Binary choice – 3.2 Apply the model on data

Michel Bierlaire

You have estimated the parameters of the following mode choice model, involving two transportation modes (index n has been dropped for notational convenience):

$$U_{\text{bicycle}} = ASC_{\text{bicycle}} + \beta_{\text{distance}} \cdot \text{distance} + \varepsilon_{\text{bicycle}} \tag{1}$$

$$U_{\text{metro}} = ASC_{\text{metro}} + \beta_{\text{time}} \cdot \text{time}_{\text{metro}} + \beta_{\text{cost}} \cdot \text{cost}_{\text{metro}} + \varepsilon_{\text{metro}} \tag{2}$$

where *distance* is the distance of the trip in kilometers, $\text{cost}_{\text{metro}}$ is the cost in Swiss francs (CHF) of the trip by metro and $\text{time}_{\text{metro}}$ is the time in minutes of the trip by metro. $\varepsilon_{\text{bicycle}}$ and $\varepsilon_{\text{metro}}$ are random terms. The parameter estimates are $ASC_{\text{bicycle}} = 0$, $ASC_{\text{metro}} = 3$, $\beta_{\text{distance}} = -0.8$, $\beta_{\text{time}} = -0.5$ and $\beta_{\text{cost}} = -1$.

Calculate the choice probabilities for a respondent with a trip of 10 kilometers that takes 20 minutes and costs 2.2 CHF by metro in the following cases:

1. using a logit model with scale parameter $\mu = 0.1$,

2. using a logit model with scale parameter $\mu = 10$,

3. using a probit model with scale parameter $\sigma = 0.1$,

4. using a probit model with scale parameter $\sigma = 10$.

Comment on these results.