Nested-Logit Beispiel aus Skript: NL-Analyse

Jedes Choice-Set hat vier Alternativen:

- Alt. $i = 1$ bzw. $(l, m) = (1, 1)$: Emma+OEV,
- Alt. $i = 2$ bzw. $(l, m) = (1, 2)$: Emma+MIV,
- Alt. $i = 3$ bzw. $(l, m) = (2, 1)$: Discounter+OEV,
- Alt. $i = 4$ bzw. $(l, m) = (2, 2)$: Discounter+MIV

Modell

Gesamtnutzen:

$$V_{ni} = V_{nlm} = W_{nl} + \tilde{V}_{nlm}$$

Nester $l = 1$: Emma und $l = 2$: Discounter:

$$\begin{aligned} \tilde{V}_{n1m}/\lambda_1 &= \beta_1 T_{n1m} + \beta_2 \delta_{m1}, \\ \tilde{V}_{n2m}/\lambda_2 &= \beta_3 T_{n2m} + \beta_4 \delta_{m1} \end{aligned}$$

Top-Level:

$$V_{nl} = \beta_5 F_n \delta_{l1} + \beta_6 \delta_{l1} + \lambda_1 I_{nl} \delta_{l1} + \lambda_2 I_{nl} \delta_{l2}$$

Inklusionswerte (effektive Nutzen der Nests):

$$\begin{aligned} I_{n1} &= \ln \left[\sum_m \exp \left(\hat{\beta}_1 T_{n1m} + \hat{\beta}_2 \delta_{m1} \right) \right] \\ I_{n2} &= \ln \left[\sum_m \exp \left(\hat{\beta}_3 T_{n2m} + \hat{\beta}_4 \delta_{m1} \right) \right] \end{aligned}$$

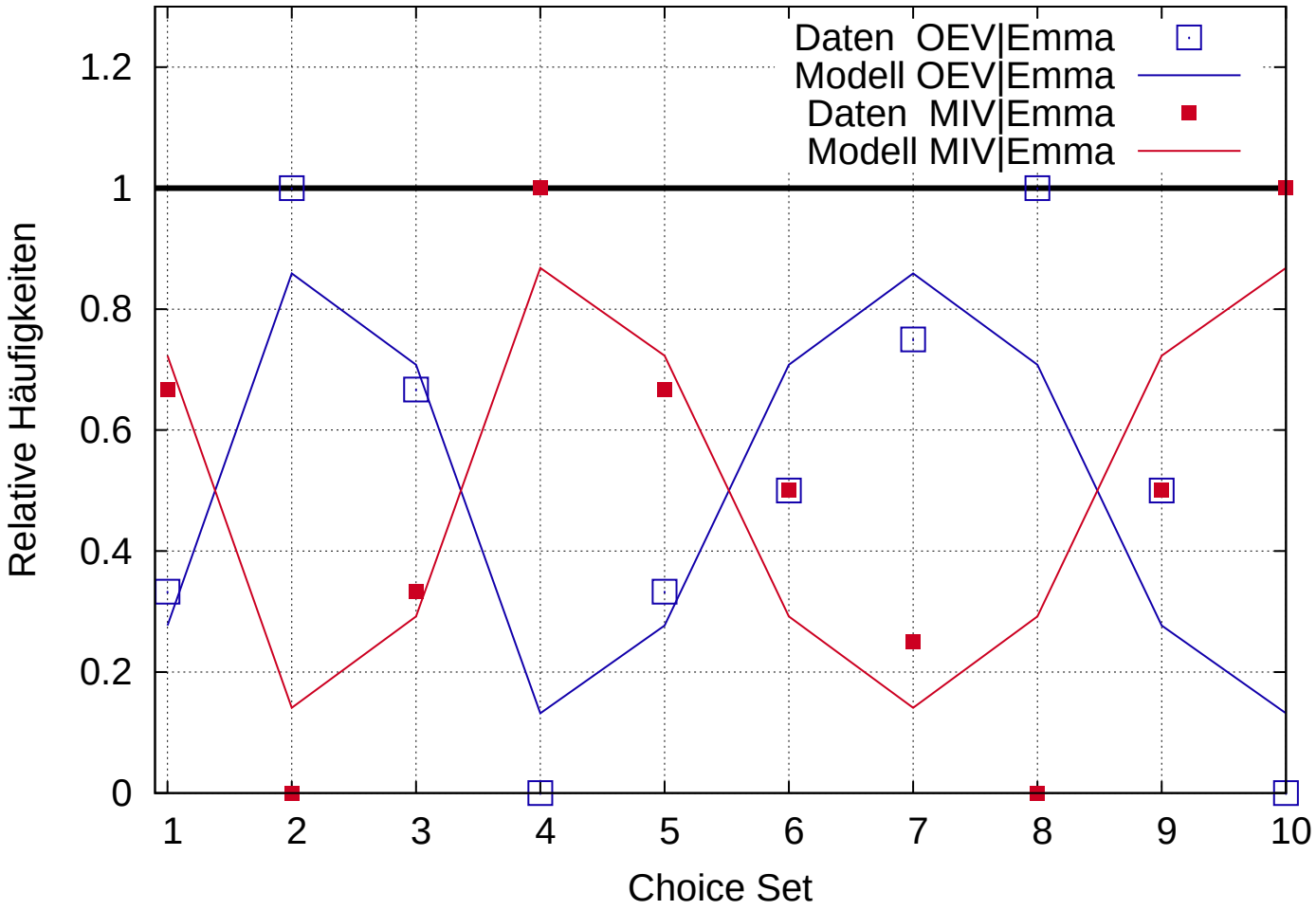
Ergebnisse der Erhebung

# T1=Cdata[0]	T2=Cdata[1]	T3	T4	F	y1	y2	y3	y4
25	15	25	20	0.9	1	2	0	0
25	30	40	30	0.8	3	0	0	1
20	20	30	30	0.7	2	1	1	1
25	10	25	10	0.6	0	3	0	2
15	5	30	20	0.5	1	2	0	2
15	15	25	20	0.4	1	1	0	1
15	20	45	45	0.3	3	1	0	1
15	15	15	15	0.2	1	0	2	3
25	15	40	30	0.1	1	1	0	1
25	10	25	20	0.0	0	1	1	3

Aus Effizienzgründen wurde die Stated-Choice-Erhebung simultan durchgeführt; in “echten” Erhebung ist eine Einzelbefragung nötig, um ggf “Panel-Struktur” der Daten zu berücksichtigen.

Nest 1

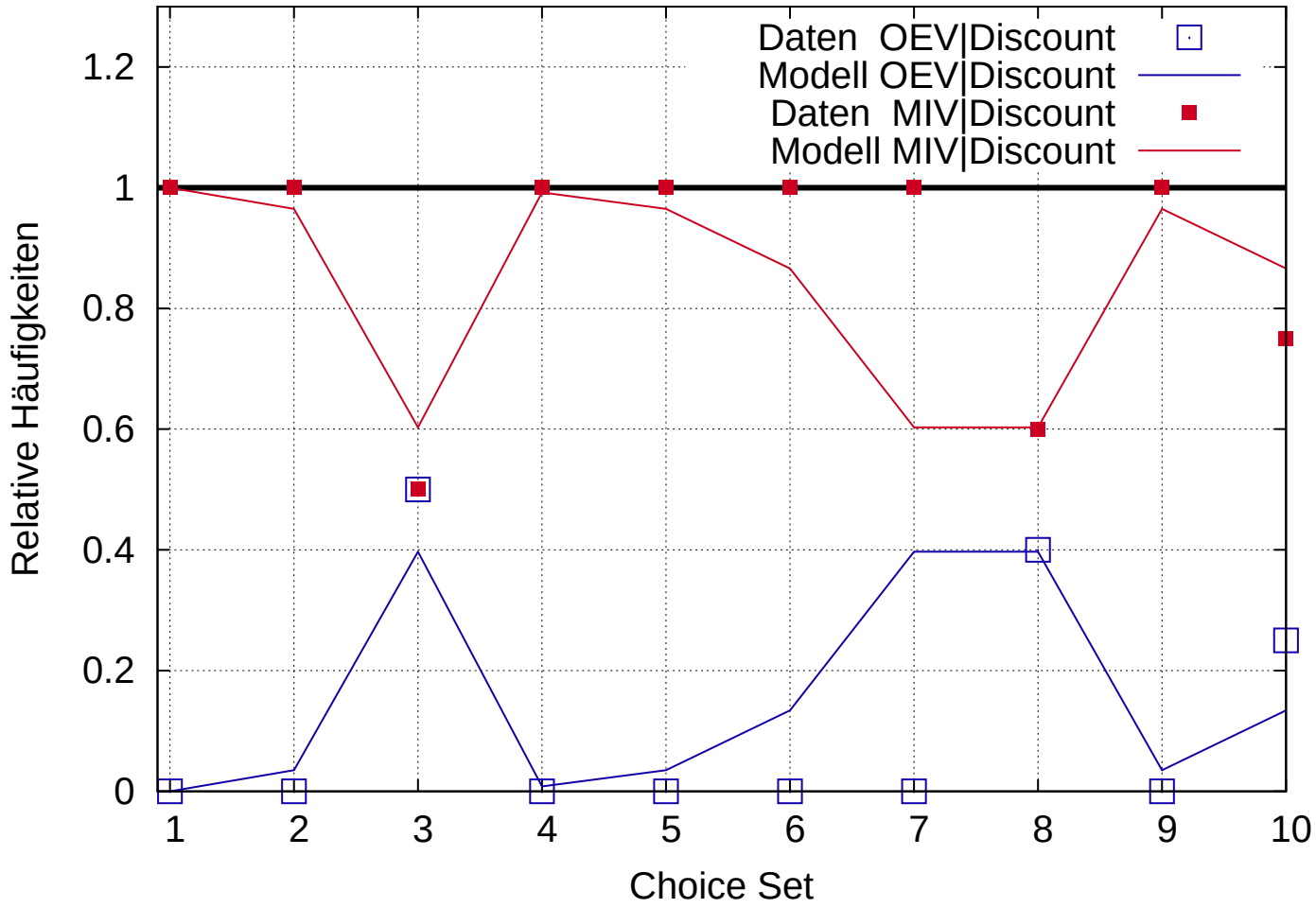
$$\tilde{V}_{1m}/\lambda_1 = \beta_1 T_{1m} + \beta_2 \delta_{m1}$$



$\beta_1 = -0.18 \pm 0.07,$
$\beta_2 = 0.9 \pm 0.6$

Nest 2

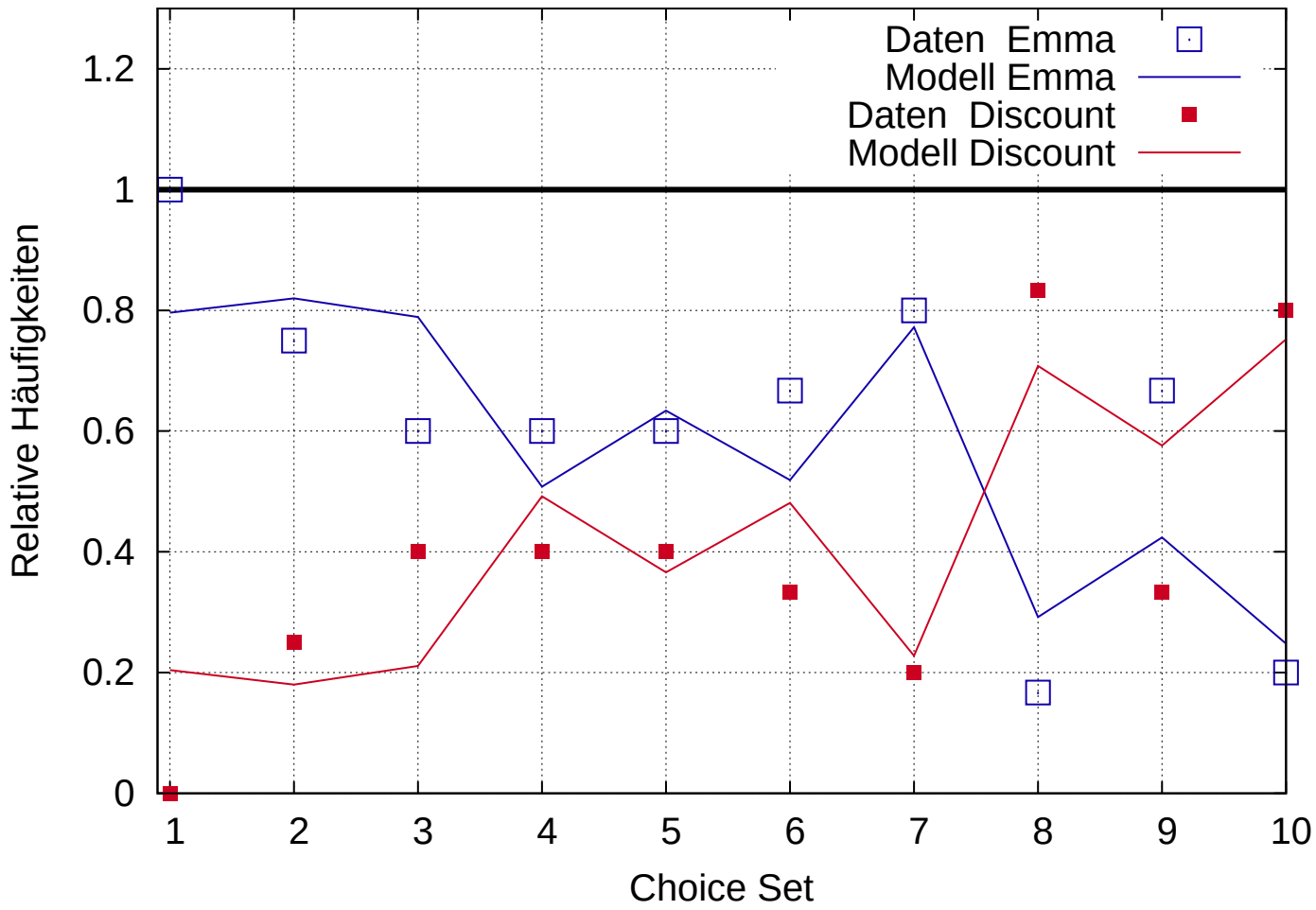
$$\tilde{V}_{2m}/\lambda_2 = \beta_3 T_{2m} + \beta_4 \delta_{m1}$$



$\beta_3 = -0.29 \pm 0.20,$
$\beta_4 = -0.4 \pm 0.7$

Top-Level

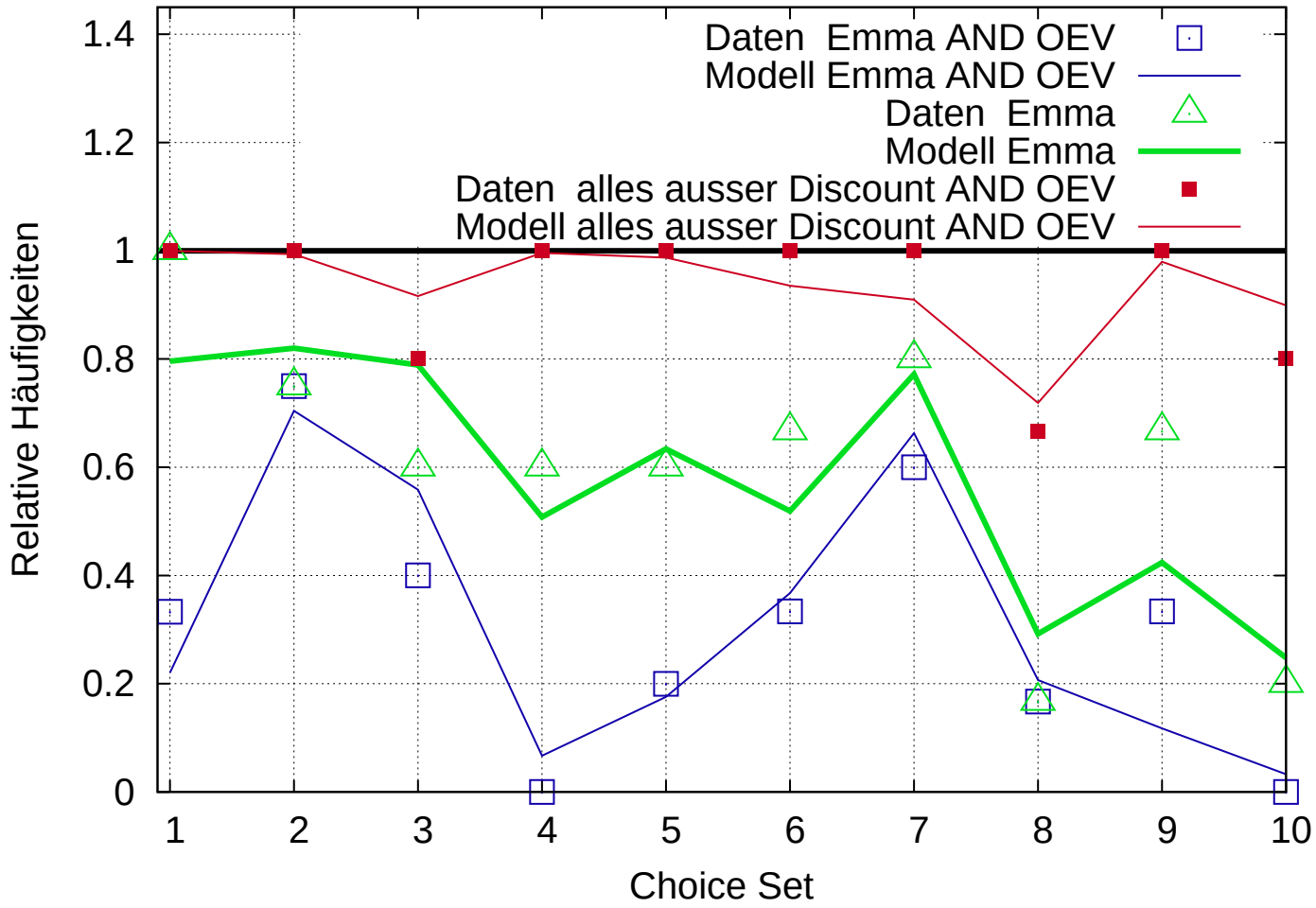
$$V_l = (\beta_5 F + \beta_6)\delta_{l1} + \lambda_1 I_l \delta_{l1} + \lambda_2 I_l \delta_{l2}$$



$\beta_5 = 2.9 \pm 1.4,$
$\beta_6 = -2.0 \pm 1.1,$
$\lambda_1 = 0.17 \pm 0.53,$
$\lambda_2 = 0.21 \pm 0.13$

Fitgüte gesamt Toplevel*Nest

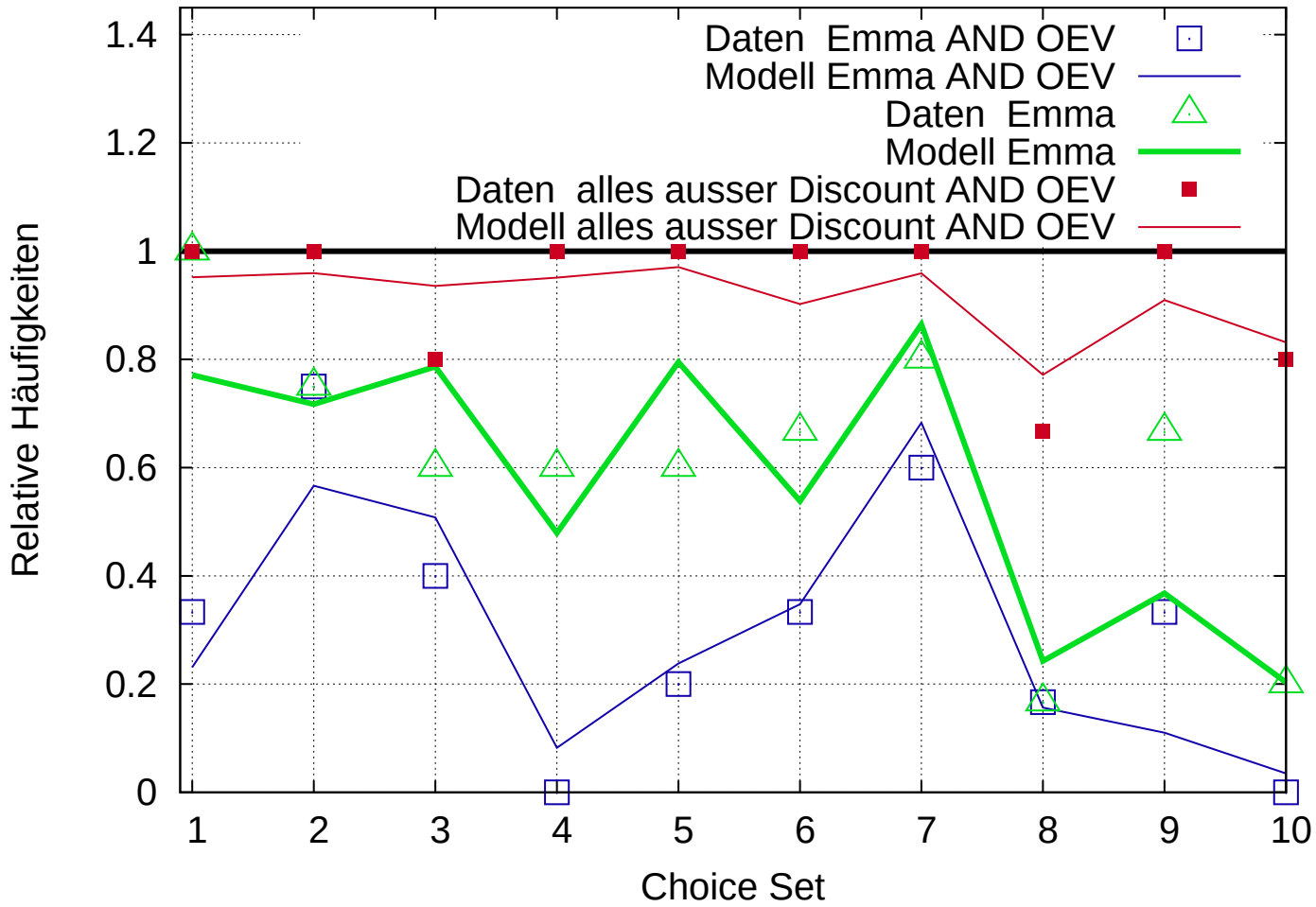
$$
\begin{aligned}
\tilde{V}_{1m}/\lambda_1 &= \beta_1 T_{1m} + \beta_2 \delta_{m1} \\
\tilde{V}_{2m}/\lambda_2 &= \beta_3 T_{2m} + \beta_4 \delta_{m1} \\
V_l &= (\beta_5 F + \beta_6)\delta_{l1} + \lambda_1 I_l \delta_{l1} + \lambda_2 I_l \delta_{l2}
\end{aligned}
$$



$$
\begin{aligned}
\beta_1 &= -0.18 \pm 0.07, \\
\beta_2 &= 0.9 \pm 0.6, \\
\beta_3 &= -0.29 \pm 0.20, \\
\beta_4 &= -0.4 \pm 0.7 \\
\beta_5 &= 2.9 \pm 1.4, \\
\beta_6 &= -2.0 \pm 1.1, \\
\lambda_1 &= 0.17 \pm 0.53, \\
\lambda_2 &= 0.21 \pm 0.13
\end{aligned}
$$

Vergleich Fitgüte des MNL

$$V_i = \beta_1 T(\delta_{i1} + \delta_{i2}) + \beta_2 \delta_{i1} + \beta_3 T(\delta_{i3} + \delta_{i4}) + \beta_4 \delta_{i3} + \beta_5 F(\delta_{i1} + \delta_{i2}) + \beta_6 (\delta_{i1} + \delta_{i2})$$



$$\beta_1 = -0.15 \pm 0.06,$$
$$\beta_2 = 0.6 \pm 0.5,$$
$$\beta_3 = -0.09 \pm 0.04,$$
$$\beta_4 = -0.8 \pm 0.6,$$
$$\beta_5 = 3.5 \pm 1.3,$$
$$\beta_6 = -1.8 \pm 1.1,$$