



Tell Me Something I Don't Already Know: Consumer (Un)informedness and the impact of smart meters on energy consumption

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Informedness and responses to information

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- Two similar households with low energy usage:
 - **A**, Informed: knows he's a low user
 - **B**, Over-estimator: thinks he's average
- Suppose we inform **A** and **B** they are low users
 - **A** learns nothing new
 - **B** might increase his energy usage
- Boomerang effects
- How to identify **A** and **B** types?
 - Find proxies
 - Ask them

What we do

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- Conduct surveys and use smart meter data to measure consumer (un)informedness in household energy usage
- Randomly inform over/under estimators about their energy usage and study how their usage changes in response to this information
- Identify factors that predict whether a household is an over/under estimator of energy use

A new “lab” for studying electricity markets

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- Context: Victoria, Australia
- Industry partner: Billcap (www.billcap.com)
- We think it's cool:
 - Competitive retail market
 - Mandatory smart meter rollout
 - Billcap is flexible as a start-up
 - Web usage data

The consumer (un)informedness project

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1. Surveyed households
 - Elicited beliefs over relative energy usage
 - Household characteristics
 - 1,719 respondents in total (20% response rate)
2. Provided households with access to the Billcap web portal, energy usage reports, and peer comparisons

Beliefs survey

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- Question: *Compared to electricity usage in Melbourne homes as large as yours, what statement best describes your household's monthly electricity use?*
 - High (top 20%)
 - Above average (top 40%)
 - Average
 - Below average (bottom 40%)
 - Low (bottom 20%)

Beliefs and actual energy usage quantiles

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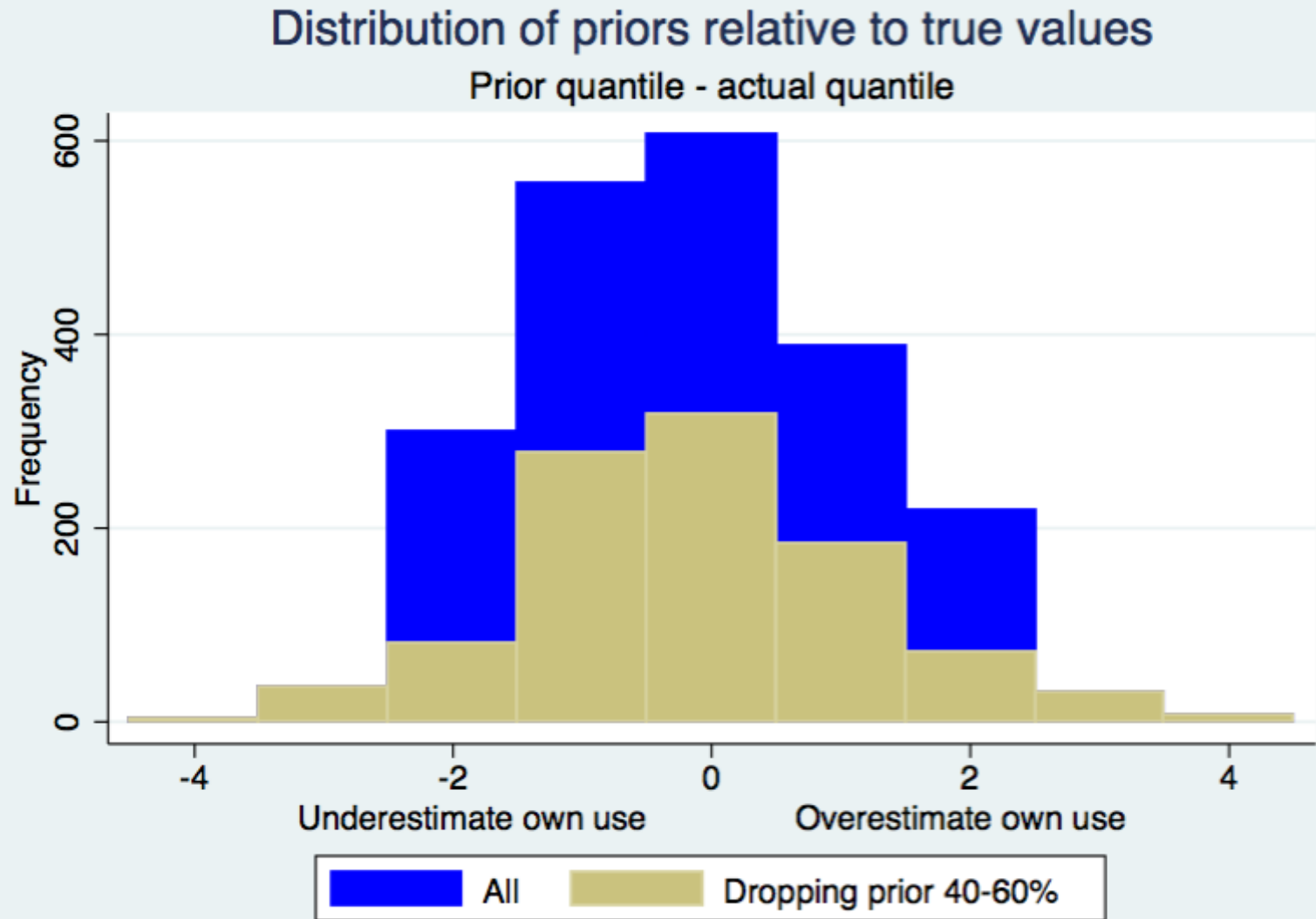
Survey data (priors)	Consumption data (usage)											
	1-20%		20-40%		40-60%		60-80%		80-100%		Total	
1-20%	31	1.8%	13	0.8%	12	0.7%	9	0.5%	4	0.2%	69	4.0%
20-40%	110	6.4%	84	4.9%	60	3.5%	51	3.0%	30	1.7%	335	19.5%
40-60%	174	10.1%	192	11.2%	217	12.6%	190	11.1%	183	10.6%	956	55.6%
60-80%	27	1.6%	42	2.4%	49	2.9%	69	4.0%	85	4.9%	272	15.8%
80-100%	4	0.2%	6	0.3%	14	0.8%	24	1.4%	39	2.3%	87	5.1%
Total	346	20%	337	20%	352	20%	343	20%	341	20%	1,719	100.0%

Table shows numbers (%) of households in each cell.

Survey data (priors) = prior beliefs of usage quantiles from pre-treatment survey.

Consumption data (usage) = actual quantile of energy usage conditional on same number of bedrooms.

Distribution of prediction errors



Beliefs and responses to usage information

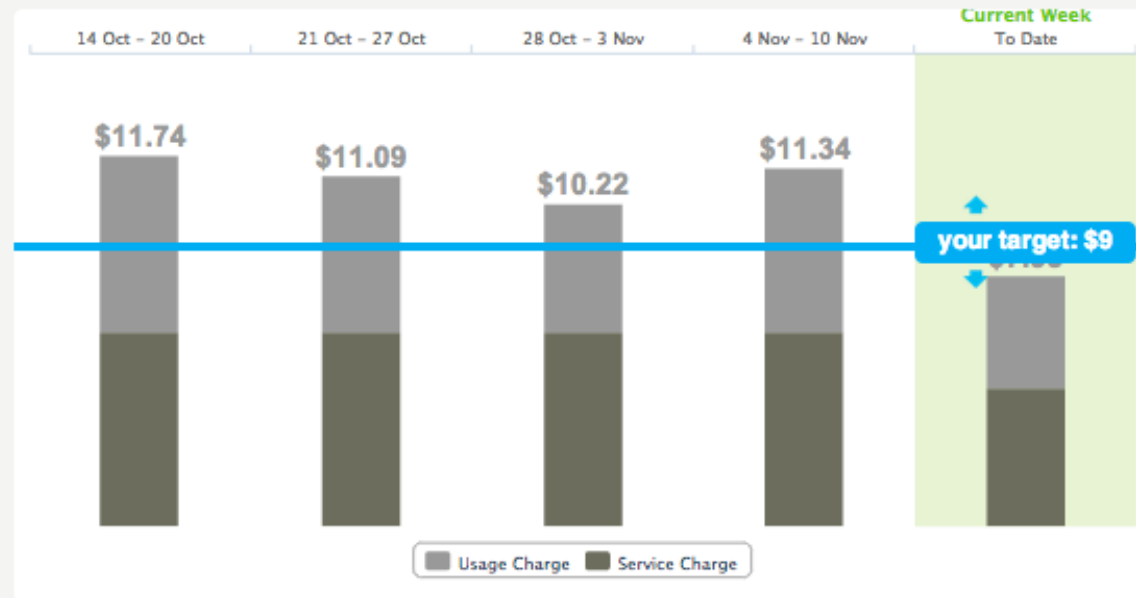
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- Do households who over/under estimate their relative energy use differentially respond to the web-portal information?
- Baseline estimating equations:
 - (1) $EnergyUsage_{it} = \alpha + \beta OfferedPortal + \mu_i + \tau_t + \epsilon_{it}$
 - (2) $EnergyUsage_{it} = \alpha + \beta AccessedInfo + \mu_i + \tau_t + \epsilon_{it}$
- Sources of exogenous variation in treatment
 - Random assignment
 - State-wide smart meter rollout
- Sample period: July 1, 2012 - June 30, 2013



\$ per week \$ kWh CO2

Advanced view (beta)



Click on a bar within the graph to zoom in

Neighbour Ranking ?

How you're doing:

- 😊 \$ Super Saver
- 😐 \$\$ Budget Conscious
- 😞 \$\$\$ Big Spender

Tip

DIG DEEPER

Click on each week's bar to view your daily usage. Click again to view usage on a half-hourly basis.



Your next bill ?

Projected bill: Expected around 15th of Dec

-\$11

Bill to date: -\$1

-\$11

AskFred (Beta)

How you're doing:



▶ 😊 \$ Super Saver

😊 \$\$ Budget Conscious

😞 \$\$\$ Big Spender

39%

Energy use ↓35% from last week

You are in the
top 39% most
efficient users

Baseline estimates

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	(1)	(2)
Received email	-0.00776 (0.00526)	
Accessed portal		-0.0228 (0.0155)
<i>N</i>	1096061	1096061

Clustered standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Informedness and responses to information

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	(1)	(2)	(3)
Underestimated * access to portal	-0.0421*** (0.0111)	-0.0528*** (0.0118)	-0.0491*** (0.0122)
Overestimated * access to portal	0.0617*** (0.0134)	0.0574*** (0.0126)	0.0584*** (0.0128)
Correct * access to portal	0.00753 (0.0149)	0.0116 (0.0145)	0.00331 (0.0136)
<i>N</i>	1095694	1095694	1095694

Clustered standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

(1) Household usage relative to full sample distribution

(2) Household usage relative to those with same number of persons

(3) Household usage relative to those with same number of bedrooms

Predicting who are the over/under estimators

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- Can we predict who are the over/under estimators with survey and publicly available data?

Predicting who are the over/under estimators

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	Overestimated	Underestimated
Full time employed (%)	-4.622** (1.824)	0.231 (2.370)
Average weekly income	0.000373 (0.000692)	0.000110 (0.000773)
Owner occupiers (%)	-0.482 (0.449)	-0.299 (0.515)
Average age	-0.0418** (0.0208)	0.0134 (0.0233)
Constant	3.365*** (0.967)	-0.145 (1.169)

Summary

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- Many households have no idea what their relative energy consumption levels are
- Once the uninformed are informed, they “follow the pack”
- On-going experiments in our lab
 - Individualized feedback and retailer switching
 - Shadow billing and consumer switching to dynamic pricing plans