ECON7103 HW3

Sedat Ors

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1 Stata

1. • a) Let's take the log of both sides

$$y_i = e^{\alpha}\delta^{d_i} z_i^{\gamma} e^{\eta_i} \tag{1}$$

$$\ln(y_i) = \alpha \ln(e) + d_i \ln(\delta) + \gamma \ln(z_i) + \eta_i \ln(e) \quad \text{where} \quad \ln(e) = 1 \tag{2}$$

$$\ln(y_i) = \alpha + d_i \ln(\delta) + \gamma \ln(z_i) + \eta_i \tag{3}$$

• b) δ means percentage change. if we increase δ 1 percent, y_i changes 1 percent. But if we need to interpret the retrofit program, it shows the effectiveness of the treatment program. if d_i =1 it means everybody treated in the group if not δ =0.

• c) when we take the derivative of the equation above according to the d_i,

$$\Delta y_i = y_i(d_i = 1) - y_i(d_i = 0) \tag{4}$$

$$= e^{\alpha\delta z_i^{\gamma}} e^{\eta_i} - e^{\alpha z_i^{\gamma}} e^{\eta_i} \tag{5}$$

$$= (\delta - 1) e^{\alpha z_i^{\gamma}} e^{\eta_i} \tag{6}$$

$$\text{Multiply by } \frac{1}{y_i} = \frac{y_i}{y_i} : \tag{7}$$

$$= \frac{(\delta - 1) e^{\alpha z_i^{\gamma}} e^{\eta_i} y_i}{e^{\alpha\delta d_i z_i^{\gamma}} e^{\eta_i}} \tag{8}$$

$$= \frac{\delta - 1}{\delta d_i} y_i. \tag{9}$$

• d)

	Coefficient b/ci95	Marginal E~s b/ci95
lnsqft	0.89***	0.89***
	0.88,0.91	0.88,0.91
lntemp	0.28*	0.28*
	0.05,0.52	0.04,0.52
retrofit	-0.10***	-0.10***
	-0.11,-0.09	-0.11,-0.09
Constant	-0.77	-0.77
	-1.81,0.27	-1.83,0.30
Observations	1000	1000

Table 1: Electricity usage

Let's take the derivative of the equation above,

$$\ln(y_i) = \alpha + \ln(\delta)d_i + \gamma \ln(z_i) + \eta_i \tag{10}$$

$$y_i = \exp\left(\alpha + \ln(\delta)d_i + \gamma \ln(z_i) + \eta_i\right) \tag{11}$$

$$\frac{\partial y_i}{\partial z_i} = \frac{\gamma}{z_i} \exp\left(\alpha + \ln(\delta)d_i + \gamma \ln(z_i) + \eta_i\right) \tag{12}$$

if we change z_i 1 unit, y_i change $\gamma \frac{y_i}{z_i}$

- e) See Table 1

- f) See Figure 1

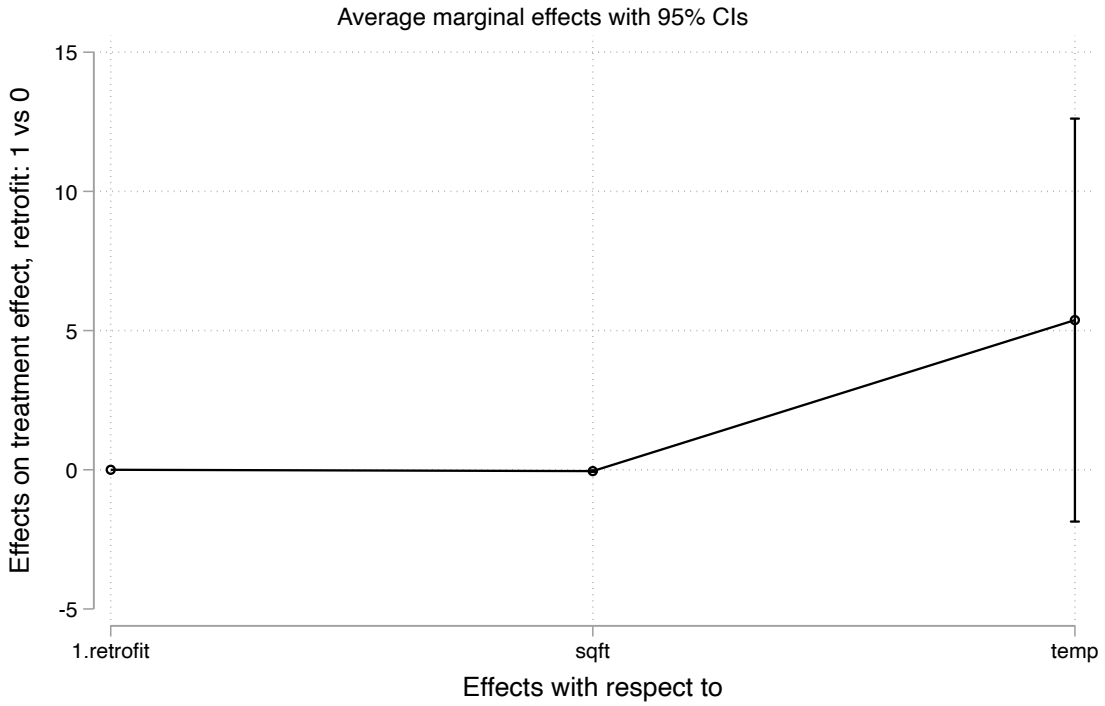

Figure 1: Marginal effects with 95% confidence intervals