Valuing forest recreation on the national level in a transition economy: The case of Poland[1]

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Abstract:

Recreation benefits constitute a substantial part of the total economic value of forests, and are important for the choice of multi-functional forest policies. The application of methods valuing such benefits is in its infancy in transition economies in Central and Eastern Europe (CEE), so value estimates for policy use are sometimes transferred from Western Europe proportionally scaled down by GDP. However, little is known about how recreation values vary with income, and one risks underestimating benefits in CEE. This paper reports the findings of the first comprehensive, national-level study in any CEE country estimating annual and per trip forest recreation values in Poland using the Travel Cost (TC) and Contingent Valuation (CV) methods. Two in-person interview surveys of forest recreation behaviour were carried out. The first was administered on-site in ten representative forest areas, and the other in the homes of a national sample of adult Poles. Results show that forest recreation is highly valued in Poland, at Euros 0.64 – 6.93 per trip per person, depending on the valuation method. Both trip frequency and per trip values are higher than the average in Western Europe, despite a lower income level. Thus, a simple GDP-adjusted transfer from Western Europe would substantially undervalue forest recreation in Poland. Further, a comparison of TC consumer surplus estimates and GDP/capita in Europe shows no clear relationship, indicating that a range of cultural, institutional and other factors may be important.

Keywords: Forest, recreation, valuation, transition economy.

1. Introduction

Recreation benefits constitute a substantial part of the total economic value of forests in modern societies, and are an increasingly important determinant in multi-functional forest management (Cubbage et al., 2007). While applications of the travel cost (TC) and contingent valuation (CV) methods to value recreation benefits are quite common in Western Europe and USA (see for example Croitoru (2007); Lindhjem (2007); Brainard et. al. (2001); Scarpa et al. (2000); Carson et al. (1996)), their use in transition economies in Central and Eastern Europe (CEE) is in its infancy[3]. TC measures people's revealed preference for forest recreation through the expenditures they incur to visit a site while CV measures people's stated preference, i.e. their Willingness-to-Pay (WTP) for a hypothetical trip. To evaluate recreation benefits in CEE the only means to date is to transfer unit values per trip from Western Europe. A simple transfer often assumes that recreation benefits vary proportionally with income, so transferred values are scaled down by the relative difference between purchasing power parity (PPP) adjusted GDP/capita. Based on an assumption like this, UNECE/FAO (2005) puts the value of a forest trip at Euro 1 in Western Europe, and Euro 0.25 in CEE. However, this approach risks underestimating recreation benefits in CEE countries[4]. There is some evidence that environmental values increase with measures of income at a less than proportionate rate at least for some goods (notably water quality, wetlands and air pollutants) and income levels (Kriström and Riera, 1996; Hökby and Söderqvist, 2003)[5]. Forest recreation may also display Kuznets curve characteristics, i.e. an U-

[3] Forestry-related TC and CV have been used separately in a few, limited cases: in the Czech Republic, Hungary and Poland, none of which are published in English (see Bartczak and Giergiczny (2006) for details).

[4] Krupnick et al. (1996) acknowledge that this is likely to be the case in their early transfer of value estimates of air quality improvements from USA to CEE.

[5] Goods displaying this characteristic are often called normal, non-luxury goods.

shaped relationship between recreation value and GDP-levels (Grossman and Kruger, 1995)[6]. If so, recreation values in CEE may also be higher in *absolute* terms than in Western Europe. Further, a number of other factors than income is likely to play a large role in explaining differences in recreation values between countries (Ready and Navrud, 2006). More advanced international benefit transfer techniques based on benefit functions or meta-analysis are also too unreliable at the current state of knowledge to capture such factors (Lindhjem and Navrud, In press). Hence, primary studies valuing forest recreation (and other forest goods) in CEE are clearly needed to understand recreation patterns and values and to guide forest policy development. The primary purpose of this paper is to report the findings of the first comprehensive national-level study, in any CEE country, valuing forest recreation by applying standard TC and CV methods. We couple a survey of national recreation patterns with on-site surveys of per trip values per person from ten representative forest sites to estimate the average per trip and total annual recreation value of forests in Poland. Further, we compare and contrast Polish recreation behaviour patterns and per trip values with Western European studies to date. We find that forest recreation is considered highly valuable in Poland, more so than would be indicated by its income level.

2. Background, study design and forest sites

Poland has about 9.2 million hectares of evenly distributed forests covering 28.4 percent of its territory (average in Europe is 31 percent). While some other transition countries have chosen to privatise forests (e.g. Hungary), Poland still has more than 80 percent state owned (mostly administered by the State Forest Enterprise – SFE). The vast majority of forests are accessible to the public free of charge. However, according to a

[6] A standard Kuznets Curve would have a meaure of environmental pollution on the Y-axes and GDP/capita on the X-axis, thus displaying an inverted U-shaped curve

law from 2004 an entrance fee can be introduced in national parks, a practice which has only been taken up in few parks to date. In 2005, the SFE commissioned a study aiming *to estimate the recreational value of forests in Poland both in terms of value per trip (or visit) and total annual value*, to inform the balancing of multiple use and timber harvesting objectives within current forest policy and management. Two independent surveys were conducted face-to-face by a professional polling agency. The first, conducted in October 2005, was an on-site survey with integrated TC and CV components aiming to estimate the recreational value per trip for day-trips to a selection of ten forest sites. The sample consisted of around 1000 interviews with users, intercepted along main paths inside the forests at random times and days of the week. The second main survey, a national household survey, was conducted in November 2005, sufficiently close in time to ensure preference stability and consistency with the on-site survey. This was an add-on to a routine in-person opinion poll administered in respondents' homes to a quota sample of 1000 people representative of the entire adult population with respect to sex, age, education, income level and geography[7]. Since the site surveys can only capture current users, the national sample supplements this data with recreation patterns of all users and non-users. The forest sites were selected to cover various ecosystems, conservation regimes, ownership structures and geographical locations (see Table 1 below).

Table 1 Selected forest sites for onsite surveys

No.	Name of the site	Conservation regime	Ownership	Location	Sample size
1	Puszcza Bialowieska	National Park	Treasury	NE	101
2	Forest Barbarka (Torun)	None	State Forest	NW	100

[7] The polling company did not report detailed response rates for the surveys, but informed us that their average refusal rate for routine polls in Poland in 2005 was around 9 percent, which is low by any standards. Further, for site surveys of user groups it is often easier to get higher response rates than for more general populations.

3	Kampinoski National Park	National Park	Treasury	C	100
4	Swierklaniec	None	State Forest	SW	101
5	Zielona Gora	None	State Forest	SW	100
6	Forest Piatkowski (Poznan)	None	Municipal	NW	100
7	Krzeszowice	None	State Forest	SE	100
8	Kudypy	None	State Forest	NE	100
9	Kozienice	Promotional	State Forest	SE	100
10	Bory Tucholskie	Promotional	State Forest	NW	100

Key: NW, NE, C, SE, and SE refer to Northwest, Northeast, Central, Southeast, and Southwest locations, respectively

Five areas represented forests with no particular conservation regime, two were national parks, two so-called "promotional areas"[8] and one was a municipal forest in a large city. Of the ten sites listed in Table 1, three can be considered "urban forests" serving mainly adjacent urban areas (Forest Barbarka, Kampinoski National Park and Forest Piatkowski). In contrast, Puszcza Bialowieska, The Bialowieza Primeval Forest, is the best-preserved example of a European lowland ecosystem, and it is quite remote from any urban centre.

3. Valuation methods

The TC and CV methods were used to obtain a robust range of per trip values. The on-site survey questionnaire was evaluated by peers in the fields of forestry, economics, and survey methodology. It generally followed valuation survey procedures well-tested in Poland in earlier studies (Zylicz, 2000).

3.1 The travel cost component

The value of a single, one-day trip to a forest was calculated according to standard single-site TC methodology (see for example Ward and Beal (2003)). In addition to

[8] A unique Polish conservation regime voluntary declared by the SFE that combines forestry with protection of ecosystems. One of the main aims is education (educational paths, centres, museums).

questions about the frequency of trips to the particular forest over the last 12 months, the TC part collected detailed information about the current trip:

- Purpose of the trip (one-destination trips and multi-destination trips[9]) and main activity (walking, picking berries, sport activities, non-recreational activities, other),
- Round trip distance in km, time required to complete the trip, mode of transport, number of people travelling together (including the number of children), time spent on-site, and information concerning relevant substitute sites.

To calculate the average visitor demand for forest recreation in Poland and thus also the consumer surplus (CS) per trip we used calculated TC, rather than perceived and stated TC (Moons et al., 2001). Cost for use of public transport and private cars per individual or household was estimated based on information about the mode used by respondents in round trip (in this case the average cost of fuel, cost of tickets in public transport from 2005 were taken), distance, number of people travelling together, and number of household members visiting a site. Many studies assume opportunity cost of time equal to a fraction of the wage rate, usually one-third (Cesario, 1973). However, the value of travel time for individuals can vary depending on many factors such as the length and route of the trip, transport mode or weather conditions. Further, travel may in some cases increase the wellbeing of visitors. Since there is no generally agreed approach to dealing with the value of time in travel cost models, we chose to exclude this value and

[9] For multi-destination trips respondents were asked to attach percentage weights to the forest trip, and the travel costs were weighted for those whose weights were equal to at least 50 percent. If the weight was less than 50 percent, the observation was dropped as it can reasonably be assumed that many people would make the trip in any case. More advanced approaches to deal with multiple-destination trips suggested for example by Parsons and Wilson (1997) were for simplicity not pursued here.

instead include travel time as a separate variable in one of two models (Shaw and Feather, 1999). Excluding respondents that stated no recreational purpose or other main purpose and trips that were longer than one day reduced the dataset from 1002 to 837 observations. The number of trips to each of ten selected sites in the last 12 months was then used to fit single-site TC models. These models allow us to estimate the demand function for recreation and the recreational value of forests as the CS associated with trips under current conditions (Alberini and Longo, 2006). In a single-site TC model, it is assumed that an individual's utility depends on aggregate consumption, leisure other than recreation to the investigated site, and number of trips to this site. Because the number of trips is reported as a discrete, non-negative integer value the count data model was applied for estimation. Either a Poisson or a negative binomial distribution for the dependent variable can be assumed (Grogger and Carson, 1991; Gomez and Ozuna, 1993; Hynes and Hanley, 2006). The Poisson model has been criticized because it ignores the real data over-dispersion problem, a common problem for recreational trip data (Haab and McConnell, 2002). After testing for the over-dispersion-problem in our data, we chose the negative binomial model. The expected value of the consumer surplus, E(CS), derived from count models can be calculated as: $E(CS) = E(R_i \mid X_i)/\beta_c = \lambda_i/\beta_c$, where: R_i is the number of trips to the forest for an individual i, X_i is a vector of explanatory variables for each individual, λ_i is the expected number of trips, and β_c is the TC variable coefficient. The expected CS per trip in this case equals $1/\beta_c$. The variables included in the two estimated TC models are given in Table 3 below.

3.2 The contingent valuation component

Following the TC part of the questionnaire, the CV part asked people to state their WTP for a hypothetical forest trip. Recreation was presented in the scenario as an important benefit from forests, but that appropriate management to sustain it is costly, e.g. in

terms of cleaning, fire protection, maintaining paths etc. Further, it was explained that although access is currently free of charge, collection of some additional funds may be necessary in the near future. Respondents were first asked if they would be willing to pay something towards forest management. Respondents who said "yes" were then asked about their individual WTP for visiting the forest in the hypothetical situation that recreation to the site would not be possible without paying an entrance fee (advised that every person, including children, would be charged the same amount). Respondents were also asked if they would change travel frequency to the site if entrance fees were introduced. An entrance fee paid to the corresponding local forest management body was chosen as a payment vehicle based on experiences from earlier valuation surveys conducted in Poland (Zylicz, 2000; Bartczak, 2006). Poles often express very limited trust in the government and environmental organisations (both of which are believed to waste resources and/or to be corrupt) (Markowska and Zylicz, 1999). Hence, various forms of taxes or donations[10] to environmental organisations often used in CV studies in Western countries would typically yield an extremely high number of protest responses in Poland.

Two different formats, payment card (PC) and single-bounded dichotomous choice (SBDC), were used for the WTP question to control for elicitation effects often observed in the literature (Bateman et al., 2002; Cameron et al., 2002; SEPA, 2006). We presented seven bid levels for SBDC, and a payment card of 25 amounts. The bids for the SBDC format were chosen based on the level of current entrance fees at national parks and other entrance fees (such as cinema tickets). Half of respondents (i.e. 50) at each of the ten sites were randomly assigned to each of the two formats. Details of the CV part of the site survey are given in Table 2:

[10] Donations also have other well-known problems as a payment vehicle, especially related to free-riding behaviour.

Table 2 Description of CV-part of site survey

Question format	Payment card (PC)	Single bounded dichotomous choice (SBDC)
Number of observations	501	501
Scenario	Presenting costs connected with keeping forests as a recreational place	
Payment vehicle	Entrance fee paid to a local forest management body	
Estimation methods	Parametric/non-parametric	
Parametric model	Spike model	
Non-parametric approach	Minimum legitimate WTP[1]	Kaplan-Meier estimator[2]

1: The minimum legitimate WTP approach calculates the mean value from the amounts indicated by respondents in the PC.

2: The Kaplan-Maier non-parametric technique is a purely empirical approach to estimate the survivor function for WTP responses. A conservative approach is applied here, i.e. the lover bound is used to characterize the interval between the two proposed bids using the pooled adjacent violators algorithm (PAVA). PAVA is a technique that pools data for two adjacent bid levels if the estimate of the survivor function for the higher bid level is greater than for the lower bid level (see for example Bateman et al., 2002)

For both SBDC and PC formats, a high share of zero responses justified the use of a standard spike model (Kriström, 1997)[11]. We also applied non-parametric approaches to check sensitivity of our results (last row of Table 2). The variables for which data was collected in the surveys are defined and explained in Table 3, and used in the regression models in the following section.

[11] Mean WTP from this model is given by $E(WTP) = N_1 * 0 + N_2(-1/\beta) \ln(1+e^{\alpha})$, where N_1 is the share of zero WTP, N_2 is the share of positive WTP, and α, β are parameters from the logistic model.

Table 3 Variables used in the TC and CV estimation models for the on-site survey

Variable	Definition	TC	CV
travel_cost	Continuous: round trip travel costs [PLN = Polish zloty]	√	
time_forest	Continuous: time spent on site [minutes]	√	
time_travel	Continuous: time spent travelling to the site [minutes]	√*	
parks	Binary: 1 if National park or promotional area, 0 if other forest	√	√
subst_f	Binary: 1 if respondents declared that site had substitutes, 0 if not	√	√
berries	Binary: 1 if one of the purposes to visit a forest was picking berries or mushrooms, 0 if not	√	√
sport	Binary: 1 if one of the purposes to visit a forest was doing sport activities, 0 if not	√	√
inc_2000	Binary: 1 if monthly hhld income was 1000-2000PLN>, 0 if <1000	√	√
inc_5000	Binary: 1 if monthly hhld income was 2000-5000PLN>, 0 if <1000	√	√
inc_high	Binary: 1 if monthly hhld income was above 5000 PLN, 0 if <1000	√	√
inc_lack	Binary: 1 if resp. did not want to state their income level, 0 if not	√	√
n_household	Continuous: number of household's members	√	√
town_20	Binary: 1 if respondents lived in town with number of inhabitants greater than 20 000 people, 0 if not	√	√
local	Binary: 1if respondents stated they were "locals", 0 if not	√	√
sex	Binary: 1 if woman, 0 if man	√	√
edu_low	Binary: 1 if education level was primary, 0 if master degree level	√	√
edu_mid	Binary: 1 if education level was middle, 0 if master degree level	√	√
age	Continuous: Age of respondent	√	√
exp	Binary: 1 if respondents were first time in the forest, 0 if not		√
spont	Binary: 1 if respondents came to forest spontaneously, 0 if not		√
m_purpose	Binary: 1 if trip had more purposes than visiting a forest, 0 if not		√
n_others	Binary: 1 if respondents visited a site with people who were not members of their family		√
bid	Continuous: 7 selected bid levels		√ **

Note: *Included in one TC model, ** Used for the SBDC model only

4. Results

First we summarise some characteristics of recreation behaviour from the surveys, before presenting the estimation results for the value of forests recreation.

4.1 Forest recreation patterns

In the national survey 85 percent of respondents paid at least one trip to a forest during the past 12 months. People who had not visited forests were primarily elderly or

seriously ill. The average number of recreational trips per adult person was estimated at 41 per year (median of 16.5 trips), or a total average of 1221 million trips in 2005. The vast majority (85 percent) go to forests for walking, though berry and mushroom picking is considered almost as important (80 percent). The on-site surveys provided more detailed information about the pattern of trips to the forests (see Table 4).

Table 4 Survey summary statistics for the ten selected forest sites

Variable	Mean	Median	Std. Deviation
Annual number of trips to a forest[1]	72	31	86
One-way distance travelled (km)	21	10	35
Travel cost per person without the value of travel time (PLN)[2]	6	2	14
One-way travel time (minutes)	34	20	40
Time spent on the site (minutes)	122	120	91
Household monthly net income (PLN)	2739	1500	3698

Notes: 1 = 26% of respondents in the on-site survey declared that they go to a forest every day or every second day;
2 = 41% of respondents claimed they go by foot or ride bicycle to get to a forest.

The annual number of trips declared by respondents interviewed on-site (72 trips per year) was higher than stated in the national survey, as expected. This reflects the fact that those who visit the site more often are more likely to be surveyed[12]. The average length of a single trip was around two hours.

4.2 The value of forest recreation in Poland

The estimates of average value of a single trip to a forest calculated from the pooled data from the on-site survey are given in Table 5, and regression model results discussed in the next subsection.

[12] For sake of simplicity we have not tried to correct for this on-site sampling bias (endogenous stratification) in our binomial model.

Table 5 Recreation value of forests in Poland (per trip per person), Euros, 2005.

Method	**Value per trip per person**	
CV; Payment Card	Parametric 0.66	Non-parametric 0.64
CV; Single-Bounded Dichotomous-choice	Parametric 4.69	Non-parametric 3.56
TC; Negative Binomial	TC 4.17	TC-TR.TIME 6.93

Note: 1 Euro = 3.97 PLN (nominal exchange rate)

For the CV survey a fairly high share of protest respondents were excluded from the sample[13], but true zeros retained. People protested against having to pay for something that had always been free to them. To justify using the CV data, despite the high number of protests, we analysed differences in characteristics between protesters and non-protesters. The results of this analysis, left out for the sake of brevity, showed that there were no significant differences between the two groups that would systematically bias WTP estimates in one direction[14]. The CV approach yielded per trip values of between 0.64 and 0.66 Euros, and 3.56 and 4.69 Euros for PC and SBDC, respectively. This is people's WTP an entrance fee to access the site over and beyond the TC they incur. The difference between using parametric and non-parametric methods is negligible for PC, but around 20 percent for the SBDC approach. The ratio of SBDC to PC estimates is between 5.6 and 7, somewhat higher than in the literature. Cameron et

[13] 41 percent for SBDC, 51 percent for PC

[14] Interestingly, there were significantly fewer protesters at the National Park sites indicating that it is more acceptable to people to use entrance fees at sites that perhaps are considered more unique. Further, protests are higher for men than women, for older than for young people, for people with low education, and for people who do not want to state their income. As is shown in the next subsection, these characteristics influence WTP both negatively and positively making it unlikely that the high number of protests skew WTP systematically.

al (2002) refer to a typical ratio of between 2.7 and 4.4. The higher ratio may be due to the tendency of people anchoring their PC WTP on other known entrance fees to recreation places such as cinemas and botanical gardens. The mean TC CS estimates of 4.17 and 6.93 Euros from the negative binomial model are higher than mean SBDC values. Multiplying the average number of trips per person with the TC CS values from Table 5 above yields a total CS from forest recreation in Poland of between 5 and 8.5 billion Euros or 570-970 Euros per hectare of forests in 2005.

4.3 Regression results and validity check of data

Below we present the results from the regression models used to estimate per trip values for TC and CV, and discuss the validity of our data. The results from the two best-fit negative binomial regressions for the TC, with ("TC") and without ("TC-TR.TIME") a separate variable for travel time, are given in the second column of Table 6.

Table 6 Regression results for TC and CV models. Coefficients (standard error)

	TC	TC –TR.TIME	CV-PC	CV-SBDC
travel_cost	-.06038***	-.03630***		
	(0.00728)	(.007759)		
time_forest	0.00046	.00102*		
	(0.00059)	(.00056)		
time_travel		-.00846***		
		(.00110)		
parks	-0.39353***	-.38489***	1.3040**	1.6944***
	(0.12532)	(.12101)	(0.63227)	(0.44815)
subst_f	-.3860***	-.30576***	-0.2810	0.7209*
	(0.11424)	(.11083)	(0.59942)	(0.39459)
berries	0.0519	-.11419	-1.6941**	0.7098
	(0.16092)	(.15615)	(0.79459)	(0.54002)
sport	0.0564	.30439*	-1.3709**	0.5913
	(0.13736)	(.14029)	(0.75459)	(0.45128)
inc_2000	-0.2678*	-.45151***	-0.5453	0.4984
	(0.14528)	(.14472)	(0.77036)	(0.43267)
inc_5000	-0.6497***	-.83718***	0.5827	1.3775**
	(0.17758)	(.17392)	(0.92316)	(0.57063)
inc_high	-0.4156*	-.61759***	4.8034***	1.9784**
	(0.24879)	(.24066)	(1.18935)	(0.99837)
inc_lack	-0.3454	-.55481**	-1.0337	1.3021
	(0.23988)	(.23190)	(1.29312)	(0.92154)
n_household	-0.01543	-.00709	-0.1105	0.0021
	(0.04345)	(.04241)	(0.24591)	(0.15076)
town_20	-0.3499**	-.40795***	-1.9213**	-0.1767
	(0.15619)	(.15162)	(0.74825)	(0.45802)
local	0.8629***	.63843***	0.2150	-0.5314
	(0.13284)	(.13409)	(0.67167)	(0.41404)
sex	-0.3077***	-.22783***	-0.9427**	-1.0466***
	(0.10526)	(.08618)	(0.55563)	(0.36636)
edu_low	0.0995	.05085	-1.5215**	-0.5613
	(0.17271)	(.16095)	(0.87978)	(0.51357)
edu_mid	-0.2396*	-.16448	-0.0308	-0.1149
	(0.13576)	(.12968)	(0.61999)	(0.41853)
age	0.0141***	.01500***	0.0140	0.0109
	(0.00336)	(.00324)	(0.01893)	(0.01120)
exp			-0.8512	0.2827
			(0.85179)	(0.55652)
spont			-0.4520	0.4429
			(0.89893)	(0.66188)
m_purpose			0.8982	-0.2536
			(0.84583)	(0.52220)
n_others			1.8198***	-0.2363
			(0.60529)	(0.36545)
bid				-0.1416***
				(0.01893)
constant	4.0709***	4.73783***	4.2282**	0.4702
	(0.32949)	(.00324)	(2.06215)	(1.32828)
n	837	837	248	311
Log Likelihood	-4013.943	-3994.129	NA	-117.307
LR chi2(17)	282.52	333.15	NA	139.58
Prob>chi2 (Prob>F for PC)	0.0000	0.0000	0.0000	0.0000
Pseudo R2 (Adj R2 for PC)	0.034	0.040	0.186	0.373
Alpha[1]	2.131002	2.13132	NA	NA

***, **, * Indicates significance at 1%, 5%, and 10%, respectively; 1 = Over dispersion parameter

The models explain fairly well the variation in trip frequency, and most of the coefficients have the expected signs. Increase in travel costs reduces number of trips, which is a first indication of reliable TC data. People visit other forests more often than National Parks, since these are located further away on average from where people live. Local people also make more trips than visitors travelling from further away, as do older people. If respondents declared availability of substitute sites within the same or shorter distance from their home to the site of visit, it reduces the number of trips to a specific site, as expected. Trip frequency decreases significantly with income groups, as compared with the base case income of <1000 PLN per month, though the coefficient is lower in absolute terms for the highest income group than for the middle-income group. Thus, trip frequency displays a non-monotonic or U-shaped relationship with income. This may not be a sign of invalid TC data. Apart from the obvious reason that people's time becomes more valuable when they grow richer (implying less time for all activities including forest recreation), other activities (conspicuous[15] or otherwise) may become available such as visits to shopping centres or foreign travel. If we interpret larger towns as an indicator of economic development, the model also predicts that people from large towns make fewer trips than people from small towns or villages. However, why these factors would revert for higher income groups is not immediately clear. One pattern, observed in several countries, is that as people get to a certain income level they can afford to move out of the city centres and closer to forested areas, making higher trip frequencies possible. The model that includes the travel time variable shows a slightly better fit. The longer it takes to travel to the site, the fewer trips people make, as expected. Since travel time is correlated with travel cost, the CS estimate increases once

[15] A telling example offered us from another transition country, Russia, is the use of jet skis on Moscow rivers – a recreation activity with undoubtedly conspicuous elements.

travel time is included as a separate variable. The signs of the coefficients are the same between the models (except for the variable "berries").

We ran several models for the SBDC and PC data. The results of the two most efficient models are displayed in columns three and four of Table 6 for PC and SBDC, respectively. The explanatory power is satisfactory for both models, and some of the coefficients have the expected signs giving us some degree of confidence in the results despite the high share of protests. WTP an entrance fee is higher for National Parks than for other forest sites for both models, which is expected since such sites are more unique. WTP increases with income for the two highest income groups for PC (one insignificant), while for SBDC all income coefficients are positive (one insignificant). From the estimation of both models, in terms of expected signs of coefficients and the number of protest responses for CV, we conclude that the TC data display a higher degree of validity. This justifies using the TC CS estimates as the primary basis for calculating the aggregate recreation value range for Poland. The results suggest that even though people seem to go to forests less frequently when their income grows (at least up to a threshold level), their WTP entrance fees to forest sites increases.

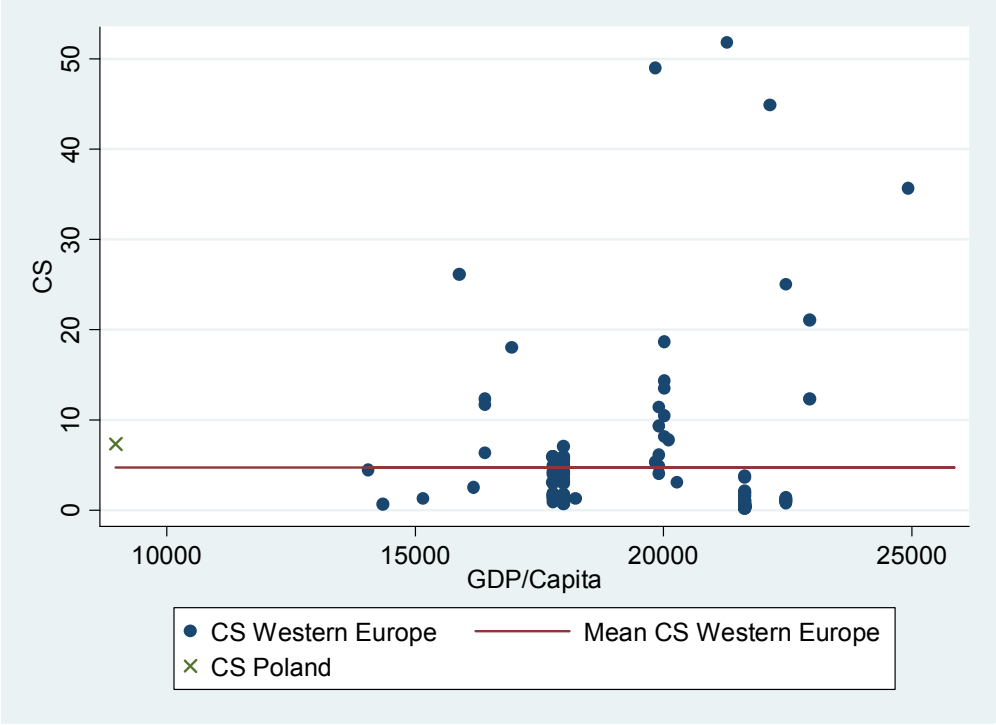
5. Discussion

Our results, both in terms of number of annual trips and recreation value per person per trip, are quite high compared with Western Europe, reflecting the importance of forests for recreation to Poles. UNECE/FAO (2005) sets the number of trips per person to 6.5 for Western Europe and 2.5 for CEE, which seem low for both regions. For example, surveys in Denmark estimate that in 1994 an average of 38 forest trips per person per year were made (Jensen and Koch, 1997). Our CV estimates are comparable to other CV studies in Europe valuing forest trips. Tyrväinen (2001), for example, finds WTP from a CV survey for a 2-hour trip to several urban forests in Finland in the range of 1.6

and 2.9 Euros (using a PC approach). Comparing our TC CS estimates with other Western European countries, confirms the high valuation of forest recreation in Poland. The average TC CS from a recently collated database of all Western European TC studies is 6.28 Euros (including cost of time) and Euros 4.73 (excluding cost of time) in 2000 (Zandersen, 2005)[16]. Since we exclude value of travel and site time, and the similar European estimates come from old zonal TC models that do not include travel time as a separate variable, the comparable estimate from Poland is Euros 4.17, or in PPP-adjusted form, Euros 7.38. The total estimated CS based on this estimate of around 5 billion Euros or 570 Euros per hectare is also higher than the few available Western European national level estimates. Two studies from the UK report total CS of ca 90-94 million Euros or 33-35 Euros per hectare based on TC (Willis and Benson, 1989; Willis, 1991). A study by Willis et al (2003) finds the recreation value in the UK using a CV approach to be around 590 million Euros, or 219 Euros per hectare. One study in Denmark, using an open ended CV study, estimates a total recreation value of Danish forests of ca Euros 57-68 million per year or 117-140 Euros per hectare (Dubgaard, 1998). Our results indicate that Poles not only seem to value trips higher than found for Western Europeans but also visit forests more often. More generally, income as measured using GDP/Capita seems to be a poor determinant of TC CS for forest recreation across Europe (see Figure 1).

[16] The database Western European forest recreation values contained 259 estimates, most of which are from the UK, Denmark and Germany – all converted using a common price index and PPP to Euro 2000 values.

Figure 1 *TC CS estimates from Western Europe (excluding value of travel/site time) and GDP per capita in Euro 2000 PPP (Source: Authors' calculations based on database collected by Zandersen (2005))*



The average CS from all Western European studies, that exclude travel time like our study does, is 4.73 Euros (horizontal line in Figure 1), while single dots are TC CS estimates from individual studies. Our TC CS estimate for Poland from the TC model that excludes travel time as separate variable is marked as "X" in the figure. A comparison of TC CS estimates across countries like this is, however, not straightforward. The database coded single or multi-site estimates and did not include any regional or national studies, which would have been a more appropriate format for comparison. Many of the Western European TC estimates are also from older studies, and comparisons across time, not only space, raises challenges of its own (see for example Zandersen et al. (2007)). Further, it was not possible to control for the assumed researcher-assigned level of travel costs across the studies in the database (see Randall (1994)), or different forest characteristics or uses. Still, the aim has not been to conduct

a thorough investigation of the relationship between GDP/Capita and TC CS[17], but to illustrate and underline our point that benefit transfer of recreation values from Western Europe to Poland will be off the mark if proportionally (or otherwise) income-adjusted. Forest recreation values seem not only to be relatively, but absolutely higher than the average in Western Europe.

6. Concluding remarks

This paper has reported the results of a comprehensive, national-level study of the recreational value of forests in Poland using the Travel Cost (TC) and Contingent Valuation (CV) methods. The national annual recreation value in 2005, based on the TC approach, was estimated at around 5 – 8.5 billion Euros, or 570-970 Euros per hectare. Per trip values per person range from 0.64 to 6.93 Euros, depending on the valuation method. The size of recreation benefits indicates that multi-functional forest management with an emphasis on recreation should continue to be a priority in Poland. Estimated values are high, but not unrealistically so compared with other countries. Both trip frequency and recreation values were found to be higher than average in Western Europe despite a lower income level. Further, a comparison of GDP/capita and per trip recreation values from a recently assembled database of European travel cost studies reveals no simple pattern. Results suggest that transferring values from Western Europe, proportionally scaled down by differences in GDP would substantially underestimate the value of forests for recreation in Poland. Explaining why values are different between countries is beyond the scope of this paper, but more research is clearly needed to understand how other factors than income, such as cultural, institutional and recreational traditions, determine forest recreation values (Ready and

[17] See Zandersen and Tol (In press) for an analysis of this dataset. As the plots here indicate, they also find no clear relationship between GDP/Capita and CS using multivariate meta-regression techniques.

Navrud 2006). An interesting question is how the high degree of state ownership and management of forests, a typical feature of transition economies such as Poland, has contributed to fostering recreation values over time. Further, factors specific to transition economies should be considered when applying valuation methods more often used in Western countries (for example choosing appropriate CV scenarios and payment vehicles to avoid protest responses). These are important areas of future research both for improving valuation methodologies and for making transfer of values for use in cost-benefit analysis of forest management policies in transition economies more accurate, until more primary valuation research becomes available.

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