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Modelling the terminal gate prices of unleaded petrol in Australia ☆

Abbas Valadkhani *

UNE Business School, University of New England, Armidale, NSW 2351, Australia

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ABSTRACT

This paper examines whether or not unleaded petrol prices (at Australia's 18 wholesale distribution terminals) respond asymmetrically to changes in the exchange rate and the Singapore petrol prices (known as MOPS95). It is found that the exchange rate is the most significant source of asymmetric behaviour in 10 terminals. In other words, following a depreciation of $A, prices significantly rise more than when the exchange rate appreciates. The results indicate that terminal gate prices do not respond asymmetrically to changes in MOPS95 with the only 3 exceptions being Cairns, Devonport and Perth. There are also 8 terminals in which prices are significantly stickier downwards than upwards, suggesting that price increases are passed onto retailers faster than price decreases.

1. Introduction

1.1. Background

Petrol price rises remain a contentious issue facing many motorists in Australia (Australian Competition and Consumer Commission, ACCC, 1996, 2007; Industry Commission Inquiry, IC, 1994; Queensland Parliament, 2006). Based on two inquiries into petrol prices (ACCC, 1996 and IC, 1994), Walker et al. (1997) argue that large retail price differences between the country and metropolitan areas can be explained, inter alia, by the lack of competition among petrol importing companies. Valadkhani and Mitchell (2002) quantified the effects of petrol price rises on inflation and found that (a) the Australian economy is less susceptible to oil price rises now than it was in the 1970s and (b) that the adverse impacts of price rises affect poor families the hardest.

From 1983 to 1998, the wholesale price of unleaded petrol was regulated by the Australian Federal Government through the Price Justification Tribunal, the Prices Surveillance Authority and finally the Australian Competition and Consumer Commission (ACCC). In 1990 an intervention pricing system (IPS) was established to set the maximum endorsed wholesale price (MEWP) for unleaded petrol charged by oil companies (Murphy et al., 1996). In 1995 this system was subject to a revision but in August 1998 it was discontinued by the ACCC. The IPS calculated the "landed" price of petrol on the basis of a rolling seven-day average Singapore[1] spot prices after adjusting for: the exchange rate (converting prices from the $US to $A), freight from Singapore, wharfage costs, insurance and stock losses. Before adding excise and state taxes to the intervention price, an additional "local component" of 7.20 cents per litre was added to the landed price to compensate oil companies for marketing and distribution expenses (FUELtrac, 2011). Major oil companies (i.e. BP, Caltex, Mobil and Shell) managed to lobby the Federal Government to remove the ACCC from their role in determining the MEWP for unleaded petrol prices through their industry association, the Australian Institute of Petroleum (AIP). However, the ACCC maintained its involvement in setting the maximum freight rates chargeable for the delivery of petroleum products in Australia till August 1998 when oil companies succeeded in setting their own "wholesale" prices and freight charges.

Fig. 1 decomposes the average price of unleaded petrol in mid 2011. More than one-third of the price of petrol relates to the GST and fuel excise taxes and 50% (i.e. 0.70/1.37) constitutes the cost of crude oil. The Singapore benchmark price of petrol (MOPS95), transport costs, GST and excise taxes represent approximately 95% of terminal gate prices (Australian Institute of Petroleum, 2012). According to Fig. 1, the retail and wholesale gross margins are 6 cents and 9 cents per litre or 4.4% and 6.6% of the price of petrol, respectively.

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* Tel.: +61 2 6773 2524.
E-mail address: abbas@une.edu.au.

[1] MOPS95 unleaded petrol is considered to be the closest substitute for Australian regular unleaded petrol.

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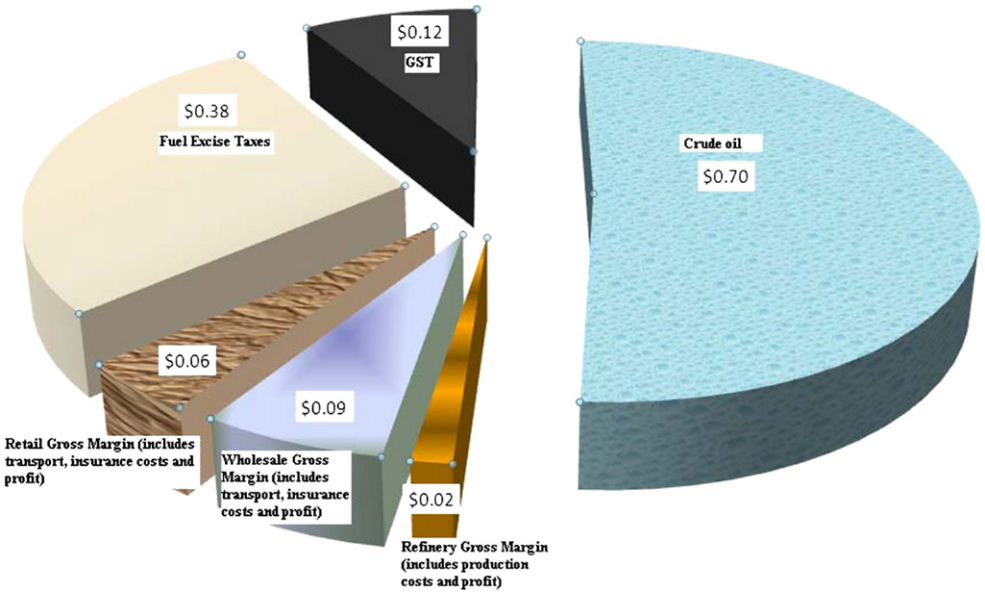

Fig. 1. Decomposition of the price of unleaded petrol (1.37 cents per litre) in June 2011.
Source: Royal Automobile Association: www.raa.com.au/page.aspx?TerID=1139.

1.2. Review of literature

Wang (2008, 2009a, 2009b) has published a series of interesting papers on retail petrol pricing in Australia using the Edgeworth cycle model (a model that the ACCC also considered in its 2007 study). Wang (2009a) argues that the behaviour of Australia's petrol prices is well captured by the Edgeworth price cycle equilibrium in the Maskin and Tirole (1988) model[2] that features short-run price commitment. He highlights the importance of price commitment in tacit collusion and finds significant evidence "that the price leadership outcome under the law is better predicted by mixed strategies play than by alternative hypotheses even though firms have the incentive not to deliberately randomise" (p. 1027). Wang (2009b) also finds that petrol prices in Perth follow regular cycles, even though wholesale prices do not fluctuate very much. In his study, there was evidence of intertemporal substitution, supporting the view that a significant number of motorists in Perth were aware of the regularity of the price cycle and very sensitive to station level petrol price differentials.

Using weekly data (1997–2002) and the Box and Tiao intervention analysis, Davey (2010) examined the impacts of the deregulation of wholesale petrol prices on relative retail prices for unleaded petrol in Adelaide, Melbourne and Sydney. He concludes "that consumers in Adelaide, Melbourne and Sydney enjoyed relatively lower retail petrol prices following [August 1998] deregulation than would have otherwise been the case if regulation had continued and were unambiguously better off as a result" (p. 96). Breuni and Gisz (2009) adopted an innovative dynamic demand model for petrol, allowing for slowly evolving unobservable habits using aggregate quarterly data (1966–2006). Unlike Maskin and Tirole (1988), they found no evidence that petrol responds differently to price rises and falls in Australia. Valadkhani (2010) has also tested the asymmetric responses of retail petrol prices to changes in crude oil prices in seven capital cities. Based on monthly data (1998–2009), his aggregate study indicates that petrol price rises were passed onto the consumer faster than price decreases in four capital cities. Liu et al. (2010) examined how petrol and diesel prices respond to changes in crude oil prices (expressed in local currency) in New Zealand using an asymmetric error correction model. They found convincing statistical evidence for asymmetry in the adjustment of diesel prices by major oil companies as price adjustments were faster upwards than downwards. As to petrol prices, they found no significant evidence for asymmetry in the adjustment process despite the estimated coefficients indicating a faster tendency in raising prices. Liu et al. (2010) conclude that fuel pricing is not competitive in New Zealand and thus warrants further government intervention and monitoring.

As can be seen from the above review of literature, there is an urgent need for conducting further research using more disaggregated (i.e. location specific) daily data throughout Australia. One should note that the use of aggregated data (such as ACCC, 2007; Breuni and Gisz, 2009; and Valadkhani, 2010) may mask the existing price differences in small regional towns and rural areas. This paper contributes to our understanding of asymmetric behaviour of wholesale unleaded petrol prices by providing answers to the following questions:

1. When the Australian dollar falls or the Singapore price of petrol rises, on average, how much will the wholesale price of petrol increase and vice versa?
2. Do wholesale prices respond asymmetrically to positive and negative changes in the Singapore price of petrol and the exchange rate? In other words, is Bacon's (1991) "rockets-and-feathers hypothesis" relevant?

Therefore, this paper tackles a very significant policy issue and offers strong diagnostic evidence by constructing a disaggregate model for wholesale petrol prices in Australia and tracing out the dynamic asymmetric effects of the Singapore price of petrol and the exchange rate on petrol prices.

The rest of this paper is structured as follows. Section 2 presents the sources and descriptive statistics of the data and the unit root test results of the daily data employed. Section 3 discusses the theoretical framework of the paper which is used to test for the existence of any dynamic asymmetric behaviour in Australia's terminal gate

[2] Maskin and Tirole (1988) developed the Edgeworth cycle model, which predicts that retail prices rise faster than they fall because petrol stations are engaged in a battle for market share. In fact, retail prices will continue to cycle even when costs are constant. Therefore, unless upstream prices change significantly in a short period of time, the only role they play in determining retail prices is the peak cycle price and the price floor.