

Appendix to
Utility in *WTP* space: a tool to address
confounding random scale effects in
destination choice to the Alps

R. Scarpa, M. Thiene and K. Train

January 2008

“Note: The material contained herein is supplementary to the
article named in the title and published in the American Journal of
Agricultural Economics (AJAE).”

The following tables collect auxiliary estimates for the above mentioned study.

Table A-1 reports the summary statistics for the ML estimates of the basic
MNL model. As can be seen by comparing the log-likelihood value at the maxi-

mum with those reported in the paper and obtained by MSL (or simulated at the posterior in the case of HB), the RPL models produce a large improvement in fit.

Table A-2 reports the estimated ML parameters of the MNL model. The WTP estimates show similar magnitudes to the means of their RPL counterparts.

Table A-3 reports the estimated Cholesky matrix for the MSL estimate in WTP space. From this one can derive the variance-covariance matrix of the multivariate distribution of WTPs, and the associated correlation matrix.

Table A-4 reports the estimated Cholesky matrix for the MSL estimate in preference space. From this one can derive the variance-covariance matrix of the multivariate distribution of taste intensities for site attributes. These, along with the mean estimates can be used to simulate draws which in turn can be used to compute WTP distributions.

Table A-5 reports the estimates of the WTP space model with bounded distributions for $\ln(\lambda)$ and number of Alpine shelters.

Table A-6 reports the estimates of the preference space model with bounded distributions for $\ln(\lambda)$ and number of Alpine shelters.

Table A-7 reports the correlations of the latent variables for both the bounded specifications.

Table A-1: **Summary of MNL model**

Model	: Multinomial Logit
Number of estimated parameters	: 7
Number of observations	: 9,221
Number of individuals	: 9,221
Null log-likelihood	: -26,652.12
Init log-likelihood	: -50,407.59
Final log-likelihood	: -21,754.39
Likelihood ratio test	: 9,795.45
Rho-square	: 0.1838
Adjusted rho-square	: 0.1835
Final gradient norm	: +1.739e-003
Variance-covariance	: from analytical hessian

Table A-2: **Estimates of MNL model**

Variable		Robust				
number	Description	Coeff. estimate	Asympt. std. error	<i>t</i> -stat	<i>p</i> -value	<i>WTP</i>
1	<i>Travel cost</i>	-0.2835	0.0057	-49.3	0.00	.
2	<i>Degree of difficulty</i>	-0.5600	0.0208	-26.8	0.00	-1.975
3	<i>Ferrata</i>	-0.0793	0.0046	-17.3	0.00	-0.280
4	<i>% of easy trails</i>	0.0157	0.0013	12.3	0.00	0.055
5	<i>Alpine shelters</i>	0.0885	0.0032	27.2	0.00	0.312
6	<i>% of hard trails</i>	.0797	0.0033	24.1	0.00	0.281
7	<i>Prealps ASC</i>	-0.8917	0.0619	-14.4	0.00	-3.145

Table A-3: Cholesky matrix from MSL estimates in WTP space

<i>Parameters</i>	$\ln \lambda$	<i>Degree of diff.</i>	<i>Ferrata</i>	<i>% Easy trails</i>	<i>Alpine Shelters</i>	<i>% Hard trails</i>	<i>Prealps ASC</i>
$\ln \lambda$	-0.043 (21.5)						
<i>Degree of difficulty</i>	0.193 (1.7)	-2.977 (19.4)					
<i>Ferrata</i>	0.067 (2.9)	-0.291 (11.1)	0.220 (9.3)				
<i>% of easy trail</i>	-0.007 (1.1)	0.060 (7.5)	0.015 (1.3)	-0.043 (12.5)			
<i>Alpine shelters</i>	-0.037 (2.2)	0.148 (8.8)	-0.149 (8.5)	-0.003 (0.3)	-0.081 (7.0)		
<i>% of hard trail</i>	0.011 (0.5)	0.279 (11.2)	0.070 (2.2)	-0.038 (4.3)	0.024 (2.1)	-0.244 (10.5)	
<i>Prealps ASC</i>	2.520 (7.9)	-4.517 (11.4)	2.449 (7.2)	1.605 (5.3)	-0.014 (1.6)	-1.312 (4.2)	2.490 (14.2)

(|z-values| in brackets)

Table A-4: Cholesky matrix from MSL estimates in preference space

<i>Parameters</i>	$\ln \lambda$	<i>Degree of diff.</i>	<i>Ferrata</i>	<i>% Easy trails</i>	<i>Alpine Shelters</i>	<i>% Hard trails</i>	<i>Prealps ASC</i>
$\ln \lambda$	0.92 (20.4)						
<i>Degree of difficulty</i>	-0.19 (3.9)	0.70 (19.7)					
<i>Ferrata</i>	-0.06 (5.5)	0.05 (6.5)	-0.08 (7.3)				
<i>% of easy trail</i>	0.00 (0.4)	0.00 (1.3)	0.00 (1.0)	0.01 (0.7)			
<i>Alpine shelters</i>	0.06 (8.1)	-0.02 (3.5)	0.06 (9.6)	-0.00 (0.1)	-0.00 (0.7)		
<i>% of hard trail</i>	0.01 (2.8)	-0.01 (2.2)	-0.02 (2.0)	0.00 (0.9)	-0.03 (6.1)	0.06 (10.8)	
<i>Prealps ASC</i>	-1.29 (7.3)	0.92 (8.2)	-0.34 (2.4)	-0.07 (0.5)	-0.02 (4.0)	1.08 (14.8)	-0.01 (0.04)

(|z-values| in brackets)

Table A-5: **Estimates of WTP space model with S_b . $\ln \mathcal{L} - 20, 177.50$**

<i>Site attributes</i>		HB estimates			
DISTR.	PARAM.	mean	st.dev.	Var.	st.dev. Var.
$S_b[0, 2]$	$\lambda \times c$	0.292	0.188	0.604	0.076
Normal	<i>Degree of difficulty</i>	-3.341	3.359	10.957	1.624
Normal	<i>Ferrata</i>	-0.450	0.419	0.176	0.024
Normal	<i>% of easy trails</i>	0.119	0.156	0.023	0.003
$S_b[0, 1.5]$	<i>Alpine shelters</i>	0.417	0.240	0.632	0.116
Normal	<i>% of hard trails</i>	0.429	0.402	0.162	0.022
Normal	<i>Prealps ASC</i>	-5.952	8.132	62.996	8.949

Table A-6: **Estimates of preference space model with $S_b \cdot \ln \mathcal{L} - 20,706.25$**

<i>Site attributes</i>		HB estimates				
DISTR.	PARAM.	mean	st.dev.	Var.	st.dev.	Var.
$S_b[0, 2]$	λ	0.383	0.291	1.076		0.128
Normal	<i>Degree of difficulty</i>	-0.920	0.932	0.877		0.105
Normal	<i>Ferrata</i>	-0.151	0.153	0.023		0.002
Normal	<i>% of easy trails</i>	0.031	0.076	0.006		0.000
$S_b[0, 2]$	<i>Alpine shelters</i>	0.133	0.097	0.572		0.082
Normal	<i>% of hard trails</i>	0.119	0.142	0.021		0.002
Normal	<i>Prealps ASC</i>	-2.196	2.284	4.937		0.613

Table A-7: Correlations from HB estimates of models with bounded distributions

Site Attributes	Correlation matrix for random WTP for WTP space model with S_b .						
PARAM.	$\ln \hat{\lambda}$	Deg. of diff.	Ferrata	% Easy trails	Alp. shelters	% Hard trails	Prealps
$\ln \hat{\lambda}$	1	-0.2737	-0.1885	0.042	0.079	0.046	-0.4014
<i>Degree of diff.</i>	-0.2737	1	0.6441	-0.3248	-0.4825	-0.5496	0.7706
<i>Ferrata</i>	-0.1885	0.6441	1	-0.2434	-0.7887	-0.3309	0.6533
<i>% of easy trails</i>	0.042	-0.3248	-0.2434	1	0.1551	0.6308	-0.4181
<i>Alpine shelters</i>	0.079	-0.4825	-0.7887	0.1551	1	0.1682	-0.5409
<i>% of hard trails</i>	0.046	-0.5496	-0.3309	0.6308	0.1682	1	-0.3489
<i>Prealps ASC</i>	-0.4014	0.7706	0.6533	-0.4181	-0.5409	-0.3489	1
Site attributes	Correlation matrix for utility coefficients of Preference space model with S_b .						
PARAM.	$\ln \hat{\lambda}$	Deg. of diff.	Ferrata	% Easy trails	Alp. shelters	% Hard trails	Prealps
$\ln \hat{\lambda}$	1	-0.1956	-0.3122	0.0237	0.6219	0.1775	-0.4204
<i>Degree of diff.</i>	-0.1956	1	0.4955	-0.0801	-0.4014	-0.3038	0.6971
<i>Ferrata</i>	-0.3122	0.4955	1	-0.1066	-0.5936	-0.2441	0.6077
<i>% of easy trails</i>	0.0237	-0.0801	-0.1066	1	0.1282	0.3609	-0.2097
<i>Alpine shelters</i>	0.6219	-0.4014	-0.5936	0.1282	1	0.2207	-0.6711
<i>% of hard trails</i>	0.1775	-0.3038	-0.2441	0.3609	0.2207	1	-0.2447
<i>Prealps ASC</i>	-0.4204	0.6971	0.6077	-0.2097	-0.6711	-0.2447	1