

# ECON 7103 Homework 2

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## 1 Python

The randomization of grouping worked. There is no significant difference in square feet of the home and the outdoor average temperature between the treatment and control groups.

	Mean (s.d.) control group	Mean (s.d.) treatment group	P-value of t-test between two groups
electricity	1181.33 (454.31)	1086.75 (423.96)	0.00069222
sqft	1633.05 (682.90)	1657.55 (686.27)	0.57163
temp	79.89 (2.16)	79.89 (1.97)	0.987135

Table 1: Sample mean, sample standard deviations, and p-values for the two-way t-test between treatment and control group means

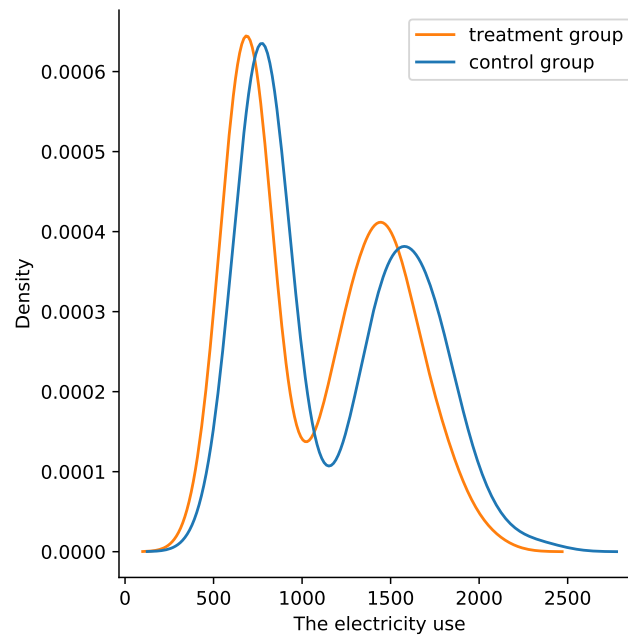


Figure 1: Kernel density plot of the electricity use for treated group and control group

Figure 1 provides graphical evidence that the retrofits worked. The energy consumption distribution of the treatment group is on the slightly left side of the control group. In other words, receiving the energy-efficiency retrofit program makes households consume less electricity.

Below Table 2 presents the coefficients of three OLS estimation techniques.

	OLS by hand	OLS by simulated least squares	OLS using a canned routine
const	-83.602758	-83.585324	-83.602758
sqft	0.615339	0.615338	0.615339
retrofit	-109.666176	-109.666282	-109.666176
temp	3.255075	3.254860	3.255075

Table 2: Coefficients of three OLS estimation techniques

## 2 Stata

Table 3 below displays each variable's sample, sample standard deviation, and p-values for the two-way t-test between treatment and control groups.

	Control mean/sd	Treatment mean/sd	Difference p
electricity	1181.33 454.31	1086.75 423.96	0.001***
sqft	1633.05 682.90	1657.55 686.27	0.572
temp	79.89 2.16	79.89 1.97	0.987
Observations	501	499	1000

Table 3: Sample mean, sample standard deviations, and p-values for the two-way t-test between treatment and control group means

Figure 2 below is a two-way scatter plot with electricity consumption on the y-axis and square feet on the x-axis. We can have a general idea that the electricity consumption per household is positively related to the size of the home.

Table 4 shows the regression result with heteroskedasticity-robust standard errors.

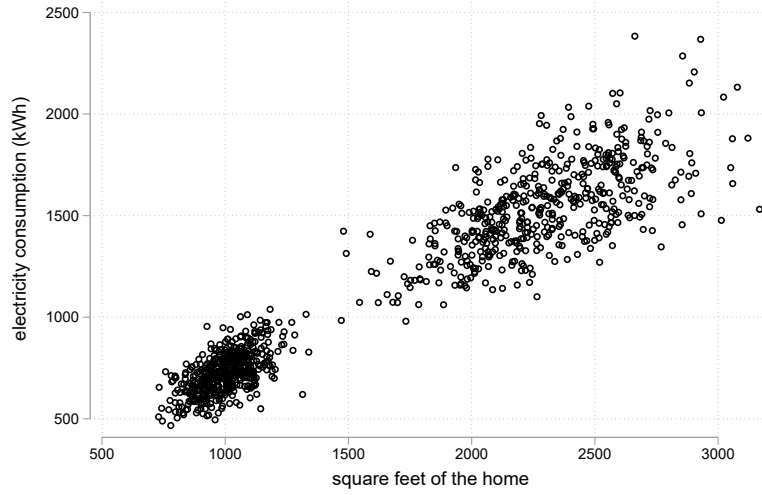


Figure 2: Two-way scatterplot of electricity consumption against square fee of the home

(1)	
VARIABLES	Ordinary least squares
sqft	0.62** (0.01)
retrofit	-109.67** (7.94)
temp	3.26 (1.93)
Constant	-83.60 (154.69)
Observations	1,000
R-squared	0.92
Robust standard errors in parentheses	
** p<0.01, * p<0.05	

Table 4: Regreesion results