FoolWatch - Further Discussion of Econometric Analysis Undertaken By ACCC

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Abstract

Using data supplied by InformedSources I find additional flaws in the ACCC analysis of FuelWatch.
First, the drop in petrol prices that is so visually convincing in the ACCC chart S1 is in fact an artifact of the method of data construction and can be attributed primarily to increases in prices in Adelaide and Melbourne — events that had nothing to do with Western Australia or FuelWatch.

Second, redoing the analysis using Sydney as the point of reference and adding prices in other cities as explanatory variables lead to results that contradict ACCC findings. First I find that the two best models that I estimate yield the conclusion that Fuelwatch either increased petrol prices in Western Australia by a small amount or had no effect.
Third, I find that the entry of Woolworths and Coles into the Western Australian market had the effect of reducing unleaded petrol prices Perth by about 2.67 per cent relative to Sydney.

1 Introduction

Data digitization procedures were used by Harding (2008) to approximate the data behind Appendix S of the ACCC (2007) report into Petrol pricing. The ACCC continues to refuse to release the data behind its analysis.

InformedSources the company that compile the price data used by the ACCC have provided access to the weekly, daily and monthly retail price data for unleaded petrol (ulp) and diesel. This data is not public but I am permitted to use the data in my analysis so long as I only publish transformations that do not permit someone to recover the actual data.[1] This restriction protects InformedSources commercial interests but does not place a significant restriction on me as an econometrician.

[1] InformedSources have reviewed the paper and confirmed that I have not breached confidentiality of their data. The paper presents the results of my own analysis and does not necessarily reflect the views of InformedSources. All responsibility for errors and omissions is mine alone.

To meet this restriction I focus attention on differences of prices, ratios of prices or logarithms of price ratios. It is not possible to return to the original data when it is so transformed.[2]

The overarching objective of this paper is to build on the findings in Harding (2008) and show that it is possible to use the InformedSources data to undertake an econometric analysis of FuelWatch that is more robust than that reported by the ACCC. This paper is a first draft comments and suggestions are welcome.

Against that background, this paper has three subsidiary objectives. The first, undertaken in section 2, is to provide a discussion of the main features of the data provided by InformedSources while remaining within the constraints described above. The second, undertaken in section 3, is to discuss and evaluate the approach used by the ACCC to construct the nominal retail margin used in Appendix S of the petrol report. The third objective is to reassess FuelWatch using the data for all of the capital cities. The results of this reanalysis are reported in section 4. Conclusions are in section 5.

2 Main features of the weekly data

2.1 Unleaded petrol

2.1.1 Terminal gate prices

Terminal gate prices (TGP) for unleaded petrol (ulp) are available from the Australian institute of Petroleum website starting from January 2004.[3] Four main points emerge from Figure 1.[4] First terminal gate prices move in a similar way across the five largest cities in Australia. Second, between mid 2005 and March 2008 the terminal gate prices fluctuated in a range between 106 cents per litre and 136 cents per litre. Third, from late March 2008 to early July TGPs increased by about 30 cents per litre (23 percent). This sharp increase is the cause of much of the economic pain being felt in Australia and most likely explains much of the decline in consumer and business sentiment. The fourth point is that terminal gate prices for unleaded petrol show little evidence of calendar variation. This suggests that the daily variation in unleaded petrol prices observed in the main capital cities is most likely the result of calendar effects on consumer demand for petrol.

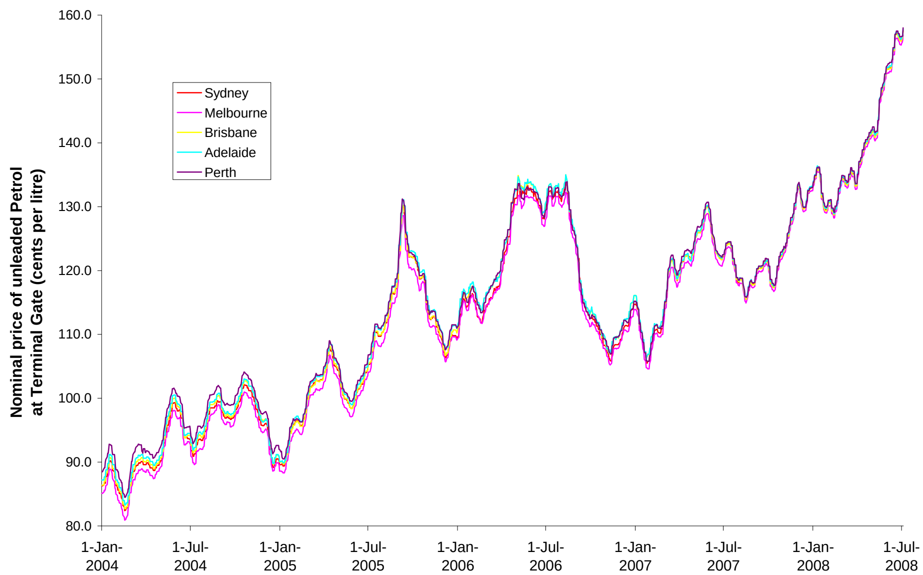
The percentage deviation from the (volume weighted) national average of terminal gate unleaded petrol prices is shown in Figure 2. Three main points to emerge from this figure. First the terminal gate price in Perth in early 2004 was about 3 per cent above the national average. Second, for cities such as

[2] It is worth noting here that the ACCC data is also transformed in such a way that one cannot go from it back to the original InformedSources data. Thus, it is not the case that the ACCC's refusal to release the data can be justified on the basis of their protecting the commercial interests of InformedSources.

[3] http://www.aip.com.au/pricing/tgp.htm

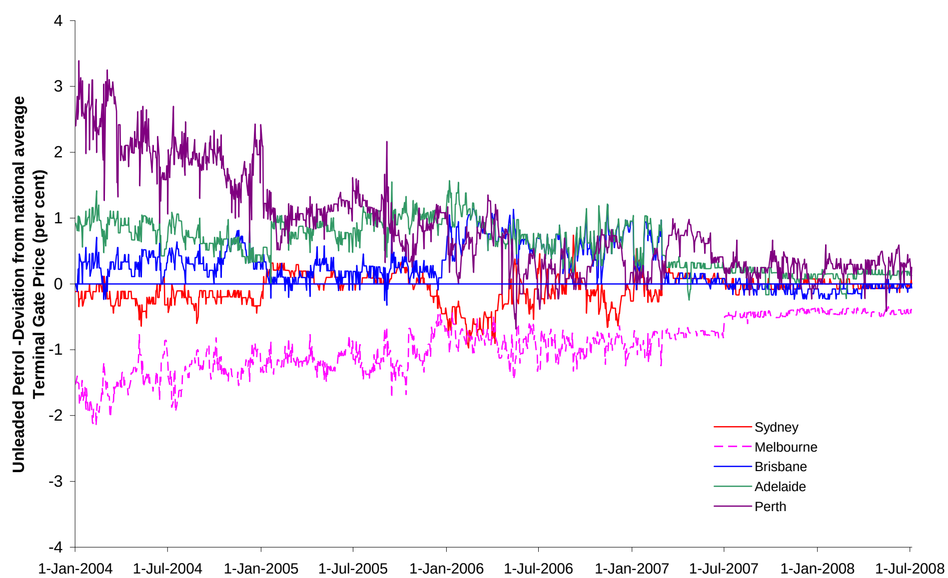
[4] The figures are in colour so the paper is easier to read if it is printed on a colour printer.

Figure 1: Nominal Price of Unleaded Petrol at Terminal Gate in Various Capital Cities (Cents Per Litre)



Melbourne the terminal gate price of unleaded petrol was about 1.5 per cent below the national average in early 2004. Third, there has been a substantial narrowing in the differences between the capital cities in the terminal gate price of unleaded petrol. This finding has implications for the ACCC's method of calculating the east-west difference in the nominal retail margin.

Figure 2: Percentage deviation of nominal price of unleaded petrol at terminal gate from the (volume weighted) national average selected capital cities (per cent)



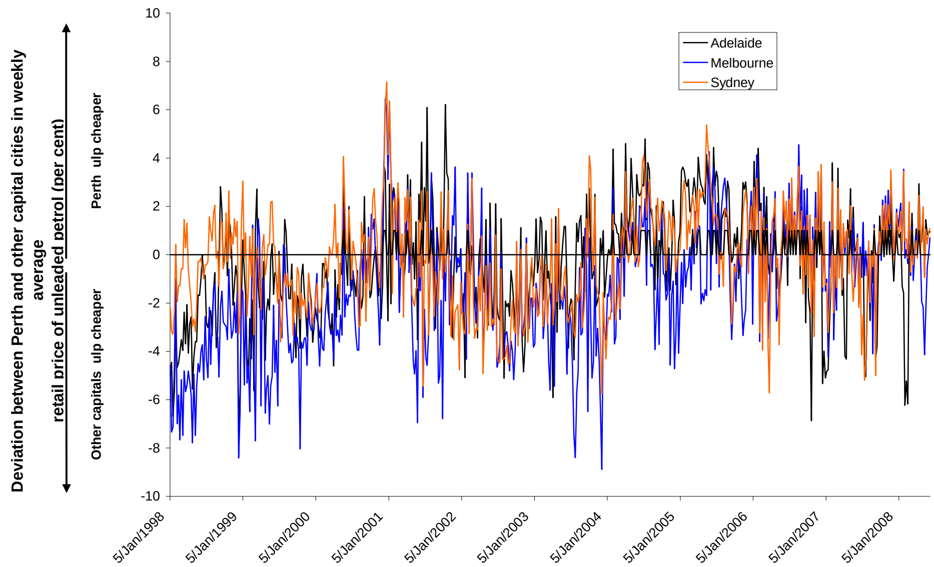
2.1.2 Retail prices

The percentage deviation of weekly retail unleaded petrol prices in Sydney, Melbourne and Adelaide from those in Perth are shown in Figure 3.[5] Points above the zero line are dates at which prices in Perth are cheaper than in the other capitals and those below the zero line are dates at which unleaded petrol is cheaper in the other cities. Three main points emerge from this figure. First, there are calender effects so that prices vary according to week as well as the much discussed variation within a week. Second, the calendar variation makes it hard to determine from the graph whether prices were systematically affected

[5] The exact calculation is $100 \times \log(\frac{ULP_{i,t}}{ULP_{Perth,t}})$ where $ULP_{i,t}$ is the price of unleaded petrol in city i at week t. This is approximately equal to the percentage difference between the price in city i and the price in Perth.

by FuelWatch. Third, there is some visual evidence that prices in Perth were on average relatively higher before 2004 and may on average be a bit lower after 2004.

Figure 3: Percentage deviation of nominal retail price of unleaded petrol in Sydney, Melbourne and Adelaide from price in Perth (per cent)



Comparable information for Brisbane prices is shown in Figure 4. Brisbane is shown separately because the 9.2 cent per litre subsidy means that prices in Brisbane have always been lower than in Perth. Also as is shown in the Figure the part of the subsidy that goes to consumers has not kept pace with the price of petrol and this is the cause of the apparent time trend in Figure 4. In part this time trend reflects the fact that over time less of the subsidy has been passed on to consumers.

There are several ways of removing part or all of the calender effects. A simple approach is to take an 11-week centred moving average as is done in Figure 5 for Sydney, Melbourne and Adelaide The main point to emerge from Figure 5 is that between January 1998 and May 2000 the price of unleaded petrol in Adelaide and Melbourne was respectively 2.0 per cent and 3.7 per cent below that in Perth. But the price in Sydney was on average only 0.7 per cent below that in Perth over this period. I will return to this fact later when discussing the ACCC data construction.

Figure 4: Percentage deviation of nominal retail price of unleaded petrol in Brisbane from price in Perth (per cent)

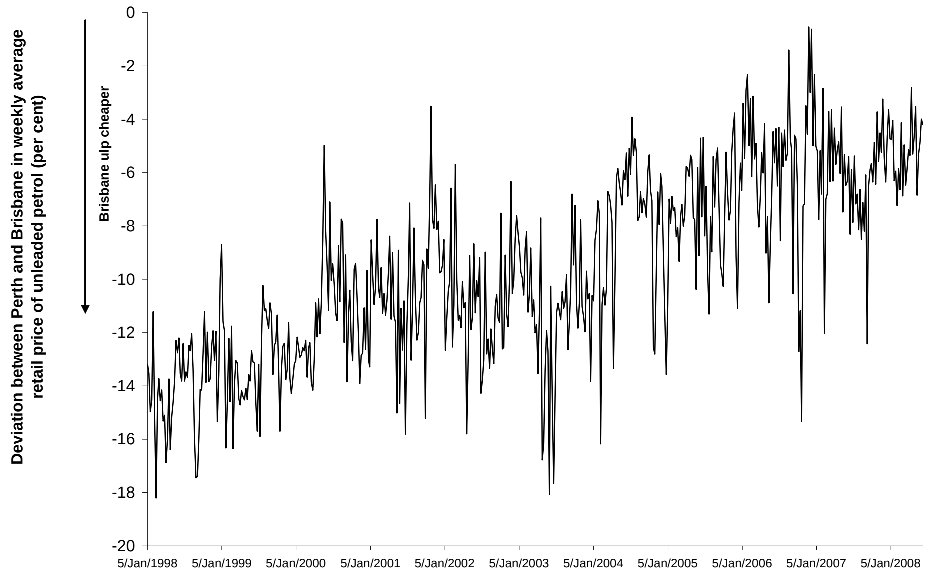
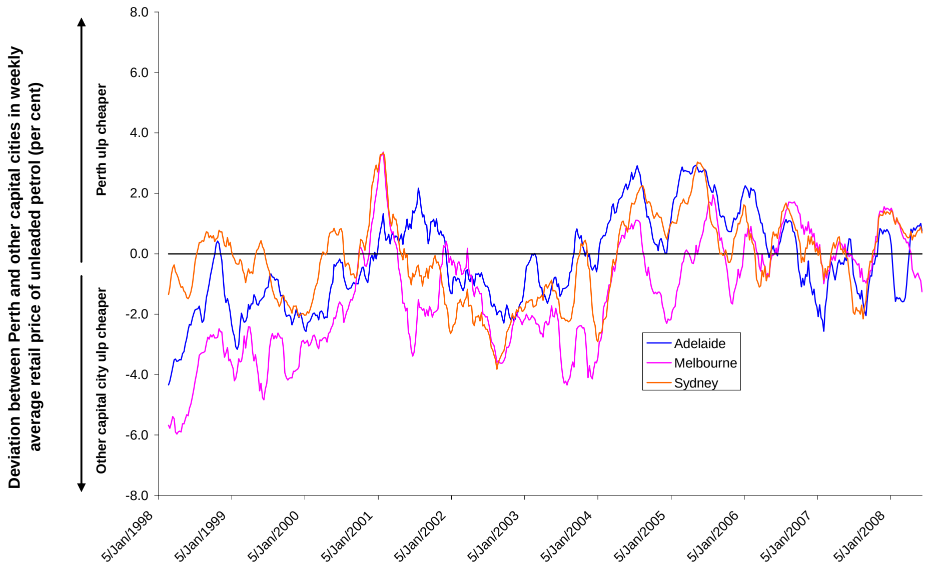


Figure 5: Eleven week centred moving average of the percentage deviation of nominal retail price of unleaded petrol in Sydney, Melbourne and Adelaide from price in Perth (per cent)

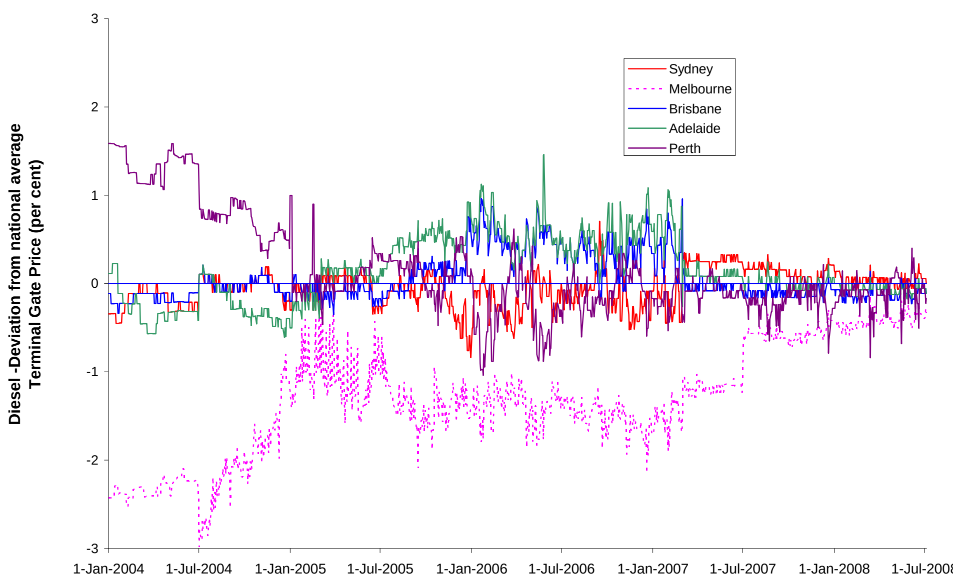


2.2 Diesel

2.2.1 Terminal gate prices

The percentage deviation of weekly terminal gate prices of diesel are also available from the Australian Institute of Petroleum. The percentage deviation from the (volume weighted) national average of terminal gate diesel prices are shown in Figure 6. The main points to emerge from this figure are firstly, as with ulp, terminal gate prices for diesel were somewhat higher in Perth at the beginning of 2004. Second, for Melbourne the terminal gate price of diesel was consistently lower than in Perth throughout the whole period. As with ulp, in 2007 and 2008, there was a narrowing in the percentage deviation of diesel prices from the national average. This was most likely caused by the higher world oil price.

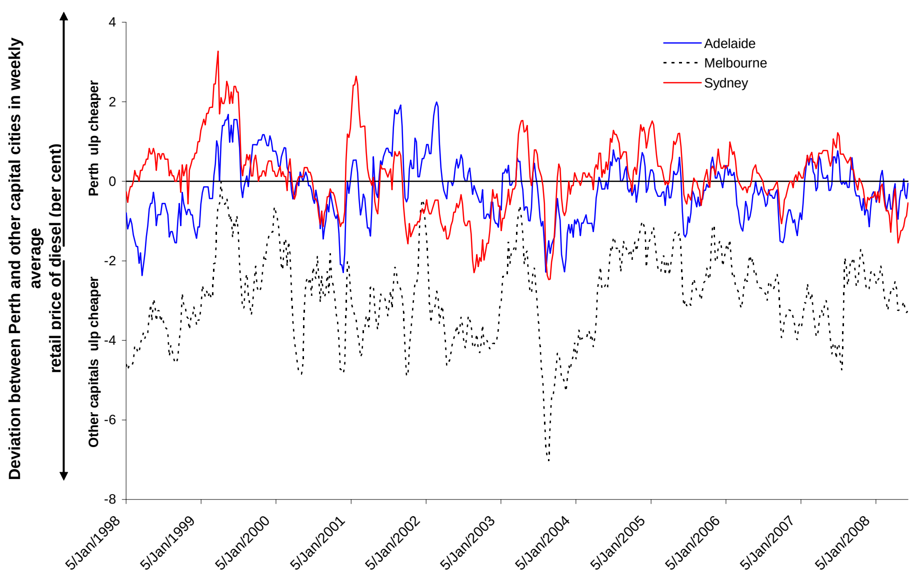
Figure 6: Percentage deviation of nominal price of diesel at terminal gate from the (volume weighted) national average selected capital cities (per cent)



2.2.2 Retail prices

The percentage deviation of weekly retail prices of diesel prices in Sydney, Melbourne and Adelaide from those in Perth are shown in Figure 7. The most notable feature of this chart is that, unlike ulp, there is no weekly calender variation in diesel prices. This suggests that the strong weekly fluctuations in unleaded petrol prices reflects the particular economic conditions in that market. The other notable feature of this figure is that retail diesel prices in Melbourne are consistently lower than in Perth, Sydney or Adelaide. The reason for this difference is unknown.

Figure 7: Percentage deviation of nominal retail price of diesel in Sydney, Melbourne and Adelaide from price in Perth (per cent)



3 The ACCC approach for constructing the east-west difference in the nominal retail margin for petrol

The ACCC constructed a series that represents the difference between the nominal retail margin on petrol in Perth $\left(m_t^{Perth}\right)$ and the nominal retail margin on petrol in the eastern capital cities m_t^{East} . The ACCC described this data as follows

> The data series was constructed using pricing information supplied by Informed Sources and Platts. The series tested was a measure of price margin that removes factors from the retail price that are beyond the scope of FuelWatch to affect, such as net taxes, fuel quality premiums and ex-refinery petrol prices. ACCC report p375.

Details of how the difference in the nominal price margin, which I denote as m_t, are calculated are provided on page 375 of the ACCC report and the 'formulas' are set out below.

m_t^{Perth} = (Retail price-lagged Mogas95 price-net taxes - fuel quality premium)$_{\text{Perth}}$

m_t^{East} = (Retail price-lagged Mogas95 price-net taxes - fuel quality premium)$_{\text{Average of eastern capitals}}$

$$m_t = m_t^{Perth} - m_t^{East}$$

Harding (2008) observes that the ACCC's description of how m_t is calculated is incomplete and provides a discussion of issues that are not addressed in the ACCC report. Ideally, I would like to redo the ACCC calculation but the Mogas95 price series is expensive (about $US2000) so I have not purchased it. More importantly because I don't have information on exactly which taxes and subsidies the ACCC used and I don't have information on the fuel quality premia it is impossible to reconstruct the ACCC data from the InformedSources data. This means that until the ACCC releases their data the most accurate public information on m_t is the data that I digitized from Chart S1.

However, to some extent the issue of whether or not the ACCC release the data is becoming an issue of secondary importance because there is sufficient information in the InformedSources data to discern additional flaws in the ACCC approach that make the variable m_t essentially meaningless. Specifically, movements in m_t can come from two sources viz, movements in m_t^{Perth} and those movements that come from m_t^{East} it is evident from Figure 5 that much of the apparent structural break visible in Chart S1 arises because of changes in the structure of petrol prices in Melbourne and Adelaide. Clearly it is incorrect to attribute such movements in unleaded petrol prices in other states to Western Australian FuelWatch.

A second issue that arises here is that as discussed in conjunction with Figure 4 there appears to be some variation in the proportion of the fuel subsidy in Brisbane that is passed on to consumers. Since the ACCC is not explicit about how they adjusted for taxes and subsidies we do not know whether they corrected for variation in the pass through of the subsidy.

The two features of m_t discussed above mean that it is not a meaningful variable for measuring the effect of events such as FuelWatch on the retail price of unleaded petrol.

4 Estimating the effect of FuelWatch using unleaded petrol price data for five capital cities

An alternative approach for estimating the effect of FuelWatch is to use Sydney as the point of comparison as unleaded petrol prices in that city had a far more stable relationship with those in Perth over the period 1998 to 2008. Thus the dependent variable is π_t^p

$$\pi_t^p = 100 \times \frac{P_t^{Perth} - P_t^{Sydney}}{P_t^{Sydney}}$$

I also constructed three other variables that reflect the percentage deviation in other capital cities from the price in Sydney

$$\pi_t^i = 100 \times \frac{P_t^i - P_t^{Sydney}}{P_t^{Sydney}} \qquad i = a\,(Adelaide),\ b\,(Brisbane),\ m\,(Melbourne)$$

These variables π_t^a, π_t^b, π_t^m, contain potentially useful information about movements in π_t^p that are caused by factors which are common across some or all of the Australian cities. Recall from the discussion in Harding (2008) that when using dummy variables to measure the effect of an event we are using the "after this therefore because of this" form of logic which is suspect in the sciences. To make this form of logic less susceptible to criticism it is important to make a serious attempt to control for other potential explanations. A straight forward way of doing this is to include the variables π_t^a, π_t^b, π_t^m and their lags in the regression.

Finally, I construct dummy variables that represent the creation of FuelWatch on 2 January 2001 (FW_t), the entry of Woolworths into the Perth market in December 2003 (WW_t) and the entry of Coles into the Perth market in March 2004 ($Coles_t$). Each of these dummy variables takes the value zero before the date of the event and the value one afterwards.

4.1 Regression model

The regression I use allows for lags in the dependent variable (π_t^p) and in the explanatory variables π_t^a, π_t^b, π_t^m. Specifically

$$\pi_t^p = \alpha + \beta FW_t + \gamma WW_t + \delta Coles_t + \lambda t + \sum_{i=1}^{K} \rho_i \pi_{t-i}^p + \sum_{i=0}^{K} \left(\phi_i^a \pi_{t-i}^a + \phi_i^b \pi_{t-i}^b + \phi_i^m \pi_{t-i}^m \right) + \varepsilon_t \tag{1}$$

The coefficients on these dummy variables reflects the impact of the event on π_t^p. Thus β measures the instantaneous percentage change in the Perth ulp price relative to the Sydney ulp price that is attributable to FuelWatch controlling for:

- the entry of Woolworths and Coles;
- the common effects experienced across cities; and
- the dynamics of petrol prices.

Similarly, γ and δ measures the instantaneous percentage changes in the Perth ulp price relative to the Sydney ulp price that are attributable to the entry of Woolworths and Coles respectively controlling for FuelWatch and other factors. Here it is important to note that because the entry of these two retailers occurred so close together it is difficult to distinguish their separate effects. It is therefore prudent to interpret $\gamma + \delta$ as the cumulative effect of entry of these businesses and not to place too much emphasis on the individual coefficients.

The parameter λ controls for any time trend that may be in the dependent or explanatory variables.

The parameters ρ_i measure lags in adjustment of prices. The long run effects of the three events allowed for can be calculated as follows (letting a + superscript denote long run parameter values)

- The long run effect of FuelWatch is β^+ which is calculated as

$$\beta^+ = \frac{\beta}{1 - \sum_{i=1}^{K} \rho_i}$$

- The long run effect of Woolworths entry (see caveat above) is γ^+ which is calculated as

$$\gamma^+ = \frac{\gamma}{1 - \sum_{i=1}^{K} \rho_i}$$

- The long run effect of Coles entry (see caveat above) is δ^+ which is calculated as

$$\delta^+ = \frac{\delta}{1 - \sum_{i=1}^{K} \rho_i}$$

The regression above is a generalization of the approach taken by the ACCC in a particular sense. Specifically, the ACCC approach is the special case where the following conditions are met:

1. $\phi_0^a = \phi_0^b = \phi_0^b = 1$;
2. $\phi_i^a = \phi_i^b = \phi_i^b = -\rho_i$ for all $i = 1, ..K$;.and
3. Sydney prices are used as the reference to put the nominal price difference into real terms.

The model does not contain direct allowance for seasonal effects through, for example, weekly dummy variables. This is because the weekly effects seem broadly similar across the cities and thus weekly effects are likely to be controlled for in the explanatory variables π_t^a, π_t^b, π_t^m if omitted weekly effects are important they will show up when we inspect the residuals.

4.2 Estimation and model selection

The regression model can be estimated using ordinary least squares. To implement the regression it is necessary to choose a value for K that is sufficiently large as to account for the dynamics. I chose K=12 weeks which is almost one quarter. Once K is selected there are two approaches to regressions like this. One is to simply estimate the model for a given K. Models estimated in this way have the feature that provided K is sufficiently large they are consistent in the sense that for a large enough sample one can get arbitrarily close to the true value. The disadvantage of this approach is that it is not parsimonious and there is some loss of efficiency which will be reflected in wider confidence intervals. The second approach is to use information criterion to trade of parsimony and fit. Two popular methods are the Akike information criterion (AIC) and the Schwartz criterion (SC). Letting $\widehat{\sigma}_{\varepsilon}^{2}(m)$ denote the estimated variance of ε_t when m parameters are freely estimated the AIC and SC are given as

$$AIC = \ln \widehat{\sigma}_{\varepsilon}^{2}(m) + \frac{2m}{T}$$

$$SC = \ln \widehat{\sigma}_{\varepsilon}^{2}(m) + \frac{2m \ln T}{T}$$

Where $\ln x$ is the natural logarithm of x and T is the number of observations. Hannan and Quinn (1979) showed that the AIC leads to an inconsistent estimator of K in vector auto regressions — (1) can be thought of as an equation from a vector autoregression. They also showed that SC leads to a consistent estimator of K. Here consistency means that as the sample size increases the probability of selecting the correct value of K goes to one. In many instances this argument is used to suggest that one should prefer SC over AIC. However, it can also be shown that for T>8 the SC selects a more parsimonious model that does the AIC. Thus the risk in using the AIC criterion is a loss of efficiency from selecting a model with too many parameters while the risk with the SC criterion is selecting a model with too few parameters and thus creating a bias where variables that are indeed important are excluded from the regression. Good econometric analysis requires that the investigator balance these risks. The required balance is likely to vary with the features of the questions investigated. In cases where the "after this therefore because of this" form of logic is being used it is important that other potential explanations are excluded and this favours the use of criteria such as AIC over SC when selecting the regressors. However, so that the reader can judge for themselves I will report the following models:

- Unrestricted model ie all parameters estimated;
- Restricted model selected by AIC;
- Restricted model selected by SC; and
- Model with only dummy variables (ie no lags and no prices from other cities).

4.3 Results

The results for the unrestricted model are in Table 1. The model fits well and there is no significant evidence of serial correlation in the residuals. A regression of the squared residuals on the explanatory variables yielded a F statistic for the test of 0.8 with a p-value of 0.8 so there is no evidence to cause a rejection of the null hypothesis of homoscedasticity.[6] These two conclusions mean that the standard errors reported here are appropriate and there is nothing to be gained from using hetroscedasticity and autocorrelation consistent standard errors.

Table 1: Results from unrestricted model

Panel 1: Dummy coefficients (parameters of interest)								
coeff	α		β		γ		δ	
	Est	S.e	Est	S.e	Est	S.e	Est	S.e
.	2.55	0.96	0.12	0.33	-0.22	0.51	-0.67	0.54
Panel 2: Other coefficients								
	ρ_i		ϕ_i^a		ϕ_i^b		ϕ_i^m	
	Est	S.e	Est	S.e	Est	S.e	Est	S.e
0	na	na	0.28	0.049	0.23	0.052	0.13	0.045
1	0.22	0.046	-0.11	0.056	-0.10	0.061	0.02	0.049
2	0.22	0.047	-0.05	0.056	-0.04	0.062	-0.06	0.049
3	-0.04	0.047	0.08	0.056	0.03	0.062	-0.07	0.050
4	0.15	0.047	-0.18	0.055	0.04	0.062	0.05	0.050
5	-0.06	0.048	0.05	0.056	0.02	0.061	0.05	0.050
6	0.04	0.048	0.06	0.056	-0.01	0.061	-0.07	0.050
7	0.06	0.048	-0.07	0.056	0.03	0.061	0.01	0.050
8	0.07	0.048	-0.05	0.056	0.01	0.061	0.04	0.050
9	-0.09	0.047	0.02	0.056	0.02	0.061	-0.08	0.050
10	0.09	0.047	0.07	0.056	-0.06	0.060	0.07	0.050
11	0.03	0.047	-0.07	0.056	-0.07	0.060	0.04	0.050
12	-0.03	0.046	-0.01	0.051	0.11	0.051	-0.05	0.046
Sum	0.66		0.02		0.21		0.08	
$R^2 = 0.553$		$\overline{R}^2 = 0.501$		$T = 533$			$HetroTest = 0.821$	
		$\widehat{\sigma}_\varepsilon = 1.486$		$df = 477$				
Panel 3: Long run coefficients								
Coeff	α^+		β^+		γ^+		δ^+	
Est	7.65		0.36		-0.66		-2.01	

The unrestricted model suggests that the instantaneous effect of FuelWatch was to raise unleaded petrol prices in Perth relative to Sydney by 0.12 of one per cent. But since the standard error is 0.33, thus 95 per cent confidence intervals will include zero. That is the instantaneous effect of FuelWatch is not statistically significantly different from zero. The long run effect is to raise unleaded petrol prices in Perth relative to Sydney by 0.36 of one per cent. I have not calculated the standard error for this long run effect but it seems unlikely that the long run effect would be significantly different from zero.

The instantaneous effect of the entry of Woolworths and Coles was to lower unleaded petrol prices by 0.89 of one per cent $(0.22 + 0.67)$ this effect was also

[6] Given the sample size is so large there is little point in worrying about the distinction between the F distribution and the χ^2 distribution.

not significantly different from zero. The long run mean effect of the entry of these two retailers was to lower prices of unleaded petrol by 2.67 per cent relative to Sydney.

Results from the model selected by the Aikike information criteria (AIC) are in table 2. Application of AIC leads to 33 parameters being set to zero. This has relatively small impact on the overall conclusions. There continues to be little evidence of hetroscedasticity or autocorrelation. The estimated instantaneous impact of FuelWatch is to lower unleaded prices by 0.01 of one percent (essentially zero) with a standard deviation of 0.23 of one per cent. So the 95 per cent confidence interval for the instantaneous effect of FuelWatch is $(-0.46, 0.45)$. The estimated long run effect of FuelWatch in this model is to lower unleaded petrol prices by 0.03 of one per cent.

Table 2: Results from model selected by AIC criteria

Panel 1: Dummy coefficients (parameters of interest)								
coeff	α		β		γ		δ	
	Est	S.e	Est	S.e	Est	S.e	Est	S.e
.	1.74	0.603	-0.01	0.23	-0.20	0.464	-0.79	0.50
Panel 2: Other coefficients								
	ρ_i		ϕ_i^a		ϕ_i^b		ϕ_i^m	
	Est	S.e	Est	S.e	Est	S.e	Est	S.e
0	*na*	*na*	0.28	0.046	0.25	0.048	0.15	0.038
1	0.21	0.041	-0.12	0.047	-0.11	0.049		
2	0.19	0.041					-0.08	0.038
3								
4	0.16	0.041	-0.10	0.040				
5								
6								
7								
8	0.09	0.039						
9	-0.09	0.038						
10	0.09	0.039						
11					-0.10	0.044		
12					0.10	0.045	-0.07	0.037
Sum	0.65		0.06		0.14		0.00	
$R^2 = 0.528$		$\overline{R}^2 = 0.510$		$T = 533$			$HetroTest = 1.5$	
		$\widehat{\sigma}_\varepsilon = 1.472$		$df = 513$				
Panel 3: Long run coefficients								
Coeff	α^+		β^+		γ^+		δ^+	
Est	4.97		-0.03		-0.57		-2.26	

Application of the Schwartz Criteria (SC) leads to the model reported in table 3. This model also show little evidence of hetrocedasticty or autocorrelation. Comparison of tables 3 and 2 indicate that the SC leads to the omitting of several variables even though the t-statistics exceed 2 (ie are significant at the 5% level). Given that we are using the "after this therefore because of this" mode of logic it seems inappropriate to use the SC as it will lead to the exclusion of potentially significant explanatory variables and thus bias the results.

Table 3: Results from model selected by SC criteria

Panel 1: Dummy coefficients (parameters of interest)								
coeff	α		β		γ		δ	
	Est	S.e	Est	S.e	Est	S.e	Est	S.e
.	2.27	0.44	-0.18	0.21	-0.16	0.463	-1.02	0.49
Panel 2: Other coefficients								
	ρ_i		ϕ_i^a		ϕ_i^b		ϕ_i^m	
	Est	S.e	Est	S.e	Est	S.e	Est	S.e
0	na	na	0.31	0.045	0.17	0.038	0.15	0.038
1	0.19	0.040	-0.14	0.045				
2	0.20	0.040					-0.10	0.038
3								
4	0.19	0.040	-0.10	0.040				
Sum	0.58		0.07		0.17		0.05	
$R^2 = 0.500$		$\overline{R}^2 = 0.510$		$T = 533$			$HetroTest = 1.5$	
		$\widehat{\sigma}_{\varepsilon} = 1.496$		$df = 513$				
Panel 3: Long run coefficients								
Coeff	α^+		β^+		γ^+		δ^+	
Est	5.40		-0.43		-0.38		-2.43	

The results of estimating a model in which all the prices in other cities are omitted is reported in Table 4. This model is of interest because it is similar in approach to the models implicitly used by the ACCC in appendix S. There are several indications that this model is inappropriate. One is that compared with the model selected by AIC the R^2has fallen from 0.528 to 0.164 suggesting that the omitted variables had a role to play in explaining unleaded petrol prices — many of the variables omitted had t-statistics of over 2 some had t-statistics over 7. Another indication that this model is inadequate is that the Durbin-Watson statistic is very low suggesting autocorrelation in the disturbances. Attempting to correct for this using hetroscedastic and autocorrelation consistent standard errors (as the ACCC does) would be inappropriate because the fundamental problem is not one of serial correlation but omitted variables.

5 Conclusion

The ACCC said in it document *Petrol — Further Econometric Analysis Undertaken by ACCC* that

Table 4: Results from heavily restricted model akin to that used by ACCC

Panel 1: Dummy coefficients								
coeff	α		β		γ		δ	
	Est	S.e	Est	S.e	Est	S.e	Est	S.e
.	0.38	*na*	0.86	*na*	1.30	*na*	-3.1	*na*
Panel 2: Other coefficients								
$R^2 = 0.164$		$\overline{R}^2 = 0.159$		$T = 545$				
$DW = 1.2$		$\widehat{\sigma}_\varepsilon = 1.92$		$df = 541$				

> The purpose of this econometric analysis has been to satisfy the ACCC that the introduction of a national FuelWatch scheme nationally would not, based on the experience in Western Australia, lead to consumers paying higher prices for Petrol.
>
> From the econometric analysis, on a conservative basis, the ACCC can say that there is no evidence that the introduction of the FuelWatch in Western Australia led to any increase in prices and it appears to have resulted in a small price decrease overall.

Harding (2008) showed that econometrics behind this conclusion was deeply flawed and that when one applied more appropriate econometric tests to data obtained by digitizing a graph in the ACCC report the estimated effect was much smaller than that found by the ACCC and the 95% confidence interval included zero so that it was no longer possible to conclude that FuelWatch did no harm.

InformedSources provided me with access to some of the petrol retail price data that was used by the ACCC. While I still do not have sufficient data to redo the ACCC calculations the InformedSources data is very useful as it yields two new insights.

First, the dramatic fall in Perth ulp prices relative to the eastern states in May 2000 to December 2000 that was so visually compelling in the ACCC's chart S1 was in fact due primarily to price changes in Adelaide and Melbourne and thus can have nothing to do with events in Western Australia.

Second, the relationship between ulp prices in Perth and Sydney seems relatively stable so it is possible to redo the ACCC analysis using the percentage deviation of Perth ulp prices from those in Sydney. It is also possible to construct similar variables for the other capitals and use these as explanatory variables in a regression where they allow one to control for a range of factors affecting ulp prices. In this set up the ACCC approach can be viewed as requiring a special set of parameter restrictions. There is no evidence that these restrictions hold. This suggests that the ACCC approach, because it omits these variables, yields estimates of the effects of FuelWatch that are biased and inconsistent. The latter econometric term means that no matter how large the sample the estimates would never converge to the true but unknown parameter representing the impact of FuelWatch.

The unrestricted model that I estimate will yield consistent but somewhat inefficient estimates. It suggests that the long run effect of FuelWatch in Western Australia was to raise ulp prices by 0.36 of one per cent. I have not calculated the confidence interval for this estimate but expect that it will most likely include zero so that the effect is not statistically significantly different from zero.

The model selected by the Aikike information criteria may omit some variables that should be in the model and could therefore result in inconsistent estimates but it has increased efficiency. This model yields estimates of the effects of FuelWatch that are essentially zero in both the short and long run.

The Schwartz criteria imposes too many restrictions on the model to be plausible. Indeed it results in omission of variables where the t-statistic on the coefficient exceeds 2.0 so it is very likely that this model would lead to biased and inconsistent estimates of the effects of FuelWatch.

In the document *Petrol — Further Econometric Analysis Undertaken by ACCC* , the ACCC claims that

> 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 FuelWatch.

The analysis in this paper shows that this conclusion is false. I have already shown that the 'structural break' attributed to FuelWatch by the ACCC a) occurred before FuelWatch was introduced and b) was caused primarily by price rises in Adelaide and Melbourne not by price falls in Perth.

Moreover, when I redo the analysis using Sydney prices as the point of comparison and with other explanatory variables I find that the entry of Woolworths and Coles into Western Australia resulted in long run price falls of about 2.67 per cent. Clearly, the entry of these two retailers had an effect on petrol prices that is one or two orders of magnitude larger than the effect of FuelWatch. Moreover entry of these firms reduced petrol prices whereas even the direction of effect of FuelWatch is unclear.

Any piece of econometric work has qualifications. The main ones here are that it would be useful to have access to the Platts Mogas95 price data , the data on net taxes and subsidies and the fuel quality premium. However, the reader of this paper who has access to such data can easily check whether such data change the results I obtain. This can be done by including the variables mentioned above in the regression and checking whether any of the conclusions are modified.

6 Bibliography

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