Testing – 6.2 Informal tests

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In a mode choice experiment with two alternatives, the following utility functions are specified for private motorized mode (pmm) and public transportation (pt):

$$U_{pmm,n} = -\beta_c \cdot \text{cost}_{pmm,n} - \beta_t \cdot \text{time}_{pmm,n} + \varepsilon_{pmm,n}$$
$$U_{pt,n} = -\beta_c \cdot \text{cost}_{pt,n} - \beta_t \cdot \text{time}_{pt,n} + \varepsilon_{pt,n} \tag{1}$$

where $\text{cost}_{pmm,n}$ and $\text{cost}_{pt,n}$ are the cost of the trip by private motorized mode and public transportation respectively for individual n in CHF, and $\text{time}_{pmm,n}$ and $\text{time}_{pt,n}$ are the corresponding travel times in minutes. The error terms $\varepsilon_{pmm,n}$ and $\varepsilon_{pt,n}$ are i.i.d. Extreme Value: $EV(0,1)$.

We have a sample containing 10 observations:

Individual	Choice	time_{pmm}	time_{pt}	cost_{pmm}	cost_{pt}
1	pmm	10	20	2.3	1
2	pt	5	10	2.3	0.5
3	pmm	35	30	9	12
4	pmm	20	22	1.5	2
5	pt	6	7.5	2	1.25
6	pt	10	15	5	3.5
7	pt	8	5	3	2
8	pt	19	18	4	5
9	pt	22	19	7	8.5
10	pmm	8	8.5	3	9

The parameter estimates are $\beta_c = 1.38$ and $\beta_t = 0.363$

1. Can you check if the value of time makes sense, given that Axhausen et al. (2008) report values ranging from 17.73 CHF/h to 50.23 CHF/h for the value of time?

2. Plot these observations where the x-axis is $\text{time}_{pmm} - \text{time}_{pt}$ and the y-axis is $\text{cost}_{pmm} - \text{cost}_{pt}$. Use a different shape for the marker depending on the observed choice.

3. Add to the previous plot the line $-\beta_c \cdot \text{cost}_{pmm} - \beta_t \cdot \text{time}_{pmm} = -\beta_c \cdot \text{cost}_{pt} - \beta_t \cdot \text{time}_{pt}$. What does its slope represent?

References

Axhausen, K., Hess, S., Koenig, A., Abay, G., Bates, J. and Bierlaire, M. (2008). Income and distance elasticities of values of travel time savings: new swiss results, *Transport Policy* **15**(3): 173–185.