

For Online Publication

A Supplemental Figures

Figure A.1: Emails sent to treatment groups

Hi David,
We're giving you an additional AMOUNT% off your electricity bill next month

Thank you for completing last month's energy usage and lifestyle survey. The information gathered as a result of the survey will help us provide you with ways to better manage your energy usage.

To thank you for your time we're giving you an additional **AMOUNT% discount off next month's electricity usage and supply charges**. The discount period starts at 12:00am on DATE and ends at 11:59pm on DATE. The discount will come off your next quarterly bill.*

Regards

Please note: the AMOUNT% discount is in addition to the discounts you receive as part of your current plan. You are still eligible to win the draw for one the prizes for completing the survey (up to \$2000 of your next quarterly bill, iPhone 6, \$1000 charitable donation). If you would like to opt out of this discount or future emails about this survey please click [here](#).

[Terms and Conditions](#) apply.

[Privacy Policy](#) [Unsubscribe](#) [Contact us](#)

(a) Round 1, groups A, B & C

Hi David,
We're giving you an additional AMOUNT% off your electricity usage charges next month

Thank you for completing last month's energy usage and lifestyle survey. The information gathered as a result of the survey will help us provide you with ways to better manage your energy usage.

To thank you for your time we're giving you an additional **AMOUNT% discount off next month's electricity usage charges**. The discount period starts at 12:00am on DATE and ends at 11:59pm on DATE. The discount will come off your next quarterly bill.*

Regards

Please note: the AMOUNT% discount is in addition to the discounts you receive as part of your current plan. You are still eligible to win the draw for one the prizes for completing the survey (up to \$2000 of your next quarterly bill, iPhone 6, \$1000 charitable donation). If you would like to opt out of this discount or future emails about this survey please click [here](#).

[Terms and Conditions](#) apply.

[Privacy Policy](#) [Unsubscribe](#) [Contact us](#)

(b) Round 1, groups D, E, & F

Hi David,
We're giving you AMOUNT% off your electricity usage charges next month

Last month we provided you with a AMOUNT% discount off your electricity usage and supply charges as a thank you for participating in our survey.

As a result of this discount you saved AMOUNT. This amount will be deducted from your next quarterly electricity bill.*

As a further thank you, **we would like to give you another discount - this time a AMOUNT% discount off next month's electricity usage charges**. The discount period starts at 12:00am on DATE and ends at 11:59pm on DATE. The discount will come off your next quarterly bill.*

Regards

If you would like to opt out of this discount or future emails about this survey please click [here](#).

[Terms and Conditions](#) apply.

[Privacy Policy](#) [Unsubscribe](#) [Contact us](#)

(c) Round 2, groups A, B & C

Hi David,
We're giving you AMOUNT% off your electricity bill next month

Last month we provided you with a AMOUNT% discount off your electricity usage charges as a thank you for participating in our survey.

As a result of this discount you saved AMOUNT. This amount will be deducted from your next quarterly electricity bill.*

As a further thank you, we would like to give you another discount - this time a **AMOUNT% discount off next month's electricity usage and supply charges**. The discount period starts at 12:00am on DATE and ends at 11:59pm on DATE. The discount will come off your next quarterly bill.*

Regards

If you would like to opt out of this discount or future emails about this survey please click [here](#).

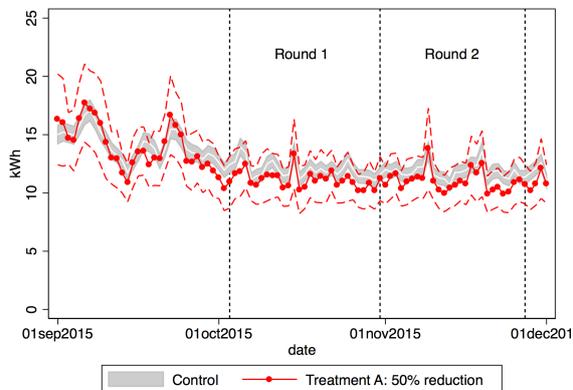
[Terms and Conditions](#) apply.

[Privacy Policy](#) [Unsubscribe](#) [Contact us](#)

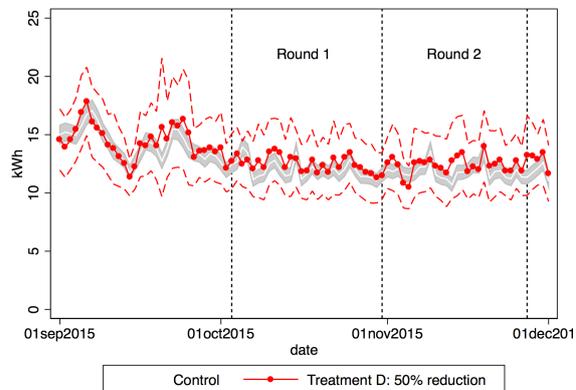
(d) Round 2, groups D, E, & F

Figure A.2: Daily use by subtreatment

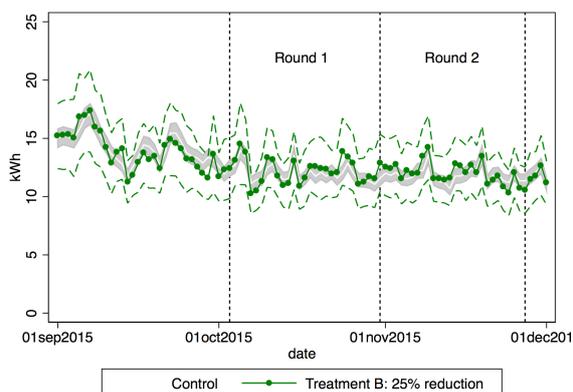
(a) 50% on total bill then over 50% on marginal



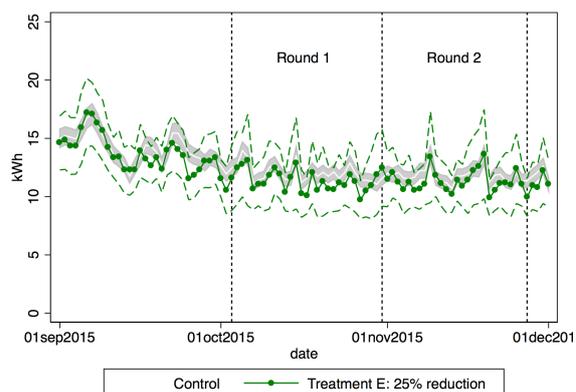
(b) Over 50% on marginal then 50% on total bill



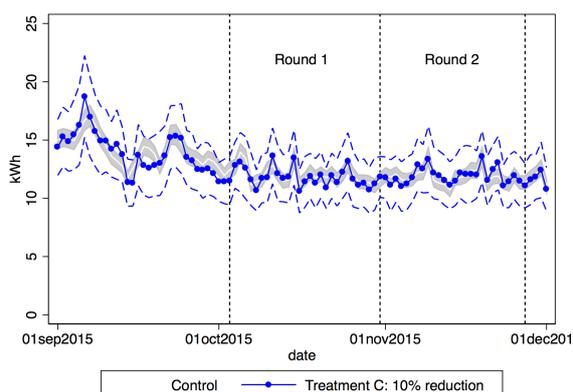
(c) 25% on total bill then over 25% on marginal



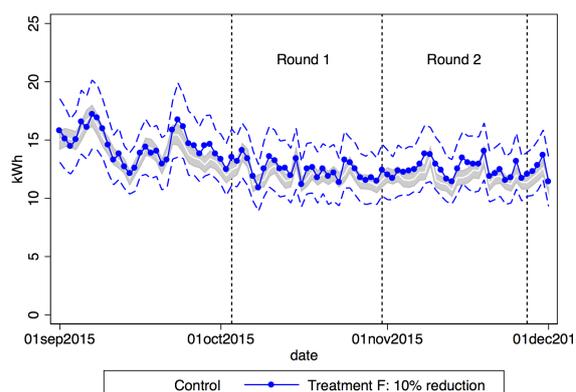
(d) Over 25% on marginal then 25% on total bill



(e) 10% on total bill then over 10% on marginal



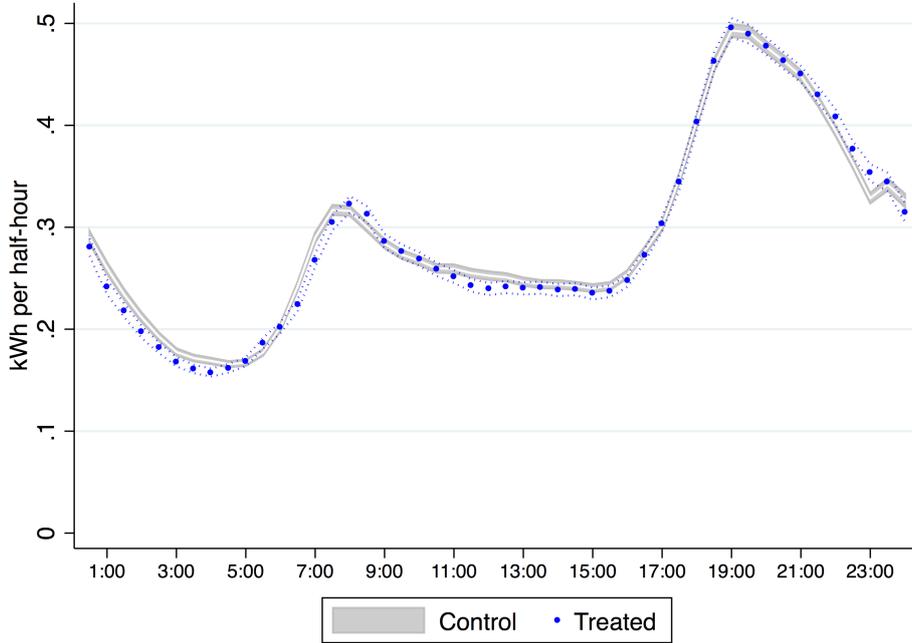
(f) Over 10% on marginal then 10% on total bill



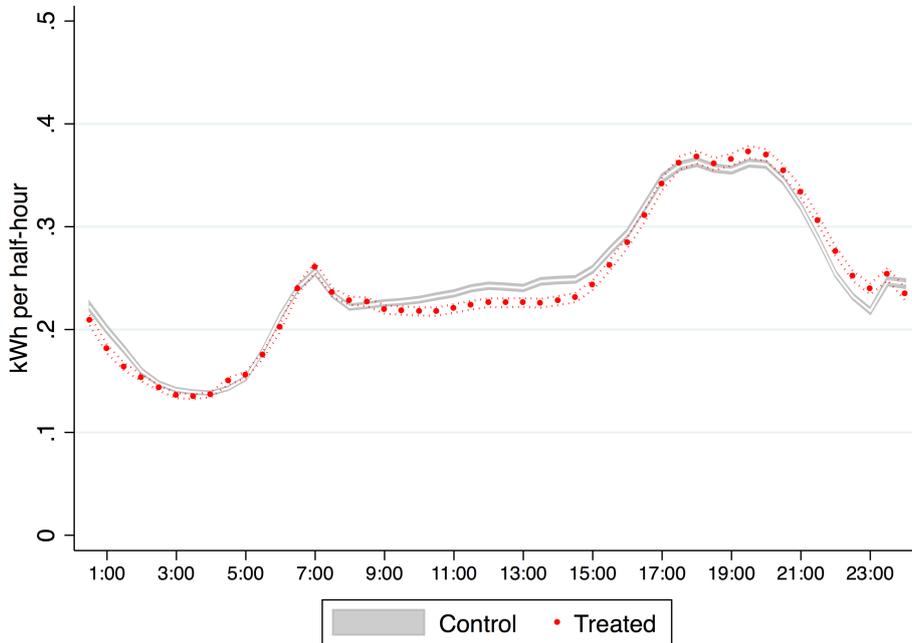
Notes: Figure plots daily consumption of electricity before, during, and after the experiment for each of the 6 subtreatments and the control group. Vertical lines show the beginning of the first and second months of treatment and the end of the experimental period.

Figure A.3: Half-hourly use for treatment and control

(a) Pre-treatment

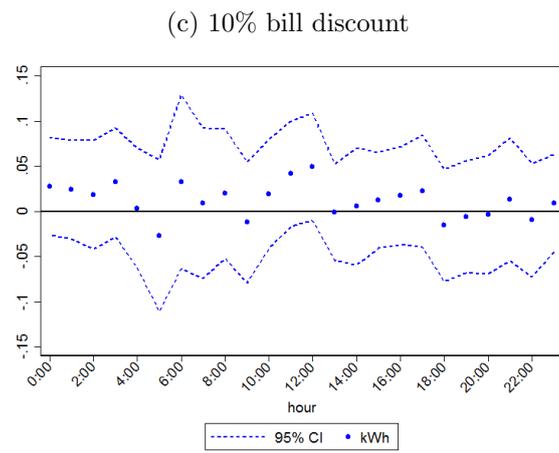
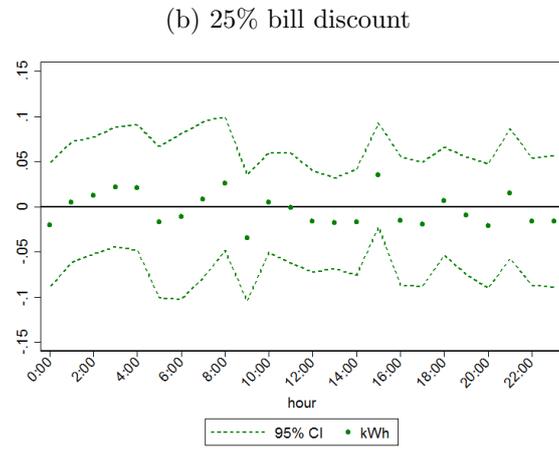
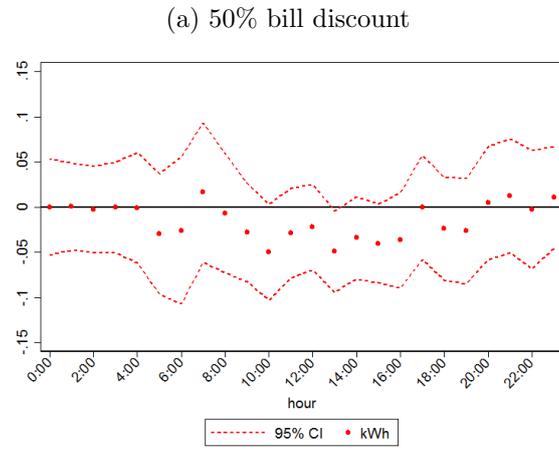


(b) Treatment rounds



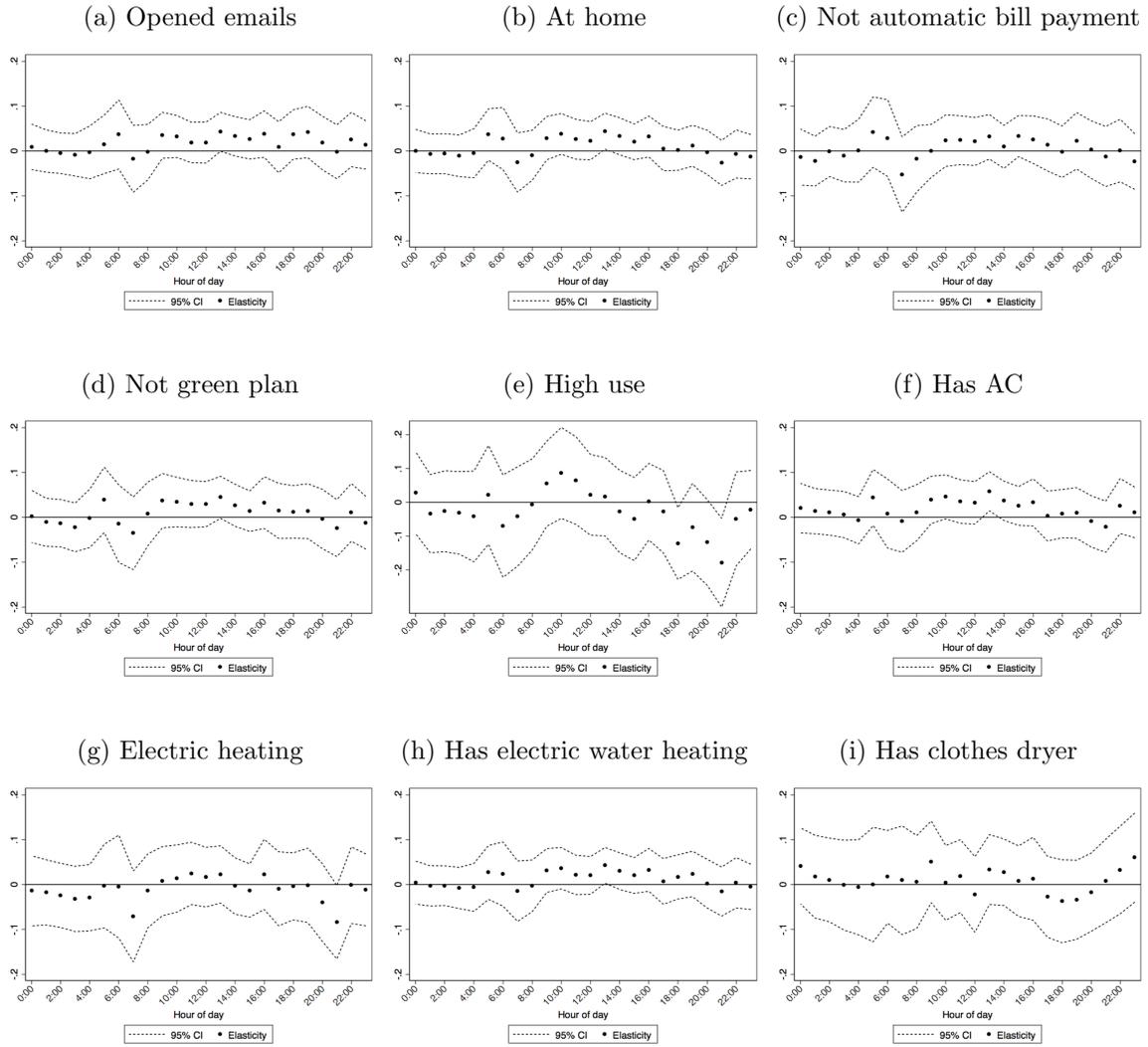
Notes: Average kWh per half-hour for households in each group and period. Control group mean is white on shaded grey. Treatment group mean represented by dots. Smaller dots represent 95% confidence interval around the sample mean for the treated groups. Shaded grey represents 95% confidence interval around the sample mean for the control group.

Figure A.4: Daily treatment effects by hour-of-day and level of discount



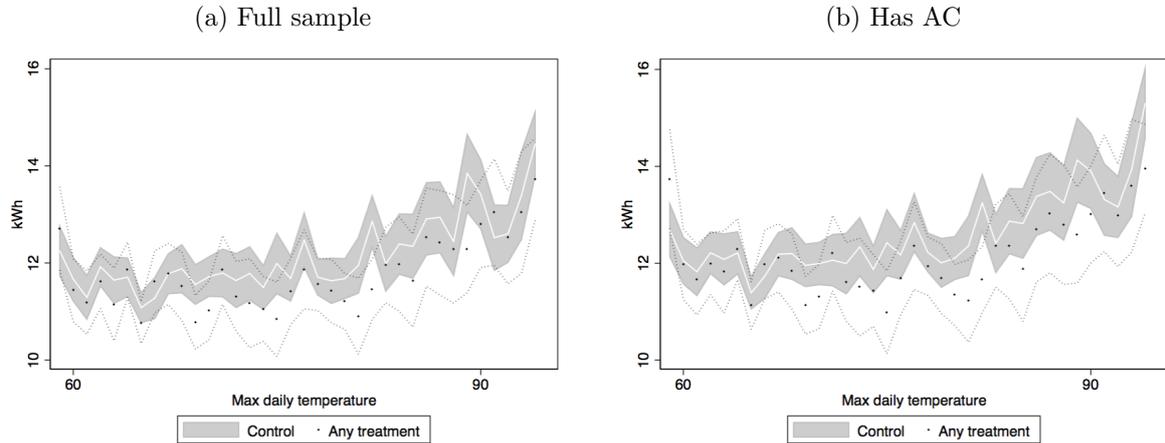
Notes: Treatment effects in equation (1) estimated separately for each hour and subgroup.

Figure A.5: Price elasticities by hour-of-day and subgroup

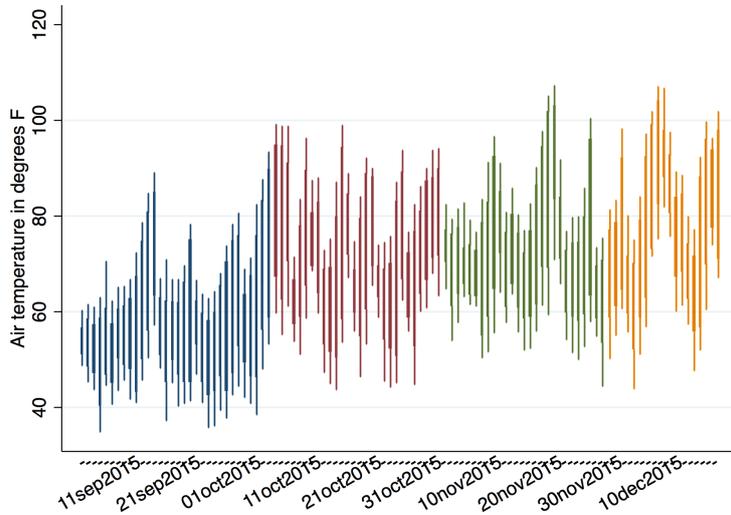


Notes: Price elasticities from equation (2) estimated separately for each hour and subgroup.

Figure A.6: Daily use by daily max temperature

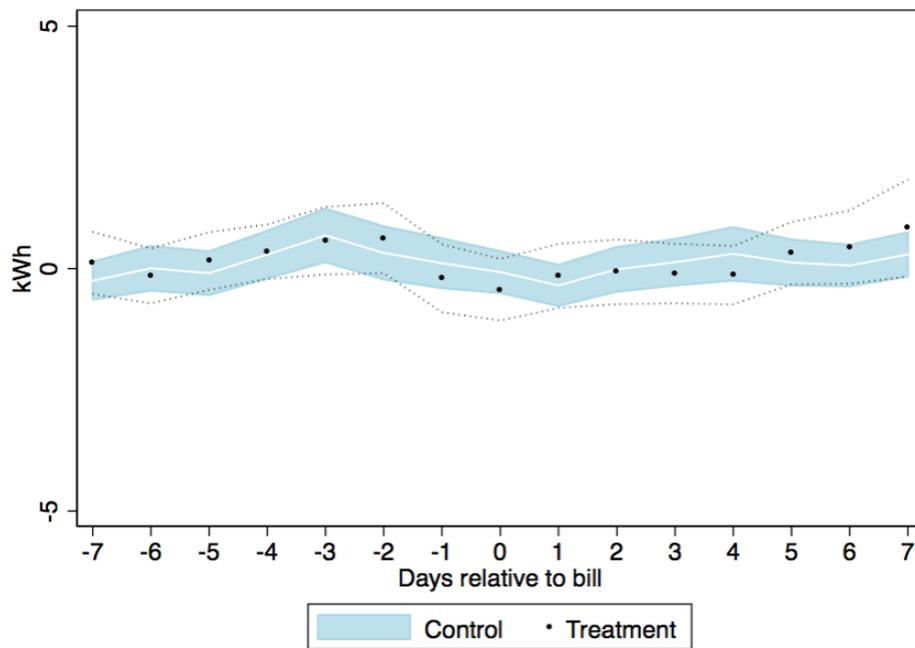


(c) Observed temperatures



Notes: Panels (a) and (b) plot daily consumption of electricity in kWh during the experimental period as a function of maximum daily temperature (F). Panel (a) shows use for the full sample whereas Panel (b) drops the 129 households that do not have air-conditioning. Panel (c) shows the distribution of temperature observations from a Melbourne Olympic Stadium over the experimental period. The distribution of temperature for each for each day is represented using a single box plot.

Figure A.7: Demeaned daily use: treatment and control before and after discount applied to bill



Notes: Treatment households received their discount payments on the first scheduled bill after the end of the experimental period. Figure plots daily register level consumption for treatment and control, demeaned to remove household and date fixed effects. “Days relative to bill” refers to days immediately before and after the bill issue date.

B Supplemental Tables

Table B.1: Pre-treatment summary statistics by subtreatment group

	Control	Difference with respect to control group					
		A	B	C	D	E	F
Panel A: Billing and meter data							
Average daily consumption (kWh)	12.69	-0.06 (0.98)	0.85 (0.99)	0.01 (1.00)	0.09 (0.98)	0.01 (1.00)	0.07 (0.99)
Variable charge (AUD \$/kWh)	0.24	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Fixed charge (AUD \$/day)	1.10	0.02 (0.02)	0.01 (0.02)	0.00 (0.02)	-0.01 (0.02)	-0.03 (0.02)	-0.00 (0.02)
Has automatic bill payment	0.35	0.01 (0.07)	-0.01 (0.07)	0.02 (0.07)	-0.01 (0.07)	-0.00 (0.07)	0.03 (0.07)
Voluntary green power purchaser	0.20	-0.06 (0.06)	-0.04 (0.06)	-0.05 (0.06)	0.00 (0.06)	-0.02 (0.06)	-0.04 (0.06)
Panel B: Survey data							
Has air conditioning	0.88	-0.00 (0.05)	0.04 (0.05)	0.02 (0.05)	0.12 (0.05)	0.02 (0.05)	-0.00 (0.05)
Has electric heating	0.49	-0.06 (0.07)	-0.06 (0.07)	0.05 (0.07)	0.01 (0.07)	0.13 (0.07)	0.20 (0.07)
Has electric water heating	0.15	-0.01 (0.05)	0.03 (0.05)	0.01 (0.05)	-0.07 (0.05)	0.01 (0.05)	-0.05 (0.05)
Has a clothes dryer	0.27	-0.07 (0.07)	-0.07 (0.07)	0.00 (0.07)	0.05 (0.07)	0.07 (0.07)	0.07 (0.07)
Is a renter	0.20	0.02 (0.06)	0.06 (0.06)	-0.01 (0.06)	0.02 (0.06)	0.10 (0.06)	0.02 (0.06)
Has a freestanding house	0.19	0.02 (0.06)	0.01 (0.06)	-0.14 (0.06)	-0.07 (0.06)	0.11 (0.06)	0.11 (0.06)
Number of bedrooms	3.22	-0.02 (0.13)	0.06 (0.13)	-0.01 (0.13)	-0.17 (0.13)	-0.15 (0.13)	-0.17 (0.13)
Number of residents	2.98	0.01 (0.19)	-0.02 (0.19)	0.09 (0.19)	-0.08 (0.19)	-0.20 (0.19)	-0.02 (0.19)
Households	666	49	49	48	50	48	49

Notes: Table shows means and differences in means for control and treatment groups (A–E). Standard errors of differences in parentheses. All variables are measured prior to the experiment. Average daily consumption measured from 01 October 2014 through 30 September 2015, inclusive. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table B.2: Contrasting experimental sample to survey respondents and full household base

	Active accounts		Answered survey		Experimental sample	
	mean/sd	obs	diff/se	obs	diff/se	obs
Billing data						
Average daily use (kWh per day)	14.3 [11.6]	244,117	1.69*** (0.12)	10,476	1.86*** (0.37)	959
Variable charge (AUD per kWh)	0.18 [0.040]	235,654	-0.0019*** (0.00039)	10,469	0.012*** (0.0013)	959
Fixed charge (AUD per day)	1.04 [0.24]	244,104	0.030*** (0.0023)	10,476	-0.022*** (0.0076)	959
Has time of use pricing	0.12 [0.32]	244,117	-0.050*** (0.0032)	10,476	-0.11*** (0.010)	959
Has green power plan	0.046 [0.21]	244,117	-0.012*** (0.0021)	10,504	0.17*** (0.0067)	959
Has automatic bill payment	0.22 [0.41]	244,117	0.079*** (0.0041)	10,504	0.13*** (0.013)	959
Census data						
Median weekly household income	1264.3 [339.0]	221,707	51.0*** (3.38)	10,504	81.9*** (11.0)	959
Median age	37.2 [5.24]	221,707	0.042 (0.052)	10,504	0.027 (0.17)	959
Full time employment rate	0.38 [0.062]	221,676	0.0070*** (0.00062)	10,504	0.0081*** (0.0020)	959
Proportion rental properties	0.27 [0.11]	221,676	-0.0033*** (0.0011)	10,504	-0.010*** (0.0037)	959
Proportion of households with children	0.65 [0.10]	221,676	-0.0072*** (0.0010)	10,504	-0.0071** (0.0034)	959
Proportion in detached home	0.76 [0.20]	221,676	-0.011*** (0.0020)	10,504	-0.013** (0.0065)	959

Notes: Table shows means and differences in means for survey respondents and experimental sample relative to retailer's entire residential household base. All billing data refers to last bill issued before the experiment began. Census data is at the SA1 level, matched by household postcode. Standard deviations in brackets. Standard errors of differences in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table B.3: Monthly electricity use and treatment effects as a function of household characteristics

VARIABLES	(1) kWh/month	(2) kWh/month
Discount (0, 10, 25, 50)	0.3694 (1.585)	-0.5494 (0.747)
Baseline kWh/month		0.8715*** (0.020)
Has air conditioning	52.6244*** (15.193)	-0.1557 (7.983)
Has electric heating	16.1438 (12.690)	-40.2758*** (5.887)
Has electric hot water	122.2371*** (19.377)	20.3938** (8.786)
Has clothes dryer	51.7699*** (14.189)	7.9082 (6.532)
Number of bedrooms	72.1171*** (8.443)	6.3044 (4.222)
Number of residents	32.9506*** (5.216)	-0.8338 (2.561)
Green power purchaser	-2.3778 (14.762)	12.3444** (5.526)
Has direct debit	-1.7167 (12.744)	-1.0086 (5.643)
Discount X Has air conditioning	0.1115 (0.784)	-0.2893 (0.353)
Discount X Has electric heating	1.1030 (0.696)	0.5115* (0.300)
Discount X Has electric hot water	0.6012 (1.221)	-0.0253 (0.536)
Discount X Has clothes dryer	-0.4284 (0.766)	-0.0347 (0.336)
Discount X Number of bedrooms	-0.9403** (0.434)	-0.0030 (0.220)
Discount X Number of residents	0.4814* (0.251)	0.1779 (0.132)
Discount X Green power purchaser	0.7354 (0.905)	-0.1094 (0.358)
Discount X Has direct debit	0.4900 (0.683)	0.0874 (0.312)
Observations	1,911	1,911
R^2	0.278	0.840
Round FE	Yes	Yes
Treated households	292	292
Control households	665	665
Mean baseline use	372.9	372.9

Notes: Dependent variable is total kWh/month for each household. Because each round of treatment lasted 4 weeks, “month” does not refer to calendar month but to a 4-week period, counting forwards and backwards from the first date of treatment. This regression does *not* include household fixed effects. “Discount” is a variable that takes on a value of 50, 25, 10, or 0, depending on whether the household is in treatment group A-D, B-E, C-F, or control, respectively. The regression focuses exclusively on the treated period. Column (2) also controls for average monthly household electricity use pre-treatment. Standard errors clustered at the household level. *** p<0.01, ** p<0.05, * p<0.1.

Table B.4: Price elasticity by appliance holdings

	(1)	(2)	(3)
	Electric heating	Electric water heating	Clothes dryer
log Marginal price	-0.0286 (0.028)	0.0169 (0.037)	0.0151 (0.032)
Observations	211,276	85,146	116,690
R^2	0.187	0.130	0.125
Number of hhregid	501	204	279
Household-register FE	Yes	Yes	Yes
Day FE	Yes	Yes	Yes
95% confidence interval (low)	-0.0843	-0.0563	-0.0482
95% confidence interval (high)	0.0272	0.0901	0.0784
First stage F	502.8	172.8	655.6

Notes: Dependent variable is daily register-level log(kWh). Price is instrumented using treatment status (10%, 25%, 50% discount) \times treatment period. Column (1) displays results for the subset of households have electric room heating. Column (2) displays results for the subset of households that have electric hot water systems. Column (3) displays results for households that have a clothes dryer. Standard errors are clustered at the household level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table B.5: Price elasticity by baseline level of use

	(1)	(2)	(3)	(4)
	High use	Above average use	Below average use	Low use
log Marginal price	-0.0359 (0.041)	0.0485 (0.038)	-0.0042 (0.029)	-0.0169 (0.039)
Observations	107,832	107,922	108,307	109,529
R^2	0.190	0.167	0.146	0.074
Registers	257	256	255	264
Household-register FE	Yes	Yes	Yes	Yes
Day FE	Yes	Yes	Yes	Yes
95% confidence interval (low)	-0.117	-0.0259	-0.0605	-0.0924
95% confidence interval (high)	0.0454	0.123	0.0521	0.0586
First stage F	412.5	574.4	326.3	345.8

Notes: Dependent variable is daily register-level log(kWh). Price is instrumented using treatment status (10%, 25%, 50% discount) \times treatment period. Sample parsed into 4 quartiles based on baseline level of use. Standard errors are clustered at the household level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table B.6: Daily treatment effects by subgroup

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Base	Opened email	Before bill	Not direct debit	Few residents	Not green plan	At home	Has AC
Treated 50% discount	-0.0403 (0.287)	-0.1037 (0.318)	-0.0230 (0.308)	-0.0102 (0.311)	-0.3464 (0.461)	-0.0611 (0.330)	0.0137 (0.301)	-0.2037 (0.324)
Treated 25% discount	0.3112 (0.333)	0.2455 (0.338)	0.4213 (0.313)	0.2906 (0.405)	-0.4413 (0.525)	0.3848 (0.416)	0.3146 (0.351)	0.2637 (0.371)
Treated 10% discount	0.1765 (0.262)	0.0829 (0.326)	0.1625 (0.284)	-0.0704 (0.339)	0.0669 (0.341)	0.1181 (0.312)	0.2595 (0.258)	0.1472 (0.289)
Observations	404,184	399,320	399,718	261,603	167,570	317,049	373,111	349,795
R^2	0.164	0.164	0.164	0.168	0.144	0.172	0.175	0.170
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Day FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Treated households	293	293	293	191	118	223	293	247
Control households	666	666	666	431	279	530	666	583
Mean baseline use	14.0	14.0	14.0	14.01	11.18	14.14	14.89	14.51

Notes: Dependent variable is kWh/day. Column (1) displays results for the full experimental sample. Regressions in Columns (2)-(7) are restricted to the following subsamples. Column (2): households that definitely opened the treatment email. Column (3): household-days before any intermediate bills were received. Column (4): households that are not signed up for automatic bill payment. Column (5): households with two or fewer residents. Column (6): households that have not opted for a green power plan. Column (7): household-days with consumption levels exceeding 4 kWh/day. Column (8): households that have central or unit air-conditioning. Standard errors are clustered at the household level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$