Elasticities

Temperature Elasticities

The temperature elasticity of demand is:

$$\eta_{tmp}^q = rac{\partial q_t}{\partial t_{mp}} rac{t_{mp}}{q_t} = rac{(2\hat{eta}_1 t_{mp} + \hat{eta}_2) t_{mp}}{q_t} = rac{2\hat{eta}_1 t_{mp}^2 + \hat{eta}_2 t_{mp}}{q_t} = rac{77.516 t_{mp}^2 - 1.426.205}{q_t}$$

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

$$\eta^{s}_{tmp} = rac{\partial s_{t}}{\partial t_{mp}} rac{t_{mp}}{s_{t}} = rac{(d2\hat{eta}_{1}t_{mp} + d\hat{eta}_{2})t_{mp}}{s_{t}} = rac{d(2\hat{eta}_{1}t_{mp}^{2} + \hat{eta}_{2}t_{mp})}{dq_{t}} = rac{2\hat{eta}_{1}t_{mp}^{2} + \hat{eta}_{2}t_{mp}}{q_{t}}$$

Wage Index Elasticities

The wage index elasticity of demand is:

$$\eta_w^q = rac{\partial q_t}{\partial w} rac{w}{q_t} = rac{\hat{eta}_4 w}{q_t} = rac{320.936 w}{q_t}$$

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

$$\eta_w^s = rac{\partial s_t}{\partial w}rac{w}{s_t} = rac{\hat{d}eta_4w}{dq_t} = rac{\hat{eta}_4w}{q_t} = \eta_w^q$$

EMAE Elasticities

The EMAE elasticity of demand is:

$$\eta_a^q = rac{\partial q_t}{\partial a} rac{a}{q_t} = rac{\hat{eta}_5 a}{q_t} = rac{15812a}{q_t}$$

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

$$\eta_a^s = rac{\partial s_t}{\partial a}rac{a}{s_t} = rac{d\hat{eta}_5 a}{s_t} = rac{d\hat{eta}_5 a}{da_t} = rac{\hat{eta}_5 a}{q_t} = \eta_a^q$$

Average Seasonal Price Elasticities

The price elasticity of demand is as follows:

$$\eta_{p_e}^q = rac{\partial q_t}{\partial p_e} rac{p_e}{q_t} = rac{\hat{eta}_3}{q_t} = rac{332004}{q_t}$$

And the average seasonal price elasticity of the subsidies is:

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

Calculating the derivative:

$$egin{aligned} rac{\partial s_t}{\partial p_e} &= -(\hat{eta}_0 + \hat{eta}_1 t_{mp}^2 + \hat{eta}_2 t_{mp} + rac{\hat{eta}_3 p_e}{p_e} + \hat{eta}_3 ln(p_e) + \hat{eta}_4 w + \hat{eta}_5 a + \hat{eta}_6 t) = \ -(\hat{eta}_0 + \hat{eta}_1 t_{mp}^2 + \hat{eta}_2 t_{mp} + \hat{eta}_3 ln(p_e) + \hat{eta}_4 w + \hat{eta}_5 a + \hat{eta}_6 t + \hat{eta}_3) = -(q_t + \hat{eta}_3) = -(q_t + \hat{eta}_3) + \hat{eta}_3 + \hat{eta}_5 d + \hat{eta}_5 d$$

So the final result is:

$$\eta^s_{p_e} = rac{-(q_t + \hat{eta}_3)p_e}{s_t}$$

Average Monomic Price elasticity

The "cost" elasticty of subsidies is defined as:

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

And the derivative is equal to q_t :

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

Therefore:

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