Energy Economics 70 (2018) 158–169

Contents lists available at ScienceDirect

Energy Economics

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

Price dispersion in Australian retail electricity markets☆

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ARTICLE INFO

Article history:
Received 25 June 2017
Received in revised form 25 October 2017
Accepted 22 December 2017
Available online xxxx

JEL classification:
D40
D20
D22
L11

Keywords:
Electricity markets
Price discrimination
Energy policy

ABSTRACT

Simshauser and Whish-Wilson (2017) examined the restructured Victorian retail electricity market and found it to be efficient as the marginal unit produced was sold at marginal cost. This article extends their analysis of price dispersion by considering the heterogeneous nature of electricity consumption when measured by volume sold (kWh). We find that customers on 'standing offer' tariffs use 18% less electricity than customers on 'high discount' products, indicating the presence of market segmentation and implicit second-degree price discrimination. Climate change policy and the emergence of new technologies such as household solar PV, battery storage and home energy management systems will create further price dispersion in Australian electricity markets due to even greater product heterogeneity. We contend that policy makers will need to facilitate, rather than prevent, both price and tariff structure dispersion with the objective of improving consumer outcomes.

1. Introduction

Price discrimination in restructured retail markets is considered to be welfare enhancing by many energy economists. However, some stakeholders continue to question the *fairness* of consumers paying different prices for electricity as a homogenous product. This should not be a surprise given that electricity is an essential service and energy systems are not only an intricate network of physical and economic infrastructure but also a significant cultural system. There are large networks of business interests, geo-political stakeholders and carefully designed legal structures. These social and cultural networks took decades to build and are as important in explaining the inner functioning of the system as the economics, wires, steel and coal (Bakke, 2016; Ghazizadeh and Seifi, 2007).

Simshauser and Whish-Wilson (2017) established that deregulated Australian retail electricity markets were producing outcomes consistent with welfare enhancing price discrimination. Their study determined that Victorian price dispersion was high with 'Standing Offer' tariffs 10% above average cost and 'High Discount' tariffs at break-even prices (20% less than average cost). The conclusion of Simshauser and Whish-Wilson (2017, p. 92) was: '*Efficient pricing requires the marginal unit produced to be priced at marginal cost and Victoria meets this criteria – but we identify an episode of inter-consumer misallocation due to high Standing Offers. We conclude policy initiatives designed to help firms shift vulnerable households from Standing Offer tariffs is desirable*.' While competition was deemed to be effectively working for most customers, 'vulnerable customers' were deemed to be at risk and an appropriate targeted policy response was required.

A key limitation of the Simshauser and Whish-Wilson study is the use of *average* consumption. The use of averages effectively implies a homogenous suite of consumer preferences. We have attempted to overcome this limitation by considering the different consumption profiles of customers on 'Standing Offer' and 'High Discount' products. By examining these consumption profiles we can better understand consumer preferences for investing time in 'shopping around' for the best discount. We can also glean insights into how retailers may be using second-degree price discrimination to provide implicit 'price discounts' for higher consuming customers.

The Australian electricity market is an important market to study for several reasons. There is sharp focus on the efficiency and fairness of the retail market. The Commonwealth Government has commissioned a review of retail electricity markets by the Australian Competition and Consumer Commission (ACCC). The Victorian Government has initiated a review chaired by the former Premier, John Thwaites (DELWP, 2017). Prominent 'think-tanks' have questioned the market's operation (see Grattan Institute, 2017, as an example) and Australia's Chief Scientist is conducting a review of the entire east-coast National Electricity Market (NEM) in response to blackouts in South Australia

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https://doi.org/10.1016/j.eneco.2017.12.026
0140-9883/

(Finkel et al., 2016). Australia also has among the highest uptake of household distributed solar PV generation of any market in the world and is expected to be among the leading markets for deployment of storage (see Orton et al., 2017). As such, the dynamics of 'retailing electricity' are likely to be advanced due to a focus on reducing emissions and further penetration of new energy technologies.

The purpose of this article is to extend the analysis of Simshauser and Whish-Wilson (2017) to consider heterogeneous customers. We have considered heterogeneity in two timeframes. Firstly, we have considered customers based on their different present consumption profiles. Secondly, we have considered how new products and services will allow unique customer *demand profiles* to be individually priced in the future. The article is structured as follows: Section 2 provides a brief recount of the existing literature that was well documented in Simshauser and Whish-Wilson (2017); Section 3 presents analysis on the consumption profiles of different Victorian consumers; the introduction of new energy products and services is considered in Section 4; with policy recommendations and concluding remarks provided in Section 5.

2. Brief literature review

Price discrimination has its origins in work presented by Pigou (1920). Stigler (1987) arguably has the best definition of price discrimination as where at least two (or possibly more) similar goods are sold at different prices relative to their marginal cost of production. Put simply, economists argue that prices are efficient where the marginal unit produced is priced at marginal cost (Varian, 1996). In electricity, such a statement can require greater consideration given that prices for electricity can reflect fixed charges, demand (i.e. kW) and energy (i.e. kWh) or a combination of the three. More generally, Robinson (1933) articulates that price discrimination relies upon firms being able to segment customers effectively, with two basic segmentations being *strong* (i.e. low elasticity, higher price) and *weak* (i.e. high elasticity, lower price). There are three basic forms of price discrimination:

- First-degree – a monopolist effectively prices each customer differently based upon their willingness to pay reflected through a downward sloping demand curve.
- Second-degree – non-linear pricing is utilised to provide discounts based on quantity consumed.
- Third-degree – market segmentation is utilised to base individual pricing for particular classes of customers on their willingness to pay (e.g. pensioner discounts at the cinema).

The concept of price discrimination overcomes the simplistic notion of *uniform pricing* being set at marginal cost. Simshauser and Whish-Wilson (2017) articulate that the presence of non-trivial sunk costs in electricity systems necessitate the use of price discrimination. Given the very large upfront capital costs of building electricity generation and network infrastructure, prices cannot be uniformly set to the marginal cost (i.e. operating costs, fuel costs) of production. If prices were set in this way, the return on capital on sunk-cost infrastructure would be sub-optimal and new investment would not be forthcoming. Levine (2002) and Baumol and Swanson (2003) explain that price discrimination is frequently how competitive firms recover their costs in a way that mirrors Ramsey[1] pricing, but instead of facing a regulated revenue constraint, the broader market imposes a proximate revenue constraint on the rival firms. That is, prevailing prices include all separable costs, and some component of common fixed & sunk costs in a way that is inversely related to the demand elasticity of segments served. And because the market (not a regulator) imposes the revenue constraint only efficient firms survive.

Simshauser and Whish-Wilson (2017) note that the price discrimination literature spans the range of markets with associated modelling bounded by numerous derivations of assumptions relating to the number of rivals, information, the size of customer segments, the ease of entry, discounts and customer poaching, mixed product bundles and other market structure characteristics. In competitive markets differential prices can fall either side of uniform price, or indeed, fall below the uniform price because ornate tariff structures are used by firms to attack rivals and steal market share and can produce what Corts (1998) describes as 'all out competition'. A key insight from Taylor (2003) is that when three or more competitors exist, firms earn economic rent on some customers but zero economic profit overall because they face strong incentives to price below-cost in some instances to poach rivals' customers. Consequently, marginal offers are not of themselves a sustainable equilibrium.

It is important to distinguish how price discrimination is utilised in competitive markets by individual firms. Much of the literature utilises the *strong* and *weak* segmentation theory discussed earlier. The theoretical *uniform* price is positioned between a higher price for the *strong* segment and a lower price for the *weak* segment (Holmes, 1989). With such pricing in place, and assuming that firms have dynamically shifting capabilities to segment (see Corts, 1998), there is an ability for firms to aggressively build market share. Discriminatory prices and ornate tariffs are used by firms to attack rivals. The presence of new energy technologies such as digital metering and analytics are enhancing the ability of electricity businesses to devise business models along these lines. The important assumption in the proposition above is that firms have differing capabilities and opinions on market segmentation (non-uniform segmentation) and actively seek to segment on the basis of the *strong* and *weak* components. Demonstrating this in practice is inherently difficult. However, it is also important to note that the alternative to price discrimination in restructured energy markets is regulated uniform pricing.

Corts (1998) has demonstrated that if firms are required to implement uniform pricing due to policy intervention, companies will naturally focus on strong market segments with a view to maximising profit. This has certain implications for policy makers in electricity markets. Simshauser and Whish-Wilson (2017) discuss in great detail the 'working laboratory' situation in the UK as a result of Ofgem intervention in the electricity market to minimise price discrimination. They summarise the work of eminent economists (including Professors Yarrow, Vickers, Green, Littlechild, and Waddams Price)[2] that reducing price discrimination is likely to reduce competition and have a detrimental impact on low-income customers.

There is general consensus within the literature that price dispersion increases as competition intensifies (see Borenstein and Rose, 1994; Dana, 1998; Stole, 2007). Firms effectively seek to utilise their market segmentation analytical capabilities to capture the market share of *valuable customers*. Theory and empirical research predicts a proliferation in the number and the complexity of products with intensifying competition. New products are how firms attract and 'poach' a rival's idle customer segments. It is not evidence of a market failure (Klein, 1993; Borenstein and Rose, 1994; Levine, 2002; Baumol and Swanson, 2003; Littlechild, 2014). This has certainly been the case in Australia where switching rates to new products in Victoria are among the highest in the world (see Grattan, 2017). Simshauser and Whish-Wilson (2017) state that, '..the presence of price discrimination is not, of itself, evidence of market power.' However, it is important to note that price dispersion is not necessarily evidence that market power (of some kind) does not exist either and issues of information asymmetry between electricity suppliers and their customers need to be addressed by policy makers in

[1] Ramsey pricing was designed to be deployed in regulated monopoly industries as a means by which to recover common fixed and sunk costs in a least distortionary way, i.e. setting a high price in the relevant strong market and low price in weak markets – essentially combining an inverse-elasticity rule with multi-part tariffs to recover infra-marginal costs for a given regulated revenue constraint. Ramsey pricing has long been regarded as a benign form of discriminatory pricing and preferable to uniform prices in declining cost monopoly industries. See Ramsey (1927).

[2] For example, see Hviid and Waddams Price (2012); Flores and Waddams Price (2013); Pollit and Haney (2014); Littlechild (2014); Littlechild (2016).