Do Victoria's households leave less money on the table when they switch electricity retailers?

VEPC Working Paper 1909
September 2019

Bruce Mountain and Stephanie Rizio

Abstract

Governments, regulators and customer groups in Australia have urged customers to switch retailers to get better deals. Customers have responded and switching rates are high. A common view is that over almost a decade of unregulated competition a two-tier market has evolved, in which "switchers" avoid the "loyalty tax" paid by "remainers". We analyse a little over 48,000 Victorian household electricity bills to compare outcomes for switchers and remainers. The typical remainer left $281 per year (20% of their bill) on the table. However, after controlling for various factors, switchers only leave $45 less on the table. This calls into question the common view of a market bifurcated between switchers and remainers. Competing explanations include that customers value attributes other than prices when they search and switch, that rents have already been competed away, that customers find tariff structures and discounts confusing or that they get poor advice. We conclude that customers mostly search for lower prices, that rents have not been competed away and that tariff structure complexity does not seem to be a problem. Discounts that are not as they seem and poor advice from price comparison service providers likely explains part of the market's failure to give most customers what they seem to be searching for. While successful retail markets may depend on demand-side participation, this is not sufficient. Customers must be able to participate effectively if they are to benefit from the market.

Keywords: Retail choice, search costs, loyalty tax

JEL Classification: C31, D11

DOI: 10.26196/nmsp-b377

bruce.mountain@vu.edu.au; stephanie.rizio@vu.edu.au

1 Introduction

Competition for the sale of electricity to households was introduced in the state of Victoria (Australia) in 2003 with prices initially subject to regulatory controls. Victoria was the first state in Australia to completely withdraw all price controls in 2009. Between 2009 and 2016 retail prices in Victoria rose by 84% (ABS Consumer Price Index, 2017). Consequently retail markets attracted attention as seen for example (Ben-David, 2015, 2018; Mountain, 2015; Thwaites, Faulkner and Mulder, 2017; Woods and Blowers, 2017; Australian Competition and Consumer Commission [ACCC], 2018). While these reports and inquiries drew attention to a range of issues, a common thread was the hypothesis of a two-tier market in which active customers who switched retailers obtained better deals than those who remained with their existing retailer. Industry representatives also described the market in these terms (see for example (Potter, 2016)).

With the bifurcation hypothesis well established, it is understandable that the mainstay of policy makers' response to dissatisfaction with retail markets has been to encourage customers to switch retailers. Consequently switching rates in Victoria have been high, possibly amongst the highest in the world[1].

Underlying the bifurcation hypothesis is the observation of a high level of price dispersion. While it is clear that many customers would pay much less if they switched to one of the cheaper offers in the market, whether in fact they did when they switched, has not yet been proven. The focus of this paper is to establish whether the market is bifurcated as supposed and whether switching has been the solution that policy makers (and customers) thought it would be.

We do this by analysing electricity bills that 48,088 different households uploaded to the Victorian Government's price comparison website during the period July to December 2018. A group (16,803) of these households switched retailer in the year before they uploaded their bills. By comparing prices paid by these "switchers" to the prices paid by those households that did not switch (the "remainers") it is possible to establish if switching achieved what the switchers (and policy makers) wanted.

We contribute to the literature by testing the bifurcation hypothesis through analysis of a large sample of bills. Analysis of customers' bills has been used in retail market inquiries (see for example (Competition & Markets Authority, 2016; Thwaites, Faulkner and Mulder, 2017; Australian Competition and Consumer Commission [ACCC], 2018)

[1] The switching data collected by the Australian Energy Market Operator showed that in 2018, 34.82% of all households switched retailer. We estimate there were 552,952 switches because of household relocations or new homes. This gives a 2018 switching rate after new homes or relocations of 20.6%. By comparison, the Council of European Energy Regulator (see (Council of European Energy Regulators, 2018) reports a similarly defined switching rate (in 2017) of EU member states. This was the highest in Norway, Portugal and Britain: 18.8%, 18.5 and 18.2% respectively.

although with smaller samples. These inquiries observed that customers could save by switching but none tested the extent to which this occurred when they did.

Considering the resources needed to establish and analyse a large number of bills and compare them to all commonly-available offers in a market, this type of research is rarely found in the literature (an exception, using a smaller survey than common in the inquiries, is Waddams Price and Wilson, 2010). In addition, in the pursuit of explanations for our results we contribute to the literature through various forensic studies of aspects of the market in the tradition of (Littlechild, 2018).

The next section reviews relevant search cost literature. This is followed by a description of our sample and comparison of our sample to the population with a view to concluding whether our sample is likely to be biased. Non-parametric and parametric approaches are then used to analyse our sample and derive our finding that switching is not associated with a large reduction in the amount of money households leave on the table. The discussion of these findings seeks to interpret and explain them. A concluding section draws out the main points and their policy implications.

2 Relevant literature

Markets that offer customers a variety of competing offers for similar products provide customers with the opportunity to obtain better deals by shopping around. Shopping involves costs ("search costs") such as the time and effort needed to acquire information to identify superior offers. By definition, search costs do not arise for consumers who are fully informed. Customers that then switch incur switching costs, such as the transaction costs involved in changing payment arrangements, paying termination or joining fees, or losing loyalty discounts.

Some of the literature looks exclusively at the effect of switching costs on customers' decision to switch (for example (Salies, 2004, Klemperer, 1987; Shy, 2002; Deller *et al.*, 2017), whereas a (larger) strand of the literature considers the effect of both switching and search costs (for example, (Waddams Price and Wilson, 2010; Wilson, 2012; Waddams Price and Zhu, 2013; Waddams Price, Webster and Zhu, 2013; Giulietti, Waterson and Wildenbeest, 2014; Honka, 2014). Several studies of retail electricity markets (e.g. (Waddams Price *et al.* 2013; Giulietti *et al.,* 2014) suggest that search costs are perceived to be larger than switching costs by consumers, and that searching is generally more time-intensive than switching and hence searching is more expensive (Wilson, 2012). The focus of this article is on search costs revealed by customers that had already switched, and we therefore do not engage further with the switching literature.

A common approach in measuring search costs is to assess the extent to which consumers have been able to find the best offers when they search for them (see for example (Stahl, 1996; Waddams Price and Wilson, 2010; Wilson, 2012; Waddams Price, 2018)). Assuming that customers search for the cheapest offers, their search cost can then be observed as the difference between the price they pay on the offer they chose compared to the price they would have paid, had they found the cheapest offer in the market. This is colloquially referred to as "money left on the table".

In their analysis of two independent surveys of the UK electricity market (Waddams Price and Wilson, 2010) estimated that consumers switching exclusively for price reasons appropriated less than half the gains available (30-52%) and that the burden of the search process explained most of this. (Waddams Price and Zhu, 2013) found that 8-18% of consumers were found to switch providers even though they did not expect any monetary gain. In their study of the electricity market in Texas using monthly household-level data between years 2002-2006 (Hortaçsu, Ali, Madanizadeh, Seyed A, Puller, 2015), conclude that neighbourhoods with lower income, lower education, and more senior citizens experienced higher search costs.

Customers may value attributes other than price in their selection of retailers (Giulietti, Waterson and Wildenbeest, 2014; Hortaçsu, Ali, Madanizadeh, Seyed A, Puller, 2015; Deller *et al.*, 2017) refer to non-price factors to explain customer choices. Non-price factors affecting search costs and switching include branding (or preference for a quality-based attribute), conscious or unconscious desire to avoid choice, regret and/or uncertainty, cognitive limitations, and aversion to time inconsistency leading to the incorrect prediction of future demand or price changes (Hortaçsu, Ali, Madanizadeh, Seyed A, Puller, 2015) and other heuristics and biases.

Besides the search and switch cost literature, (Defeuilley, 2009) describes and provides the rationale for the bifurcation hypothesis that this paper tests.

3 Data

This section explains how our sample was established and compares the sample to the population.

3.1 Establishing the data

The Government of Victoria provided a little under 50,000 household electricity bills in PDF format to us. Of these, a little over 48,000 households were able to choose their retailers[2]. Individual households in Victoria had voluntarily uploaded these bills to the Government's price comparison website (https://compare.energy.vic.gov.au/) over the period from July 2018 to December 2018.

Customers were encouraged to use the Government's price comparison site through the payment of $50 if they consulted the site, although they were not required to upload their bills in order to receive the payment. Customers who had uploaded their bills agreed that the deidentified data in their bills could be used for research.

Commercially available software (MISwitcher) developed by the author parsed these PDFs to extract the relevant information including the address, consumption, rooftop PV production (where relevant), supply, consumption and feed-in prices, discounts, their distributor and retailer. By examining consumption history in all bills except those for one retailer (Powershop) it was possible to determine whether the customer switched their retailer at some point in the year before they uploaded their bills.

Working out the price that customers actually pay for electricity is complex. Much of this complexity originates in the discounts that exist in around 85% of all the bills in the sample. Since discounts are an important component of most bills, properly accounting for them is essential in accurately pricing bills and in order to compare the bill to competing offers to work out customers' relative position. These discounts are often opaque and complex. For example, in some bills the discounts are stated as fixed amounts at the start and/or at the end of bills. Sometimes they are stated as percentages but frequently it is not clear whether the percentage applies to the total bill or just the usage charges in bill. Sometimes discounts apply to the amounts after concessions and solar feed-in revenue and sometimes to the bill before either or both. Some bills have several separate discounts that apply in some cases to consumption charges and in others to daily charges and consumption charges.

[2] Most of the 2000 remaining customers were supplied on "embedded" networks and thus not able to choose their retailer.

MISwitcher prices each bill based on the details of each bill and then annualises[3] the amounts assuming the prices and volumes in the bill are representative of the annual demand (and in the case of exports from rooftop solar, grid exports). A more accurate estimate of annual rooftop solar production can be obtained by also obtaining information on the kW capacity of the rooftop installation. These data were not available so our estimate of solar exports relies on an annualisation of the solar export volumes in each bill. Annualisation of consumption is used to produce bill estimates in a commonly understood unit (annual charges).

All competing offers available to each of the customers is then determined, based on the offers listed on the Victoria Government's price comparison website on the median end date of all the bills in the sample (30 August 2018). Retailers are required to list all publicly available offers on the Government's price comparison site. Retailers in Victoria offer in total around 1,300 different offers to households in the five distribution zones that divide Victoria.

In our price comparisons we restrict the list of eligible offers available to each customer based on their tariff type and, of course, distribution zone. This means that we only compare tariffs with single or multiple non-time variant rates to bills with single or multiple non-time variant rates. Similarly we restrict the comparison of bills with two rate time-of-use or three rate time-of-use charges to offers with two rate or three rate time-of-use charges respectively.

Restrictions are also made to account for the existence, where applicable, of controlled load charges and solar feed-in payments. Following these restrictions, the median number of competing offers for the bills in our dataset is 254. This restriction means that we understate the amount that customers might save if they select offers with tariff structures that are different to their current structure. However customers seldom select offers with tariff structures that are different to the ones they currently have. Retailers do not encourage their current or potential customers to change tariff structures and retailers often charge existing or potential customers to change to tariffs with different structures. Our restrictions are therefore consistent with how the market actually operates.

The data file for each bill in our sample therefore contains all the bill's details as described above, the annualised charges before and after solar exports and before and after the receipt of government concessions and the amount that customers can save by switching to any of the other competing offers, and the details of those offers. In addition since we have post code data for each customer we associate post code level socio-economic data available from the Australian Bureau of Statistics respectively, with each customer in the sample.

---

[3] The bills covered charges for the supply of electricity over the standard 30 day period. It might be suggested that annualising from one month's data is not adequate. However Victoria's household electricity users is generally not seasonal (space conditioning is predominantly winter heating from gas). The uploaded bills cover the period from the tail end of winter through spring and early summer. Furthermore even if the annualised consumption estimates are not appropriate there is no reason to believe that there is any asymmetry between those that switched and those that remained.

Appendix A provides a statistical summary of the data and the analysis of annual bills, annual consumption and prices segmented by tariff type, distributor, switched/not-switched, concession/no-concession, solar/no-solar, retailer and ABS socio-economic decile.

3.2 Comparing the sample to the population

Here we compare our sample to the population of household electricity consumers in Victoria in respect of tariff type, distributor, retailer, proportion with rooftop PV production, proportion with concession, the proportion that switched retailer in the past year and finally the socio-economic decile of the postcode that the household lives in.

Tariff type

Table 1 shows the number and proportion of customers by the structure of their tariff for our sample compared to the population. We have slightly fewer on block or flat structures and more on time-variant structures but the gap is not large.

Table 1. Number and proportion of customers by tariff type – sample versus population

Category	Sample		Population		Sample minus population
Block or flat	40,961	83.00%	2,030,547	86.79%	-3.79%
Time of use	7,565	15.33%	307,743	13.15%	2.18%
Flexible	822	1.67%	1,199	0.05%	1.61%
Total	49,348	100.00%	2,339,489	100.00%	

Source of population data: Carbon Market Economics (CME), 2017

Distributor

Table 2 compares the number and proportion of customers by distribution zone. Our sample has more customers in the lower cost urban distributors (Citipower and United) than in the higher cost distributors (Powercor and Ausnet Services).

Table 2. Number and proportion of customers by distribution zone – sample versus population

Category	Sample		Population		Sample minus population
Citipower	6,979	14.14%	302,973	11.41%	2.73%
Ausnet Services	11,416	23.13%	652,885	24.60%	-1.46%
United	13,642	27.64%	541,868	20.41%	7.23%
Powercor	11,231	22.76%	863,534	32.53%	-9.77%
Jemena	6,080	12.32%	293,028	11.04%	1.28%
Total	49,348	100.00%	2,654,288	100.00%	

Source of population data: Carbon Market Economics (CME), 2017

Retailer

Table 3 compares the number and proportion of customers by retailer zone. Our sample has more customers in the lower cost urban distributors (Citipower and United) than in the higher cost distributors (Powercor and Ausnet Services). Relative to the population, the sample is skewed towards the lower priced third tier retailers, away from the typically more expensive first tier retailers, with proportionately the greatest difference being amongst the cheapest new entrant retailers.

Table 3. Proportion of customers by retailer – sample versus population

Retailer	Sample	Population	Sample minus Population
AGL	19.33%	22.04%	-2.71%
Origin	15.49%	18.26%	-2.77%
Energy Australia	14.24%	18.22%	-3.97%
Simply Energy	11.56%	9.60%	1.95%
Red Energy	6.76%	9.30%	-2.53%
Lumo	6.54%	6.69%	-0.15%
Alinta	3.86%	3.58%	0.28%
Momentum Energy	4.62%	3.18%	1.45%
Powershop	3.24%	2.30%	0.94%
Dodo	2.62%	1.87%	0.74%
Click Energy and Amaysim	2.98%	1.57%	1.41%
Powerdirect	0.58%	1.30%	-0.73%
Sumo	2.18%	1.11%	1.07%
Globird	3.48%	0.51%	2.97%
Tango	2.51%	0.46%	2.05%
Total	100.00%	100.00%	0.00%

Source of population data: Essential Services Commission Victorian Energy Market 2017-2018 (p. 27)

Rooftop PV and receipt of government concession

The proportion of households with rooftop solar in the sample (14.64%) is similar to the population (13.95%) (Clean Energy Council, 2018). Similarly, the proportion of customers that received some form of government concession in our sample (35%) is similar to the population (37%) (Colmar Brunton Social Research, 2018).

Switching rate

The proportion of customers that had switched retailer in the year before they uploaded their bills (36%) is slightly higher than the estimated switching rate of the population (34.82%) (AEMO National Electricity Market Monthly Retail Transfer Statistics, 2019).

Socio-economic decile

Table 4 shows the proportion of customers in the sample by socio-economic decile of the postcode they live in compared to the population. Areas in Australia are ranked relative to socio-economic advantage and disadvantage (Socio-Economic Indexes for Areas; SEIFA), based on information from the five-yearly Census. The lowest 10% of

areas are given a decile number of 1, the next 10% of areas are given a decile number of 2 and so on. Customers in the sample are by far over-represented in the highest economic deciles relative to the population.

Table 4. Proportion of customers in each socio-economic decile – sample versus population

Category	Sample	Population	Sample minus population
1	3.71%	4.82%	-1.10%
2	4.57%	6.27%	-1.69%
3	2.94%	8.64%	-5.70%
4	6.61%	9.70%	-3.08%
5	4.61%	12.07%	-7.46%
6	12.80%	12.80%	0.00%
7	11.61%	13.65%	-2.05%
8	15.66%	13.52%	2.13%
9	20.83%	11.21%	9.62%
10	16.66%	7.32%	9.34%
Total	100.00%	100.00%	

Source of population data: Australian Bureau of Statistics, 2011

To summarise, our sample is similar to the population in respect of the proportion of customers with rooftop solar, receipt of government concessions, tariff type and whether they switched retailer in the last year. But the proportion that live in metropolitan areas, that buy electricity from typically less expensive retailers, and that live in higher socio-economic post codes is appreciably higher in the sample than the population.

Customer surveys in 2017 (see (Newgate Research, 2017)) found extremely low (2%) unprompted awareness of any of the government run price comparison websites in Australia. However the customers that uploaded their bills to the Victorian Government's price comparison site after July 2018 (and hence that have been included in our sample) did so following an extensive campaign by the Government to draw attention to its site and encourage its use including by paying customers to consult the site.

Taken together, we conclude that our sample may be biased towards customers that are more engaged with the retail market than the population. However we doubt that the bias is large considering the effort and expense that the Government had gone to, to advertise and encourage use of its site, and through this to access customers who are likely to have previously been disengaged, particularly so for the "remainers" in our sample.

4 Analysis of Money Left on the Table

This study seeks to understand how successfully customers engage in the electricity market, as measured by the amount of money they leave on the table when they switch retailers relative to the money left on the table by those that did not switch retailer. The "Money Left on the Table" (MLT) is the difference between a customer's estimated annual bill based on the prices in their contracts with their retailers and how much their estimated annual bill would be if they had selected the commonly available offer with the cheapest rates. If customers have solar the calculation considers the combination of purchase and sales prices that maximises the financial gain from switching.

In the econometric analysis that follows we compare MLT for those customers that switched retailers at some point in the year before they uploaded their bills to the Government's price comparison site (the "switchers"), and MLT for those customers that have remained with their same retailer for at least a year before they uploaded their bills (the "remainers").

We do not know the switchers' original retailer or what prices they were paying before they switched. Therefore we do not know how much they reduced MLT by switching and hence we do not know what proportion of their possible bill reductions they appropriated by switching. We also do not know whether customers that did not switch, had nevertheless negotiated a better deal with their existing retailer. In other words, how much better off were those customers that negotiated with their retailer but did not change retailer? It might be suggested that a large number of the remainers might have switched to a cheaper deal with their retailer even if they did not switch retailer. For example in a survey of 400 customers, (Newgate Research, 2017) suggested that more customers switched plans than switched retailers in 2016. However the retailer switching rate it reported was around half the actual rate of transfers counted by the Australian Energy Market Operator and so their survey result in this respect is not representative of the known population. Nevertheless it is possible that a non-trivial proportion of the remainers will have switched plan even if they did not switch retailer.

Our conclusions are based on linear regressions[4] using cross-sectional data. Endogeneity attributable to measurement error, simultaneity bias and omitted variable bias are common concerns with cross-sectional data (Oster, 2017). With respect firstly to measurement error we are confident that the bill data has been accurately extracted and the bills accurately priced. The parsing and pricing software we use is commercially available and prior to its use in this study, it has been used over the last three years to estimate and compare bills of more than 12,500 customers in all contestable retail markets in Australia.

With respect to simultaneity bias, there are three continuous independent variables (annual solar export volumes, the level of discounts and consumption) in our data and model. From first principles we reject simultaneity bias with respect to solar export volumes or discount rates: customers do not export more or obtain different discounts

[4] We also consider non-parametric methods and as discussed later they deliver much the same result as our parametric method.

because they leave more money on the table. This leaves a possible concern of simultaneity bias between MLT and consumption i.e. that customers that switched retailer at some point in the year before they uploaded their bills to the Government's price comparison site, would have meaningfully increased their consumption after they switched. We reject this possibility on the basis on evidence of the low short term price elasticity of demand (for example Fan and Hyndman, 2011; Burke, 2017; Labandeira, Labeaga and López-Otero, 2017). This is also visible in our own data. For example we find no statistically significant relationship between the differences in peak and off-peak prices and the ratio of peak to off-peak consumption in the 6,800 customers with peak/off-peak rates. If customers do not respond to large differences in their peak and off-peak prices, why would they respond to possibly lower overall prices after having switched retailer?

It might be argued that there is simultaneity between MLT and switchers: i.e. that the switchers knew they were getting a bad deal and so switched. But we are not trying to predict who switched or remained and we do not measure how much the switchers saved when the switched, only how much money they left on the table after they had switched.

It is an interesting question – and not one that our data can answer - whether the switchers in the sample had statistically different pre-switch MLT as the remainers. It might be argued that those who were getting a bad deal would be more likely to switch (and so their pre-switch MLT would be higher than that of the remainers). But on the other hand the evidence of the limited success that switchers had in reducing MLT compared to the remainers suggests that the switchers might well not have known that they were on particularly bad deals before they switched. And so, the switchers may well not have been paying more than the remainers before they switched.

This leaves omitted variable bias as a potential concern. As with any cross-sectional study we cannot dismiss the prospect of omitted variable bias: we can't know what we don't know. But we control for all the supply-side factors that define the retail market (tariff type, distributor, inclusion or not of rooftop solar). On the demand-side, our characterisation is limited to post-code level socio-economic data and we know if customers received a government concession. A more complete demand-side characterisation (for example distinguishing customers on the basis of income, wealth, gender, age, education etc. would be helpful in understanding how these factors affect MLT). While this would be interesting, knowing the effect of these factors would not affect the conclusions of this study because we are not attempting to predict what type of customer switched or, as noted, how much customers saved when they switched.

The stability of the coefficients in our different models suggest we need not be concerned with potential omitted variables that are correlated with the independent variables in our models. Our consideration of the theory of electricity retail markets and of the retail market literature does not suggest any uncorrelated variable whose absence would bias our results.

The rest of this section develops our analysis. We first describe potential explanatory variables and then use Multivariate Adaptive Regression Splines (MARS) (see Friedman, 1991) to understand the relative importance of the possible explanatory variables. Our conclusions do not rest on the MARS analysis, but MARS is useful in

understanding the relative importance of different explanatory variables[5]. Since it can generate piece-wise linear relationships, unlike linear regressions it is also able to detect and account for nonlinearities in our explanatory variables.

After testing the independence of potential continuous and discrete factors and analysing heteroskedasticity of the error term, we generate results using our OLS models and then draw out the main points.

Potential explanatory factors

The continuous variables include "ann_total_use" (annual kWh consumption estimated by annualising the consumption in each bill), "ann_ solar_export" (annual kWh exports from those households with rooftop solar estimated by annualising the exports bill) and the percentage discounts in the bills. Categorical variables include whether the households have controlled loads, their tariff type, their retailer, whether they receive government concessions and the socio-economic deciles of the post code in which they live.

Multivariate Adaptive Regression Splines (MARS)

Table 5 shows the MARS regression of MLT. It shows that switchers left $47 less on the table (the coefficient on the "has_switchTRUE" variable) than the remainers.

Table 5. MARS model: Money Left on the Table

```
best_saving =
2.3e+03
-       47 * has_switchTRUE
-      135 * retailer10
+      208 * retailer12
+       53 * retailer4
+      377 * retailer16
-      339 * retailer9
-      221 * retailer4
+      290 * retailer13
-      563 * retailer8
-      151 * tariff_typeflexible
-       51 * tariff_typetou5
-    0.046 * pmax(0, 53747 - ann_total_use)
+    0.073 * pmax(0, ann_total_use -  53747)
+      150 * pmax(0, discount_percent -  1)
+       91 * pmax(0, 6 -discount_percent)
-      206 * pmax(0, discount_percent - 6)
+       43 * pmax(0, discount_percent - 10)
+   0.0084 * pmax(0, 5177 - ann_solar_export)
+     0.06 * pmax(0, ann_solar_export - 5177)
```

[5] MARS is a non-parametric regression technique and can be seen as an extension of linear models. It automatically models nonlinearities and interactions between variables. It is available in open-source (R, Matlab, Python) and commercial software (Salford, SAS, Statsoft)

```
GCV 40350    RSS 1864219405    GRSq 0.61    RSq 0.61
```

In this table:

- "has_switchTRUE" is a binary variable that has the value of 1 if the customer switched retailer at any point in the 12 months before they uploaded their bill;
- tariff_typetou5 describes tariffs thathave peak, and off-peak rates during weekdays and off-peak rates on weekends;
- tariff_typeflexible describes tariffs that have peak, shoulder and off-peak rates;
- ann_total_use is the customers annual electricity volume purchased from the grid (kWh);
- discount_percentage is the percentage discount rate in the customers' bill;
- ann_solar_export is the annual volume of electricity exported to the grid from households with rooftop solar.

Analysis of the residual sum of squares of the regression shows that having switched retailer in the last year is only the 10th most important explanation of MLT.

Pearson Product Moment correlations of the continuous variables showed the continuous variables are independent of one another (the highest correlation was 0.03). In the case of our categoric factors, Chi-square tests were used to evaluate whether there is a significant association between the categories of the two variables. The test examines whether rows and columns of a contingency table are statistically significantly associated. Applying this test to the categorical factors we find dependence between tariff type and distributor, in respect of Ausnet and multi-flat tariffs in particular (multiflat tariffs are popular in Ausnet's area of supply but not amongst other distributors). Regressions that contain both tariff type and distributor will fail to provide robust estimates of the coefficients on these variables.

With respect to heteroskedasticity, the models show heteroskedasticity in plots of the residual against the dependent variable. This is confirmed by Breusch-Pagan tests. To account for this we use Robust Standard Errors.[6]

Table 6 presents four OLS models with MLT as the dependent variable, after adjustment for heteroskedasticity and taking account of the analysis of the independence of explanatory variables.

[6] In view of our very large sample size these show, as expected, only small differences relative to the standard errors of all of the main coefficient estimates.

Table 6. OLS regression: Money Left on the Table

Variable	Model 1	Model 2	Model 3	Model 4
Intercept	117.77 ***	449***	460.53***	448.38***
ann_total_use	0.05***	0.05***	0.05 ***	0.05 ***
has_switchTRUE	-91.98***	-43.89***	-46.53***	-43.69***
ann_solar_export	-	0.01 ***	0.01 ***	0.01 ***
discount_percent	-	-11.81 ***	-11.83 ***	-11.82 ***
has_cldTRUE	-	-30.41 ***	-36.23 ***	-30.48 ***
has_concessionTRUE	-	-15.88 ***	-15.27 ***	-16.3 ***
Retailer6	-	-50.59 ***	-51.59 ***	-50.2 ***
Retailer10	-	-134.47 ***	-145.11 ***	-134.28 ***
Retailer12	-	221.44 ***	221.99 ***	221.58 ***
Retailer17	-	-161.43 ***	-137.27 ***	-161.34 ***
Retailer14	-	33.84 ***	35.2 ***	34.08 ***
Retailer4	-	45.59 ***	43.79 ***	45.84 ***
Retailer16	-	362.25 ***	358.5 ***	363.6 ***
Retailer7	-	-56.79 ***	-51.35 ***	-56.4 ***
Retailer11	-	-37.88 ***	-42.07 ***	-37.73 ***
Retailer9	-	-414.1 ***	-413.14 ***	-414.2 ***
Retailer2	-	-2.84	-3.75	-2.25
Retailer15	-	-86.5 ***	-83.44 ***	-86.59 ***
Retailer18	-	-344.08 ***	-334.54 ***	-344.71 ***
Retailer3	-	-205.41 ***	-204.33 ***	-205.16 ***
Retailer5	-	1.5	-4.6	1.93
Retailer13	-	274.08 ***	276.74 ***	274.18 ***
Retailer8	-	-648.37 ***	-650.25 ***	-647.98 ***
Decile2	-	-	14.29*	9.89
Decile3	-	-	5.58	0.01
Decile4	-	-	0.82	-1.26
Decile5	-	-	3.34	0.95
Decile6	-	-	4.45	1.17
Decile7	-	-	1.83	-0.38
Decile8	-	-	-2.65	-3.76
Decile9	-	-	-2.46	-0.83
Decile10	-	-	0.16	6.26
tariff_typeflexible	-	-	-160.55 ***	-
tariff_typemultiflat	-	-	-3.88	-
tariff_typemultiflexible	-	-	-198.94 ***	-
tariff_typemultitou5	-	-	-65.12 ***	-
tariff_typeseasonalFlexible	-	-	-190.7 ***	-
tariff_typetou5	-	-	-67.7 ***	-
distributorcitipower	-	-	-	-7.9
distributorjemena	-	-	-	4.39

Variable	Model 1	Model 2	Model 3	Model 4
distributorpowercor	-	-	-	0.72
distributorunited	-	-	-	1.05
R^2	0.3887	0.5871	0.5957	0.5872
N	48088	48088	48088	48088

* significant at 10%
** significant at 5%
*** significant at 1%

In this table:

- "has_switchTRUE" is a binary variable that has the value of 1 if the customer switched retailer at any point in the 12 months before they uploaded their bill;
- has_cldTRUE
- tariff_typetou5 describes tariffs thathave peak, and off-peak rates during weekdays and off-peak rates on weekends;
- tariff_typeflexible describes tariffs that have peak, shoulder and off-peak rates;
- tariff_typemultiflat describes tariffs that have more than one rate corresponding to consumption bands that may be measured daily or monthly.
- tariff_typemultiflexible describes tariffs that have peak, shoulder and off-peak rates and more than one peak rate corresponding to consumption bands that may be measured daily or monthly.
- tariff_typemultitou5 describes tariffs that have peak and off-peak rates and more than one peak rate corresponding to consumption bands that may be measured daily or monthly.
- tariff_typeseasonalFlexible describes tariffs that have peak, shoulder and off-peak rates and more than one peak rate corresponding to consumption bands that may be measured daily or monthly.
- retailerX is a specific retailer
- decileX is the ABS socio-economic decile of the postcode that the customers' house is located.
- has_concessionTRUE has the value 1 if the customer is in receipt of a government concession
- ann_total_use is the customers annual electricity volume purchased from the grid (kWh);
- discount_percentage is the percentage discount rate in the customers' bills;
- ann_solar_export is the annual volume of electricity exported to the grid from households with rooftop solar.

Table 6 shows that in the three well-specified models, households that switched retailer in the last year left $44 to $47 less money on the table compared to those households that did not switch. The estimate is stable and statistically significant (at 1%) in the different fully specified models and compares to $47 in the MARS model. Other notable results from this analysis include that:

- The volume of electricity bought and in the case of customers with rooftop solar the volume of electricity sold, are both statistically significant indicators of MLT. Customers leave more money on the table after adjusting for all other factors, at

the rate of 5 cents per kWh of their consumption and 1 cent per kWh of their rooftop solar sales.

- The socio-economic decile of the postcode that the customers lives in, is not a statistically significant explanation of the amount of money customers leave on the table.
- The receipt of a government concession is a statistically significant explanation of MLT but the gap is not large: those that receive a concession only leave a little less money on the table (around $16) than customers that do not.
- Tariff structure is a statistically significant explanation of MLT. Contrary to expectations, customers with simpler tariff structures leave more money on the table than customers with more complex tariff structures.
- The distribution area that the customer is located in, does not explain MLT.

5 Discussion

The analysis of our sample finds that while customers that switch retailers are likely to pay lower bills, across the sample the switchers leave only a little less money on the table (around $45 per year) which is about 16% of the MLT of the remainers, or around 3% of the typical annual bill. This finding is at odds with the common view that the market can be distinguished on the basis of whether customers switched or stayed, with the latter paying a "loyalty tax"[7] In the rest of this discussion we explore three possible explanations: firstly that rents have already been competed away; second that customers switch for reasons other than price; and third that customers find it difficult to know if they are getting a good deal.

Have rents already been competed away?

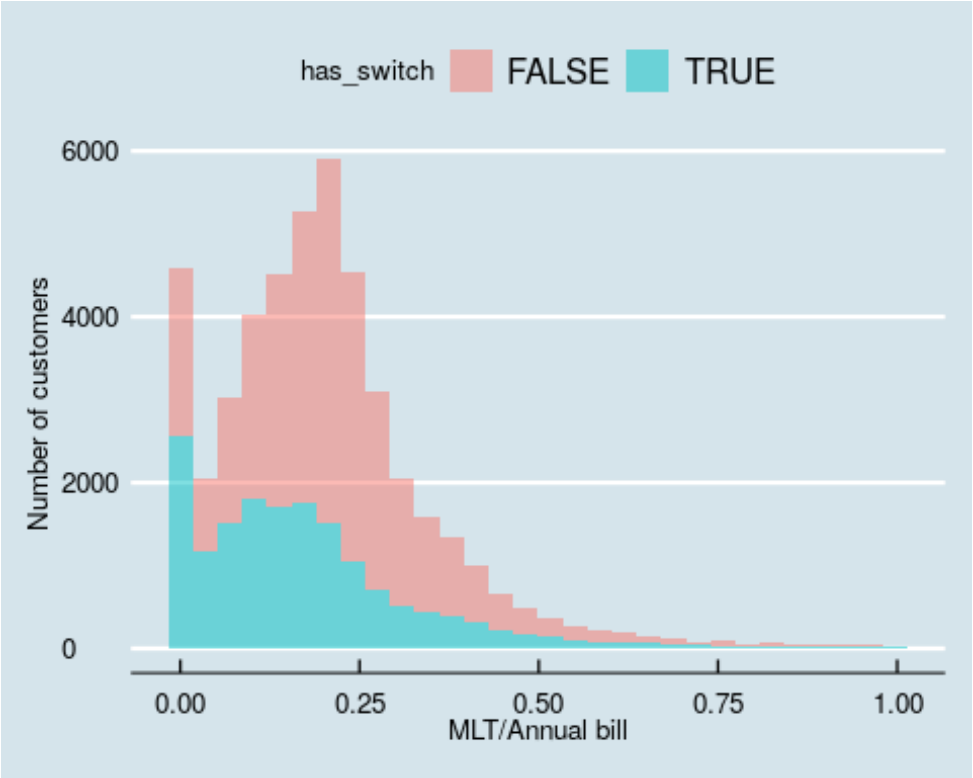
It might be argued that the small gap between switchers and remainers is because the retail market has reached an equilibrium in which the rents have been competed away. The indicators of a market in which rents had been competed away might include low switching rates, that most customers are on low margin offers and that the number of loss-leading offers would be small. None of these seem to apply: Firstly, as noted earlier, the switching rate in Victoria is the highest in Australia and higher than in other countries as far as we know.

Second the histogram of MLT divided by annual bill (in Figure 1 below) shows most customers are on offers that are substantially higher than the best offers in the market. This histogram shows that the shape of the distribution of MLT divided by annual bill is

[7] It might be suggested that a large number of the remainers might have switched to a cheaper offer from their retailer even if they did not switch retailer. For example in a survey of 400 customers, (Newgate Research, 2017) suggested that more customers switched plans than switched retailers in 2016. However the retailer switching rate it reported was around half the actual rate of transfers counted by the Australian Energy Market Operator. Nevertheless it is likely that some, non-trivial, proportion of the remainers will have switched plan even if they did not switch retailer. The evidence of the level of MLT for the remainers suggests that if this proportion accounts for a reasonable proportion of all remainers, then such intra-retailer switching has not been successful in reducing MLT to levels that might be expected in well-functioning contestable markets.

much the same for switchers as for remainers, though a slight leftward shift is visible. This is consistent with the findings of the econometric analysis.

Figure 1. Histogram of MLT divided by annual bill for switchers and remainers



Third, analysing the offers in the market shows that if we define MLT by reference to the second or third cheapest offer (rather than the cheapest offer), the median MLT reduces, relative to MLT calculated with respect to the cheapest offer, by $8 and $26 respectively. Evidently customers have a selection of competing offers that present substantial savings to them. The data does not support a conclusion that the Victoria retail market can be characterised as one in which rents have already been competed away.

Do consumers switch for reasons other than price?

Is the small gap in MLT for switchers and remainers because switchers were not looking, primarily, for cheaper deals? Customer surveys (see (Newgate Research, 2017) find that customers say that price is by far the dominant motivation for switching. We also examined the result of annual surveys conducted by consumer review and comparison website, Canstar Blue[8] to assess the extent to which switching might be explained by the pursuit of high quality service rather than price.

We compare first the medial MLT for the switchers, by retailer, and then examine Canstar Blue's service rating of the retailers that the 16,803 switchers in our sample had

[8] Canstar Blue has surveyed around 3,000 energy consumers across Australia since 2010.

switched to. Table 7 shows that the highest proportion of switches were to first tier retailers (AGL, Origin, Energy Australia) and one second tier retailer (Red energy). These four retailers together accounted for just over half of the switches. The median MLT for the switchers to these retailers ranged between $189 and $240 per year. Table 7 also shows that the four retailers with the lowest MLT was Tango and Amaysim (median of $31 and $34 respectively), followed by Globird ($41) and Alinta ($84). Together these retailers attracted 22% of all switchers. Consistent with the finding from the econometric analysis that MLT for switchers is not much lower than MLT for the remainers, Table 7 shows that most switchers are not selecting the least expensive retailers.

Table 7. Switching proportion and median MLT for switchers, by retailer

Retailer	Proportion of switches	Median MLT for the switchers
AGL	18.00%	$227
Origin	11.45%	$240
Red Energy	10.67%	$189
Energy Australia	10.25%	$233
Simply	9.00%	$171
Alinta	8.33%	$84
Globird	6.62%	$41
Tango	4.83%	$31
Momentum	4.03%	$215
Amaysim	2.01%	$34
Lumo	3.75%	$178
Click	3.54%	$225
Sumo	5.09%	$178
Dodo	1.51%	$228
Powerdirect	0.48%	$172
Firstenergy	0.29%	$359
Diamond	0.11%	$346
Qenergy	0.04%	$184
Total	**100.00%**	

Table 8 shows Canstar Blue's latest customer service ratings for most of the retailers in our sample. This table shows that retailers that we find charged the lowest prices (Tango, Amaysim, Alinta, Globird) had an average customer service rating of 4 (out of 5) stars. By comparison the retailers that most customers switched to (AGL, Origin, Energy Australia, and Red Energy) had an average Customer Service rating of 3.5 stars. It is also notable that three of the five retailers with the highest proportion of switches advertised discounts on their landing pages. Also, consistent with Canstar Blue's service quality ratings, we see that the three retailers with the lowest MLT emphasised customer service whereas neither of the two retailers that attracted the most switchers (and whose switchers had amongst the highest MLT) mentioned their customer service.

While it would not be appropriate to make too much of this – it reflects Canstar Blue's assessment, not customers' own assessment[9] - it does suggest that customers are not prioritising customer service above price in their selection of retailers. Or alternatively if the suggestion is that customers do prioritise customer service above price then the switching results in the context of Canstar Blue's analysis suggests most customers are not making the right decision.

Table 8. Canstar Blue customer service rating by retailer

Retailer	Customer service rating[10]
AGL	3
Origin	3
Red Energy	4
Energy Australia	4
Simply	4
Alinta	4
Globird	3
Tango	5
Amaysim	Not rated

Source: (Canstar Blue, 2019)

It is notable that in its study of the UK electricity market, the Competition and Markets Authority (CMA) similarly found that the smaller suppliers which generally offer cheaper prices were perceived by their customers to also provide better customer service than the larger suppliers who typically also charged more (see (Competition and Markets Authority, 2016). However (Littlechild, 2018) found that apparently lower price offers are not what they seem. Many all had limitations of various kinds, including unusual tariff structures and unknown suppliers, many of whom subsequently went out of business.

The relative importance of price and non-price factors in customers' selection of their retailers might also be established by analysing how retailers' present themselves to their existing and prospective customers. To do this we examined retailers' websites to understand how they presented themselves to their customers. This involved counting the number of times they mentioned various attributes including discounts, prices, simplicity, customer service/ reliability, Australian-owned and environmentally friendly. Price was by far the most frequently mentioned attribute (nine of the ten retailers), environment and customer service tied for second place (six out of ten) and then simplicity and finally "Australian-owned". Appendix D provides further detail and the source material. Evidently retailers in Victoria think customers value price more than other factors. In its analysis of electricity retailers in Great Britain, the CMA made the same observation.

[9] Websites that compile data on customers' own assessments, such as Trustpilot, do not yet provide reliable coverage of the retail electricity market in Australia.

Do customers know if they are getting a good deal?

An alternative explanation for our finding is that customers have difficulty working out if they are getting a good deal. Australia's regulators, policy makers and customer groups have raised concerns (see citations in the introduction) about customers' ability to compare offers, in many cases referring to complexity as a barrier to competition. Tariff structures and discounts are two sources of complexity and so we examine here whether complexity in these areas has affected MLT.

While most customers in Victoria are charged on two-part tariff structures (a daily charge and a consumption charge) many customers have more complex structures that include time-variant rates, controlled loads and multiple block consumption rates. The econometric analysis however suggests that more complex tariff structures do not translate into higher MLT. In fact, to the contrary: tariff structure is a statistically significant explanation of MLT but contrary to expectation, MLT and tariff structure complexity are inversely related. This might be explained by the fact that very few customers are themselves likely to grapple with the complexity of their own tariff structures in their selection of offers. None of the retailers advertise the structure of their prices and, as noted earlier, customers are not known to change tariff structures when they switch retailers. Presumably retailers have not found that tariff structure is an issue that attracts customers. And since changing tariff structure entails additional administrative cost,[11] retailers simply provide a variety of offers with different tariff structures and do not intentionally set their prices in a way that encourages switching from one structure to another. In this way, tariff structure is perhaps best defined as a characteristic that defines the market – like the distribution zone – and not an important choice variable for customers.

Discounts seems to be quite different. If customers are unable to understand the underlying prices, it is understandable that they might look to the stated level of a discount as a proxy for distinguishing a good deal from a poor one. However, for the reasons explained earlier, it is difficult for customers to calculate the discounts in their own bills and hence know the after-discount prices that they are actually paying. The same complexity is likely to exist in evaluating the discounts on offers that competing retailers make so that assessing the effective after-discount prices of competing offers is also likely to be difficult. Therefore if customers discriminate between offers on the basis of the discounts as they understand them, many are likely to be making a mistake. There is much evidence to suggest that this is the case. For example, as noted earlier, the MARS regression identified non-linearity in the relationship between discount and MLT. This can be seen also by segmenting the sample by discount band and calculating the median annual bill and MLT in each discount band.

Table 9 shows that the median annual bill of those bills that have no discount is lower than the median annual bill of all customers other than those that receive discounts of more than 30%. The segmentation of MLT by discount is even more stark: the median

[11] Changes need to be made to the central settlement system and network service providers notified of the changes so that their network charges (to the retailer) reflect the customer's new tariff structure.

MLT of customers that receive no discount is lower than the median MLT of all discount segments except the segment of customers whose discount is greater than 41%.

Table 9. Annual bill and MLT segmented by discount band

Discount range (%)	Number of bills	Median annual bill (before GST)	Median MLT
No discount	4568	$1,181	$189
(0,5]	1278	$1,280	$402
(5,17]	6521	$1,217	$343
(17,27]	6081	$1,275	$352
(27,30]	7037	$1,205	$279
(30,33]	5371	$1,158	$251
(33,35]	4485	$1,094	$222
(35,41]	5394	$1,154	$196
(41,78]	5801	$1,108	$121

We conclude from this that if price is the most important issue to customers (which we think is likely to be the case) confusion over discounts and hence the effective after-discount price is likely to be an important factor explaining MLT and the small gap between MLT for switchers and remainers.

Finally, we tested the price comparison services provided by the Government of Victoria and by 17 other commercial price comparison providers using bills from five members of our Centre[12]. Only the Government's price comparison site included all competing offers from all retailers. All of the commercial sites are paid by one or more of the retailers whose offers they list. We found that many of the sites would not provide online comparisons and insisted on telephone interaction. The focus of the ensuing conversations in almost all cases was on the discount rate, without discussion of the underlying, pre-discount prices. None of the price comparison sites were prepared to estimate the savings that their recommended offers would deliver. In all cases (except iSelect which is listed on the Australian Stock Exchange) we found it impossible to establish comparison site ownership, which retailers paid them or the nature of those payments.

Table 10 summarises the result of our exploration. The first three rows compare the annual bills on the most expensive offer that was recommended by any of the price comparison providers for each bill, the least expensive offer and the median recommended offer. Typically the most expensive recommended offer was 40% more expensive than the least expensive offer. Row four shows that between seven and ten different offers were recommended for the five bills tested. The last row shows that in one case all the recommended offers would have presented a saving while in one case

[12] Victoriaenergycompare, 50Up, 9Saver, Compare the market, You compare, Compare with us, iSelect, Goswitch, Energywatch, Electricitywizard, Electricitymonster, Energydeal, Finder, Canstar Blue, Seek the deal, You Choose, Make it cheaper and Mozo.

only one of the seven recommended offers presented a saving – all other recommended offers would have meant a higher bill.

Table 10. Price comparison case study

	Bill 1	Bill 2	Bill 3	Bill 4	Bill 5
Annual bill on most expensive recommended offer	$716	$710	$543	$1.064	$1,489
Annual bill on least expensive recommended offer	$516	$501	$403	$711	$930
Annual bill on median recommended offer	$634	$580	$484	$901	$1,095
Number of different recommended offers	7	8	8	9	10
Proportion of recommended offers that would have resulted in higher bills	6/7	2/8	3/8	0/9	5/10

This case study suggests that inadequacies in price comparison are likely to be part of the explanation for MLT and for the small gap in MLT between switchers and remainers. It should be recognised however that while a majority of switchers are likely to have used some sort of price comparison service (Newgate Research, 2017) many customers will have searched without seeking the advice of such services.

Summary

This discussion has explored possible explanations of the main conclusion from our analysis, that switchers and remainers leave a similar amount of money on the table. We reject the possibility that rents have been competed away or that customers prioritise factors other than price when they search the market. Rather the main reason seems to be that customers find it difficult to know whether they are getting a good deal. Tariff structure complexity does not seem to be a factor but difficulty in working out effective discounts and price comparison services that mostly provide poor advice seem to be issues.

6 Conclusions

In his critique of retail electricity markets (Defeuilley, 2009) focussed on the complexity of the determinants of choice and suggested this would explain why many customers would avoid switching even if they would gain by switching. He suggested that would translate into persistent segmentation between active and inactive customers. While active customers would benefit from competition, weak price competition for inactive customers would give market power to the incumbent retailer over the customer. Such bifurcation is pithily summarised by the term “loyalty tax”, a term that is now frequently used by Australian policy makers and some market participants in their criticism of retail markets. The criticism has resonated particularly with advocates of the interests of disadvantaged communities on the basis that poorer or less well-educated people are even less able to engage effectively in a complex market than richer and better educated people and so competition is likely to be regressive.

Our analysis of a little over 48,000 household electricity bills tests this bifurcation hypothesis. We find that complexity does indeed seem to be a problem, but its impact is

not straight-forward, and it cannot explain the high switching rate. The complexity and opaqueness of discounts seems to explain why many customers with big discounts actually pay more than customers with no or small discounts. On the other hand, those customers with more complex tariffs leave less money on the table than those with simpler tariffs. We also find that customers living in more affluent areas with more highly educated residents do not seem to pay lower prices or leave less money on the table than customers living in less affluent areas and whose residents are less well educated. Consistent with this, we find that those customers that received a concession from the government did not achieve noticeably different outcomes to those customers that did not receive a concession.

Our main finding however is that after controlling for various factors switchers only leave $45 per year less on the table than remainers. This casts doubt on the common understanding that the retail market bifurcates between switchers who get much better deals than remainers. This is not necessarily inconsistent with the proposition (which we could not test) that a subset of switchers consistently gets better deals than remainers (and other switchers). While we think our sample may be a biased towards more engaged customers, we do not think this bias is likely to be large and so the conclusions from our sample are likely to be true for the population.

Encouraging customers to switch retailers has been the mainstay of policy makers' response to customers' concerns about the retail market. Customers have responded to the encouragement to engage, but evidently many are not getting the results that they and policy makers are seeking. Policy needs to be refocussed to promote effective participation by the demand side. Improving price comparison services would be valuable. Comparing the comparers and/or regulating comparison methods such as has long been the case in Great Britain for example, merits consideration. Alternatively providing an easy way for customers to know when they are getting bad advice might be considered.

It would be valuable to know if the conclusion we reach in Victoria is also true in the three other States in Australia with contestable retail electricity markets. While we imagine the conclusion will hold in these markets too, the markets in these States differ from those in Victoria in subtle, but possibly important ways.

Finally, establishing longitudinal bill data is essential for a more precise understanding of the differences between switchers and remainers, and also of the relative importance of price and non-price factors to customers. Has the recent introduction of regulated offers and obligations on retailers to tell their customers about their best deals, changed the market? Most importantly, markets evolve, and it is essential that policy responses are informed by evidence based on changing markets.

Acknowledgements

We thank Amine Gassem for extensive data science support and Russell Smyth for reviewing earlier drafts of this paper.

Bibliography

Australian Bureau of Statistics (2011) *Socio-Economic Indexes for Areas (SEIFA)*. Canberra. doi: Cat. No. 2033.0.55.001.

Australian Bureau of Statistics (2017) *6401.0 Consumer Price Index*, *TABLE 9. CPI: Group, Sub-group and Expenditure Class, Index Numbers by Capital City*. Canberra: c=AU; o=Commonwealth of Australia; ou=Australian Bureau of Statistics. Available at: https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/6401.0Sep 2017?OpenDocument (Accessed: 14 August 2019).

Australian Competition and Consumer Commission [ACCC] (2018) 'Restoring electricity affordability and Australia's competitive advantage', (June). doi: 10.1080/0965431042000212740.

Ben-David, D. R. (2015) 'If the retail energy market is competitive then is Lara Bingle a Russian cosmonaut?', *NEM Future Forum 2015*. Available at: http://www.esc.vic.gov.au/getattachment/fc947897-7d4f-4772-97c9-959e3baad0db/If-the-retail-energy-market-is-competitive-then-is.pdf.

Ben-David, R. (2018) *Competition , Neo-paternalism and the Nonsumer uprising*. Melbourne.

Burke, P. (2017) *The price elasticity of electricity demand in the United States: A three-dimensional analysis*, *CAMA Working Paper 50*. Available at: https://ssrn.com/abstract=3016911.

Canstar Blue (2019) *Victoria Electricity Providers | Compare Plans and Prices*. Available at: https://www.canstarblue.com.au/electricity/.

Carbon Market Economics (CME) (2017) *The retail electricity market for households and small businesses in Victoria, Analysis of Offers and Bills, Prepared for the Victorian Department of Environment, Water, Land, and Planning*. Melbourne.

Clean Energy Council (2018) *Number of Australian homes with rooftop solar tops 2 million...and counting | Clean Energy Council*, *3 December 2018*. Available at: https://www.cleanenergycouncil.org.au/news/number-of-australian-homes-with-rooftop-solar-tops-2-million-and-counting (Accessed: 24 July 2019).

Colmar Brunton Social Research (2018) *Australian Competition and Consumer Commission: Consumer Outcomes in the National Retail Electricity Market - Final Report*. Melbourne. Available at: https://www.accc.gov.au/system/files/Appendix 12 - Colmar Brunton - Consumer Outcomes in the National Retail ....pdf (Accessed: 24 July 2019).

Competition & Markets Authority (2016) *Energy market investigation: Summary of final report*. doi: 10.1002/9781118716571.ch6.

Competition and Markets Authority (2016) *Energy Market Investigation*. London. Available at: https://assets.publishing.service.gov.uk/media/5773de34e5274a0da3000113/final-

report-energy-market-investigation.pdf.

Council of European Energy Regulators (2018) *Performance of European Retail Markets in 2017*. Brussels. Available at: https://www.ceer.eu/documents/104400/-/-/31863077-08ab-d166-b611-2d862b039d79.

Defeuilley, C. (2009) 'Retail competition in electricity markets', *Energy Policy*, 37(2), pp. 377–386. doi: 10.1016/j.enpol.2008.07.025.

Deller, D. *et al.* (2017) 'Switching Energy Suppliers: It's Not All about the Money', *SSRN Electronic Journal*. doi: 10.2139/ssrn.3024534.

Essential Services Commission Victorian Energy Market 2017-2018 (no date). Available at: https://www.esc.vic.gov.au/sites/default/files/documents/RPT - Final - Victorian Energy Market Report 2017-18 - 20190218_0.PDF (Accessed: 24 July 2019).

Fan, S. and Hyndman, R. J. (2011) 'The price elasticity of electricity demand in South Australia', *Energy Policy*, 39(6), pp. 3709–3719. doi: 10.1016/j.enpol.2011.03.080.

Friedman, J. H. (1991) 'Multivariate Adaptive Regression Splines (with discussion)', *Annals of statistics*, 19(12).

Giulietti, M., Waterson, M. and Wildenbeest, M. (2014) 'Estimation of Search Frictions in the British Electricity Market', *The Journal of Industrial Economics*. John Wiley & Sons, Ltd (10.1111), 62(4), pp. 555–590. doi: 10.1111/joie.12062.

Honka, E. (2014) 'Quantifying search and switching costs in the US auto insurance industry', *The RAND Journal of Economics*, 45(4), pp. 847–884. doi: 10.1111/1756-2171.12073.

Hortaçsu, Ali, Madanizadeh, Seyed A, Puller, S. L. (2015) 'Power to Choose: An Analysis of Consumer Behaviour in the Texas Retail Electricity Market', *American economic journal: economic policy*, 9(4), pp. 192–226. Available at: http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Power+to+Choose+:+An+Analysis+of+Consumer+Behavior+in+the+Texas+Retail+Electricity+Market#0%5Cnhttp://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Power+to+Choose:+An+Analysis+of+Cons.

Klemperer, P. (1987) 'The Competitiveness of Markets with Switching Costs', *The RAND Journal of Economics*, 18(1), p. 138. doi: 10.2307/2555540.

Labandeira, X., Labeaga, J. M. and López-Otero, X. (2017) 'A meta-analysis on the price elasticity of energy demand', *Energy Policy*, 102, pp. 549–568. doi: 10.1016/j.enpol.2017.01.002.

Littlechild, S. C. (2018) *Is there competition below the PPM tariff cap? What are the implications for policy?* Cambridge. Available at: https://www.eprg.group.cam.ac.uk/report-is-there-competition-below-the-ppm-tariff-cap-what-are-the-implications-for-policy-by-s-littlechild/.

Mountain, B. (2015) *A critique of the Victorian Retail Electricity Market: A report for*

the Brotherhood of St Laurence. Melbourne. Available at: http://cmeaustralia.com.au/wp-content/uploads/2013/09/150601-FINAL-bosl-victorian-retail-market-report.pdf.

National Electricity Market Monthly Retail Transfer Statistics (2019). Available at: http://www.aemo.com.au/data/retail_transfers.html. (Accessed: 24 July 2019).

Newgate Research (2017) *CONSUMER RESEARCH FOR THE AUSTRALIAN ENERGY MARKET COMMISSION'S 2017 RETAIL COMPETITION REVIEW*. Available at: https://www.aemc.gov.au/sites/default/files/content/62080e52-06d1-4526-8c92-3eadec24876f/Newgate-Research-AEMC-2017-Retail-Competition-Review-Consumer-Research-Report-F.pdf.

Oster, E. (2017) 'Unobservable Selection and Coefficient Stability: Theory and Evidence', *Journal of Business & Economic Statistics*. doi: 10.1080/07350015.2016.1227711.

Potter, B. (2016) 'Big Power neglects best customers, AGL boss says', *Australian Financial Review*. Available at: https://www.afr.com/politics/big-power-neglects-best-customers-agl-boss-says-20160823-gqzbgu.

Salies, E. (2005) 'Charges, costs and market power: the deregulated UK electricity retail market', *MPRA Paper*. Available at: https://www.jstor.org/stable/41323040?casa_token=lI7pyqMROfUAAAAA:mI82e61JDEzx3Uk1yKdEX2kjZsRn-7kCNvaRBkEumdVpv1jUCUM7iQOj_m3ifv5B27LqofPFeowG6xSHD9nXshszIerk1YWfu0g0mDzbPLSN0pqZAx5k.

Shy, O. (2002) 'A quick-and-easy method for estimating switching costs', *International Journal of Industrial Organization*, 20(1), pp. 71–87. doi: 10.1016/s0167-7187(00)00076-x.

Stahl, D. O. (1996) 'Oligopolistic pricing with heterogeneous consumer search', *International Journal of Industrial Organization*. North-Holland, 14(2), pp. 243–268. doi: 10.1016/0167-7187(94)00474-9.

Thwaites, J., Faulkner, P. and Mulder, T. (2017) *Independent Review Into The Electricity and Gas Retail Market in Australia*. Available at: https://engage.vic.gov.au/application/files/7415/0267/4425/Retail_Energy_Review_-_Final_Report.pdf.

Waddams Price, C. (2018) 'Back to the Future? Regulating Residential Energy Markets', *International Journal of the Economics of Business*. Routledge, 25(1), pp. 147–155. doi: 10.1080/13571516.2017.1402469.

Waddams Price, C., Webster, C. and Zhu, M. (2013) 'Searching and Switching: Empirical estimates of consumer behaviour in regulated markets', *Centre for Competition Policy, Working Paper*, pp. 11–13.

Waddams Price, C. and Wilson, C. M. (2010) 'Do consumers switch to the best supplier?', *Oxford Economic Papers*, 62(4), pp. 647–668. doi: 10.1093/oep/gpq006.

Waddams Price, C. and Zhu, M. (2013) 'Pricing in the UK retail energy market , 2005 - 2013', *CCP Working Paper 13-12*. Available at: http://competitionpolicy.ac.uk/documents/107435/107587/13-12+Waddams+and+Zhu+(Final).pdf/6d49a6ed-b489-4603-a19e-890f6a098acc.

Wilson, C. M. (2012) 'Market frictions: A unified model of search costs and switching costs', *European Economic Review*. North-Holland, 56(6), pp. 1070–1086. doi: 10.1016/J.EUROECOREV.2012.05.007.

Woods, T. and Blowers, D. (2017) *PriceShock: Is the retail electricity market failing consumers?* Melbourne. Available at: https://grattan.edu.au/wp-content/uploads/2017/03/Price-shock-is-the-retail-market-failing-consumers.pdf.

Appendix A: Summary statistics of the sample

6.1 Annual Bill (before GST)

By tariff type

tariff_type	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
flat	27983	$-5,619	$859	$1,148	$1,338	$1,580	$59,110
multiflat	11718	$-8,608	$908	$1,262	$1,464	$1,769	$12,525
tou5	6899	$-1,229	$825	$1,193	$1,443	$1,776	$14,681
multitou5	666	$-875	$920	$1,281	$1,654	$1,998	$14,923
flexible	742	$-582	$737	$1,086	$1,308	$1,570	$14,890
seasonalFlexible	14	$698	$898	$1,420	$1,480	$1,945	$3,223
multiflexible	66	$342	$722	$1,066	$1,299	$1,684	$3,739

By distributor

distributor	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
citipower	6114	$-22	$786	$1,067	$1,250	$1,503	$15,697
ausnet	11401	$-1,229	$954	$1,289	$1,519	$1,819	$14,923
united	13352	$-5,619	$828	$1,129	$1,321	$1,578	$59,110
powercor	11219	$-8,608	$890	$1,221	$1,441	$1,722	$14,681
jemena	6002	$-582	$845	$1,141	$1,324	$1,578	$9,210

By switched/not switched

has_switch	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
false	29734	$-8,608	$912	$1,234	$1,440	$1,727	$14,071

has_switch	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
true	16803	$-5,619	$801	$1,087	$1,294	$1,536	$59,110
	1551	$88	$819	$1,142	$1,393	$1,670	$14,681

By concession/no concession

has_concession	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
false	40949	$-8,608	$862	$1,177	$1,387	$1,658	$59,110
true	7139	$-515	$880	$1,185	$1,389	$1,665	$13,424

By solar/no-solar

has_solar	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
0	40864	$207	$897	$1,206	$1,420	$1,683	$15,697
1	7224	$-8,608	$663	$1,000	$1,205	$1,496	$59,110

By retailer

retailer	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
15	277	$181	$1,070	$1,549	$1,805	$2,166	$6,421
3	3238	$-8,608	$806	$1,120	$1,321	$1,614	$8,447
6	1846	$-190	$799	$1,076	$1,254	$1,497	$7,513
4	6819	$-118	$924	$1,229	$1,420	$1,684	$8,443
19	1551	$88	$819	$1,142	$1,393	$1,670	$14,68
9	2214	$44	$887	$1,194	$1,445	$1,716	$14,92
1	9252	$-5,619	$930	$1,231	$1,428	$1,684	$13,52
2	7416	$-571	$891	$1,206	$1,417	$1,701	$14,07
11	3133	$-604	$775	$1,090	$1,288	$1,552	$12,52
12	1086	$-546	$914	$1,388	$1,670	$2,026	$15,69
5	5532	$-947	$848	$1,162	$1,358	$1,627	$10,75
14	1252	$-72	$908	$1,183	$1,444	$1,692	$59,11
16	64	$582	$902	$1,300	$1,646	$2,037	$4,448
7	1667	$-921	$630	$896	$1,090	$1,313	$14,89
8	1203	$-1,229	$720	$1,014	$1,190	$1,424	$11,18
13	1045	$416	$992	$1,381	$1,675	$2,055	$11,32
10	340	$213	$724	$956	$1,106	$1,280	$4,590
17	139	$-875	$810	$1,156	$1,337	$1,686	$5,148
18	14	$890	$1,724	$2,320	$2,617	$3,391	$5,204

By decile

Decile	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
1	1804	$-420	$851	$1,164	$1,378	$1,656	$8,443

Decile	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
2	2236	$-660	$874	$1,241	$1,480	$1,800	$13,424
3	1439	$-8,608	$932	$1,307	$1,525	$1,845	$10,182
4	3235	$-582	$865	$1,182	$1,423	$1,679	$12,525
5	2255	$-258	$859	$1,165	$1,398	$1,715	$6,905
6	6244	$-5,619	$869	$1,164	$1,345	$1,602	$14,923
7	5600	$-635	$878	$1,206	$1,407	$1,690	$14,675
8	7367	$-604	$873	$1,177	$1,373	$1,658	$14,890
9	9911	$-986	$855	$1,162	$1,353	$1,605	$59,110
10	7592	$-947	$849	$1,174	$1,406	$1,692	$15,697

6.2 Annual Consumption

Tariff type

tariff_type	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
flat	27,983	0	2,396	3,725	4,676	5,793	280,768
multiflat	11,718	0	2,568	4,182	5,011	6,272	61,986
tou5	6,899	0	2,668	4,229	5,503	7,006	73,918
multitou5	666	168	2,963	4,550	6,517	8,123	80,074
flexible	742	23	2,652	3,970	5,145	6,266	49,831
seasonalFlexible	14	1,229	1,783	5,142	5,189	7,344	14,264
multiflexible	66	712	2,786	4,781	5,859	7,214	18,248

Distributor

distributor	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
citipower	6,114	0	2,198	3,659	4,599	5,923	63,041
ausnet	11,401	0	2,566	3,987	5,002	6,236	80,074
united	13,352	0	2,530	3,926	4,855	6,045	280,768
powercor	11,219	0	2,571	4,063	5,236	6,421	73,918
jemena	6,002	5	2,430	3,704	4,568	5,676	65,077

Switched/not switched

has_switch	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
false	29,734	0	2,640	4,058	5,040	6,248	86,925
true	16,803	0	2,248	3,643	4,709	5,873	280,768
	1,551	12	2,202	3,567	4,619	5,782	73,918

Concession/no concession

has_concession	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
false	40,949	0	2,475	3,900	4,910	6,122	280,768
true	7,139	0	2,548	3,904	4,912	6,114	58,072

Solar/no-solar

has_solar	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
0	40,864	0	2,488	3,920	4,905	6,131	86,925
1	7,224	19	2,488	3,818	4,942	6,043	280,768

Retailer

Retailer	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
15	277	819	3,751	5,889	7,310	8,959	42,850
3	3,238	16	2,253	3,586	4,525	5,623	30,704
6	1,846	128	2,486	4,115	5,167	6,431	42,119
4	6,819	0	2,554	3,963	4,847	6,074	47,758
19	1,551	12	2,202	3,567	4,619	5,782	73,918
9	2,214	11	2,796	4,286	5,527	6,741	80,074
1	9,252	0	2,526	3,928	4,870	6,074	86,925
2	7,416	0	2,514	3,906	4,965	6,189	58,900
11	3,133	0	2,281	3,569	4,470	5,498	42,125
12	1,086	263	2,544	3,888	4,932	6,288	63,041
5	5,532	9	2,602	4,068	5,059	6,247	65,077
14	1,252	11	2,598	3,835	4,993	5,880	280,768
16	64	380	1,966	3,994	5,195	7,312	15,927
7	1,667	0	1,984	3,251	4,075	5,119	49,831
8	1,203	7	2,722	4,395	5,584	6,807	62,092
13	1,045	30	2,763	4,270	5,615	7,251	40,722
10	340	45	2,144	3,402	4,246	5,291	18,704
17	139	988	2,756	3,997	4,944	6,174	19,675
18	14	3,147	5,886	7,832	10,645	13,638	24,783

Decile

Decile	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
1	1,804	0	2,434	3,751	4,834	6,090	42,119
2	2,236	0	2,434	4,106	5,270	6,680	58,072
3	1,439	100	2,784	4,497	5,591	7,042	51,768
4	3,235	0	2,454	3,826	5,023	6,129	56,525
5	2,255	23	2,318	3,763	4,819	6,150	27,711
6	6,244	3	2,461	3,743	4,634	5,688	73,918
7	5,600	3	2,486	3,942	4,916	6,120	80,074
8	7,367	0	2,437	3,803	4,721	5,874	54,141
9	9,911	0	2,568	3,934	4,847	6,020	280,768

Decile	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
10	7,592	0	2,513	4,102	5,198	6,664	86,925
	405	12	2,044	3,365	4,252	5,138	35,036

6.3 Prices (cents per kWh, before GST)

Tariff type

tariff_type	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
flat	26,935.0	11.0	26.0	31.0	32.2	37.0	84.0
multiflat	11,324.0	12.0	27.0	31.0	32.3	36.0	89.0
tou5	6,714.0	11.0	25.0	30.0	32.0	37.0	78.0
multitou5	654.0	14.0	25.0	30.0	30.8	35.0	71.0
flexible	717.0	14.0	25.0	30.0	31.2	35.0	73.0
seasonalFlexible	14.0	14.0	27.0	32.0	36.1	42.2	66.0
multiflexible	64.0	16.0	21.0	25.5	26.8	32.0	52.0

Distributor

distributor	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
citipower	5,799.0	13.0	24.0	29.0	30.8	36.0	78.0
ausnet	11,060.0	11.0	29.0	33.0	34.6	39.0	79.0
united	12,872.0	11.0	25.0	29.0	30.5	34.0	75.0
powercor	10,890.0	12.0	26.0	31.0	32.2	37.0	89.0
jemena	5,801.0	12.0	27.0	31.0	32.3	36.0	72.0

Switched/not switched

has_switch	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
false	28,996.0	11.0	27.0	31.0	32.4	37.0	89.0
true	15,968.0	12.0	25.0	30.0	31.6	36.0	78.0
	1,458.0	19.0	27.0	31.0	33.2	37.0	73.0

Concession/no concession

has_concession	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
false	39,454.0	11.0	26.0	31.0	32.1	36.0	89.0
true	6,968.0	12.0	26.0	31.0	32.2	37.0	84.0

Solar/no-solar

has_solar	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
0	39,394.0	11.0	26.0	31.0	32.0	36.0	89.0
1	7,028.0	12.0	26.0	31.0	32.8	37.0	84.0

Retailer

retailer	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
15	275.0	14.0	24.0	27.0	28.8	32.0	59.0
3	3,114.0	15.0	28.0	32.0	32.9	37.0	62.0
6	1,790.0	12.0	22.0	27.0	28.4	33.0	66.0
4	6,624.0	11.0	27.0	32.0	33.2	38.0	78.0
19	1,458.0	19.0	27.0	31.0	33.2	37.0	73.0
9	2,159.0	13.0	24.0	29.0	29.8	34.0	66.0
1	8,956.0	14.0	27.0	32.0	33.4	38.0	74.0
2	7,128.0	14.0	27.0	31.0	32.6	37.0	78.0
11	3,000.0	17.0	28.0	31.0	32.3	36.0	70.0
12	1,065.0	18.0	30.0	37.0	38.1	44.0	84.0
5	5,366.0	11.0	25.0	29.0	30.2	34.0	67.0
14	1,228.0	14.0	27.0	32.0	32.8	37.0	69.0
16	59.0	22.0	27.0	32.0	36.1	39.5	89.0
7	1,553.0	14.0	25.0	29.0	30.5	35.0	61.0
8	1,165.0	12.0	20.0	24.0	25.1	28.0	50.0
13	1,011.0	15.0	26.0	32.0	33.2	38.5	78.0
10	319.0	17.0	23.0	26.0	28.7	31.0	67.0
17	138.0	22.0	30.0	34.0	36.1	40.0	67.0
18	14.0	16.0	21.0	25.0	27.3	31.8	44.0

Decile.

Decile	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
1	1,733.0	13.0	27.0	31.0	32.5	37.0	67.0
2	2,152.0	12.0	26.0	31.0	32.7	38.0	84.0
3	1,410.0	12.0	26.0	30.5	32.0	36.8	73.0
4	3,124.0	11.0	27.0	31.0	32.7	37.0	75.0
5	2,176.0	14.0	27.0	32.0	33.4	38.0	73.0
6	6,050.0	12.0	27.0	32.0	33.2	37.0	83.0
7	5,413.0	12.0	27.0	31.0	32.5	37.0	89.0
8	7,085.0	14.0	27.0	31.0	32.9	37.0	78.0
9	9,606.0	11.0	26.0	30.0	31.2	35.0	79.0
10	7,304.0	12.0	25.0	29.0	30.5	35.0	75.0
	369.0	16.0	27.0	31.0	32.5	36.0	74.0

Appendix B. Money Left on the Table

Tariff type

tariff_type	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
flat	27983	$0	$166	$255	$323	$391	$19,987
multiflat	11718	$0	$123	$232	$317	$398	$5,228
tou5	6899	$0	$127	$226	$304	$374	$6,275
multitou5	666	$0	$139	$241	$363	$445	$4,658
flexible	742	$0	$57	$148	$232	$273	$6,331
seasonalFlexible	14	$0	$194	$262	$321	$408	$924
multiflexible	66	$0	$0	$40	$129	$144	$1,052

Distributor

distributor	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
citipower	6114	$0	$144	$237	$303	$382	$9,029
ausnet	11401	$0	$147	$239	$323	$396	$6,331
united	13352	$0	$156	$251	$320	$387	$19,987
powercor	11219	$0	$144	$246	$326	$401	$5,217
jemena	6002	$0	$155	$245	$305	$376	$4,568

Switched/not switched

has_switch	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
false	29734	$0	$181	$281	$355	$433	$5,262
true	16803	$0	$106	$187	$248	$295	$19,987
	1551	$0	$158	$251	$361	$439	$4,730

Concession/no concession

has_concession	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
false	40949	$0	$148	$246	$320	$391	$19,987
true	7139	$0	$152	$242	$306	$381	$4,350

Solar/no-solar

has_solar	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
0	40864	$0	$154	$248	$323	$396	$9,029
1	7224	$0	$125	$222	$289	$355	$19,987

Retailer

retailer	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
15	277	$0	$172	$271	$320	$415	$1,456

retailer	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
3	3238	$0	$155	$242	$315	$390	$5,217
6	1846	$0	$66	$96	$123	$133	$1,224
4	6819	$0	$188	$265	$344	$409	$4,237
19	1551	$0	$158	$251	$361	$439	$4,730
9	2214	$0	$104	$196	$283	$364	$3,383
1	9252	$0	$206	$289	$361	$422	$4,463
2	7416	$0	$210	$294	$355	$430	$4,584
11	3133	$0	$136	$222	$297	$357	$5,228
12	1086	$0	$150	$414	$630	$837	$9,029
5	5532	$0	$126	$194	$256	$315	$3,171
14	1252	$0	$199	$277	$342	$395	$19,987
16	64	$111	$266	$356	$517	$609	$2,176
7	1667	$0	$22	$92	$183	$229	$6,331
8	1203	$0	$0	$6	$41	$61	$1,126
13	1045	$0	$121	$297	$468	$609	$6,275
10	340	$0	$6	$34	$121	$137	$2,139
17	139	$124	$277	$363	$440	$486	$1,738
18	14	$0	$79	$240	$598	$1,078	$1,895

Decile

Decile	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
1	1804	$0	$152	$244	$315	$379	$4,283
2	2236	$0	$154	$255	$343	$419	$4,658
3	1439	$0	$149	$259	$348	$414	$5,217
4	3235	$0	$146	$245	$324	$387	$5,228
5	2255	$0	$148	$237	$310	$385	$3,362
6	6244	$0	$142	$236	$300	$368	$6,275
7	5600	$0	$147	$242	$315	$390	$4,934
8	7367	$0	$148	$239	$307	$386	$6,331
9	9911	$0	$152	$247	$314	$388	$19,987
10	7592	$0	$156	$258	$339	$410	$9,029
	405	$0	$148	$216	$267	$313	$1,742

6.4 Money Left on the Table divided by annual bill

Tariff type

tariff_type	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
flat	27,983	0.00	0.11	0.19	0.25	0.27	383.00
multiflat	11,718	0.00	0.09	0.19	0.23	0.27	96.86
tou5	6,899	0.00	0.10	0.17	0.28	0.26	44.38
multitou5	666	0.00	0.08	0.16	0.29	0.28	24.33
flexible	742	0.00	0.05	0.15	0.30	0.26	31.34
seasonalFlexible	14	0.00	0.11	0.18	0.17	0.23	0.34
multiflexible	66	0.00	0.00	0.06	0.11	0.20	0.60

Distributor

distributor	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
citipower	6,114	0.00	0.10	0.18	0.21	0.26	20.18
ausnet	11,401	0.00	0.12	0.20	0.26	0.28	44.38
united	13,352	0.00	0.10	0.19	0.23	0.27	61.88
powercor	11,219	0.00	0.10	0.19	0.32	0.27	383.00
jemena	6,002	0.00	0.09	0.17	0.22	0.26	36.00

Switched/not switched

has_switch	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
false	29,734	0.00	0.13	0.20	0.26	0.28	96.86
true	16,803	0.00	0.06	0.15	0.25	0.24	383.00
	1,551	0.00	0.12	0.18	0.22	0.31	2.02

Concession/no concession

has_concession	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
false	40,949	0.00	0.10	0.19	0.25	0.27	383.00
true	7,139	0.00	0.11	0.18	0.26	0.26	110.00

Solar/no-solar

has_solar	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
0	40,864	0.00	0.10	0.18	0.20	0.26	1.10
1	7,224	0.00	0.12	0.22	0.56	0.35	383.00

Retailer

retailer	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
15	277	0.00	0.10	0.17	0.18	0.20	1.74
3	3,238	0.00	0.14	0.20	0.29	0.26	96.86
6	1,846	0.00	0.00	0.04	0.12	0.13	11.21
4	6,819	0.00	0.13	0.20	0.25	0.29	30.11
19	1,551	0.00	0.12	0.18	0.22	0.31	2.02
9	2,214	0.00	0.05	0.14	0.18	0.25	11.64
1	9,252	0.00	0.14	0.21	0.25	0.29	31.34
2	7,416	0.00	0.16	0.21	0.26	0.27	56.92
11	3,133	0.00	0.12	0.18	0.41	0.25	383.00
12	1,086	0.00	0.13	0.31	0.33	0.45	9.14
5	5,532	0.00	0.08	0.14	0.22	0.21	110.00
14	1,252	0.00	0.14	0.21	0.23	0.25	8.18
16	64	0.11	0.18	0.25	0.31	0.39	0.88
7	1,667	0.00	0.00	0.11	0.30	0.23	57.60
8	1,203	0.00	0.00	0.00	0.12	0.02	27.89
13	1,045	0.00	0.06	0.26	0.23	0.36	1.08
10	340	0.00	0.00	0.00	0.10	0.12	1.02
17	139	0.19	0.27	0.30	0.55	0.37	13.44
18	14	0.00	0.01	0.04	0.20	0.42	0.51

Decile

Decile	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
1	1,804	0.00	0.11	0.19	0.23	0.28	17.67
2	2,236	0.00	0.12	0.20	0.30	0.29	110.00

Decile	count	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
3	1,439	0.00	0.11	0.19	0.26	0.27	20.30
4	3,235	0.00	0.10	0.19	0.28	0.28	42.00
5	2,255	0.00	0.11	0.19	0.26	0.28	24.71
6	6,244	0.00	0.11	0.19	0.27	0.27	57.60
7	5,600	0.00	0.10	0.18	0.23	0.27	41.09
8	7,367	0.00	0.11	0.19	0.25	0.27	96.86
9	9,911	0.00	0.10	0.18	0.26	0.26	383.00
10	7,592	0.00	0.10	0.18	0.21	0.26	20.18
	405	0.00	0.10	0.16	0.34	0.29	44.38

Appendix C: Analysis of retailer websites

Summary of webpage attributes by retailer

Retailer	Discount offered	Lower price/value/ affordable	Simple	Reliable	Quality customer service	Australian-owned	Environmentally friendly	Bundling	Awards	Ambiguous/other	Total no. attributes
AGL	✓	✓				✓	✓				4
Origin	✓	✓	✓				✓				4
Red energy			✓		✓	✓	✓		✓		5
EA	✓	✓	✓		✓		✓		✓		6
Simply		✓	✓								2
Alinta	✓	✓			✓						3
Globird		✓			✓				✓		3
Tango		✓			✓	✓	✓		✓	✓	6
Momentum		✓	✓			✓	✓				4
Amaysim		✓		✓							2
Total	4	9	5	1	5	4	6	0	4	1	

Source material

Retailer			Bottom of page / About us

	Tier	Landing page	
AGL	1	Discount: Low rates, fixed for 2 years: + up to $160 in credits over 24 months when you sign up to electricity and gas https://www.agl.com.au	Proudly Australian; Give power to our people: matched-giving and volunteering programs; Right behind renewables Sustainable, secure and affordable energy
Origin	1	Origin Maximiser. Good energy, well spent. 29% off our electricity usage charges in VIC on a 12-month plan. Includes bonus 5% - online only * 16% off our natural gas usage charges in VIC on a 12-month plan. Includes bonus 1% - online only * https://www.originenergy.com.au	Power up with solar; No lock-in contracts; Life's easier with the Origin app More affordable, more sustainable, smarter and easier
Red Energy	2	100% local energy https://www.redenergy.com.au	100% Australian, 100% local; Award winning customer solutions team; Awards and Recognition - we keep it simple; Part of Snowy Hydro's business
Energy Australia	1	Winter just got cosier. 30% OFF gas market usage rates; 36% OFF electricity market usage rates https://www.energyaustralia.com.au	Award-winning; Digital customer experience; Easy online signup; Carbon neutral; Powering Australia Simple, more affordable energy; 100% carbon neutral
Simply	2	Renovate your energy bills; battery storage and our VPP; Start today with affordable energy https://www.simplyenergy.com.au	Australia's fastest growing energy companies; Provide Australians with affordable energy; Simple, smart ways to manage energy usage

Alinta	2	43% off electricity, switch now; award-winning electricity, voted by customers like you https://www.alintaenergy.com.au	More affordable; A wealth of experience; Competitive pricing; Transparent pricing
Glo Bird	3	GloBird offers you unbeatable rates on Gas & Electricity: compare now and save https://www.globirdenergy.com.au	No lock in contracts; Victoria's best value energy rates; Friendly, local phone support; More choice and better value; Fiercely independent; Won multiple awards
Tango	3	Tango is the energy company that dances to your tune. https://www.tangoenergy.com	Retail arm of Pacific Hydro; Competitive products delivering value; Experienced team; Canstar Blue award for Most Satisfied Customers - Electricity Providers, VIC 2018; Headquarters located in Geelong providing a major boost for jobs.
Momentum	2	Less hassle. More hustle; switch for a $100 bonus https://www.momentumenergy.com.au	100% Aussie energy company; Australia's largest generator of clean, renewable energy; Simple and transparent pricing; Make energy more human
Amaysim	3	30GB of Tinder for $30 – that's 384,000 right swipes (go get 'em tiger) https://www.amaysim.com.au/	No lock-in contracts; Amazing value; Online-driven customer service; Simple to join; You're in control Two times a winner - WhistleOut Awards Winner for Best Provider 2018, Mobile Plans for Kids and Best Provider 2018, International Calls.
Lumo	2	How can we help you today? https://www.lumoenergy.com.au	100% local service; 100% Australian; 20 Awards; Part of Snowy Hydro; 100% Australian owned; Value community

Powershop	3	Energy, we sell it; want greener power for your business; Renewables? We love them. Let us explain https://www.powershop.com.au	100% carbon neutral; People pleasers; Love solar': power up and save; Australia's greenest power company; Control your power in your pocket
Sumo	3	Bundle & save on electricity, gas & internet: 3% off Electricity usage charges; 25% off Gas usage charges; Unlimited Internet from $55 https://www.sumo.com.au	One-stop shop (single point of contact); No lock-in contracts (flexibility); Australian owned (and employing locals); Flexible plans (choice of bundling with gas, internet and home phone); Best prices = best savings; Better value and simplicity; Customer-oriented culture and service: improvement, simplicity, empathy
Diamond	3	Feel Good...Live... greener, cleaner and cheaper: ositively supplying more renewable electricity than our customers consume https://diamondenergy.com.au	More electricity sourced from renewables to the grid than our customers consume; Committed to helping save energy and save on bills; Passionate and committed group of people making a difference.
Q Energy	3	Use your promo code to receive a credit on your electricity: switch to Q Energy https://www.qenergy.com.au	Giving You the Best Electricity Rates; Tailored Energy Solutions; Convenient Monthly Payments; Ongoing Advice; Helping You Save Money
Click	3	We are your energy: switch to a simple online energy company, and get on with your life.	Simple, easy to understand energy; Pay on time discounts off usage & supply; No lock-in contracts; Award winning

		https://www.clickenergy.com.au	support; Pay on time discounts that don't expire’ We're 100% online (lower costs),