Homework 2 Solutions

Kelly Lifchez

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1 Python

1.1 Balance

2 provides evidence suggesting that the randomization worked and that there is a statistically significant difference in the energy efficiency of homes that were retrofitted and homes that were not. The p-value for the difference-in-means test on the electricity outcome is significant at the 1% level, indicating that there is a statistically significant difference between the electricity usage in treatment and control homes. If the retrofitting assignment treatment is truly random, then we can say that, on average, retrofitted households reduce monthly electricity consumption by approximately 94 kWh compared to non-retrofitted households. The difference-in-means tests on square footage and temperature are not statistically significant at any level. This provides strong evidence that the assignment of treatment was random (at least along these parameters).

Table 1: Descriptive statistics and balance

	Control (s.d.)	Treatment (s.d.)	P-Value
Electricity	1181.33	1086.75	0.00
	(454.31)	(423.96)	
Sqft	1633.05	1657.55	0.57
	(682.90)	(686.27)	
Temp	79.89	79.89	0.99
	(2.16)	(1.97)	
Observations	501	499	1000

This table presents mean values for observable covariates for the sets of non-retrofitted (Control) and retrofitted (Treatment) homes in the sample. The final column shows the p-values for differences in means tests (two-way t-tests) between the treatment and control groups.

1.2 Graphical evidence of treatment effect

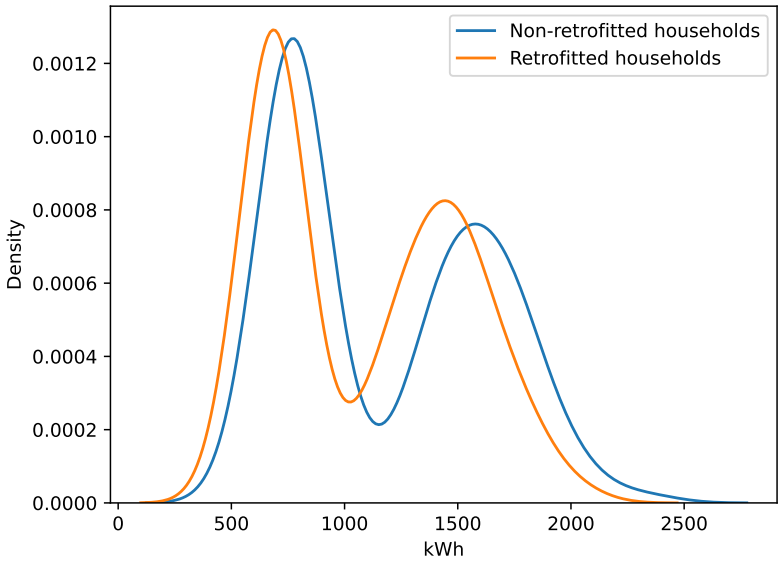

Figure 1: Kernel density plot of electricity usage for retrofitted and non-retrofitted homes in sample

1.3 OLS Results

Table 2: OLS results using different methods

	(a)	(b)	(c)
Retrofit	-109.666	-109.666	-109.666
Sqft	0.615	0.615	0.615
Temperature	3.255	3.255	3.255
Constant	-83.603	-83.588	-83.603
Observations	1000	1000	1000

2 Stata

2.1 Balance

Table 3: Descriptive statistics and balance

	(1)		(2)		(3)	
	mean	sd	mean	sd	b	p
Electricity	1181.329	(454.308)	1086.745	(423.960)	94.584	(0.001)
Square Feet	1633.052	(682.904)	1657.551	(686.271)	-24.499	(0.572)
Temperature	79.891	(2.163)	79.893	(1.968)	-0.002	(0.987)
Observations	501		499		1000	

2.2 Scatter plot

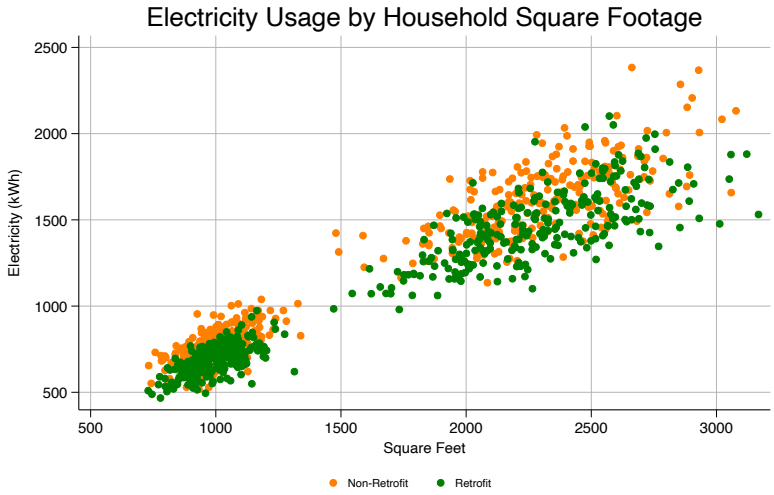

Figure 2: Scatter plot of electricity usage and square footage for retrofitted and non-retrofitted homes

2.3 OLS Results

Table 4: OLS Results

VARIABLES	(1) electricity
Retrofit Treatment	-109.7***
	(7.943)
sqft	0.615***
	(0.00678)
temp	3.255*
	(1.932)
Constant	-83.60
	(154.7)
Observations	1,000
R-squared	0.919

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1