an intercept, a break dummy equal to 0 before the break and equal to 1 after the break and no time trend.

not simultaneously test for a FuelWatch effect and for the impact of other possible structural breaks, such as the entry of Coles in the Perth market, on the calculated margin.

48 The ACCC was clearly alert to this factor as Mr Brian Cassidy of the ACCC indicated before an earlier inquiry into petrol prices by the Senate Economics Committee on 19 October 2006:[9]

> *We (the ACCC) are doubtful, at the very least, about just what impact the Western Australian arrangements have had on price levels in Western Australia. The arrangements came into place in 2001. If you compare Perth prices against Sydney and Melbourne, between 2001 and 2003-04, there was a marginal improvement in Perth prices relative to Sydney prices and there was an actual deterioration in Perth prices relative to Melbourne prices. Around 2003-04, two things happened. Firstly, Coles and the joint venture Woolworths-Caltex sites started to enter the Western Australian market. … Secondly, Western Australia for some time has had reasonably restrictive fuel standards. Around 2003-04, the Commonwealth introduced national fuel standards, which are not as restrictive as the Western Australian standards but they nonetheless came into force, although the more restrictive Western Australian standards still apply in Western Australia. So it meant there was a levelling up to some extent, if you like, in the price impact of the fuel standards between Western Australia and other states.*
>
> *If you look at that price comparison I was talking about it is interesting to note that **it is really only after 2003-04 that there has been some improvement in Perth prices as against both Sydney and Melbourne prices**. Given the Western Australian arrangements have been in place since 2001, you are then left to wonder whether that improvement, which has occurred from about 2003-04 onwards, is a product of the Western Australian arrangements or whether it is a product of these other factors. If you say it is a product of the Western Australian arrangements, then the next question is why did it take two or three years for those arrangements to actually start to impact on the price relativities between, say, Perth and Sydney and Melbourne?*

49 These doubts remain as relevant today as they were in October 2006.

50 Concept Economics has conducted its own empirical analysis in an attempt to replicate the ACCC analysis and, further, to test the proposition that the ACCC may have overstated the benefits of FuelWatch given the failure (at least initially) to test simultaneously for a structural break due to the entry of Coles into the Perth market.

51 We obtained data on average daily unleaded petrol prices in Perth and the eastern state capitals from Informed Sources covering the period from 2 January 1998 to 31 May 2008. The daily Mogas95 price was obtained from Platts, which is an estimate of the free-on-board (FOB) price ex Singapore.[10] A series on net taxes paid on unleaded petrol in Perth and the eastern state capitals was also constructed. It consists of:

- Petrol excise collected by the Federal Government. Data on the rate of excise applicable to particular time periods was sourced from a paper prepared by the Parliamentary Library[11]; plus

---

9 Mr Brian Cassidy, Chief Executive Officer, ACCC, *Committee Hansard*, Senate Standing Committee on Economics, Reference: Price of Petrol in Australia, 19 October 2006, pp. E19-20, emphasis added.

10 Prior to 12 April 1999, Informed Sources did not collect petrol price data on weekends for Perth or the eastern state capitals. The Platts data only cover weekdays.

11 Webb, Richard (2006), Parliamentary Library Research Brief, Excise Taxation: Developments since the mid-1990s, 13 April, p.36. available at www.aph.gov.au/library/pubs/rb/2005-06/06rb15.pdf.

- GST calculated as one eleventh of the Informed Sources estimate of the retail price of unleaded petrol; minus
- State fuel subsidies. The rate of State fuel subsidies was obtained from an Issues Paper prepared by the Commonwealth Treasury as part of a 2002 fuel tax inquiry.[12] Only Queensland and Victoria were indicated as having state fuel subsidies applicable to capital city regions.

52 In Victoria, a state fuel subsidy of 0.429 cents per litre was introduced in 1997 and abolished on 1 July 2007.[13] Queensland introduced a fuel subsidy in 1997. As at 12 May 1999, the Queensland subsidy was set at 8.206 cents per litre[14] and it was subsequently increased to 8.354 cents per litre as at 30 June 2000.[15] The Queensland subsidy arrangements also include an amount equal to 0.046 cents per litre as a component towards administration costs. The administration component of the subsidy was introduced on 1 October 2000.[16]

53 The ACCC margin set out above also includes an adjustment for fuel quality differences. This is required to allow for the fact that 'Western Australia has had generally stricter fuel standards although the gap in reported premiums between WA and the eastern states has decreased over time'.[17]

54 Concept Economics could not obtain data on fuel quality standards, thus our margin does not account for changes in fuel standards through time. However, this is not considered critical given the ACCC concluded that its own results were 'robust even allowing for the exclusion of fuel standard premiums'.[18]

55 The Concept margin as calculated is shown in Figure 3.

56 It has several features that are similar to the calculated ACCC margin.[19] As with the ACCC margin, visual inspection of the data indicates that:

- The relative price margin is higher before around May 2000 compared with after that date; and
- There are two clusters of lower values: one around December 2000, the other around July 2004.

57 While the similarities are clear, the ACCC graph has a more pronounced drop in the margin post May 2000.

---

12 Department of Treasury (2002), Fuel Taxation Inquiry, Issues Paper Part 5, p.13 Table 5.6. available at: fueltaxinquiry.treasury.gov.au/content/issues/issues-04.asp

13 Queensland Fuel Subsidy Commission of Inquiry Report, November 2007, Hon C.W. Pincus QC, p. 17. available at: http://www.fuelsubsidycommission.qld.gov.au/

14 Fuel Subsidy Regulation 1998, reprint No1A.

15 Queensland Fuel Subsidy Commission of Inquiry Report, November 2007, Hon C.W. Pincus QC, p. 17. available at: http://www.fuelsubsidycommission.qld.gov.au/

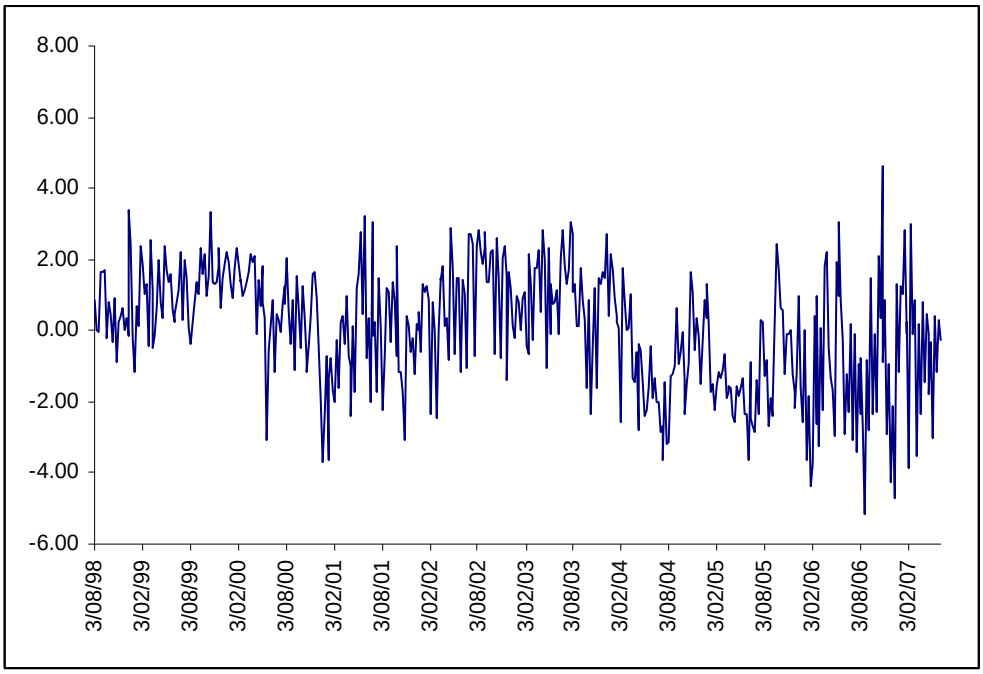
16 Queensland Government Information Bulletin, Fuel Subsidy Amendment Act 2000. available at: info_bulletins/fuel_subsidy_amendment_act_2000.pdf

17 ACCC, Op. cit., p. 377.

18 Ibid., p. 377. We sought from the ACCC disclosure of the evidence to this point in the form of the estimated models. This request was refused.

19 Ibid., p. 376.

Figure 3: Retail and wholesale margin on unleaded petrol in Perth minus the same margin in the eastern capital cities (cpl)



Source: Concept Economics calculations based on data supplied by Informed Sources.

58 In order to replicate the ACCC's analysis of FuelWatch, Concept tested for a structural shift in the calculated margin at the time FuelWatch was introduced from January 2001. The results from estimating this equation are shown in Table 2.

59 The estimation of a model with only one structural break yields results similar to those found by the ACCC. FuelWatch (or some other factor at the posited date) has a significant negative effect on the margin in Perth relative to the margin in the eastern state capitals.

Table 2 : Concept Economics results from estimation of ACCC FuelWatch equation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.803730	0.150009	5.357896	0.0000
FUELWATCH	-1.040010	0.215981	-4.815285	0.0000
R-squared	0.241977	Mean dependent var		.047
Adjusted R-squared	0.238674	S.D. dependent var		1.67
Durbin-Watson stat	1.251267	Prob(F-statistic)		0.0000

60 However, the inability to deduct the fuel quality premiums from the data, given the difference in premiums fell through time, means that the FuelWatch effect as estimated by Concept Economics (a reduction of 1.04 cpl relative to the eastern state capitals) is less than that found by the ACCC.

61 This is not a major concern as our main objective is to examine how robust is the estimated FuelWatch effect to the inclusion of a structural break to take account of the effect of Coles entering the Perth market.

62 Based on a simultaneous test for both a FuelWatch effect and for a structural break due to Coles entering the Perth market, it was found that FuelWatch did not significantly affect the difference in the margin. By contrast, the entry of Coles led to a reduction of 1.6 cpl in the nominal price of petrol in Perth relative to the eastern state capitals (Table 3).

Table 3 : Concept Economics results from estimation of ACCC FuelWatch equation with the addition of "Supermarket effect" dummy variable

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.803730	0.150172	5.352069	0.0000
FUELWATCH	-0.229185	0.213756	-1.072180	0.2842
Supermarket effect	-1.593200	0.235832	-6.755660	0.0000
R-squared	0.241977	Mean dependent var		.047
Adjusted R-squared	0.238674	S.D. dependent var		1.67
Durbin-Watson stat	1.522934	Prob(F-statistic)		0.000000

63 These results suggest that FuelWatch had no significant effect on petrol prices in Perth. Rather, the negative FuelWatch effect found by the ACCC resulted from the failure of the ACCC to test simultaneously for a FuelWatch effect and for other factors causing possible structural breaks, such as the entry of Coles in the Perth market.

64 Subsequently, in the context of government deliberations over introducing a national FuelWatch scheme, the ACCC conducted further econometric work which was reported in a press release issued on 29 May 2008. This was undertaken to examine two issues: (i) whether consumers who benefited from the price cycle by buying on the lowest day each week may be harmed by FuelWatch; and (ii) whether further factors could explain the price effects.

65 On the first issue, the ACCC concluded that 'the overall price reductions indicated by the inquiry analysis were not isolated to certain times of the week'.[20] Based on price changes for the lowest price day of the week, the highest price day of the week and for the remaining five days of the week, the ACCC reported the following results:

- prices decreased an average of 3.5cpl for the highest price day of the week;
- prices decreased an average of 0.7 cpl for the lowest price day of the week; and
- prices decreased an average of 1.8 cpl for the remaining middle five days of the week

[20] Australian Competition and Consumer Commission, 'Petrol – Further econometric analysis undertaken by the ACCC', Press release, 29 May 2008, p. 3.

66 On the second issue, the ACCC conducted an 'endogenous selection of structural break points' analysis to investigate when the most significant events occurred and their impact. Using the same series as the original analysis, the tests were designed to identify the timing of a single significant event or alternatively the timing of two significant events in the average of the price margin measure.

67 The ACCC concluded that:[21]

> *The main event identified by all of these tests was the decrease in price margin around from around the time of the establishment of the WA Select Committee on Pricing of Petroleum Products and the establishment of Fuelwatch.*
>
> *The analysis of the structural breaks indicated that the entry of Coles into Perth was an event that may have had a price impact. However, its impact was small compared to the break around the time of the introduction of Fuel Watch. Further the entry of Coles into the eastern capitals could have induced a similar break favouring the Eastern capitals. Hurricane Katrina was also indicated as a significant event.*

68 The results of this analysis are reproduced in Table 4.

Table 4 : ACCC additional econometric results (press release, 29 May 2008)

Structural breaks in the pricing measure, cpl, August 1998 to June 2007

Price margin series	Single structural break Timing & price margin change	Two structural breaks Timing & price margin change
Weekly average	May 2000 -1.1cpl	May 2000 -1.1cpl February 2004 -0.4cpl
Monthly average	March 2000 -1.5cpl	March 2000 -1.4cpl February 2004 -0.6cpl
Weekly minimum	March 2000 -0.8cpl	March 2000 -1.0cpl September 2005 +0.4cpl

69 The key results for the weekly average series are a somewhat smaller FuelWatch price effect (-1.1cpl) than the original analysis (-1.92cpl), though no tests of statistical significance are reported in the later analysis. Also, the timing of the structural break due to FuelWatch is now assessed to be in the first half of 2000, prior to the scheme's actual introduction.

70 Perhaps because of these difficulties, the ACCC has become ever less willing to claim FuelWatch reduced prices. Rather it concluded: 'From the econometric analysis, on a conservative basis, the ACCC can say that there is no evidence that the introduction of Fuelwatch in Western Australia led to any increase in prices and it appears to have resulted in a small price decrease overall'.[22]

[21] Ibid., p. 4.

[22] Australian Competition and Consumer Commission, 'Petrol – Further econometric analysis undertaken by the ACCC', Press release, 29 May 2008, p. 4.

71 These results raise further concerns about the ACCC's econometrics and the way the case for FuelWatch has been made in the public domain. Firstly, it seems clear that there has been a change of emphasis from the earlier (strong) claims about the price effects of FuelWatch made by the ACCC Chairman and by the Minister. The stress is now on the failure to find evidence that the introduction of FuelWatch led to an increase in petrol prices in Perth (which hardly seems like sensible grounds for introducing costly regulation).

72 Secondly, and more fundamentally, there is now the claim that the FuelWatch effect appeared *before the scheme was actually introduced*, with the results pointing to a structural break some time in the first half of 2000. When questioned about this, ACCC Commissioner Dr Stephen King argued that the announcement in April 2000 by the West Australian Parliament of an inquiry into petrol prices is the important variable in this context, stating that: 'Committees of inquiry tend to have effects on price. … People who were thinking of putting up price, if there is a committee of inquiry breathing down their neck, tend not to be so active.'[23] However, this statement does not appear to be based on any evidence whatsoever, as the ACCC has not tested the effect of price inquiries for fuel and other goods on prices, which it could readily have done.

73 Even putting that fact aside, the questions only multiply in light of evidence presented by Mr Cassidy of the ACCC to the Senate Standing Committee on Economics before the Budget Estimates on 5 June 2008. There he pointed to the fact that for some months after the January 2001 start-date of FuelWatch, prior to amending legislation in August 2001, service stations were required to notify their price for the next day, but not actually required to move to that price. Mr Cassidy went on to argue that this 'serious glitch' meant that 'for a period of about seven to eight months up until when the legislation was changed in August 2001, FuelWatch, as it is now called, really was not working as intended. **FuelWatch, as we know it in WA, actually came into real effect in September 2001**.'[24]

74 Assuming Mr Cassidy was not being misleading, the suggestion now seems to be that the FuelWatch structural break occurred more than six months before the scheme was officially introduced, even though the scheme did not work as intended for around eight months subsequent to its introduction. **In other words, FuelWatch is said to have lowered petrol prices in Perth relative to the eastern states roughly 15 months prior to its effective operation**. This seems entirely implausible.

75 At best, the ACCC's explanation as to both the timing and the magnitude of any price effects due to FuelWatch is confused. More recently it has further played down results which the Government had cited as the main empirical basis for the scheme. Thus, on 5 June 2008, Mr Samuel told the Senate Standing Committee on Economics that while there has been 'an enormous amount of focus on 1.9c a litre and 0.7c a litre' this seemed 'to miss the whole point of FuelWatch'. FuelWatch was now simply 'a consumer empowerment exercise' and 'not about 1.9c or 0.7c or whatever econometric modelling might be able to show'.[25]

---

[23] Remarks quoted in David Uren, 'Petrol fell before state scheme', *The Australian*, 30 May 2008.

[24] Mr Brian Cassidy, Chief Executive Officer, ACCC, *Committee Hansard*, Senate Standing Committee on Economics, Budget Estimates, 5 June 2008, p. E37. Emphasis added.

[25] Mr Graeme Samuel, Chairman, ACCC, *Committee Hansard*, Senate Standing Committee on Economics, Budget Estimates, 5 June 2008, p. E15.

76 Additional points are worth making about the ACCC's econometric analysis. Concept Economics would like to stress that our results presented in 4 should not be taken as definitive. Nor should our attempt to replicate the ACCC margin be interpreted as an endorsement of the ACCC's overall approach.

77 Indeed, we believe the estimated margin is deficient in various respects. In particular:

- It is based on a simple average of daily price data across all sampled petrol stations and so does not account for differences in the volume of petrol sold at different stations on different days. In our view, the margin analysis should have been undertaken using the daily petrol price data available from Informed Sources; and
- The ACCC margin subtracts from the calculated Perth margin a simple average of the margin in eastern state capital cities. This procedure does not incorporate different levels of consumption of petrol in the eastern capital cities and therefore potentially introduces errors and statistical biases into the calculated difference in margins.

78 Additionally and importantly, as recognised by the ACCC, its procedure does not allow for any divergence through time in the cost of transporting petrol from Singapore to Perth and from Singapore to the eastern capital cities. Because of the rise in the cost of bunker fuels through time, we believe the cost of longer distance voyages has been rising more significantly than has the cost of shorter sea voyages. As a result, transport to Perth would have become cheaper relative to transport to Sydney, distorting the ACCC's results. This is a serious bias, and should in itself lead to the ACCC's results being set aside or at least very heavily qualified. (A more detailed explanation of concerns regarding sea freight in the ACCC analysis is included in Appendix A.)

79 In summary, the Concept Economics margins analysis finds no price effects as a result of FuelWatch. The FuelWatch effect disappears when a test is conducted simultaneously for the various structural breaks, such as the entry of Coles in the Perth market. There is a need for a more robust analysis of the factors driving differences between margins in Perth and margins in the eastern capital cities than that provided by the ACCC.

80 All that can be said based on the release of further ACCC econometric results in May 2008 is that any price effects from FuelWatch now appear even harder to identify, both in terms of their timing and magnitude.

3. MARKET DYNAMICS AND PRICE DISTRIBUTION UNDER FUELWATCH

81 The Australian Government and the ACCC have argued that FuelWatch alters significantly the balance of market power between buyers and sellers of petrol, with consumers benefiting handsomely to the detriment of 'big oil companies'. Thus it has been claimed by Mr Samuel that FuelWatch 'neutralises the sophisticated price advantage that the sellers have got … and instead gives the consumer an advantage'.[26] Moreover, the requirement to notify the following day's prices by 2pm, together with the 24-hour rule, it is argued by Mr

[26] ACCC Chairman Graeme Samuel, quoted in Michelle Grattan, Nassim Khadem and Tim Colebatch, 'Cabinet leak leaves Rudd petrol strategy in tatters', *The Age*, 29 May 2008.

Samuel, 'puts the real mettle on the sellers of petrol to get their prices as keen as possible'.[27]

82 The argument is that FuelWatch redresses an imbalance in pricing transparency between buyers and sellers. This imbalance, it is argued, is the source of negative effects on competition and social costs arising from price volatility and associated consumer search costs.

83 In its December 2007 petrol pricing report, the ACCC noted that:

> *Price transparency can be described in terms of the costs in time and money for market participants to determine market prices, for transactions that will occur or have occurred. Where these costs are lower, the market has greater price transparency.*
>
> *In general increased price transparency has benefits for consumers unless it significantly increases the risks of anti-competitive practices among sellers. The more price transparency allows sellers to react more quickly than buyers to price movements the worse the situation is generally from a competition perspective, and vice versa.*

84 The report went on to argue that enhanced price transparency is more likely to benefit consumers the more it is aimed at improving buyer information and options relative to seller information and options.

85 The ACCC also drew attention to what it saw as the potential anti-competitive pricing effects stemming from asymmetric price transparency between buyers and sellers in the petrol market. It argued that:[28]

> *The more price transparency allows sellers to react more quickly than buyers to price movements the worse the situation is from a competition perspective. This would appear to be the current situation in markets serviced by Informed Sources. It could also extend to a lesser extent in other markets where retailers inform themselves of rival's prices by driving around.*
>
> *The direct exchange of prices by sellers alone allows a seller to lead the price up with reduced risk. If others do not respond the leader knows quickly and can reverse the price rise with little loss of price sensitive consumers. Direct exchange of prices by sellers also allows sellers to match rivals' price cuts faster than most petrol buyers can respond to the price decrease. This helps retailers retain customers that otherwise might have been wooed away by rivals' lower prices. If a retailer's competitors can immediately match any price decrease by the retailer, then that price decrease is less likely to allow the retailer to win over customers from competitors. Knowing this, retailers are more reluctant to decrease prices in search of greater sales than they otherwise would be. That would reduce incentives to compete on price and tend to harm buyers.*

86 In short, the ACCC maintains that the scheme yields significant benefits in terms of reduced consumer search costs and the additional competitive keenness in pricing. The ACCC Chairman has stated that it was on the basis of this analysis that the competition body 'began to understand some of the issues that were affecting Australian consumers in

---

[27] Mr Graeme Samuel, Chairman, ACCC, *Committee Hansard*, Senate Standing Committee on Economics, Budget Estimates, 5 June 2008, p. E16.

[28] Ibid., p. 241-242.

terms of petrol prices, and why we started, back in August 2007, to look more favourably at the FuelWatch system'.[29]

87 However, this analysis of the impact of FuelWatch on market dynamics is, at best, incomplete and, potentially, quite misleading. In the first instance, the inability to clearly identify price effects from FuelWatch itself raises doubts about the extent of any posited competitive benefits. That the analyses undertaken do not take account of volumes sold at the various prices available in the market makes these concerns all the greater. The lack of evidence that FuelWatch led to lower prices thus casts doubt on the claim that FuelWatch alters significantly the balance of market power to the benefit of consumers.

88 More broadly, the effects of FuelWatch price regulation are likely to be significantly more complex than the ACCC analysis allows. While FuelWatch ensures petrol buyers have more information, it is also likely to alter the interaction between petrol suppliers. As a result, the pattern of fuel pricing may change in ways that have complex effects on consumers.

89 Contrary to the impression painted by the ACCC, petrol retailing under FuelWatch is not a simple 'one-shot game' in which identical retailers are forced to the lowest mark-up outcome by the fear of losing revenue. Rather, retailers come in a range of sizes and structures and operate in a range of areas that differ in terms of the competition they face. Of course, consumers differ too, in their price sensitivity, their ability to travel to areas where there are many outlets, and even in their preferences between brands.

90 In such a setting, a scheme such as FuelWatch can have significant unintended consequences.

91 Under the scheme, petrol suppliers do not face a once-and-for-all price setting exercise, in which all is at risk; instead, they interact repeatedly and can observe and respond to each other's behaviour. Over time, retailers may learn how to play the system and use it to make prices higher and more 'sticky'.

92 In addition, the retailers who are most likely to gain are the larger multi-site operators who are better placed in their capacity to strategically set prices in the daily auction. Multi-site operators have a greater ability to analyse past outcomes and plan strategies, because they can spread the costs of such analysis over larger volumes. They also have more pricing tools at their disposal, because they are more likely to carry a greater range of products and because of their multiple locations. Moreover, the fact that they repeatedly face each other in multiple locations accentuates their capacity to behave strategically.

93 The ability multi-site owners have to optimise over different locations also makes it less likely that a multi-site owner will face a string of days of low-margin sales or a loss of custom either of which could seriously undermine the viability of a smaller, independent player. Together, these factors may change the industry structure towards fewer outlets and higher concentration, which seems plainly contrary to the intended effect.

94 The effects of FuelWatch on consumers are no less complex. The fact of the matter is that consumers differ and under a scheme such as FuelWatch, some outlets will be patronised

[29] Mr Graeme Samuel, Chairman, ACCC, *Committee Hansard*, Senate Standing Committee on Economics, Budget Estimates, 5 June 2008, p E8.

only by the least price-responsive customers (as the more price-responsive consumers will shift to those outlets that post the lowest prices). These less price-responsive consumers would include those who are unfamiliar with technology and find it difficult to access the information FuelWatch provides, those who consider the cost of identifying low prices not worth the potential savings, customers who are unwilling to drive out of their way for savings, customers who have a shopfront preference, and customers who wish to conduct other business at the premises (such as shopping or cleaning or mechanical repairs).

95 These consumers are likely to be made worse, rather than better, off by FuelWatch. Thus, under FuelWatch, petrol stations that would otherwise have been reasonably competitive might find that price-sensitive customers (who they would otherwise have had some prospect of attracting) now go to the lowest price supplier. These stations can respond in two ways:

- by cutting price further, thereby keeping (or trying to keep) the price sensitive customers, but losing revenue on sales to all their other customers; or
- by raising price, which may be profit maximising since, without their price sensitive customers, these stations face a more steeply declining (less price elastic) demand curve.

96 The result could be that FuelWatch would make the market more bifurcated, with some customers facing higher prices and some lower, an outcome referred to as a separating equilibrium in the economic literature. Further, the more price sensitive customers may not materially benefit from obtaining low prices, since prices may not be much lower than in the pre-FuelWatch circumstance, and increased driving and queuing costs could somewhat offset lower search costs and petrol prices.

97 The net effect of a separating equilibrium on consumer wellbeing will in large part depend on the volumes and locations of purchases by customers who currently shop around for petrol and those who do not (matters that were not explored by the ACCC, but should have been).[30] On this, the data described in section 3.1 below suggests, much as might be predicted by a separating equilibrium model, that in WA FuelWatch has tended to remove the lowest prices from the market, and may even have raised the extent of high prices (both of which could occur even while the average price drops, which it did not). This underlies the difficulty of determining whether the scheme would on average make consumers better off, as this fundamentally depends on how much petrol is bought by whom at the different prices and how the respective gains and losses are weighted.

98 In short, any proper assessment of the impacts of FuelWatch needs to consider heterogeneity in consumer search behaviour, and the impact that has on the optimal response of petrol stations to the scheme. As these factors have not been taken into account by the ACCC (going on the information it has disclosed to date), it could not, in good faith, claim to know that consumers, or at least potentially materially numbers of

[30] For a textbook presentation of these issues see Carlton, D. W. and J. M. Perloff (2005) *Modern Industrial Organisation*. Boston, MA, Pearson Addison-Wesley, pp. 452-463. For a survey see, for example, Stiglitz, J. E. (1979) "Equilibrium in product markets with imperfect information" *American Economic Review* 69, pp. 350-55. There is some evidence that providing price information can lower average prices (Carlton and Perloff, op. cit. pp. 463-467), though the welfare effects of this remain ambiguous for the reasons given in the main body of this submission. Of course, Fuelwatch is substantially more restrictive than merely providing price information, for example, in preventing intra-day price cuts.

consumers, were not harmed by FuelWatch. Rather, it is highly probable that FuelWatch harms those consumers who are least "technology savvy", live and work in areas where there are few petrol stations, or who for other reasons would not switch petrol station given a higher price.

99 Finally, even if FuelWatch were to increase competition to the benefit of consumers, which has not been shown, this is only likely to increase the market power of the upstream refiners who the ACCC considers "dominate the wholesale market".[31] This is because greater downstream competition increases the degree to which upstream wholesalers can play downstream retailers off against each other. The effect would be that the lower downstream margins that FuelWatch is said to bring would be offset, and could even be swamped, by higher upstream margins. Thus, given even the ACCC now seems to believe the change in retail margins FuelWatch would bring are likely to be small if they exist at all, consumers are likely to be made worse off once changes in the wholesale market are factored in.

100 Moreover, if the real problem in this market is that "competition between refiner-marketers in wholesale petrol markets is not fully effective",[32] it seems odd so much attention is being given to retail regulation, when the ACCC's premise, at least, seems to be that whatever the extent of that competition, it is more vigorous than existing upstream rivalry.

3.1. MARKET DYNAMICS

101 To assess some of the claims about improved market dynamics under FuelWatch, Concept Economics conducted further statistical analysis to examine the possible effect of the scheme on the structure of prices.

102 Focusing on the Perth and Sydney markets for selected years, market structures were analysed using daily prices by postcode; in Perth and Sydney for the 2007 calendar year and for the 2000 calendar year in Perth (pre-FuelWatch).

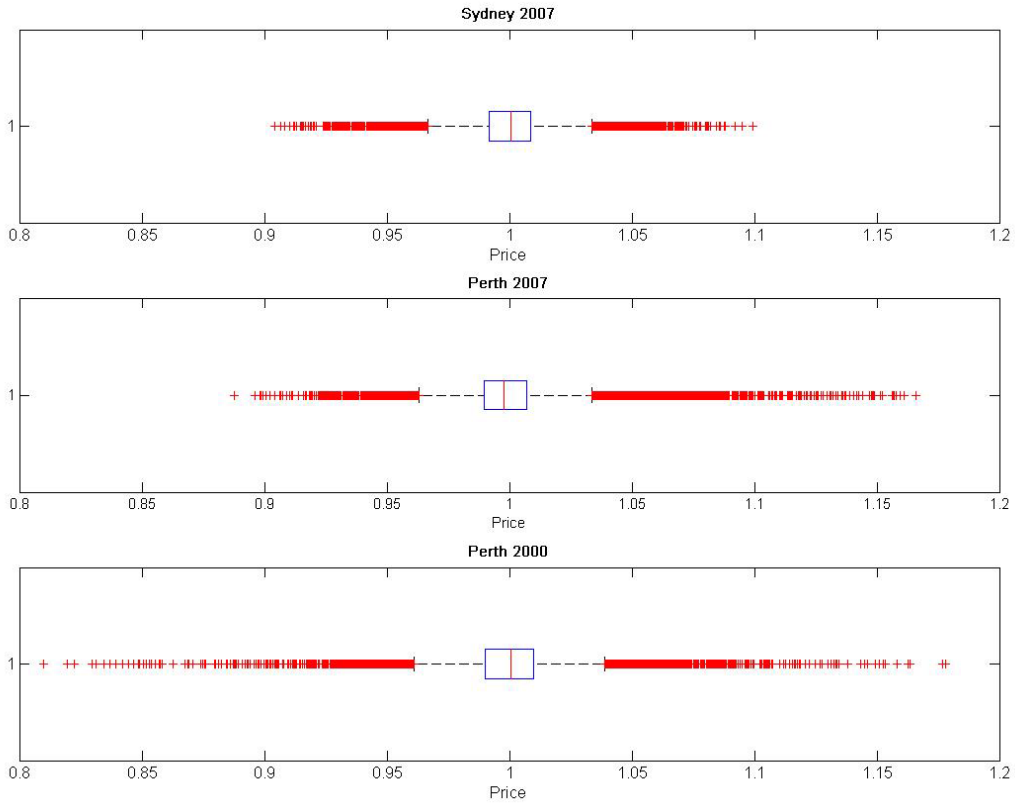
103 Price series were converted into daily mean price deviations for each market, with the price in each postcode divided by the mean price of the relevant capital city for each day. The data can be examined using box and whisker plots as shown in Figure 4, where the boxes show the inter-quartile range (containing 75% of all observations) and the whiskers show the outlying deviation in daily prices by postcode.

104 This indicates that in Sydney and in Perth (before and after FuelWatch), the majority of data fall within narrow bounds, though prices in Perth for 2007 are right skewed compared with both Sydney and Perth prior to FuelWatch. In other words, Perth in 2007 has a greater percentage of ***high priced*** postcodes relative to Sydney in 2007 and Perth in 2000. Hence it appears that FuelWatch has the effect of truncating the lower end of the price range in Perth, i.e. of compressing the lower end of the price range.

[31] Australian Competition and Consumer Commission (2007), *Petrol Prices and Australian Consumers*, Canberra, December, p. 126.

[32] Ibid.

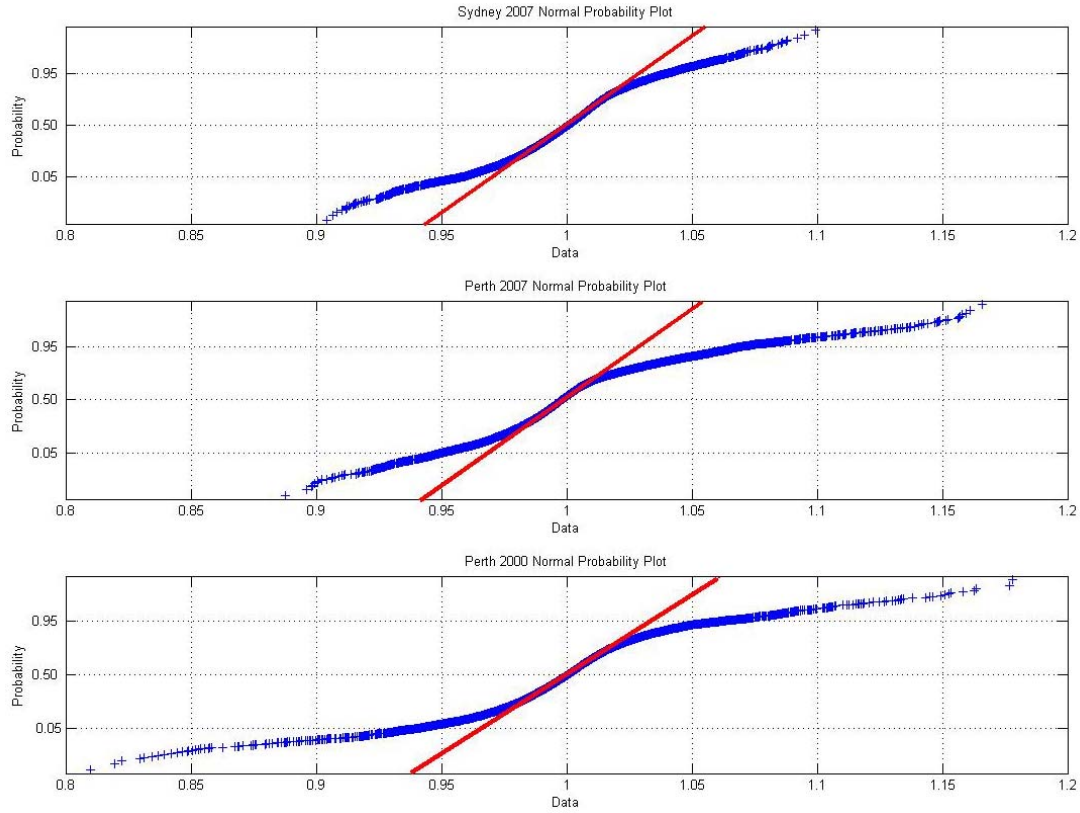
Figure 4 Box and whisker plots of mean daily price deviations in Perth and Sydney.



105 This effect can also be examined using an empirical versus a normal cumulative distribution plot, showing the shape of the price distribution relative to a normal distribution of price deviations from the daily mean, as illustrated in Figure 5. The diagonal (red) line represents what would be expected if daily postcode prices deviated from the capital city mean in a pattern consistent with a normal distribution. It can be seen that the central part of the empirical distribution in each of the three cases falls along the normal line, suggesting that when the deviations from the mean are small they appear normally distributed (in the same way one would expect the heights of individuals to be normally distributed about the mean).

106 At the same time, the tails of the price distribution appear much wider than a normal cumulative distribution. That is, the deviations of the highest and lowest postcodes appear to be greater than one would expect based on a normal distribution. Again, it appears from the 2007 data for Perth that the low price end of the distribution has been truncated and there is a right skew of the price distribution at the high end.

Figure 5 : Cumulative distribution of daily mean price deviations by post code



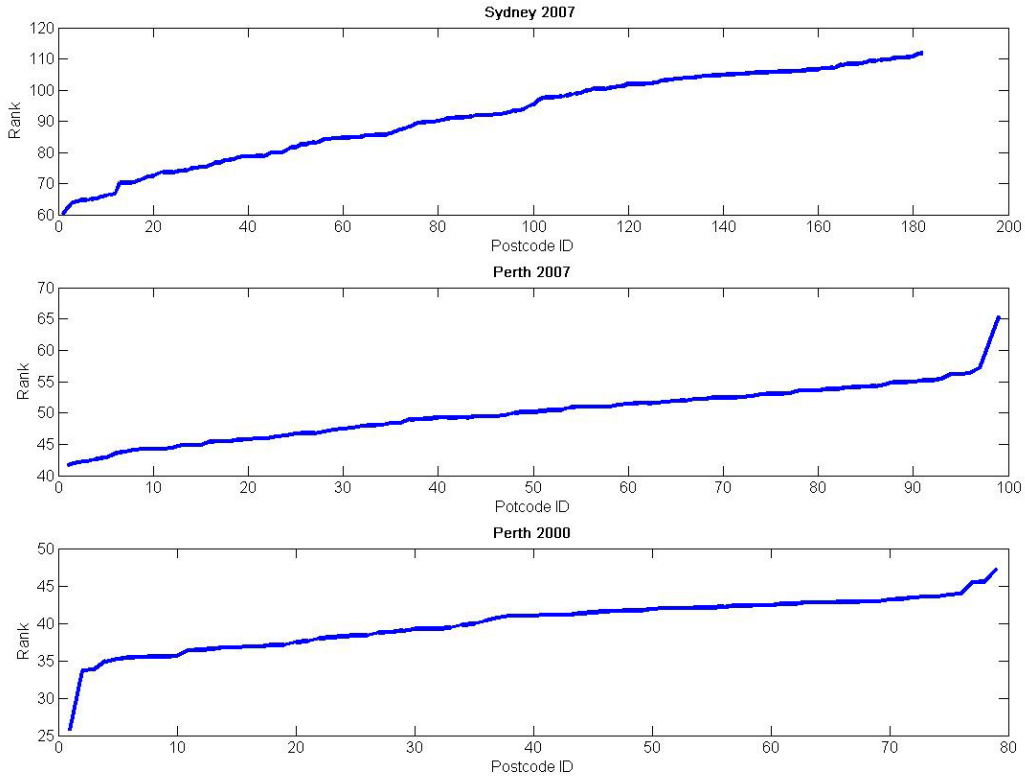
107 It could be argued that the differences between markets and over time reflect structural changes in the cost of providing retail services. For example, the rapid growth in the WA economy may mean that there are now fewer lower cost locations in Perth compared with Sydney and compared with the past.

108 To assess this, Figure 6 shows the cumulative distribution of postcode ranks. The ranks are constructed by assigning each postcode a daily rank from the lowest priced to the highest price. These are then averaged over the year and the postcodes ordered from the lowest to the highest average rank.

109 If the price deviations were structural, the daily ranks would be expected to be fairly s (as relative costs are unlikely to vary much over the year), ranging from a reasonably low average rank to a reasonably high average rank. If deviations were random, with little or no structural component with respect to location, most postcodes would lie close to the middle of the average range.

110 Figure 6 shows that the data is closer to the latter hypothesis for both locations, with the great majority of ranks falling in the middle range. In the case of Perth, the vast majority of average ranks fall within a range of approximately plus or minus 10 of the middle ranked postcode. This suggests a high level of variation in daily postcode ranks. In Sydney, the rankings appear somewhat more s.

Figure 6 The cumulative distribution of postcode ranks



111 The remaining question is whether the observed changes in the structural characteristics of the Perth market plausibly reflect features of the FuelWatch scheme. In particular, does the elimination of within day competition under FuelWatch alter the process of price competition and the distribution of prices?

112 A spatial analysis was conducted to examine how current and past prices of nearby competitors (defined in terms of physical distance) influence prices at a particular location.

113 A Spatial/Temporal Auto-regressive model was used to examine the pricing structure in the Perth and Sydney markets (for more details, see Appendix B). Conceptually, spatial auto-regression is analogous to the more familiar time series or temporal process. In a temporal auto-regressive model, past prices are used to predict future prices. In the spatial model, nearby neighbouring values are used to predict what is happening at a location of interest.

114 The starting point of the spatial component of the analysis is to identify a specified number of nearest neighbours and to construct a weighted average of their current or past prices.

115 A model was constructed using the 10 nearest neighbours of a given location to construct a weighted average of current and past prices.

116 For Perth 2007, the mean price deviation for a given postcode was modelled as a function of:

- The price deviation at that location on the previous day;
- The price deviation at that location two days previously;
- The average neighbouring price deviation on the previous day;

- The average neighbouring price deviation two days previously; and
- The minimum price deviation on the previous day.

For Sydney 2007 and Perth 2000, the mean price deviation for a given postcode was modelled as a function of:

- The price deviation at that location on the previous day;
- The price deviation at that location two days previously;
- The average neighbouring price deviation on the current day; and
- The average neighbouring price deviation on the previous day.

117 The variables, with the exception of the minimum price deviation, were introduced as pairs to allow for an asymmetric price response to above and below average prices. The results are summarised in Table 5.

Table 5 Spatial regression results; nearest neighbours = 10.

	Perth 2007		Sydney 2007		Perth 2000	
Variable	Beta	Sign L %	Beta	Sign L %	Beta	Sign L %
Constant	-0.01	100	0.00	52	0.00	36
Own Price A Lag=1	0.85	100	0.44	100	0.71	100
Own Price B Lag=1	0.37	100	0.56	100	0.69	100
Own Price A Lag= 2	0.02	98	-0.12	100	0.02	98
Own Price B Lag= 2	0.15	100	-0.09	100	0.01	88
NN Price A Lag =0	-	-	-0.33	100	-0.19	100
NN Price B Lag =0	-	-	-0.40	100	-0.13	100
NN Price A Lag=1	0.20	100	0.97	100	0.45	100
NN Price B Lag=1	0.20	100	0.90	100	0.42	100
NN Price A Lag =2	0.00	0	-	-	-	-
NN Price A Lag =2	0.11	100	-	-	-	-
Minimum Price Lag =1	+0.00	100	-	-	-	-
Rho	0.75		0.80		0.60	
R-Square	61%		54%		62%	

118 From the coefficient estimates, it is difficult to see how FuelWatch impacts on the overall distribution of prices. To examine this, the Perth 2007 model coefficients were used to simulate prices in Sydney.

119 The results point to a statistically significant but trivial increase in Sydney prices when the 2007 Perth market structure is imposed on the Sydney market. The more substantive effects are on the price distribution. The before and after Fuel Watch price distributions are shown in Figure 7 and Figure 8.

Figure 7 Box and whisker plot of modelled pre & post FuelWatch prices, Sydney 2007

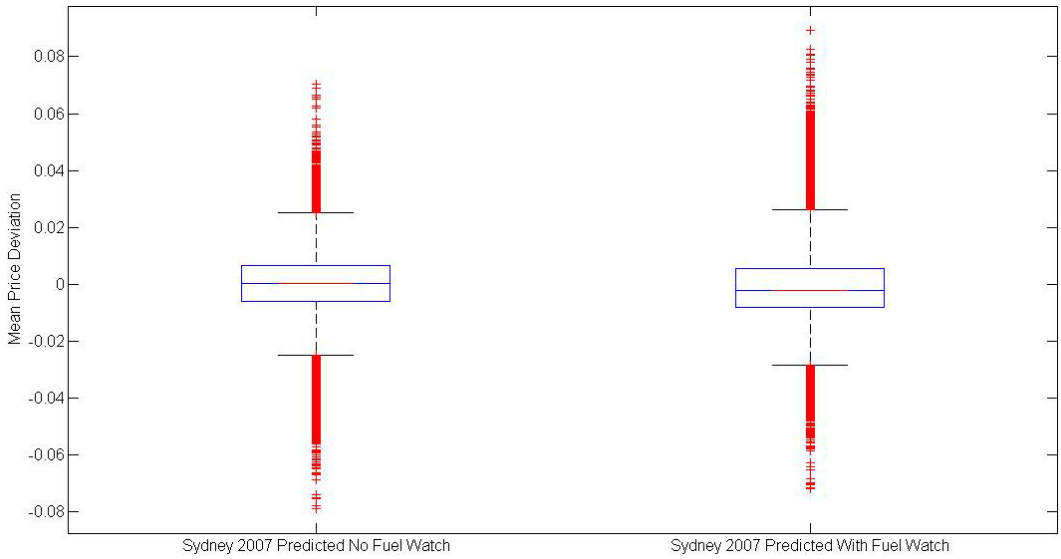
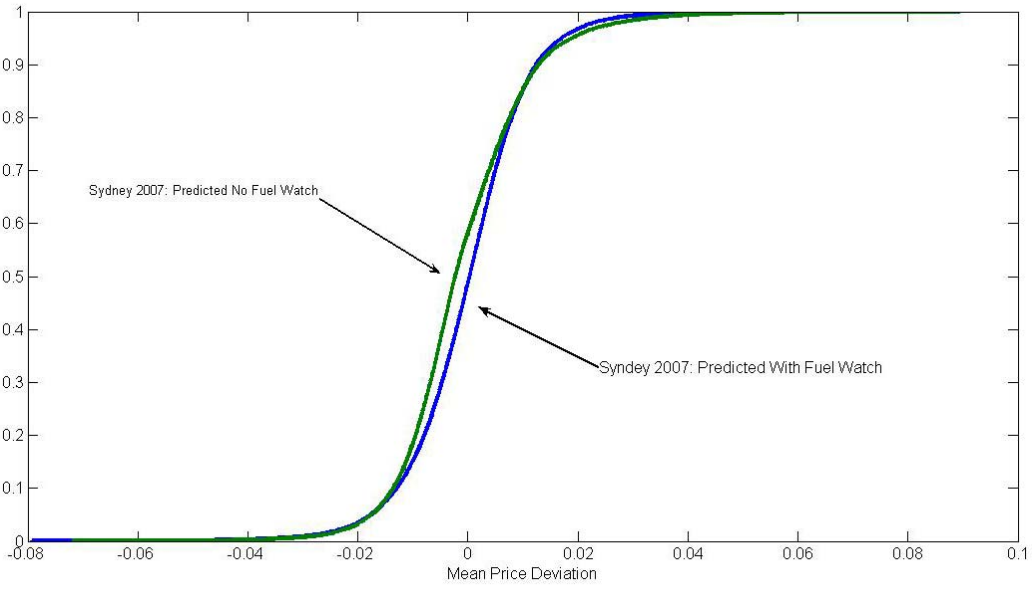


Figure 8: Cumulative distribution plot of modelled pre & post FuelWatch prices, Sydney 2007



120 As can be seen in the box and whisker plot in Figure 7, the predicted impact of FuelWatch on the Sydney market is to truncate the lower end of the price distribution and skew the upper end to the right. This is compensated for by an increase in the number of locations that have prices that are lower under FuelWatch in the middle of the distribution. This can be seen in the cumulative distribution plot in Figure 8.

121 It could be argued that there are structural aspects of the Perth and Sydney markets that make this hypothetical imposition of FuelWatch in Sydney open to question. For example, there may be a greater degree of geographic isolation of petrol stations in one of the two markets.

122 To take account of this potential bias, the estimated market structure in Perth 2000 was imposed on Perth 2007 market. That is, the estimated coefficients from Perth 2000 were used to predict what would have occurred in Perth 2007 if FuelWatch had not been in place.

123 The results are presented in Figure 9 and Figure 10. While FuelWatch did not have a significant impact on the average market price, it does skew the distribution of prices to the right. Again, there are fewer lower priced locations and there are a greater number of higher prices locations. At the same time, there are a large number of locations that have slightly lower prices in the centre of the distribution.

Figure 9 Box and whisker plot of modelled pre and post FuelWatch prices, Perth 2007

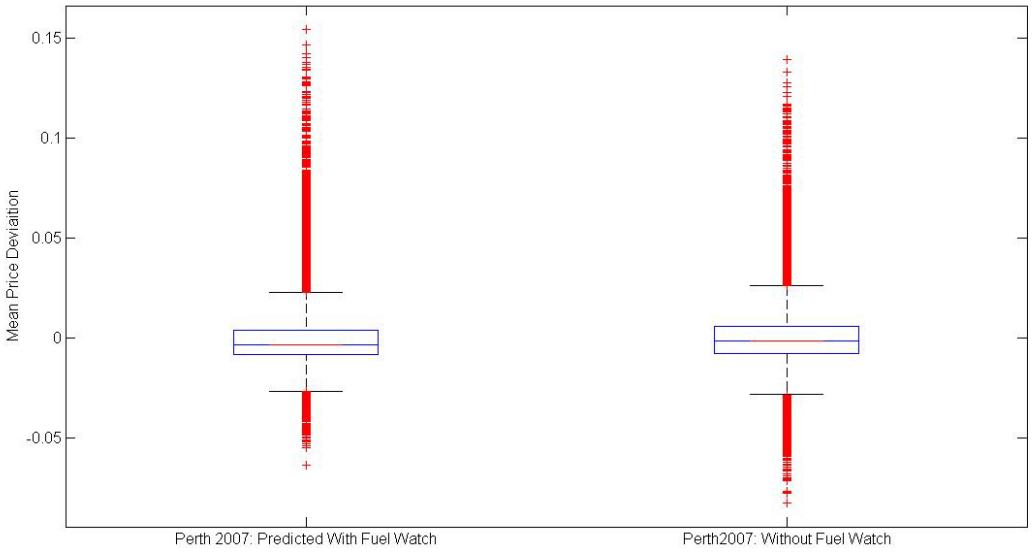
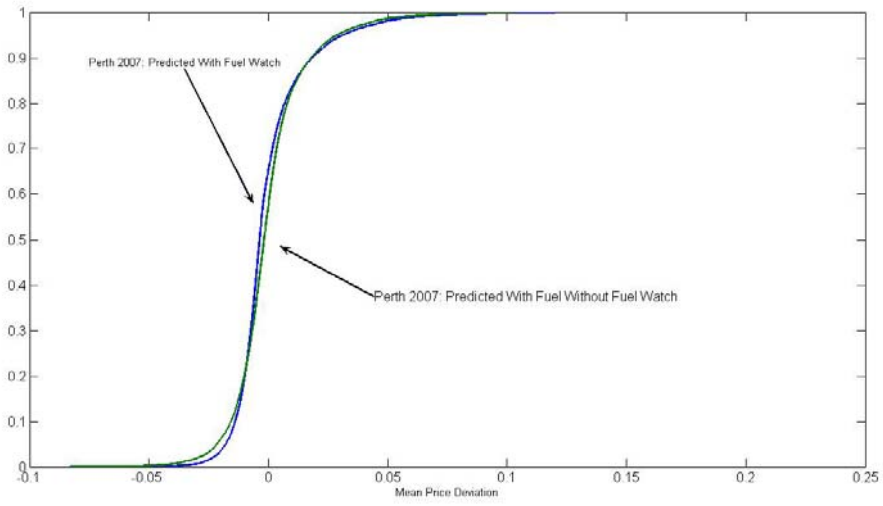


Figure 10 Cumulative distribution plots of modelled pre and post FuelWatch prices, Perth 2007



124 Overall, and adding weight to our analysis in the previous section, the introduction of FuelWatch does not seem to have had a significant impact on the average level of fuel prices in Perth relative to Sydney.

125 Retail petrol markets appear relatively competitive with or without FuelWatch. In this context, the main effect of FuelWatch seems to be to have truncated the price distribution in Perth at the lower price end. In other words, there are relatively fewer petrol stations offering very low prices, and a greater chance of higher priced locations remaining higher priced in the immediate future.

126 Together with the margins analysis in the previous section, these results cast serious doubt on claims that FuelWatch improves market dynamics to the benefit of consumers. The failure to find robust evidence for claims that FuelWatch reduces petrol prices in itself raises questions about both the quantum of any relative shift in market power towards consumers and the channels by which this occurs. Where FuelWatch reduces the number of petrol stations offering very low prices, it would seem to especially disadvantage price-conscious consumers with relatively low search costs. At the same time, by inducing some petrol stations to set relatively high prices (presumably aimed at those consumers who have little ability to search), it increases the risk for consumers of "drawing" out of the pool of potential retailers, one with a very high price. This risk is likely to be especially acute for disadvantaged and older consumers, who are likely to be least aware of schemes such as FuelWatch.

127 In summary, the results of the spatial analysis by Concept Economics appear to confirm that there is a significant risk of unintended consequences from a national FuelWatch scheme. While the overall price effects of FuelWatch are small, there are no impacts on price distribution and some (small) delay in price adjustment. FuelWatch appears to reduce the incentive to set very low prices and creates incentives for some locations to set high prices.

128 Based on these results, it is impossible to conclude that consumers as a whole are no worse off under FuelWatch. At the very least, there needs to be an evaluation of the gains to consumers who buy at the middle of the price distribution as against losses to consumers from the reduced number of very low priced locations and the greater number of high priced locations. No such analysis has been undertaken by the ACCC.

4. FUELWATCH AND CONSUMER PREFERENCES

129 The third pillar of the case for FuelWatch relates to consumer preferences for more s petrol prices and, in particular, the emphasis given to consumer anxiety and frustration about intra-day price volatility. ACCC Chairman Graeme Samuel has evoked the spectre of consumers being 'confused, duped, frustrated and angered by the price cycles as they currently operate' with 'no guarantee they won't pass a service station on the way home selling fuel five or 10 cents a litre cheaper than what they thought was the best price'. According to the Prime Minister, a singular benefit of FuelWatch is that it will 'see an end to

Mums and Dads driving around on a Tuesday or a Wednesday searching for the cheapest petrol'.[33]

130 The ACCC has claimed that fewer price changes reduce consumer search costs directly and have a psychological benefit to consumers:[34]

> *The main evidence of price transparency for petrol consumers in Australia appears to be the prevalence of large headboard signage with each retailer proclaiming their current price. However, the existence of petrol price volatility and weekly cycles makes this prominent signage less of a sign of transparency than it would be in markets with more s prices. This volatility makes it difficult to know how the signage board will compare with other retailers in the area, or how it will compare with the same retailer later that day or week. Comparative current price level information is more important due to the high price volatility and is much more difficult for the consumer to get.*
>
> *A key source of pricing information and a form of pricing commitment in many other markets is advertising. However, in Australia the volatility of the retail petrol price appears to forestall any retailers from advertising their prices beyond the signboards and some company internet sites. With petrol pricing practices inducing cycles and volatility so as to make price commitments and advertising impractical, many consumers are concerned with the search costs associated with retail petrol prices.*

131 The ACCC's view on the sources and implications of price volatility, as on other aspects of the petrol market, has again shifted. Informed by a December 2001 report into fuel price variability, the ACCC's consistent view until recently has been that petrol has certain product characteristics that make it more susceptible than other products to price volatility and that attempts to regulate the price cycle – through measures such as FuelWatch's 24-hour rule – are likely to adversely affect both competition and some groups of consumers.

132 Reasons offered for the relative volatility of petrol prices have been that: petrol is a relatively homogeneous product; the price is very visible, as it is prominently displayed on price boards at service stations; service stations with shops attached may use petrol as a loss leader to attract customers; and demand for petrol (and therefore prices) varies over the week, generally peaking around the end of the week or on the weekend.[35]

133 Yet, it is not even clear that there is much intra-day volatility that FuelWatch's 24-hour rule could eliminate. '[D]ata from the variability report indicated that, contrary to a widely held perception, petrol prices are relatively s on average within a day'.[36] The average number of price changes per day was found to be only 1.18 in the Perth market prior to the introduction of the 24-hour rule.[37]

---

33 Mr Graeme Samuel, Chairman, ACCC, *Committee Hansard*, Senate Standing Committee on Economics, Budget Estimates, 5 June 2008, p. E49. Graeme Samuel, 'Steering motorists to the right price', *The Age*, 30 May 2008. Prime Minister Kevin Rudd, 'A National FuelWatch Scheme', Press release, 15 April 2008.

34 Ibid., p. 241.

35 The December 2001 report recommended a public campaign to raise consumer awareness of the price cycles so that more people could benefit from lower prices. Subsequently, the ACCC launched a petrol price website in November 2002 to provide consumers with information on taking advantage of the petrol price cycles in the five major metropolitan cities.

36 ACCC, Terminal Gate Pricing Arrangements in Australia and Other Fuel Pricing Arrangements in Western Australia, December 2002, p. 3. available at: http://www.accc.gov.au/content/index.phtml/itemId/321849

37 ACCC, Op. cit., p. 241.

134 As recently as 2006, the ACCC has argued that while FuelWatch may increase price transparency, the 24-hour rule may harm competition.[38] At that time, the ACCC Chairman Mr Samuel drew attention to the fact that the deep discounting element of the price cycle tended to occur 'on a half-hourly or hourly basis'.[39]

135 Mr Cassidy of the ACCC elaborated on this in Committee hearings on 19 October 2006, highlighting a consumer-driven, highly competitive market based on the importance of price boards and consumers reacting to highly visible price information. A relatively sanguine view of market dynamics was advanced with 'people zipping into where they see a price which they think is a bit lower than the prices immediately around. It is that sort of consumer behaviour which in turn drives the real-time rapid response by the oil companies and the independent chains.'

136 In the current debate over FuelWatch, the main qualitative evidence offered in support of high consumer anxiety about intra-day price volatility is drawn from a survey conducted by ANOP Research Services for the 2007 petrol price inquiry.[40]

137 Among the survey's key conclusions are:

- There is a high level of price consciousness in petrol purchasing with three quarters (76%) of motorists paying close attention to petrol prices;
- About the same proportion (70%) usually tries to buy petrol when it is cheapest;
- There is high (81%) awareness of a regular petrol price cycle and 59% of motorists manage to take advantage of the perceived price cycle by purchasing when cheapest; and
- There is a slight preference for longer cycles with smaller variations, but more price conscious motorists prefer a weekly cycle with a larger price variation.

138 Motorists were asked to rate four issues of potential concern, with 'a clear order of distinction between three of these concerns' reported in Appendix H. **Price variations before holiday periods** constituted the greatest concern. This was followed by two other issues at the next (roughly equivalent) level of concern – **the current price** and **price variations between different days of the week**. The fourth issue – **price variations over the same day** – was also a concern but at a slightly lower level.

139 Despite this, in the main body of the report, the ACCC report sought to emphasise that the results 'appear to reflect the high search costs and consumer angst associated with intra-day price variability'.[41] The discussion in Appendix H, however, was much more equivocal, and faithful to the survey evidence, noting that:[42]

> *Motorists are clearly attracted to the idea of having the same price over the whole day (83%), even if this meant missing out on taking advantage of price variations during the day. The concept loses some attraction if this means a less regular*

[38] The Senate Standing Committee on Economics (2006), Petrol Prices in Australia, December, pp. 30-31.

[39] ibid.

[40] See ACCC, Op. cit., Appendix H: Summary of the ANOP consumer survey in November 2007 commissioned by the ACCC.

[41] Ibid., p. 244.

[42] Ibid., p. 281.

price cycle over different days of the week. This scenario still attracts majority support but it is down to 63% (58% among the most price conscious). Perth remains slightly higher at 68%.

The concept loses majority appeal when motorists are faced with the possibility that the same price over a whole day could result in a slightly higher average price. Support is down to 33%, with Perth a slightly higher 37%.

Daily price fluctuations is an irritant for motorists but not the biggest irritant. Motorist support for the same price over a whole day, while strong in concept, loses its appeal if the proposition is introduced that this will reduce the frequency of lower average prices.

140 Taken in its entirety – based on high price awareness, the relative ranking of issues of concern and the generally sophisticated, finely-balanced trade-offs which consumers make – there is little in this survey that would recommend a scheme such as FuelWatch that, in effect, views consumers as an amorphous mass with a strong preference for s intra-day prices. Indeed, when coupled with the analysis in the previous section which found FuelWatch altered the price distribution in various ways, it seems safe to conclude that a sizeable group of consumers would not prefer intra-day fixed prices if this meant a reduced number of very low priced locations and a greater number of higher priced locations.

141 The ACCC is therefore in no position to conclude – at least if that conclusion is to be based on evidence – that consumers would prefer a scheme that tended to eliminate very low priced outlets, and increase the number of relatively high price outlets, as compared to the situation without FuelWatch.

5. FUELWATCH AND BEST PRACTICE REGULATION

142 It is simply bad as well as uncommon practice to introduce far-reaching price regulation in an industry that successive government inquiries, including the 2007 inquiry by the ACCC, have judged fundamentally competitive. Among the conclusions of that inquiry were that: there is ‘a significant degree of price competition at the retail level’; retail margins are ‘relatively small’ and ‘have remained broadly constant over the last four years (falling with increased competition from the supermarkets between 2003-04 and 2004-05, before increasing to 2006-07); and ‘the existence of price cycles does not provide any evidence of a lack of retail competition’.

143 Indeed, the presumption would be that such findings would support a reliance on market forces to set prices (including the structure of prices) and to reflect consumer preferences. Take, for example, the specific issue of consumer preferences on prices. There is no barrier that would prevent a petrol retailer from implementing some form of low price guarantee if this was judged both profi and in accord with consumer preferences. Indeed, there are strong incentives for a firm to innovate in ways that improve on transactional processes and that secure gains from trade, including by improving the ability of consumers to act on their preferences. If fixed intra-day pricing was sufficiently attractive to consumers that it allowed the stations pricing in this way to outperform their rivals, then it would be undertaken.

144 Regulating one of Australia’s largest industries – including by making it illegal for petrol retailers to lower prices during the day – on the basis of assertions about price effects that appear incorrect and claims about consumer preferences that are questionable is simply

contrary to best regulatory practice. There is no convincing evidence of a 'market failure' that would justify such intervention with all the costs and attendant risks to competition that this would entail.

145 The current Federal Government has emphasised its commitment to deregulation and to 'best practice regulation'. Deregulation, it has said, is 'front and centre' of its economic reform agenda for Australia. On numerous occasions, the Government has affirmed its commitment to 'best practice regulation' where 'any proposed new regulations are thoroughly scrutinised so that they are introduced only where necessary and at minimum cost to consumers and businesses'.[43]

146 A new Best Practice Regulation Handbook was released by the former Coalition Government in August 2007. The principles on which these requirements for good regulatory process are based reflect those outlined by the 2006 Taskforce on Reducing the Regulatory Burdens on Business chaired by Productivity Commission chairman, Gary Banks. The six principles for good regulatory process recommended by the Banks Taskforce are as follows:

1. Governments should not act to address 'problems' until a case for action has been clearly established. This should include establishing the nature of the problem and why actions additional to existing measures are needed, recognising that not all 'problems' will justify (additional) Government action.
2. A range of feasible policy options – including self-regulatory and co-regulatory approaches – need to be identified and their benefits and costs, including compliance costs, assessed within an appropriate framework.
3. Only the option that generates the greatest net benefit for the community, taking account all the impacts, should be adopted.
4. Effective guidance should be provided to relevant regulators and regulated parties in order to ensure that the policy intent of the regulation is clear, as well as the expected compliance requirements.
5. Mechanisms are needed to ensure that regulation remains relevant and effective over time.
6. There needs to be effective consultation with regulated parties at all stages of the regulatory cycle.

147 In a Ministerial Statement on Best Practice Regulation Requirements on 17 March 2008, the Minister for Finance and Deregulation, Lindsay Tanner, stated that the Rudd Government 'fully endorses' these principles and is 'committed to not just maintaining but further strengthening these requirements'. Those commitments are to be welcomed. The issue is to ensure they are translated into practice.

148 An important question, then, is how does FuelWatch rate against these principles for 'best practice regulation'.

149 First, has the problem been fully explored and the case for action been clearly established?

[43] Mr Lindsay Tanner, Minister for Finance and Deregulation, Ministerial statements: Best Practice Regulation Requirements, 17 March 2008.

150 Based on the analysis so far in the public domain, there is no convincing evidence of price effects in the market for petrol that would justify government establishing a national FuelWatch scheme. The strongest claim that could be supported on the basis of the evidence is that there may be some consumer frustration with price fluctuations, though consumers would likely prefer those fluctuations to a situation where fewer bargains were available and they were more exposed to the risk of drawing relatively high prices.

151 In light of the principles outlined above, the next question then is whether or not a range of feasible policy options have been fully explored in an appropriate cost-benefit framework?

152 The ACCC's December 2007 report called for 'great care' to be taken in moving towards any national FuelWatch scheme and that 'it is clear that a case-by-case approach is required to assess the potential impacts on competition of any similar scheme'. Based on the limited evidence that has been produced, there is little to suggest this approach has been followed.

153 Nor is there evidence that other policy options to increase price transparency, including those which the ACCC report noted in its December report had 'only briefly been considered in the time available', were given full consideration prior to the 15 April announcement on FuelWatch.

154 Based on the evidence presented to the Senate Budget Estimates hearings on 5 June, the main focus of work post the December report appears to be Treasury providing some form of review of the ACCC's econometric work on FuelWatch and analysis of the likely budget and compliance costs of establishing a national FuelWatch scheme. This review has not been disclosed, but it seems difficult to see how, if properly carried out, it could have (as suggested by the ACCC) endorsed claims that FuelWatch had been shown to reduce prices.

155 As this process has been totally opaque, it is impossible to conclude, based on the third principle, that the policy option that generates the greatest net benefit for the community, taking into account all the impacts, has been adopted. The comment by Senator Sherry before the Senate Economics Committee Budget hearings – that 'there was enormous evaluation and consideration of Fuelwatch and then once the report was received the government proceeded to act decisively to implement the program' – seems to suggest very little analysis of alternative policy options.[44] If in fact alternative approaches had been evaluated, and found less satisfactory, it would be desirable for those evaluations to be disclosed.

156 The fourth principle asks whether effective guidance has been provided to relevant regulators and regulated parties to ensure that the policy intent and expected compliance requirements are clear. This is difficult to judge, but the fact that there remains a degree of confusion as to what precisely are the expected benefits of a national FuelWatch scheme raises obvious concerns.

157 Fifth, are mechanisms in place to ensure that regulation remains relevant and effective over time? This is perhaps premature to assess, though it is welcome that the Government has announced that it will review the operation of FuelWatch after 12 months.

[44] Senator Nick Sherry, *Committee Hansard*, Senate Standing Committee on Economics, Budget Estimates, 5 June 2008, p. E25.

158 Finally, has there been effective consultation with regulated parties at all stages of the regulatory cycle?

159 Based on the concerns raised about the inability of smaller independent petrol retailers to discount in the course of a day under FuelWatch, it would appear that consultative processes were minimal prior to the 15 April announcement. Given what one ACCC official described as the 'ambivalent' position of the competition body's report on the impact of FuelWatch on independents, one might have thought this would have been an area of priority.[45]

160 It is important to stress, of course, that greater transparency and pricing information for Australian motorists is a potentially worthwhile policy objective. To the extent to which it is, attention should be given to other, more efficient ways of meeting the Government's stated policy objective. Price transparency can be increased and consumer search costs reduced without preventing petrol retailers from changing their prices during the day. Concept Economics believes that, far from inducing greater competitive keenness in the retail petrol market, a ban on petrol stations lowering their prices over the course of a day only serves to distort and dull the competitive dynamics of the market.

161 One possible option would be a system of voluntary notification by petrol stations of maximum prices. This would offer many of the advantages of a scheme to improve consumer information, but without the costs of FuelWatch in terms of administration, compliance and market distortion. Under such a system, petrol stations would have the option of setting a maximum price for the day and motorists would be assured that if they chose to fill up on a given day at a given location they would not pay more than that price. It is difficult to believe that any consumer would be aggrieved if, having selected an outlet on the basis of its guaranteed maximum price, the price actually charged was lower than that amount.

162 There are obvious difficulties involved in knowing whether such a scheme would prove effective. Given that, a sensible policy approach would be to trial this option for (say) a year, assess its effects (if any) and then, if and only if it had clearly failed to meet the policy objectives, move to based scheme based on compulsion.

163 In summary, FuelWatch appears a long way short of the template for 'best practice regulation' laid down by the Australian Government. Rather, FuelWatch looms on the face of it as a potential example of government failure. There is an urgent need for the Government to think again and explore more efficient ways of improving price information for Australian motorists.

[45] Mr Brian Cassidy, ACCC, *Committee Hansard*, Senate Standing Committee on Economics, Budget Estimates, 5 June 2008, p. E6. Notable in this context is the degree to which the ACCC appeared to rely on the evidence provided on the position of independents by the Department of Consumer and Employment Protection, the agency charged with administering the FuelWatch scheme in WA. A simple public choice analysis would imply this agency's powerful vested interest in proclaiming the success of the scheme.

APPENDIX A THE IMPORTANCE OF SEA FREIGHT TO THE ACCC ANALYSIS

1 The ACCC calculates a wholesale and retail margin for petrol in Perth and the eastern state capital cities by assuming that wholesalers price at import parity. Thus, as detailed above, the ACCC margin is, in part, constructed by deducting the lagged MOGAS95 price from the observed retail price of Petrol in the relevant capital city.

2 As we understand it, the MOGAS95 price is the FOB price in United States dollars per barrel ex Singapore for unleaded petrol. Thus to obtain a unit import parity price to subtract from the relevant retail price the unit transport margin from Singapore to the port that serves the relevant capital city should be added to unit cost of petrol derived from the Mogas 95 price.

3 Similarly, the Mogas 95 price should also be adjusted for unit port costs incurred in handling imported petrol in the port that serves the relevant capital city.

4 In the ACCC analysis, no adjustment was made for sea freight and port charges. The rationale for this was explained by Dr Stephen King to the Senate Estimates hearings on 5 June 2008 where he stated:[46]

> With regards to the transport and port charges, we do not have to explicitly model those in the sense that we use the east coast as a baseline. So as long as pre-FuelWatch and post-FuelWatch—this is what Mr Dimasi was saying earlier on—Perth has not moved relative to Singapore, any effect that the transport charges have in making Perth cheaper due to being close to Singapore is taken into account pre-FuelWatch and post-FuelWatch relative to the east coast. So we have to have a difference between an effect on transport charges to Perth compared to what would have happened with transport charges to the east coast post-FuelWatch as compared to pre-FuelWatch.

5 Soon after the introduction of FuelWatch diesel oil prices started to rise dramatically (**Figure** A). This in turn led to a significant increase in bunker costs for sea going vessels. The rapid rise in fuel costs led to a significant increase in sea freight rates and this effect was more pronounced for voyages of longer distances.

6 For example, data provided for Platts suggests a significant widening of sea freight rates for a clean tanker capable of transporting 30,000 metric tonnes of fuel travelling from Singapore to Japan (a distance of 2,910 sea miles) and the same type of tanker travelling from Singapore to Sydney (a distance of 4,273 sea miles); see **Figure** B.[47]

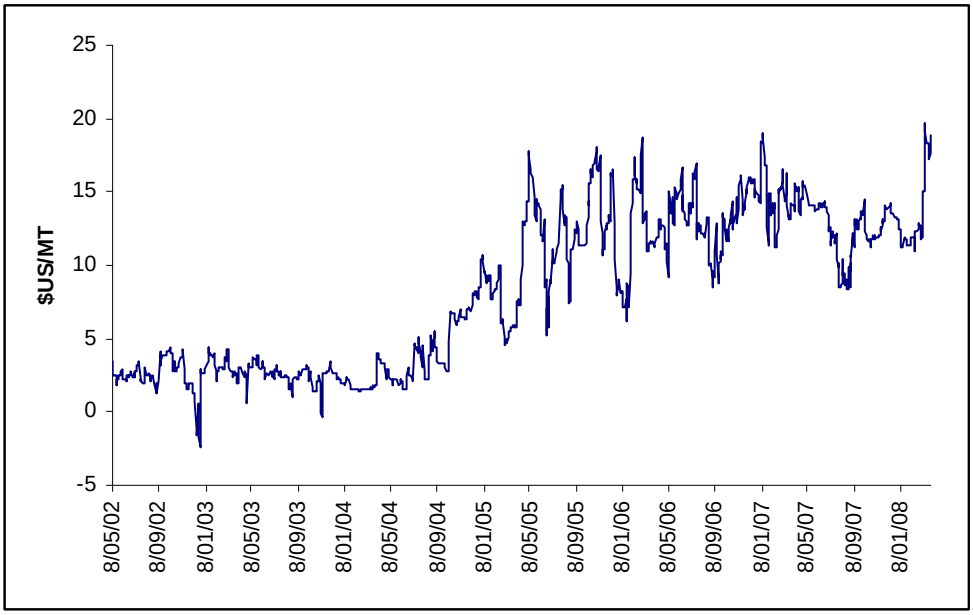
[46] Dr Stephen King, ACCC, *Committee Hansard*, Senate Standing Committee on Economics, Budget Estimates, 5 June 2008, p. E64.

[47] Voyage distances were calculated using the facility provided by e-ships. This facility can be accessed at: http://e-ships.net/dist.htm. According to e-ships the distance from Singapore to Perth is 2,220 sea miles. We thus use the clean tanker freight rate data from Platts for a clean tanker Singapore to Japan as a crude proxy for the clean tanker freight rate Singapore to Perth.

Figure A: Price of diesel oil ex Singapore, 13 July 1992 to 19 June 2008 ($US/barrel)

Source: Data provided by Platts.

Figure B: Difference in freight rates of a 30,000 DWT clean tanker travelling from Singapore to Sydney and Singapore to Japan ($US/metric tonne)



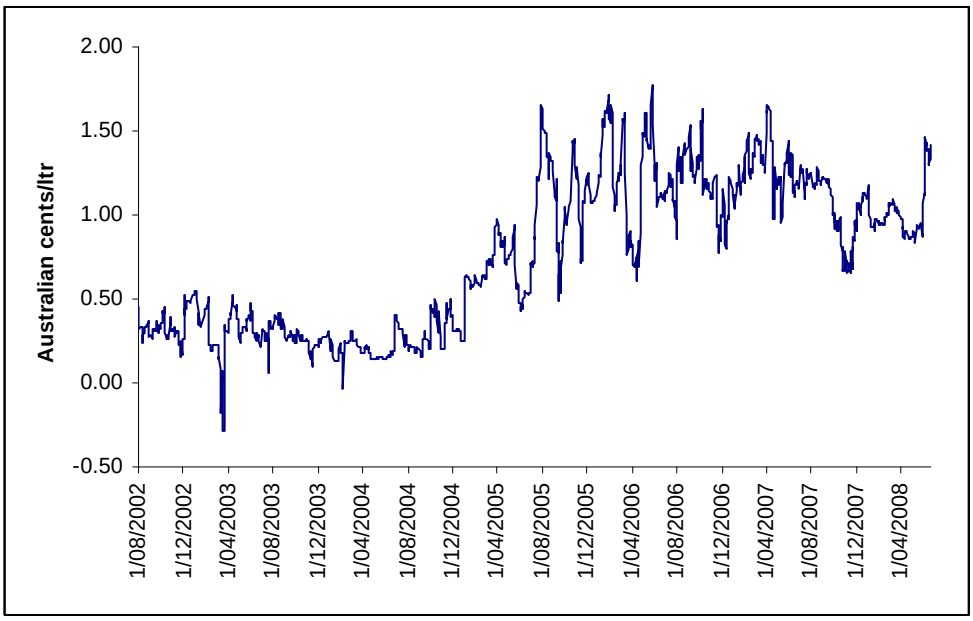
Source: Data provided by Platts.

7 Thus part of the fall in the price margin in Perth relative to the margin in the eastern state capitals may be due to the rise in sea freight costs into eastern states relative to sea freight costs into Perth.

8 That is, rather than FuelWatch lowering prices in Perth, and hence the calculated margin, the freight rate differential to the eastern states could have reduced the margin by raising prices in the eastern states relative to Perth.

9 To illustrate, if we convert the difference in freight rates given in **Figure** B into Australian cents per litre of fuel transported we find that the rising freight rate into the eastern states since the latter part of 2002 added as much as an additional cent to eastern state petrol prices compared to Perth petrol prices (Figure C).

Figure C: Impact of difference in freight rates of a 30,000 DWT clean tanker travelling from Singapore to Sydney and Singapore to Japan on petrol prices in Sydney relative to Perth (cpl)



Source: Data provided by Platts.

10 This is a significant effect given the ACCC found that FuelWatch reduced prices in Perth by 1.8 cents per litre. Hence (even abstracting from the other issues identified in the main body of this submission) the majority of this effect could have been due to a failure by the ACCC to accurately estimate the import parity price of petrol into Perth and the import parity price of petrol into the eastern states.

APPENDIX B SPATIAL ANALYSIS

1 The spatial analysis was used to examine how current and past prices of nearby competitors influenced prices at a particular location. Nearby competitors are defined as the set of nearest neighbours in terms of physical distance.

2 There are several hypotheses to consider:

- That the Fuel Watch scheme simply delays price competition by a day and has not had an impact on the distribution of prices;
- The elimination of within day competition under FuelWatch alters the process of price competition and changes the distribution of prices; and
- That notification of minimum prices under FuelWatch has an impact on price competition.

3 The pricing structure in the Perth and Sydney markets was examined using a Spatial/Temporal Auto-regressive model, with neighbouring values are used to predict what is happening at a location of interest. In the spatial model, nearby Postcode locations were obtained through concordance data from the ABS. Postcodes were matched with Statistical Local Areas (SLA) and the centroid of the SLA was used as the reference latitude and longitude. Postcodes that were common to a single SLA were given random locations in the immediate vicinity of the centroid of the SLA.

4 The starting point of the spatial component of the analysis is to identify a specified number of nearest neighbours and to construct a weighted average of their current or past price. For each choice of the number of nearest neighbours an optimal weighting parameter, Rho, was estimated. A Rho value of 1 gives all the nearest neighbours equal weight. A Rho value of 0 gives weight to only the absolutely closest neighbour.

5 For Perth 2007, the mean price deviation for a given postcode was modelled as a function of:

- The price deviation at that location on the previous day;
- The price deviation at that location two days previously;
- The average neighbouring price deviation on the precious day;
- The average neighbouring price deviation two days previously;
- The minimum price deviation on the previous day.

6 For Sydney 2007 and Perth 2000, the mean price deviation for a given postcode was modelled as a function of:

- The price deviation at that location on the previous day;
- The price deviation at that location two days previously;
- The average neighbouring price deviation on the current day;

- The average neighbouring price deviation on the previous day;

7 The variables, with the exception of the minimum price deviation, were introduced as pairs to allow for an asymmetric price response to above and below average prices. The formula is:

$$Above = \begin{cases} \hat{p} & if \quad \hat{p} > 0 \\ 0 & otherwise \end{cases}$$

$$Below = \begin{cases} \hat{p} & if \quad \hat{p} < 0 \\ 0 & otherwise \end{cases}$$

8 where phat is the daily mean price deviation.

9 The use of concurrent prices from neighbouring competitors does introduce a degree of endogeneity. That is, the price at the current location also influences the prices of neighbours. However, this influence reduces as the number of neighbours is increased. The optimal Rho value was estimated using a grid search over the log-likelihood. The grid selected was crude as the differences to the coefficient estimates were small.

10 The Sydney specification was also used for Perth 2007 to ensure that within days effects were not significant. The results were not reported but the contemporaneous effects were low and their inclusion did not substantially alter the estimates of the other coefficients.

11 The estimates indicated that there was a correction process working. If prices are set too high, relative to surrounding prices, at the start of the day they are adjusted downwards. The converse is also indicated, if prices are set to low at the start of the day they are adjusted upwards.

12 There are first order lagged competitor pricing effects in Perth 2007 but these are small compared to Sydney and there does not appear to be any lagged correction process. The minimum price deviation has a significant effect on price in Perth 2007. However, the effect is less than one per cent of the average daily price.