Elasticities

Temperature Elasticities

The temperature elasticity of demand is:

$$\eta^q_{tmp} = \frac{\partial q_t}{\partial t_{mp}} \frac{t_{mp}}{q_t} = \frac{(2\hat{\beta}_1 t_{mp} + \hat{\beta}_2) t_{mp}}{q_t} = \frac{2\hat{\beta}_1 t^2_{mp} + \hat{\beta}_2 t_{mp}}{q_t} = \frac{77.516 t^2_{mp} - 1.426.205}{q_t}$$

If we define $d = p_m - p_e$, then the temperature elasticity of the subsidies is:

$$\eta^s_{tmp} = \frac{\partial s_t}{\partial t_{mp}} \frac{t_{mp}}{s_t} = \frac{(d 2\hat{\beta}_1 t_{mp} + d\hat{\beta}_2) t_{mp}}{s_t} = \frac{d(2\hat{\beta}_1 t^2_{mp} + \hat{\beta}_2 t_{mp})}{d q_t} = \frac{2\hat{\beta}_1 t^2_{mp} + \hat{\beta}_2 t_{mp}}{q_t}$$

Wage Index Elasticities

The wage index elasticity of demand is:

$$\eta^q_w = \frac{\partial q_t}{\partial w} \frac{w}{q_t} = \frac{\hat{\beta}_4 w}{q_t} = \frac{320.936 w}{q_t}$$

And again, the wage index elasticity of the subsidies is equal to the elasticity of demand:

$$\eta^s_w = \frac{\partial s_t}{\partial w} \frac{w}{s_t} = \frac{d\hat{\beta}_4 w}{d q_t} = \frac{\hat{\beta}_4 w}{q_t} = \eta^q_w$$

EMAE Elasticities

The EMAE elasticity of demand is:

$$\eta^q_a = \frac{\partial q_t}{\partial a} \frac{a}{q_t} = \frac{\hat{\beta}_5 a}{q_t} = \frac{15812 a}{q_t}$$

And just as before, the elasticty of the subsidies is the same:

$$\eta^s_a = \frac{\partial s_t}{\partial a} \frac{a}{s_t} = \frac{d\hat{\beta}_5 a}{s_t} = \frac{d\hat{\beta}_5 a}{d q_t} = \frac{\hat{\beta}_5 a}{q_t} = \eta^q_a$$

Average Seasonal Price Elasticities

The price elasticity of demand is as follows:

$$\eta_{p_e}^{q} = \frac{\partial q_t}{\partial p_e}\frac{p_e}{q_t} = \frac{\hat{\beta}_3}{q_t} = \frac{332004}{q_t}$$

And the average seasonal price elasticity of the subsidies is:

$$\eta_{p_e}^{s} = \frac{\partial s_t}{\partial p_e}\frac{p_e}{s_t}$$

Calculating the derivative:

$$\frac{\partial s_t}{\partial p_e} = -(\hat{\beta}_0 + \hat{\beta}_1 t_{mp}^2 + \hat{\beta}_2 t_{mp} + \frac{\hat{\beta}_3 p_e}{p_e} + \hat{\beta}_3 ln(p_e) + \hat{\beta}_4 w + \hat{\beta}_5 a + \hat{\beta}_6 t) =$$
$$-(\underbrace{\hat{\beta}_0 + \hat{\beta}_1 t_{mp}^2 + \hat{\beta}_2 t_{mp} + \hat{\beta}_3 ln(p_e) + \hat{\beta}_4 w + \hat{\beta}_5 a + \hat{\beta}_6 t}_{=q_t} + \hat{\beta}_3) = -(q_t + \hat{\beta}_3)$$

So the final result is:

$$\eta_{p_e}^{s} = \frac{-(q_t + \hat{\beta}_3)p_e}{s_t}$$

Average Monomic Price elasticity

The "cost" elasticty of subsidies is defined as:

$$\eta_{p_m}^{s} = \frac{\partial s_t}{\partial p_m}\frac{p_m}{s_t}$$

And the derivative is equal to q_t:

$$\frac{\partial s_t}{\partial p_m} = \hat{\beta}_0 + \hat{\beta}_1 t_{mp}^2 + \hat{\beta}_2 t_{mp} + \hat{\beta}_3 ln(p_e) + \hat{\beta}_4 w + \hat{\beta}_5 a + \hat{\beta}_6 t = q_t$$

Therefore:

$$\eta_{p_m}^{s} = \frac{q_t p_m}{s_t} = \frac{q_t p_m}{(p_m - p_e)q_t} = \frac{p_m}{(p_m - p_e)}$$