Energy Policy 69 (2014) 179–188

Contents lists available at ScienceDirect

Energy Policy

journal homepage: www.elsevier.com/locate/enpol

Modelling how much extra motorists pay on the road? A cross-sectional study of profit margins of unleaded petrol in Australia ☆

Abbas Valadkhani *, Alperhan Babacan

Swinburne Business School, Swinburne University of Technology, Hawthorn, VIC 3122, Australia

HIGHLIGHTS

- We examine the profit margin for petrol across 108 retail locations in Australia.
- No evidence of excessive profiteering was found in 76 out of 108 retail locations.
- There are 13 locations in which the likelihood of abnormal margins is quite high.
- Regulatory bodies have limited resources so they should target these locations.

ARTICLE INFO

Article history:
Received 13 December 2013
Received in revised form
4 February 2014
Accepted 6 February 2014
Available online 22 February 2014

Keywords:
Petrol
Profit margin
Australia

ABSTRACT

Gross profitability margin (difference between retail and wholesale prices) for unleaded petrol exhibits substantial variations across 108 cities, towns and regional centres in Australia. This paper examines if such variations (averaged during 2007–2012) can be explained by (a) transport costs proxied by the distance between retailers and wholesalers; (b) the size of the retail market; (c) market competition proxied by the number of cars in the vicinity of the retailers; (d) dummy variables capturing other qualitative attributes associated with the retailers' locations. Three cross-sectional regressions are estimated but only one successfully passes all diagnostic tests. By identifying a number of locations exhibiting excessive profit margins, the results of this paper enhance the efficiency and transparency of petrol pricing in the retail market. It is found that the extent of excessive profiteering in Western Australia (WA) and South Australia (SA) were lower than other Australian states and territories. This important finding can be explained by a strong presence of independent petrol stations in SA and the successful price-monitoring performance of FuelWatch in WA.

1. Introduction

During 2007–2012 on average petrol prices in Australia increased by 2.8% per annum. The rising petrol prices are considered as one of the most topical issues in the Australian media although they are still relatively low in comparison to other OECD countries (Webb, 2000). Depending on income levels, the share of petrol in total household expenditure in Australia varies from 2.2% to 7.4%; therefore, retail price rises exert direct pressure on people's standard of living (Mitchell et al., 2000). Changes in petrol prices have also significant impacts on the transport industry and as such attract a great deal of media attention. For example, a report on petrol prices published in *The Australian* newspaper argues that the average weekly household expenditure on fuel would soon increase from $55.00 in 2010 to $65.00 in 2011.[1]

Previous studies found that the price of petrol is determined by changes in the price of crude oil, the price of imported petrol, the exchange rate and taxes including excise and GST and State government rebates (Manning, 1991; Roarty and Barber, 2004; Australian Competition and Consumer Commission, 2007; Angelopoulou and Gibson, 2010; Valadkhani, 2013a, 2013b). For example, Angelopoulou and Gibson (2010) studied the way

☆We wish to thank Professor Michael Jefferson the Editor and two anonymous referees, whose useful inputs and comments considerably improved an earlier version of this article. The usual caveat applies.

* Corresponding author. Tel.: +61 392 144 990.
E-mail address: abbas@swin.edu.au (A. Valadkhani).

[1] 'Petrol prices ready to rocket', *The Australian*, 25 February 2011: http://www.theaustralian.com.au/archive/business-old/petrol-prices-ready-to-rocket/story-e6frg9h6-1226011622061, (accessed 1 September 2012).

http://dx.doi.org/10.1016/j.enpol.2014.02.010
0301-4215

in which asymmetric changes in Greek petrol prices were related to variations in the exchange rate, crude oil prices, tax rates and a number of other relevant explanatory variables. Their comprehensive results support the view "that while responses to changes in international prices and exchange rates appear to be roughly one-to-one, the same cannot be said of the response to tax rises (p. 1537)."

In 2011 the GST and fuel excise taxes constituted more than 33% of Australian retail prices (Valadkhani, 2013a). In a similar context Karamychev and van Reeven (2009) argue that with rising oil prices, fuel surcharges have become a widely adopted practice in the transportation industry. *Inter alia*, they find that firms usually pass on increasing fuel surcharges to consumers, leading to an anticompetitive behaviour.

The literature contains a growing number of studies/inquiries about the Australian retail and wholesale behaviour of unleaded petrol prices (Industry Commission, 1994; Australian Competition and Consumer Commission, 1996, 2007; Department of Parliamentary Services, 2004; Queensland Parliament, 2006; de Roos and Katayama, 2010; Valadkhani, 2013a). For example, in a comprehensive study, de Roos and Katayama (2010) used a Markov-switching model in the spirit of the Edgeworth price cycles of Maskin and Tirole (1988) to examine dynamic pricing behaviour in the Western Australian retail petrol market. They provided compelling evidence that cycles were frequent, asymmetric and generally of large magnitude, and that they occurred in "an environment inconsistent with the timing specification of the leading theory of Edgeworth cycles" (de Roos and Katayama, 2010, p. 1).

Using a comprehensive database containing 114 locations during the period January 2005–April 2012, Valadkhani (2013c) identified on which days petrol is more expensive and in which locations discount days are non-existent. He examined the day of the week effect in retail prices of unleaded petrol for each and every 114 locations in Australia and found that prices generally peak on Thursday/Friday and then fall until they reach their cyclical trough on Sunday/Tuesday. He argues that significant daily differences are observed only in 16 major capital cities and regional centres, which have relatively high population and/or are in close proximity to a large population centre. In such locations, motorists can make significant savings by shifting purchases to the cheapest days. They just need to be aware of the prevailing fuel price cycles.

It is well established that higher petrol prices and large retail price differences between rural and urban areas are largely due to the lack of competition among market participants (Industry Commission, 1994; Australian Competition and Consumer Commission, 1996). A critical review of these inquiries (Industry Commission, 1994; Australian Competition and Consumer Commission, 1996) indicates that higher petrol prices and large retail price differences between the country and metropolitan areas are mainly as a result of the lack of competition among petrol importers and the limited market power of independent discount retailers. It is also argued that such petrol price rises can adversely affect poor families more than the rich (Valadkhani and Mitchell, 2002). There are numerous studies in the literature which have tested Bacon's (1991) "rockets-and-feathers hypothesis" and concluded that: petrol prices "shoot up like rockets" in response to positive oil price shocks and "float down like feathers" in response to price falls (Borenstein et al., 1997; Kaufmann and Laskowski, 2005; Valadkhani, 2013a, 2013b).

According to Bacon (1991, p. 214), such asymmetric pricing behaviour may arise for two main reasons: "(1) there are lags between the costs changing and the retailers experiencing these because of transport time and the presence of inventories; (2) the firms, once experiencing the changed costs, may decide not to react fully immediately. Instead they may choose some partial adjustment policy. This could involve further delays in changing price and/or a gradual series of price rises to the new equilibrium level". Previous studies for the US and UK petrol markets (*e.g.* Reilly and Witt, 1998; Bachmeier and Griffin, 2003) clearly indicate that evidence of the "rockets-and-feathers hypothesis" mainly depends on the frequency of the data employed and model specification.

Using panel data on sales volume and petrol prices in 43 US cities over the period 1986–1991, Borenstein and Shepard (1996) adopted a number of 'supergame' models of tacit collusion to highlight the importance of the expected future demand and costs in determining petrol profit margins. Their study showed that collusive margins diminished when the demand for petrol was expected to decline or its marginal costs were expected to increase. For a detailed theoretical discussion of collusive behavior and antitrust enforcement see de Roos (2004), Abrantes-Metz et al. (2006), Harrington (2008), Abrantes-Metz and Bajari (2009). Using the US data, Ford (2011) analysed the relationship between oil companies' gross profit margins and retail petrol prices, and found that the integrated oil companies' margins diminished when oil and petrol prices were extremely high, even compared with times when prices were markedly low. He provided evidence that: (1) large oil companies become most profitable when petrol prices are at moderate levels; and (2) smaller and vertically integrated oil companies are no longer profitable when retail petrol prices are very high.

The present study makes an attempt to facilitate a cross-sectional comparison of retail margins using regression analysis to determine whether the observed large variations can be described as somewhat excessive. For example, during the period 29 October 2007–January 2012 on average, the GPM (gross profitability margin) was 24.1 cents per litre in Tennant Creek, whereas the same average margin was just 2.4 cents per litre in Mackay. What can possibly explain such large differences? According to the Australian Institute of Petroleum (2012), the average (net) retail margin is estimated to be approximately 6 cents per litre or 4.4% of the price of petrol. This paper can verify this type of statements.

After controlling for the locations of wholesale outports/states at which retailers purchase petrol, this paper examines what major factors statistically affect the variations of gross margin series. It is found that distance (as a proxy to capture the effect of transport costs), population (as a proxy to the size of the market), and the number of motor vehicles within the surrounding retailer location (as a proxy for market structure) are three major determinants of such variations in cross-sectional margins.[2]

This paper also identifies in which locations profit margins can be described as excessive. By using a unique dataset, which is not publically available, this study compares the difference between the expected average retail margins and the actual average margins for each of the 108 locations. This paper finds that there are very large differences in gross margins across various locations. In 76 out of the 108 locations the difference between the expected average retail margins and the actual average margins can be reasonably explained by various proxies capturing the size of the market, the transport costs and market competition. However, there are 13 retail locations in particular, where such differences are greater than 2 standard deviations and as such their margins appear to be relatively excessive. Future studies may conduct further research as to why in these 13 locations such unexplained differences exist and whether or not they can be attributable to any other relevant factors not explored in this study.

[2] In a comprehensive panel study of European countries, population demography was also found to be one of the major determinants of car usage (van Reeven, 2011).