SP survey in the Audience, WS 2023/24 (red: bad weather, $W = 1$)

Data: Times T_i, Costs C_i, weather $W = 0/1$: nice/bad:

Alt. 1: Pedestrian	Alt. 2: Bike	Alt. 3: Public transport	Alt. 4: Car	#1	#2	#3	#4
30 min	30 min	30 min+0€	30 min+0€	4	5	19	9
15 min	15 min	30 min+0€	30 min+0€	8	11	10	8
20 min	20 min	20 min+0€	20 min+2€	4	8	23	5
60 min	60 min	60 min+0€	60 min+2€	0	2	26	8
20 min	15 min	20 min+2€	20 min+0€	2	8	2	19
30 min	10 min	10 min+2€	10 min+2€	0	27	2	9

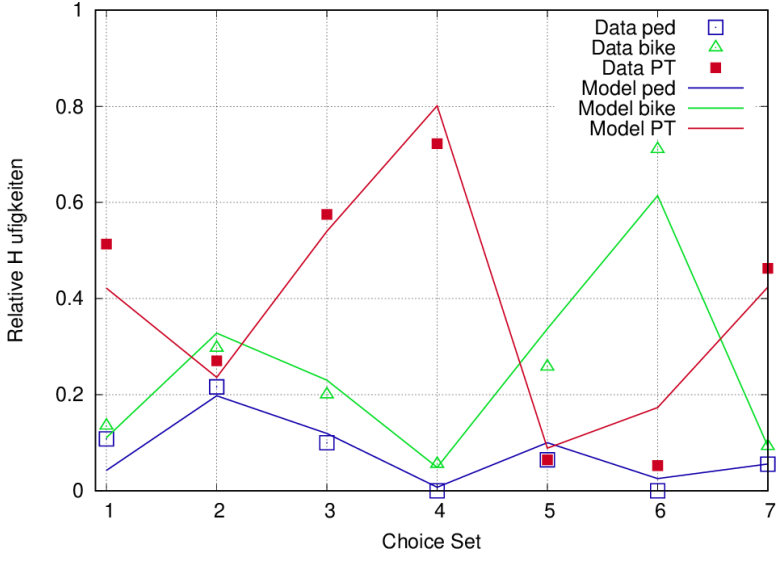
Note: For reasons of efficiency, the survey was performed simultaneously for each choice set. In reality, everybody gets individual questionnaires.

Model specification and calibration

$$V_i = \beta_0\delta_{i1} + \beta_1\delta_{i2} + \beta_2\delta_{i3} + \beta_4 C_i + \beta_5 W(\delta_{i3} + \delta_{i4}) + \beta_3 T_i\delta_{i1} + \beta_6 T_i\delta_{i2} + \beta_7 T_i\delta_{i3} + \beta_8 T_i\delta_{i4}$$

or

$$V_1 = \beta_0 + \beta_3 T_1 + \beta_4 C_1 + \beta_5 W,$$
$$V_2 = \beta_1 + \beta_6 T_2 + \beta_4 C_2 + \beta_5 W,$$
$$V_3 = \beta_2 + \beta_7 T_3 + \beta_4 C_3 + \beta_5 W,$$
$$V_4 = \beta_8 T_4 + \beta_4 C_4 + \beta_5 W$$



$$\ln L_{\text{init}} = -378.5,$$
$$\ln L = -295.7,$$
$$\hat{\beta}_0 = -0.05 \pm 0.86,$$
$$\hat{\beta}_1 = -0.01 \pm 0.47,$$
$$\hat{\beta}_2 = -0.11 \pm 0.43,$$
$$\hat{\beta}_4 = -0.82 \pm 0.15,$$
$$\hat{\beta}_5 = 1.85 \pm 0.49,$$
$$\hat{\beta}_3 = -0.141 \pm 0.036,$$
$$\hat{\beta}_6 = -0.111 \pm 0.027,$$
$$\hat{\beta}_7 = -0.063 \pm 0.028,$$
$$\hat{\beta}_8 = -0.066 \pm 0.027$$

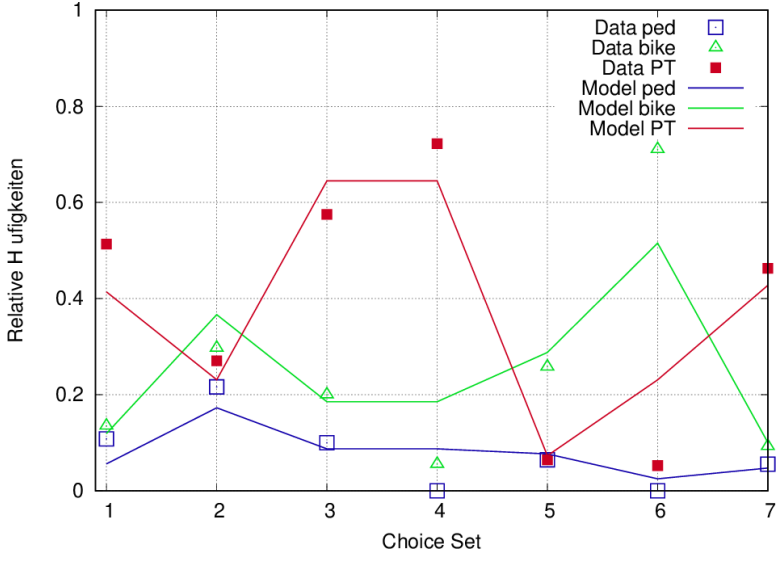
$\text{VoT}_{\text{ped}} = 60\hat{\beta}_3/\hat{\beta}_4 = 10.39\,€/\text{h},$
$\text{VoT}_{\text{car}} = 60\hat{\beta}_8/\hat{\beta}_4 = 4.86\,€/\text{h},$
$\text{shelter cost}\hat{\beta}_5/(-\hat{\beta}_4) = 2.27\,€$

Comparison with global modelling of TT depenence

$$V_i = \beta_0\delta_{i1} + \beta_1\delta_{i2} + \beta_2\delta_{i3} + \beta_3 T_i + \beta_4 C_i + \beta_5 W(\delta_{i3} + \delta_{i4})$$

or

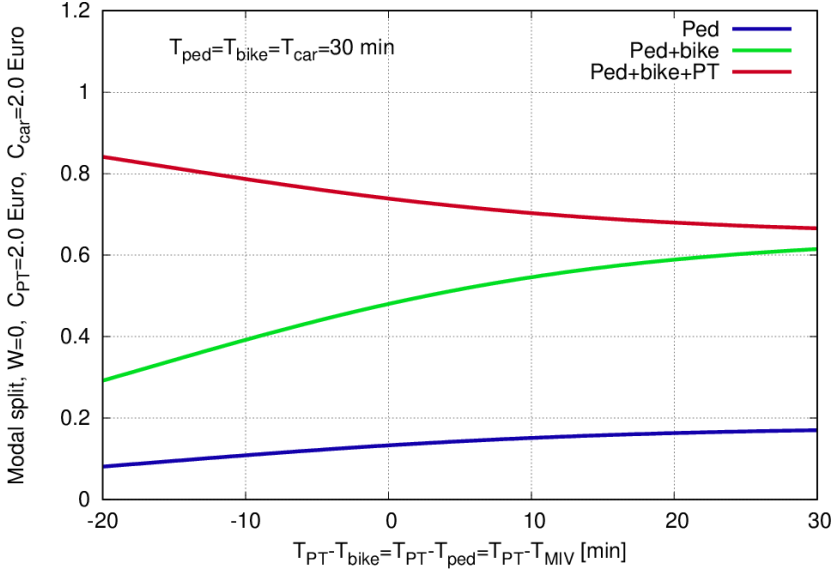
$$V_1 = \beta_0 + \beta_3 T_1 + \beta_4 C_1 + \beta_5 W,$$
$$V_2 = \beta_1 + \beta_3 T_2 + \beta_4 C_2 + \beta_5 W,$$
$$V_3 = \beta_2 + \beta_3 T_3 + \beta_4 C_3 + \beta_5 W,$$
$$V_4 = \beta_3 T_4 + \beta_4 C_4 + \beta_5 W$$



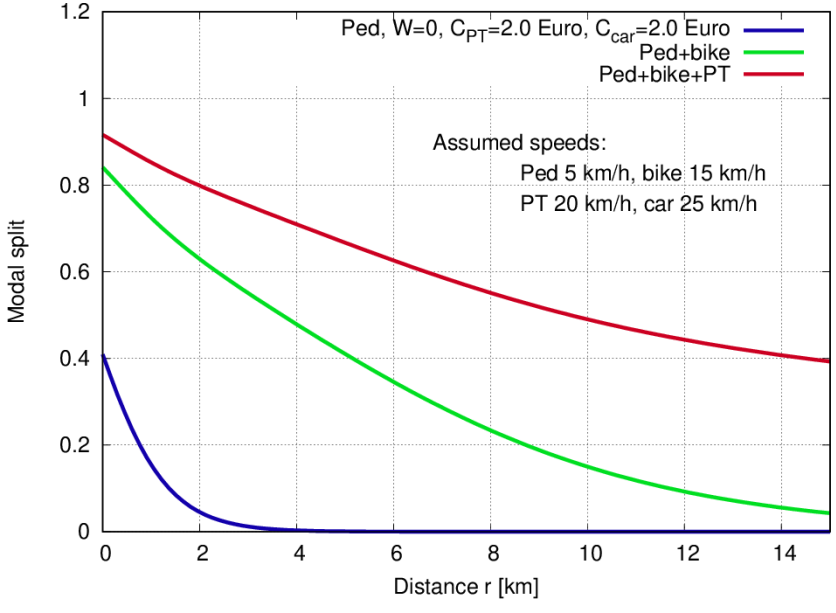
$$\ln L_{\text{init}} = -378.5,$$
$$\ln L = -304,$$
$$\hat{\beta}_0 = -1.99 \pm 0.28,$$
$$\hat{\beta}_1 = -1.24 \pm 0.24,$$
$$\hat{\beta}_2 = -0.01 \pm 0.17,$$
$$\hat{\beta}_3 = -0.114 \pm 0.023,$$
$$\hat{\beta}_4 = -1.02 \pm 0.14,$$
$$\hat{\beta}_5 = 1.90 \pm 0.49$$

$$\hat{\beta}_0/(-\hat{\beta}_3) = -17.5\,\text{min},$$
$$\hat{\beta}_1/(-\hat{\beta}_3) = -10.9\,\text{min},$$
$$\hat{\beta}_2/(-\hat{\beta}_3) = -0.1\,\text{min},$$
$$\text{VoT} = 60\hat{\beta}_3/\hat{\beta}_4 = 6.67\,€/\text{h},$$
$$\text{shelter cost}\hat{\beta}_5/(-\hat{\beta}_4) = 1.86\,€$$

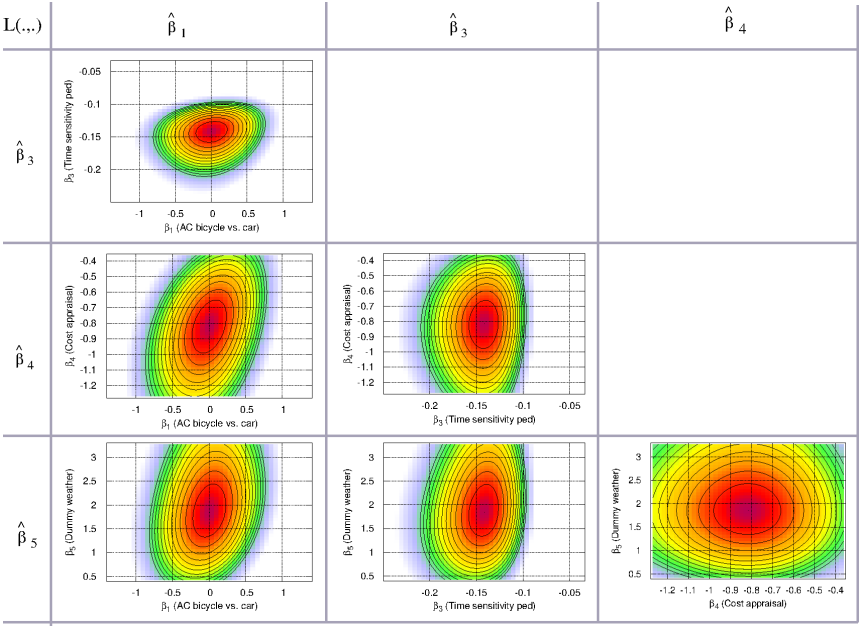
Dependence of the modal split on the PT attributes



Dependence on the distance



Log-likelihood function in parameter space



$$
\begin{aligned}
V_i = \quad & \beta_0 \delta_{i1} \\
& + \beta_1 \delta_{i2} \\
& + \beta_2 \delta_{i3} \\
& + \beta_4 C_i \\
& + \beta_5 W(\delta_{i3} + \delta_{i4}) \\
& + \beta_3 T_i \delta_{i1} \\
& + \beta_6 T_i \delta_{i2} \\
& + \beta_7 T_i \delta_{i3} \\
& + \beta_8 T_i \delta_{i4}
\end{aligned}
$$