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Value of Forest Recreation. Meta-analyses of the European Valuation Studies

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Motivation

Meta-analyses approach:

-provides synthesises of the results retrieved by primary studies;

-allows to base upon the considerable number of individual observations;

-accounts for both 'real life' (e.g. site-specific) and strictly methodological factors and their effects;

-is 'cheaper' since it avoids direct fieldwork.

Meta-analyses of ecosystem services valuation studies: Johnston *et al.* (2006); Bario & Loureiro (2010); Brander *et al.* (2006); Brander *et al.* (2007); Londoño & Johnston (2012); Kuik *et al.* (2009).

Zandersen & Toll (2009) – meta-analyses of European forest recreation studies, 26 primary studies, 9 countries, 251 entries; RP, TCM, consumer surplus

Shrestha & Loomis (2003) – international outdoor recreation in the US, both RP and SP primary studies included

Benefit transfer (not reported here)

Dataset

53 primary valuation studies of forest recreation (1970 – 2012), 8 countries (+Northern Ireland), 253 entries into the model, 73 forest sites, over 40 000 individual observations;

Stated preference (CVM/CE) studies – Hicksian surplus, WTP per person per visit;

Revealed preferences (TCM) studies – Marshallian surplus, CS per person per visit.

Methods

- Meta-regression
- Multiple observations from the same study included
- Model specification:

$$\mathrm{Ln}[\mathrm{WTP(CS)}_{\mathrm{ha/year}}(EUR'2005)] = \sim + \; x_i + \alpha_i + e_{it}$$

error term is decomposed into error at the study level α_i and at the estimation level e_{it} (both are assumed to be normally distributed with zero mean and variances respectively: $\pm_{\alpha}$ and $\pm_e$.

Effects of α_i are assumed equal across multiple observations in the same study – OLS regression.

Variables:

- Method variables
- Site variables
- Other variables (year of data collection)

Method variables

SYMBOL	VARIABLE
	METHOD VARIABLES
RP	1 - if Revealed Preference method (Marshallian measure) 0 if Stated Preference method (Hicksian measure)
DC	1 - if dichotomous choice elicitation format in SP 0 -otherwise.
OE	1 - if Open ended elicitation format in SP 0 -otherwise.
OValue	1 – if option value included, 0 otherwise
Ttime	1 – if value of time is accounted for, 0 otherwise.
ML	1 if ML estimator was used in RP method, 0 otherwise.

Site variables

SYMBOL	VARIABLE
	SITE VARIABLES
	Country dummies (8 countries + Northern Ireland) GB-reference level
Ln_Inc	Log of Income on country level (Euro '2000)
Ln_Alt	Log of Elevation of the highest point in the forest area (in 100s of meters)
Ln_Size	Log of study site forest area (ha)
Protected	Protection status -1 if protected (national park, reserve or natural park) 0-otherwise
Ln_Density	Log of Population density (NUTS 3 level) (people/km^2)

Modelling Results

SYMBOL	Coefficient	Standard errors
METHOD VARIABLES		
RP	1.959***	.425
DC	1.837***	.462
OE	1.306***	.459
OValue	.643	.430
Ttime	.435*	.261
ML	-.421	.456
SITE VARIABLES		
Ln_Alt	.131*	.079
Ln_Size	-0.451***	.069
Protected	1.06***	.2205
Ln_Density	.686***	.104
Ln_GDPPPP	-.054	.716
Year	.0531*	.0284
COUNTRY SPECIFIC DUMMIES		
Austria	2.701***	.766
Germany	2.215***	.592
Ireland	2.483***	.632
Italy	.435	.366
Northern Ireland	1.062*	.599
Poland	1.701	1.102
Spain	1.887***	.527
R^2=0,61; N obs.=253, indicates statistical significance at: *** 0.01 level, ** 0.05 level.		

Discussion and Conclusions

- The signs and significance of the variables are in most cases consistent with expectations and past recreation valuation studies;
- Method variables effects are consistent with the literature (e.g. Carson *et al.* (1996), Shrestha&Loomis (2003): *ceteris paribus* SP studies provide lower estimates then RP;
- Following site characteristics: altitude, forest area, protected area, density of population proved to be statistically significant (interpreted as elasticity because of Log in the left-hand side of the model) – unlike in Zandersen & Toll (2009) except the size – however some of them are missing undivided interpretation (e.g. altitude);

Discussion and Conclusions (continued)

- Income – GDP per capita (PPP) – turned out to be not significant (the same found by Zandersen & Toll (2009);
- Protected area turned out to be positive and highly significant. Assuming that protection is an indicator of relative uniqueness of a given ecosystem, obtained results indicate that standardised recreational benefits are higher for forests in which the natural processes are relatively better preserved;
- *Ceteris paribus* the more recent valuation studies retrieve the higher level of consumer surplus (either Marshallian or Hicksian). Consumers' preferences might have changed in time yielding ever higher recreational benefits, derived out of forest recreation.

Thank you for your attention!

Literature

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