Power to Choose? An Analysis of Consumer Inertia in the Residential Electricity Market

Ali Hortaçsu, Seyed Ali Madanizadeh and Steven L. Puller

Online Appendix

Demographic Differences in Potential Savings that are Achieved

Here we provide descriptive evidence that retail choice disproportionately benefits specific demographic groups. These correlations are consistent with the findings of our structural model in section IV.D.

We calculate metrics of the fraction of potential savings that were realized by switching, as compared to a benchmark of purchasing from the incumbent at the price-to-beat for the entire sample period. Our "upper bound" measure of electricity expenditures is the bill size if the household had purchased from the incumbent for the entire sample period. Our "lower bound" of expenditures is the monthly bill size if the household had purchased from the lowest price retailer each month. Finally, we calculate the actual monthly bill under the observed retail choice by the household and compare it to these bounds.

For each household-month, we define a metric of the amount of potential savings that are realized. "Percent achieved" is the percent of possible gains realized and is defined as: $Percent\ Achieved \equiv \frac{Actual\ Bill - Incumbent\ Bill}{Lowest\ Possible\ Bill - Incumbent\ bill}$. The mean "Percent achieved" across all household-months is 11.0%.[1] This relatively low figure should not be surprising because nearly 60% of households purchase from the incumbent at the end of the sample period.

We characterize correlations between "Percent achieved" and demographic characteristics of the household's neighborhood. Note that we do not have demographic data on the occupants of each household; rather we have characteristics of the household's Census block group. Thus, we interpret these regressions as correlations between realized gains of retail choice and demographics of the *neighborhood* rather than demographics of individuals.[2]

Table 1 shows the mean of "Percent achieved" for households in Census block groups above and below the median of three demographic characteristics – income, education, and fraction of senior citizens. Specifically, we compute if each Census block group is above or below the median Census block group when ordered by household income, fraction of the population with at least a bachelor's degree, and the fraction of the population that is over age 65. The mean "Percent achieved" is nearly twice as large in high income versus low income neighborhoods – 14.2% in wealthier neighborhoods and 7.5% in less wealthy neighborhoods. Similar trends are present when comparing neighborhoods by education and senior citizens. Households realize more of the potential savings of switching in neighborhoods with higher education and fewer senior citizens.

[1] In calculating this figure, we do not include months in which there were no potential savings from switching away from the incumbent, which primarily includes only the first few months of the sample period.

[2] Borenstein [2010] documents the heterogeneity within Census block groups and the shortcomings of using such metrics for distributional analyses in some settings.

Table 1: Direct Measures of Potential Savings that are Achieved by Switching

Characteristic of Block Group	High	Low
Income	14.2%	7.5%
Fraction Senior	8.1%	13.8%
Fraction with Education Bachelor or More	14.3%	7.4%

Notes: This table contains the mean "Percent Achieved" of possible savings from switching to the lowest price retailer, as compared to remaining with incumbent. We calculate the monthly bill size under three scenarios: 1) purchasing from the incumbent, 2) purchasing from the lowest-price retailer, and 3) the household's actual choice. "Percent achieved" is the percent of possible gains realized ((actual bill - incumbent bill) / (lowest possible bill - incumbent bill)). Households are grouped by the characteristics of their Census block group into categories of above or below the median for the sample.

Counts of Switchers that Identify Model Parameters

Our benchmark model includes a search rate for incumbent customers and a common search rate for customers of any new entrant. The parameterization of the brand effect allows for the incumbent's product to be differentiated from the entrants; new entrants have a common brand effect. Thus, switchers from the incumbent to any entrant, or any entrant to the incumbent, or any entrant to any other entrant serve to identify the model parameters. Below we report the 2x2 matrix documenting the number of switchers that are used in our 20% sample for identification. Also, for completeness, we show the matrix of switching between any of the 6 firms (the incumbent and 5 entrants).

Table 2: Counts of Switchers that Identify Model Parameters

	Incumbent	Entrant
Incumbent	–	6048
Entrant	1931	1543

Note: This table contains the counts of the number of switchers between firms in the 20% sample used for estimation. Switchers in the Entrant-Entrant cell are switchers between entrant firms.

	Incumbent	Entrant 1	Entrant 2	Entrant 3	Entrant 4	Entrant 5
Incumbent		1737	2921	222	342	826
Entrant 1	699		375	45	54	88
Entrant 2	858	308		50	58	138
Entrant 3	109	35	82		13	53
Entrant 4	64	9	47	1		12
Entrant 5	201	34	105	32	4	

Note: This table contains the counts of the number of switchers between firms in the 20% sample used for estimation.

Table 3: Using Movers to Explore State Dependence

	Benchmark	Using Only Movers
	(1)	(2)
Stage 1: Decision to Choose		
Parameters (γ)		$\lambda_{it}^k == 1$
Constant	-3.363***	
	(0.04493)	
Incumbent	-0.6432***	
	(0.06408)	
Estimated Effects		
Prob(Search) if Incumbent Customer (λ)	0.018	1
Prob(Search) if New Retailer Customer (λ)	0.033	1
Stage 2: Choice of Retailer		
Parameters (θ)		
Price (cents/kwh)	-0.4346***	-0.4962***
	(0.09054)	(0.06352)
Incumbent Brand Dummy	2.764***	3.973***
	(0.2559)	(0.08289)
Incumbent*Month-of-Sample Counter	-0.07564***	-0.04388***
	(0.01427)	(0.003746)
Estimated Effects		
Incumbent Price Elasticity	-2.52	-1.11
Avg Entrant Price Elasticity	-4.51	-5.62
Incumbent Brand Effect ($/mo) in Jan '04	$61.86	$79.18
Incumbent Brand Effect ($/mo) in April '06	$14.87	$55.31

Notes: This table reports results that use movers to explore possible state dependence, as described in section IV.C. Column (1) reports our benchmark model results, which is also Column (1) from Table 2. Column (2) estimates the model using only new market participants (movers) by restricting movers to choose in stage 1.

Testing Robustness of the Movers' Incumbent Brand Effect

In section IV.C, we find that movers have an initial incumbent brand effect that is comparable to that of the non-movers, but the brand effect declines substantially slower over time for the movers. As we describe in the paper, one can imagine scenarios under which the incumbent brand advantage could be larger or smaller for movers. On one hand, some customers moving from outside the service territory of the incumbent may not know the incumbent. On the other hand, some movers may come from locations that do not have retail choice policy, which could make those customers more attached to the incumbent per se, regardless of the identity of that incumbent.

In this section, we show that this result is not model-driven but can be seen in "raw data". Figure 1 shows the share of the customers choosing the incumbent in the *first month after a move*. In Texas, movers have no power at their residence until they make an active decision to choose a provider. Therefore, these households do not face inertia due to inattention, and this pattern reflects only an incumbent brand effect. As seen in the figure, the incumbent share is very high, despite the incumbent charging higher rates. This large and slowly declining incumbent market share is consistent with the large brand effect that is estimated by our structural model.

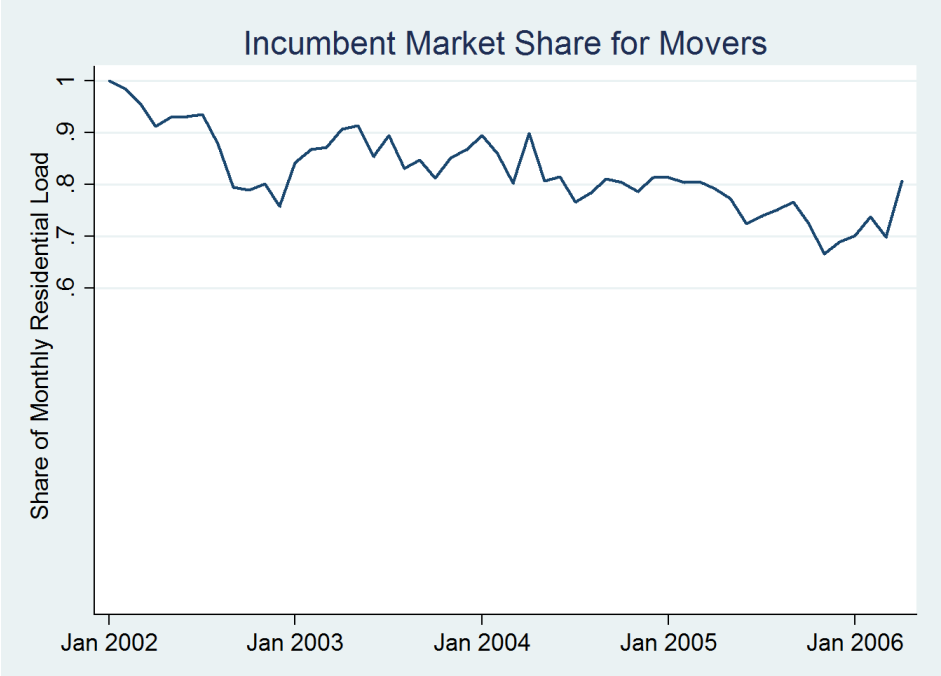

Figure 1: Movers Market Share in First Month After Move

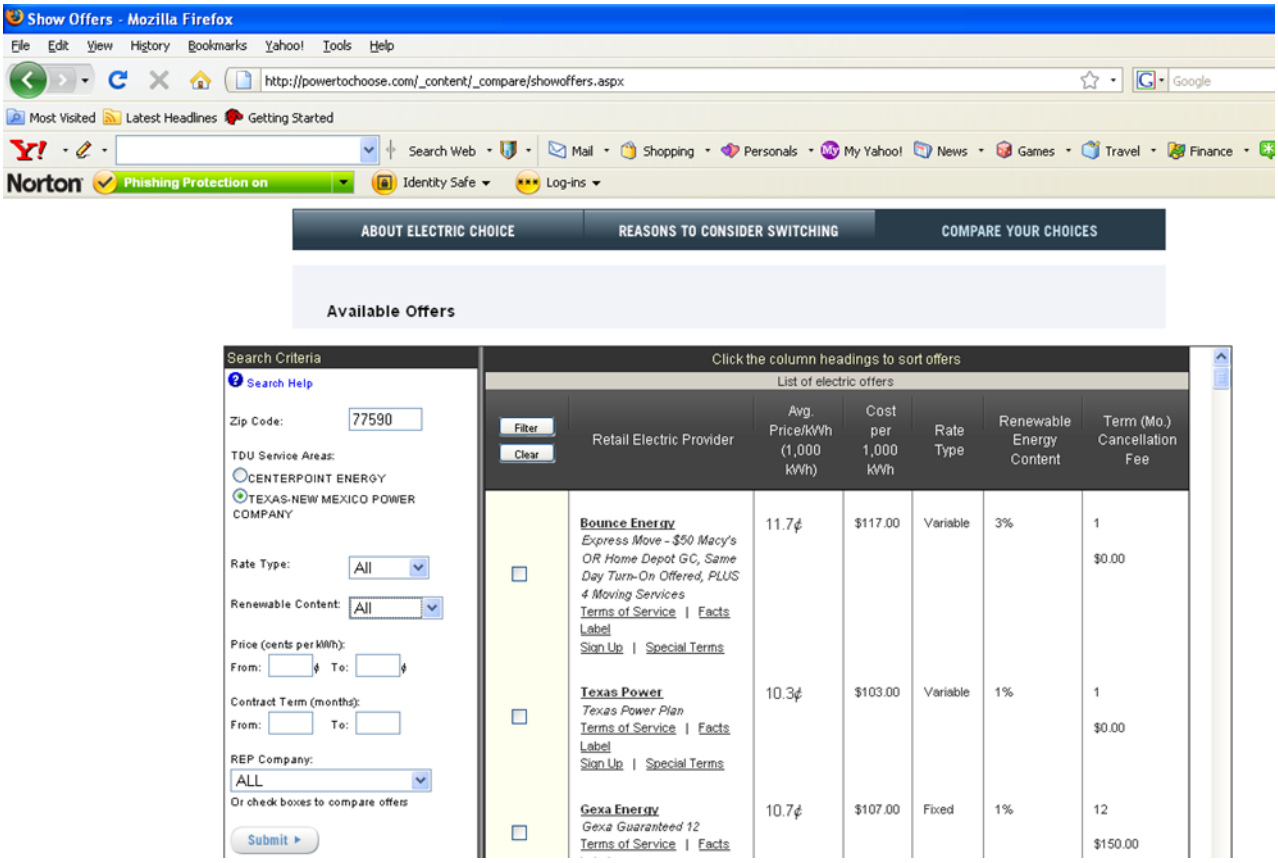

Figure 2: Web Portal to Search and Switch Retailers

Notes: This displays a screenshot of the website *www.powertochoose.com* where households can search for alternative retailers and switch on-line. A customer enters her zipcode and then is able to observe a list that displays the average price per kwh at a usage level of 1000kwh/month. If she finds a plan she wishes to switch to, she clicks on "Sign Up" and then goes through a brief on-line process to switch the retailer.

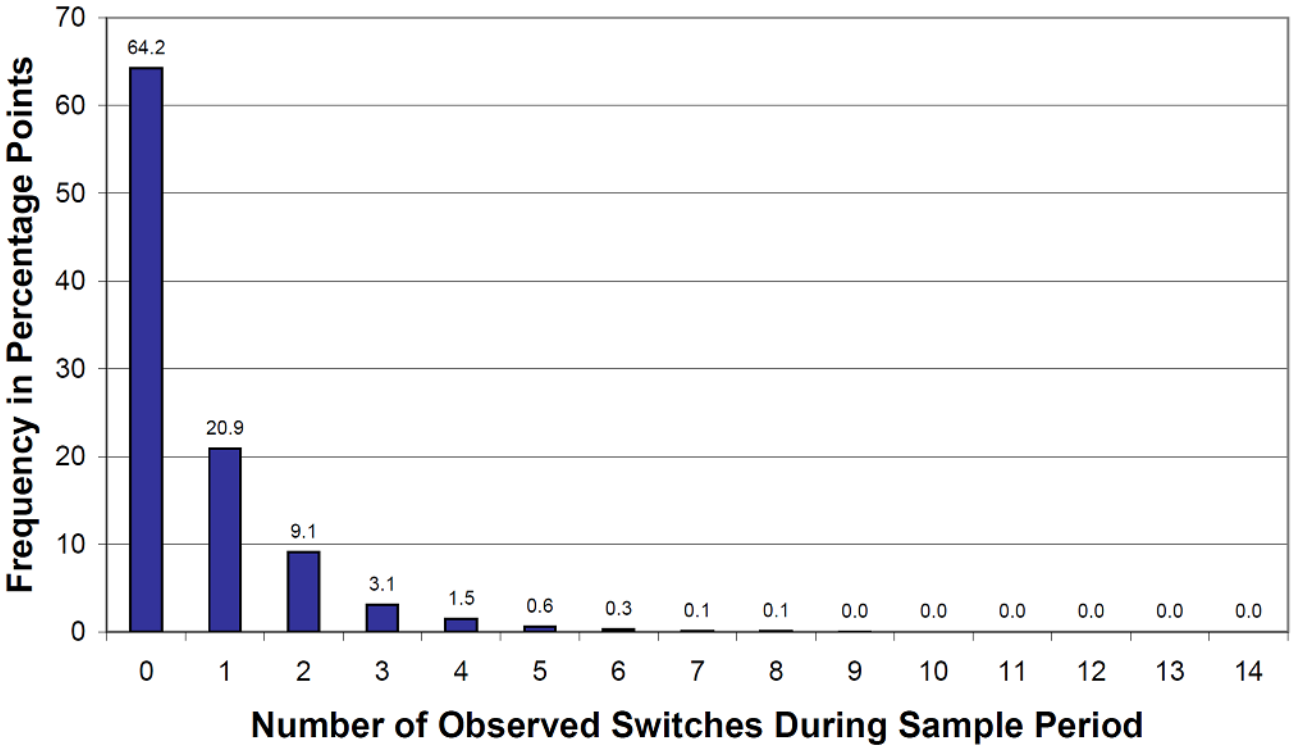

Figure 3: Frequency of Switches Per Household

Notes: This figure displays the frequency of the number of switches in retailer by a household over the sample period of January 2002-April 2006. This indicates that 64% of households never switched, and for those that did switch retailers, most switched only once or twice. We only include households that are classified as 'non-movers'. Any changes in residence for a household or changes in tenancy of a residence are excluded. 'Non-movers' are defined according to the procedure described in section II.