

$$\begin{aligned}
 \ln C = & a_0 + a_y \ln y + \sum_i b_i \ln z_i + \sum_j g_j \ln p_j + a_{yy} \frac{(\ln y)^2}{2} + \\
 (4) \quad & + \frac{1}{2} \sum_i \sum_l b_{il} \ln z_i \ln z_l + \frac{1}{2} \sum_j \sum_s g_{js} \ln p_j \ln p_s + \\
 & + \sum_i a_{yi} \ln y \ln z_i + \sum_j t_{yj} \ln y \ln p_j + \sum_i \sum_j s_{ij} \ln z_i \ln p_j + e
 \end{aligned}$$

As AA and POT can take on values of zero, it is not possible the logging of these variables, so the Box-Cox⁷ transformation has been applied.

The cost-share equations are therefore :

$$(5) \quad S_j = \gamma_j + \sum_s \gamma_{js} \ln p_s + \tau_{yj} \ln y + \sum_i \sigma_{ij} \ln z_i + \varepsilon_j \quad j = L, E, M.$$

To ensure that the cost function (4) is linearly homogeneous in factor prices, the following restrictions are imposed:

$$(6) \quad \sum_j \gamma_j = 1, \quad \sum_j \tau_{yj} = 0, \quad \sum_j \sigma_{ij} = 0 \quad \forall i, \quad \sum_j \gamma_{js} = 0 \quad \forall s$$

Symmetry is guaranteed by:

$$(7) \quad \gamma_{js} = \gamma_{sj}, \quad \beta_{il} = \beta_{li}$$

The variables are normalised around (that is divided by) their own sample mean. Table 3 shows the Zellner's estimates of the system made up of (4) and two cost-share⁸ equations (5), under conditions (6) and (7), both for the hedonic model and the traditional one.

The adjusted R² indicates that the hedonic function fits better the data. When we exclude the hedonic variables, the estimate on Y (volume of delivered water) changes from 0.634 to 0.92. The increase in this coefficient is probably due to the fact that, in the traditional specification, it summarises all the effect explained by the hedonic variables. The preference for the hedonic approach is, therefore, motivated by the possibility of analysing the links between costs and each

⁷ This enables the passage from a generic variable x to a x^* variable:

$$x^* = \begin{cases} \frac{x^\alpha - 1}{\alpha} & \alpha \neq 0 \\ \ln x & \alpha = 0 \end{cases}$$

As $\lim_{\alpha \rightarrow 0} \frac{x^\alpha - 1}{\alpha} = \ln x$, x^* , for small values α , approximates the $\ln x$. As the Box-Cox function has been used, (4) is more appropriately a *Generalised Transcendental Logarithmic*.

⁸ Refer to notes 2 and 3.