Choice with multiple alternatives – 5.2 Specification of the deterministic part

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Solution to the practice quiz: parameters

1. In order to obtain an equivalent model where ASC_{walk} is zero, each constant must be increased by 0.01. The coefficient β_{time} is not affected.

   - $\text{ASC}_{\text{bicycle}}$: 0.01,
   - ASC_{walk}: 0,
   - $\text{ASC}_{\text{metro}}$: 0.21
   - β_{time}: -0.05.

2. The coefficient of travel time must be multiplied by 60.

   - $\text{ASC}_{\text{bicycle}}$: 0,
   - ASC_{walk}: -0.01,
   - $\text{ASC}_{\text{metro}}$: 0.2,
   - β_{time}: -3.

   For instance, for a trip of one hour, the contribution of travel time to the utility is -3 for both models.

3. The socio-economic characteristic is interacted with the alternative specific constant, but is not normalized in this model. Increasing all $\beta_{\text{man},i}$ parameters by the same quantity does not change the choice probability and, therefore, the log likelihood. Consequently, there is an infinite number of maxima of the log likelihood function, and the second derivative matrix is singular at the solution. A proper specification would be

$$
\begin{aligned}
V_{\text{bicycle},n} &= \text{ASC}_{\text{bicycle}} &&+ \beta_{\text{time}} \cdot \text{travel time}_{\text{bicycle},n} \\
V_{\text{walk},n} &= \text{ASC}_{\text{walk}} &&+ \beta_{\text{time}} \cdot \text{travel time}_{\text{walk},n} &&+ \beta_{\text{man,walk}} \cdot \text{man}_n, \\
V_{\text{metro},n} &= \text{ASC}_{\text{metro}} &&+ \beta_{\text{time}} \cdot \text{travel time}_{\text{metro},n} &&+ \beta_{\text{man,metro}} \cdot \text{man}_n.
\end{aligned}
$$