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Analysis

Preferences for site and environmental functions when selecting forthcoming national parks

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ABSTRACT

A political decision to establish the first ever national parks in Denmark allowed us to examine if people hold preferences regarding which *site* to be designated as national park, separate from the preferences for its *environmental functions*. To this end, we designed a choice experiment representing the national park alternatives by the possible site and the possible improvements in environmental functions.
Results revealed that respondents have strong preferences for the establishment of a national park *per se*. Furthermore, there are significant differences in taste parameters for the different sites, which cannot be explained by respondents' valuing the different functions differently across sites. Instead we explain the results with differences in regional and cultural preferences.
We also performed a balanced split-sample test of anchoring effects and found clear evidence of this. We included a zero-bidder screening question prior to the choice set part of the survey instrument to improve WTP estimation.

1. Introduction

The destruction of a suitable habitat is the primary cause of species extinction in Europe, where more than one third of species are endangered (European Commission, 2008). To counter this, the European Union has implemented the EU Habitat and Wild Birds Directives to establish a European network of protected areas, known as the Natura 2000. The Danish parliament has supported a parallel process to identify additional measures for halting and reversing biodiversity decline in Denmark. A key conclusion from this work is the need for (re-)establishing larger nature areas in the heavily fragmented Danish agricultural landscape (Wilhjelm Committee, 2001). Subsequently, the Ministry of Environment identified seven candidate areas with potential for becoming the first Danish national park, and a locally anchored participatory process was started in each area to develop local ownership and interest in the idea, as well as to undertake various feasibility studies. This policy development provided us with a rare option to study people's *a priori* preferences for sites of national park establishment as well as their preferences for enhancement of different environmental functions of such parks.

The issue of preferences over sites is of interest, because choosing between site candidates may involve several factors, which may not be captured in environmental attributes alone. Each site represents a particular landscape type with its embedded cultural and historic connotations and meaning (Hanley et al., 2009b), values inherently linked with the site. There are also distributional aspects to consider: Which region will benefit or lose from proximity to the new national park? Benefits may include improved recreational accessibility and function, in turn affecting the tourism sector, but also branding, feelings of authenticity and local pride, and other aspects belonging intrinsically to the establishment of a national park *per se*. Costs may include increased restrictions on land-uses and other activities, increased negative tourism effects etc. Even though Denmark is a small country, its isle structure creates relatively long travels between the parts and surprisingly large differences in regional cultural identity, which could be decisive in the people's choice among site candidates.

A key implication is of course the potential enhancement of different environmental functions in any national park. In the present context, the protection of biodiversity and habitat types was likely to be considered by respondents due to the simultaneous process and debate. However, the recreational use of nature areas is quite intense in Denmark, e.g. the average hectare of forest will see more than 150 visits/year (Jensen, 2003), and the use of a forests for recreation in Denmark is high compared to other places (Sievänen et al., 2009). Therefore access rights are highly debated and valued (Jacobsen et al., 2008; Zandersen et al., 2007). Hence, when deciding which optional sites to designate a national park and site for potential improvements of environmental functions, it is a key question how respondents value the different environmental functions of the potential national

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parks. These functions may to some extent be considered generic across sites, but may also correlate with site specific variations in, e.g. wildlife or recreational potential. The empirical question is to what degree the site inherent values influence choices and preferences, as compared to the more generic gains from improving environmental functions in national parks — and if these can be disentangled.

Due to the unusual process of which this study was a part of, our key contribution is to address this question in a choice experiment (CE) with embedded generic attributes for different environmental functions of any national park, alongside an attribute for the actual potential site for a national park. Analyses of the patterns of response including cross-effects between site and environmental function attributes allowed us to disentangle these elements. There are environmental valuation studies focusing on existing national parks (Carson and Mitchell, 1995; Czajkowski and Hanley, 2009; Hanley et al., 2009b; Hearne and Salinas, 2003; Nunes, 2002), but we believe this study is a rare – perhaps the only – example of a valuation study being undertaken prior to the certain establishment of one or more national parks.

Apart from this main contribution, the study allowed us to make two additional methodological contributions, which we briefly report on. First, we introduced an opt-out option before the choice sets, making it easy for people with no willingness to pay (WTP) for national parks to state this and not answer the choice sets. This approach imitates the spike model of the contingent valuation (CV) method (Kriström, 1997). It captures a possible spike at zero and reduced the risk that people with in fact no WTP feel morally pressured to accept at least one of the several alternatives presented to them (cf. Jacobsen et al., 2009). A second contribution is a test for anchoring effects undertaken in a split design, where choice sets in each questionnaire are entirely randomised in one split, whereas in two others, the randomisation is slightly manipulated by placing the two most (least) expensive ones first.

2. Theory and Methods

2.1. Valuation of National Park Attributes

There may be several environmental improvements connected with the establishment of a national park, which differ across sites. Using a choice experiment, we can obtain valuation measures for improvements in several environmental functions. This allows us to focus on protection (of nature and biodiversity) vs. purely use related recreational functions. The technique represents an improvement over the CV method, as it may avoid confounding the effects of different attributes and improve internal scope sensitivity (Adamowicz et al., 1998; Carson and Mitchell, 1995). It has been used in valuation studies of national parks (Hearne and Salinas, 2003) as well as numerous other studies addressing the valuation of changes in habitat or site-related environmental functions (e.g. Hailu et al., 2000; Jakobsson and Dragun, 2001; Lehtonen et al., 2003; Li et al., 2004; Loomis and Gonzalez-Caban, 1998, to mention a few). While the valuation of improved habitat quality or species status is often a main focus, there are studies where recreational values have also been assessed alongside protection effects (Hasler et al., 2007; Hearne and Salinas 2003; Jacobsen et al., 2008, 2009; Rolfe et al., 2000).

We combine the focus on different attributes representing environmental functions of a national park with an attribute representing explicitly the actual site and hence landscape in which the national park will be established. This is particularly interesting as the degree of 'wildness', how 'special' a location is perceived to be, and the history of landscape changes have been found to determine landscape preferences (Hanley et al., 2009b) as has also the labelling effect (Czajkowski and Hanley, 2009). Some of the sites are habitats for special (sometimes rare) species and we include this possible 'icon' effect (cf. Jacobsen et al., 2008) by naming the relevant species for each park in each choice set. Other sites may be perceived to be more valuable for recreation. By estimating cross-effects between the site attribute and the generic environmental attributes we can correct for such correlations to assess more accurately the value components of each site.

2.2. Identifying Zero-bidders

A challenge in valuation studies is to identify zero-bidders if these constitute a special group that should not be modelled in the same statistical model as other respondents. In CV, zero-bidders have been handled with the spike model of Kriström (1997). This model and variations hereof have been heavily used in the CV literature and usually reduce WTP significantly (e.g. Amigues et al. 2002). Other approaches also take negative WTP values into account (Hanley et al., 2009a). In CEs, zero-bidders are commonly left only an opt-out option in each choice set (e.g. Jacobsen et al., 2008) and hence their choice is modelled no different from that of other respondents. It can be argued that respondents choosing the status quo in all choice sets are likely zero-bidders and consequently do not have the same marginal rate of substitution as others (von Haefen et al., 2005). This can partly be accounted for by the use of panel random coefficients (Train, 2003), but still the problem remains that exact zero-bidders are interpreted only as having a WTP lower than those offered in non-status quo alternatives.

Furthermore, if zero-bidders are forced to repeatedly pick status quo alternatives, they may become tired and not return the questionnaire. Also, if this group otherwise differs markedly from the other respondents, they may not be part of the same population with respect to the good in question. Consequently, it would be useful to identify them separately.[1] We used an approach related to that of Carlsson and Kataria (2008) and introduced a screening question for whether respondents wanted to pay at all, and only if they said yes, they were introduced to the choice sets. As opposed to Carlsson and Kataria we included a status quo alternative in each choice set, capturing respondents with a WTP larger than zero, but lower than the presented alternatives. Alternative approaches include, e.g. von Haefen et al. (2005) who apply a hurdle approach to model serial non-participants explicitly.

Identification of protest bidders was based on follow-up questions to those respondents who stated a zero-bid to the zero-bid screening question. Halstead et al. (1992) discuss different motives for protesting, e.g. protesting against the policy, the payment vehicle or the questionnaire. In the present study only respondents objecting to the questionnaire instrument or the payment vehicle *and* not for any other reason were rejected. People who disagreed with the policy initiative was not categorised as protest bidders, since the environmental good and the policy are valued jointly. Like Dziegielewska and Mendelsohn (2007) we remove protest bidders from the sample before model estimation.

2.3. Anchoring and Learning Effects in Valuation Studies

Anchoring and starting-point bias arise from the way the first questions are presented to respondents, e.g. the first opening price in a double-bounded dichotomous choice survey may affect respondents' stated WTP. Usually, the higher the first price presented, the higher is the estimated WTP. Anchoring or starting-point bias in CV has been intensively studied (e.g. Alberini et al., 1997; Bateman et al., 2008; Flachaire and Hollard 2007), but less so in CE, though examples exist (Ladenburg and Olsen, 2008).

[1] Notice that we are talking about true zero-bidders, thereby assuming that protest bidders have otherwise been identified and neglected.

A related strand of work is the issue of learning in stated preference studies, i.e. the hypothesis that when respondents are confronted with several consecutive choices, preferences tend to stabilise as they complete more choice sets (Johnson and Desvousges, 1997). Contradictory evidence also exists, e.g. Swait and Adamowicz (2001) find that after some choice sets respondents seem to base their choices increasingly on heuristics. Bateman et al. (2004), Carlsson and Martinsson (2001), Dellaert et al. (1999), and Holmes and Boyle (2005) also study learning effects, and the fatigue vs. learning effect question was recently addressed by Savage and Waldman (2008).

Thus, although there is some evidence from the literature of different response patterns in people's stated preferences through a sequence of choice sets, the cause — anchoring, learning, fatigue or the development of simple heuristics, is still debated. To test this, we randomised the choice set order, with one third of the respondents presented with the two most expensive choice sets in their questionnaire first, and another one third with the two cheapest first. The choice set order in the last third was kept entirely randomised. This allowed us to test the effect of anchoring across the splits.

2.4. The Econometric Method

The CE method relies on McFadden's (1974) random utility model, where the utility of a good is described as a function of its attributes and people choose among complex goods by evaluating their attributes. Since observation of utility can only be made imperfectly, the random utility model is the basis for estimation and can formally be described as:

$$U_{ij} = V_{ij}\left(y_i - t_j, x_j, z_i\right) + \varepsilon_{ij} \tag{1}$$

The term U_{ij} is the ith individual's utility of paying t_j out of individual income y_i for the good described by alternative j. V_{ij} is a deterministic term depending on income, the alternatives' attributes x_j and the individual's characteristics, z_i. The term ε_{ij} is stochastic in the sense that its variation cannot be observed by the analyst, and it may capture also heterogeneity in taste preferences as well as other aspects. Assuming that U is linear in its arguments and collecting arguments in the vector x_{ki} for given alternative k and individual i, we can write $U_{ki} = \beta' x_{ki}$ where β is a vector of parameters. Assuming that ε_{ki} is IID extreme value distributed, the probability of an individual i choosing alternative k over a set of alternatives J is given by the Conditional Logit model:

$$\Pr(ki) = \frac{\exp^{\beta' x_{ki}}}{\sum_j^J \exp^{\beta' x_{ji}}} \tag{2}$$

The establishment of a national park *per se* was of interest to the study, and consequently we use an Alternative Specific Constant (ASC) to capture the systematic component of a potential status quo effect (cf. Scarpa et al., 2005). An error component is incorporated in the model to capture remaining status quo effects in the stochastic part of utility associated with the cognitive effort of evaluating two experimentally designed hypothetical scenarios relative to the status quo scenario (Greene and Hensher, 2007; Ferrini and Scarpa, 2007; Scarpa et al., 2007; Scarpa et al., 2008). This error component, σ_i, is implemented as an individual-specific zero-mean normally distributed random parameter and is assigned to the two non-status quo alternatives.

This Conditonal Logit model is sensitive to the independence of irrelevant alternatives (IIA)-assumption. To address these issues, we applied the more robust Mixed Logit model (Train, 2003), describing the probabilities as integrals of the standard conditional logit function over the distribution of β. The specification can be generalised to allow for repeated choices by the same respondent, i.e. a panel structure, if the utility coefficient varies over people but is constant over choice situation n. If the distribution of β is specified to be normal, the probabilities of such a model become:

$$\Pr(kin) = \int \left(\frac{\exp^{\beta_i' x_{kin}}}{\sum_j^J \exp^{\beta_i' x_{jin}}} \right) \varphi(\beta | b, W) d\beta, \tag{3}$$

where $\varphi(\beta|b,W)$ is the distribution function for β, with mean b and covariance W. The analyst chooses the appropriate distribution for each parameter in β.

3. The Study

3.1. Survey Design

Two focus groups were used to identify the attributes to be used, and the questionnaire was pre-tested in three iterations. Respondents were presented with three items: a covering letter, an information sheet briefly describing each of the potential national parks and their location (see Appendix A), and the questionnaire. In the information sheet, it was explained that in the different potential national park sites, there were already several legal nature protection measures and access routes in place, but that the establishment of national parks could in different ways be used to enhance environmental functions. The questionnaire included introductory questions regarding use, knowledge and opinions of nature and the potential national parks in Denmark. Respondents were then asked if they wanted at all to pay for the establishment of a national park in Denmark via an increase in income taxes. If not, they were guided to a set of debriefing questions concerning their motivation of this answer, allowing us to sort valid zero-bids from potential protest bids. Otherwise, respondents were guided through the choice sets. All respondents were asked debriefing questions and follow-up questions regarding their socio-demographic characteristics.[2]

Each respondent was presented with only four of the seven potential national park sites, as offering all seven sites was identified in focus groups as being too burdensome. They were informed that other respondents were asked about other sets of sites. A cyclic design was used to assign parks to seven different groups of four parks, using a random ordering as presented in Table 1 that also shows the main habitat characterising each park. Apart from the site attribute, the attributes presented in Table 2 were included in the choice sets. The attribute levels for 'extra nature protection' ranged from low, described as improvements in the environmental content and habitat quality of currently protected nature areas, to high efforts including the conversion of arable land into natural habitats. This paralleled the discussion in the public debate during the process. The attribute 'Extra effort for special animals and plants' related to additional specific measures for special, perhaps threatened, species, and here respondents were presented with the name of two relevant species (or group of species) for the given park site, see Table 1. These were selected following consultations with the local national park pilot project committees, as representative for the species discussed in the political process. An example of a choice set is shown in Appendix B.

A full factorial design would contain $4^2 \times 2^2 \times 8 = 512$ combinations of the 5 attributes for each of the 7 groups of respondents. We constructed an orthogonal fractional factorial design using SAS

[2] A translated questionnaire is available upon request from the authors.

Table 1
Main habitat and special species or group of species belonging to each park.

Park	Main habitat or attraction	Specific species	Scientific name
Læsø	Marine habitats	Blue lobster (var. of *Homarus gammarus*) and small sharks	*Homarus gammarus* L.; Selachimorpha
Møn	Chalk cliffs and coastal beech forest	Orchids and butterflies	Orchidaceae; Lepidoptera
Thy	Dunes and dune heath	Crane and red deer	*Grus grus* L.; *Cervus elaphus* L.
Nordsjælland	Former royal forest land and lakes	Goldeneye and sika	*Bucephala clangula* L.; *Cervus nippon* T.
Mols Bjerge	Dry commons	Butterflies and barnowl	Lepidoptera; *Tyto alba* S.
Lille Vildmose	High peatbogs and forest	Golden eagle and wild boar	*Aquila chrysaetos* L.; *Sus scrofa* L.
Vadehavet	Tidal water area and marsh	Flatfish and migratory birds	(using common grouping, not scientific)

Table 2
Attributes presented in the choice experiment.

Attribute	Levels	Expected sign for coefficient
Site	Læsø	+(/−)
	Møn	
	Thy	
	Nordsjælland	
	Mols Bjerge	
	Lille Vildmose	
	Vadehavet	
	None	
Extra nature protection in general	No extra initiatives	+
	Limited extra initiatives	
	Some extra initiatives	
	Large extra initiatives	
Extra effort for special animals and plants	No	+
	Yes (with indication of which species)	
Extra roads and paths	No extra roads and paths	+(/−)
	Increased amount of roads and paths	
Additional tax to be paid per household and year	DKK 0 = € 0	−
	DKK 50 = € 7	
	DKK 100 = € 14	
	DKK 200 = € 27	
	DKK 400 = € 54	
	DKK 700 = € 95	
	DKK 1500 = € 203	
	DKK 2000 = € 270	

(Kuhfeld, 2004), using 4 blocks of 8 pair wise comparisons (and a status quo). No choice sets were eliminated, i.e. potentially dominating alternatives with zero payment for a national park occurred. The design also allowed us to estimate cross-effects reliably. The *D*-error was 0.08 and the *B*-value 100% (cf. definitions in Scarpa and Rose 2008) for the basis design. As described in Section 2.2, we designed three different splits, which only varied with respect to the ordering of the choice sets. In two splits the first two choice sets were the ones with the lowest (highest) sum of payments and remaining choice sets were randomly ordered. In the third split all choice sets were randomly ordered.

To allow for preference heterogeneity, we assume all parameters, except the ones for tax payment and the ASC, to be normally distributed random parameters. This choice is based on experience from other Danish valuation studies, where preferences for similar attributes have been found to vary considerably in the population. Extended access rights and facilities can have a negative value to some respondents, see e.g. Jacobsen et al. (2008) and Lundhede et al. (2009), e.g. due to concerns for protection in nature areas. Also, the value of increased wildlife and protection of different habitats is not necessarily (equally) positive to all (Jacobsen et al. 2009). The tax parameter is fixed, even though it implies that the marginal utility of money is fixed over the population, but it avoids a number of potentially severe problems associated with specifying a random price parameter (see e.g. Hensher et al., 2005; Train 2003; Train and Sonnier, 2005).

Table 3
Ranking of the sites. Rank 1 is the best, and 4 the lowest. Every respondent has ranked up to four areas.

Area	Number of 1sts	Number of 2nds	Number of 3rds	Number of 4ths	Rank
Læsø	61	122	132	159	2.8
Møn	130	150	105	102	2.4
Thy	125	113	135	110	2.5
Nordsjælland	99	60	98	229	2.9
Mols Bjerge	140	133	133	89	2.3
Lille Vildmose	167	136	118	69	2.2
Vadehavet	151	136	116	80	2.3

3.2. Data Collection and Screening

A total of 1932 questionnaires were mailed to a representative sample of the Danish population (between 18 and 75 years), selected from the Danish central personal register. The questionnaires were mailed on July 8, 2005 and on August 12, 2005 a reminder was sent to the 1239 respondents who had not replied. In total 952 respondents returned a questionnaire where the payment questions were answered (including zero-bidders). The respondents were representative of the population with regard to gender and geography, whereas respondents with higher education, higher income and young as well as old, were slightly overrepresented.[3]

4. Results

4.1. Ranking Exercise

As a cross-check on the preferences for the potential sites, respondents were asked – after the choice sets – to rank the four potential park sites presented to them. The results are shown in Table 3. Nordsjælland is ranked lowest, but Læsø is also ranked low. Less pronounced, Lille Vildmose, Vadehavet and Mols Bjerge are ranked highest.

4.2. Zero-bidders

303 of the 952 respondents answered 'No' to the initial question on WTP additional tax for the establishment of national parks. Of these, 196 chose motivations for this answer that were not consistent with a true zero-bid, but stated opposition to the instrument or the payment vehicle.[4] These were eliminated from the analyses. The proportion of true zero-bidders was larger among people living in the western part of the country (34%) than in the east (27%) and among women (30% vs. 23%). For the main model (Table 4) the right most column shows the zero-bid weighted WTP estimates. All other estimates are only for those having a non-zero WTP.

[3] See Jacobsen et al (2006) for a detailed analysis.
[4] Non-protest reasons included e.g. 'A national park has no value for me', 'I oppose in general to the national park idea', and 'I cannot afford to pay anything'.

Table 4
Parameter estimates and WTP for the main model. A random parameter error component logit model. WTP reported in DKK (1 € = 7.4 DKK) per household per year. Weighted WTP is weighted by valid zero-bids. Simulations are based on 1000 Halton draws. Confidence intervals were estimated by the Krinsky–Robb procedure (Krinsky and Robb 1986; 1990) with 10,000 replications. *** indicates significance at the 1°% level, ** at the 1% level and * at the 5% level. Non-significant WTP values are not reported.

	Parameter[a]	*t*-value	WTP	Confidence interval for WTP[a]	Zero-bid weighted WTP
Variable					
ASC[b]	2.0389***	10.14	994	(814–1147)	851
Møn	0.3597*	2.52	175	(41–310)	150
Thy	0.2780	1.90	–	(−4–275)	–
Nordsjælland	−0.1024	−0.60	–	(−116–216)	–
Mols Bjerge	0.4223**	2.65	206	(53–359)	176
Lille Vildmose	0.8116***	6.01	396	(268–524)	339
Vadehavet	0.6006***	3.98	293	(150–435)	251
Extra nature protection	0.4152***	5.18	202	(127–278)	173
Extra effort for special plants and animals	1.1209***	14.18	547	(477–616)	468
Extra roads and paths	0.1993*	2.30	97	(14–180)	83
Price	−0.0021***	−32.84			
Standard deviations					
Møn	1.3197***	7.04			
Thy	1.1904***	7.03			
Nordsjælland	1.8436***	10.09			
Mols Bjerge	1.5698***	8.39			
Lille Vildmose	1.3044***	7.87			
Vadehavet	1.5965***	10.10			
Nature protection	0.6008***	3.68			
Extra effort for special plants and animals	0.8045***	7.14			
Extra roads and paths	0.8138***	5.88			
Sigma*10	2.6747***	14.68			
Number of observations	4866				
Number of respondents/Pseudo R^2	636	0.3009			
Log-likelihood/R^2 adjusted	−3737	0.3009			
Restricted LL/χ^2	−5346	3217			

[a] Estimated by the Krinsky-Robb method with 10,000 draws.
[b] Fully correlated (negatively) with the benchmark park, Læsø.

4.3. Main Model

Excluding protest bidders and valid zero-bidders, 636 respondents evaluated 4866 choice sets, and the resulting estimations are shown in Table 4. As the site variable was dummy coded, one site (Læsø) needed to be excluded, and the WTP for a national park *per se* on the site eliminated will therefore be confounded with the ASC of the model. The implication is that the coefficients and WTP for the other sites should be interpreted as additions to the value of the ASC.[5] The variables 'Extra initiatives for special plants and animals' and 'Extra roads and paths' are dummy coded too. 'Extra nature protection' is dummy coded as 1 for any level of extra protection and 0 otherwise as there were no significant differences between the three levels above status quo.

The ASC estimate is large and could be interpreted as the WTP for the establishment of a national park *per se*, but confounded with the benchmark park Læsø, which was ranked among the two lowest in the ranking exercise. The ASC may also capture other alternative specific effects not captured in other parameters. As with Læsø, the Nordsjælland site is also valued significantly lower than most other sites — in spite of their differences: Læsø being a small remote island and the Nordsjælland site a larger forest landscape fairly close to Copenhagen. The Lille Vildmose site has a WTP significantly higher than all others except Vadehavet. Apart from this, we see that there is a significant willingness to pay for all three generic attributes. The WTP for 'Extra roads and paths' is significantly lower than the WTP for any of the nature protection related attributes. Note that the when not weighed with the true zero-bidders, the WTP estimates are only valid for the non-zero bidding part of the population. The estimated standard deviations of the random parameters are highly significant, revealing considerable heterogeneity in preferences and somewhat larger for the site attributes than for the generic attributes. The parameter σ is significant, indicating a correlation pattern over the alternatives as opposed to the status quo. The adjusted Pseudo R^2 indicates a good model fit.

4.4. Second Order Effects

In the choice sets the attribute 'Extra effort for special plants and animals' was accompanied by two special species/groups of species for each park. Thus, differences in charisma of or preferences for these species could influence the WTP for the different sites (cf. Giraud et al., 1999; Jacobsen et al., 2008). However, estimating a model with cross-effects between this attribute and sites gave non-significant parameters for all the cross-parameters except Lille Vildmose (results are shown in Appendix C), and the ranking of the different sites did not change significantly. In particular, the two eastern sites, Nordsjælland and Møn, remain low in rank. Standard deviation of the interaction terms became significant.

If use values are important, we would expect *a priori* that sites located close to larger population centres are valued higher than sites located far away from such centres. From the location estimates we have already seen that sites located close to densely populated areas, e.g. Nordsjælland, do not top the list, but to investigate this further, we tested whether cross-effects between site and 'Extra roads and paths' supported such a pattern. It showed no significant effect for any of the parks (see Appendix C), nor did the interaction effect with 'Extra nature protection'.

4.5. Geographical Patterns of Preferences

To evaluate the hypothesis that cultural values, regional identities and others likely to be exclusively site-related values could be decisive in the choice of site, we analysed preferences across sub-samples of

[5] Notice that ASC here is defined as having the value of zero when status quo is chosen and one otherwise.

Table 5
Estimates for two geographically different groups of respondents. A random parameter error component logit model. WTP reported in DKK (1 € = 7,4 DKK) per household per year. Not adjusted for zero-bidders. Simulations are based on 1000 Halton draws. Confidence intervals were estimated by the Krinsky–Robb procedure (Krinsky and Robb 1986; 1990) with 10,000 replications. *** indicates significance at the 1% level, ** at the 1% level and * at the 5% level. Non-significant WTP values are not reported.

	West				East			
	Parameter	*t*-value	WTP	Confidence interval for WTP	Parameter	*t*-value	WTP	Confidence interval for WTP
Variable								
ASC	1.9503***	6.99	883	(652–1115)	2.1762***	6.64	1422	(812–1433)
Møn	−0.0585	−0.29	–	(−203–150)	0.7273***	3.47	375	(169–582)
Thy	0.1107	0.49	–	(−152–252)	0.4152*	2.07	214	(11–418)
Nordsjælland	−0.5976**	−2.68	–	(−472–70)	0.4839	1.67	250	(−47–546)
Mols Bjerge	0.3189	1.56	–	(−38–327)	0.4838	1.76	–	(−31–530)
Lille Vildmose	0.5769**	3.18	261	(101–422)	1.0045***	4.54	518	(296–741)
Vadehavet	0.6055**	3.01	274	(96–453)	0.5979*	2.49	308	(70–547)
Extra nature protection	0.4923***	4.45	223	(124–322)	0.3593**	2.84	185	(60–310)
Extra effort for special plants and animals	1.1620***	10.67	526	(438–615)	1.0861***	8.98	560	(447–673)
Extra roads and paths	0.1326	1.08	–	(−75–152)	0.2526	1.91	–	(−4–265)
Price	−0.0022***	−24.34			−0.0019***	−21.72		
Standard deviations								
Møn	1.2283***	4.42			1.3613***	5.23		
Thy	1.5907***	7.18			0.8372**	2.58		
Nordsjælland	1.2974***	5.26			2.4179***	7.54		
Mols Bjerge	1.3696***	5.56			1.8420***	5.90		
Lille Vildmose	1.2148***	5.41			1.4225***	5.75		
Vadehavet	1.5097***	6.31			1.7307***	7.48		
Extra nature protection	0.7076***	3.36			0.5733*	2.36		
Extra effort for special plants and animals	0.8509***	5.87			0.6983***	3.67		
Extra roads and paths	1.1583***	6.89			0.1967	0.33		
Sigma*10	2.7713***	11.47			2.7749***	7.07		
Number of respondents /Pseudo R^2	2768	0.303			2098	0.311		
Log-likelihood/R^2 adjusted	−2119	0.303			−1589	0.311		
Restricted LL/χ^2	−3041	1843			−2305	1433		
LR test, χ^2=	59							

respondents living in the eastern and the western part of the country. Due to the infrastructure, geography and history of Denmark this distinction is the most obvious one to use, and the one that follows the delimitation of the largest differences in regional sub-cultures.[6] The results are shown in Table 5. A likelihood ratio test rejects that the two samples are identical.

It is seen that the respondents in the east generally have a higher WTP for *any* park. The difference is largest for the sites in the east, i.e. Møn and Nordsjælland, but interestingly also large for Lille Vildmose and to some extent Thy, two sites in the western part of the country, and Lille Vildmose even for the Easterners easily top the eastern sites. Notice that respondents in the west do not have a higher WTP for parks located in the west of the country than respondents from the east, but they do have much lower WTP for the Nordsjælland site close to the capital than for *all* the western sites. Interestingly, for the generic attributes there are no significant differences between the two sub-samples.

4.6. Results of Anchoring Analysis

In Appendix D the results of RPL-models of the anchoring splits are shown. It is seen that the anchoring effect works primarily through the ASC parameter capturing the WTP for a national park *per se*. This is the only parameter where the WTP estimated for the different splits were significantly different: the largest ASC being estimated for the split exposed to the two most expensive choice sets in their batch. For the generic attributes, this split also has higher WTP estimates than the 'Cheap CE First' split, but with a strict parameter-by-parameter evaluation, this difference is not significant. The effects on the site parameters are inconclusive.

[6] A more detailed distinction using counties showed no major difference from the results reported here.

In order to test for possible differences in preference variation, we tested for differences in scale between the three splits, but found no significant difference (results not shown). We also performed a test for a possible learning effect by estimating a model where we parameterised the scale parameter with the choice set number for the entire sample (see Lundhede et al., 2009). In none of the cases did the choice set parameter explain variation in scale across the choice sets.

5. Discussion

The key contribution of this study is the disentangling of the preferences for specific sites from the preferences for the different environmental functions that could be enhanced at any potential site.

5.1. Main Effects of Environmental Functions and Site

Regarding the three generic attributes we found that extra nature protection and extra efforts for special plants and animals had a quite high WTP, whereas WTP for 'Extra roads and paths' was considerably lower. This is much in accordance with results from other WTP studies in Denmark (Jacobsen et al., 2008, 2009).

Turning to the site attributes, we note the high WTP implied by the ASC, which could be interpreted as WTP for the establishment of a national park *per se*, though it may also capture other alternative specific values, is not otherwise captured in the model. As it was pointed out to the respondents that the sites are already protected today, this seems to be mainly a labelling effect as also found by Czajkowski and Hanley (2009). Respondents 'trade' between sites of rather different geographic position and landscape character. We find that Lille Vildmose and Vadehavet are the most popular sites, both being located in the western part of Denmark. In the main effects model, the WTP for Lille Vildmose is higher than the WTP for all other sites and significantly for all except Vadehavet. Similarly, the WTP for

Læsø and Nordsjælland is considerably lower than for most other sites.

Differences across sites could be caused by variations across sites in the potential value of the environmental functions they may offer as national parks. To investigate this, we estimated a series of models including site-environmental function interaction terms.

5.2. Environmental Function and Site Interactions

The interaction effect of site and 'Extra nature protection' could indicate preferences for a specific landscape's beauty since the parks differ in characteristics. However, as none of the interaction terms were significant, it seems respondents have related to the extra nature protection only in a generic sense.

Evaluating the interaction between the site and the enhanced protection of special species, we find no significant correlation, as revealed by the parameters of the interaction terms, except for one — Lille Vildmose. This indicates that variation in preferences between the different special or threatened species is not so pronounced, which accords with Jacobsen et al. (2008, 2009), who found small differences between species. The standard deviations are significant, indicating that it may be taken into account by some individuals. We also note that including the interaction term does not change the overall pattern in site preferences, i.e. some of the western sites are still much preferred to the eastern sites. It should be noted that this finding is in spite of analyses (Larsen et al. 2008; Petersen et al., 2005) is documenting that species diversity is in fact highest in the Nordsjælland site, and also this site hosts a rather high number of endangered species compared with the other sites.

Turning to the recreational potential of the different sites, a reasonable hypothesis would be that sites far away from population centres would have a lower WTP, *ceteris paribus*. Overall, this is not what the main model showed. We do see that WTP for the Læsø site (confounded with the ASC) is lower than for most other sites, which is not unexpected as it is quite a remote island. However, for Nordsjælland, the low WTP is more surprising as it is easily within reach of one third of the population. We would expect the interaction terms between 'Extra roads and paths' and the site to capture variation in the recreational value, but again no significant interaction terms are found. Thus, also for this environmental function respondents seem to have assessed its generic value and did not discriminate much between sites on the basis of this function. This does not imply that enhanced recreational access is an unimportant function — it has a significant WTP. But it does imply that the preferences over sites are formed and based (also) on other criteria than this and the other environmental functions.

Overall, these results show that respondents have largely separated their preferences for the different generic environmental function attributes from their preferences for the national park site *per se*. Thus, for understanding the preferences for sites, we take a regional perspective.

5.3. Understanding Preferences Over Site

Having established that there are only limited interaction effects between environmental functions and site, the puzzle remains to understand why the western sites are preferred over the eastern, and notably why Nordsjælland is ranked so low in spite of its large actual potential for providing benefits such as recreational gains. To this end, we estimated models dividing respondents in those living in the western and those living in the eastern part following the delineation of the largest differences in regional sub-cultures.

The geographical split (Table 5) shows that across this divide, respondents have similar WTP for the generic environmental function attributes. Turning to the site attributes, we find that respondents in the west express a lower WTP and in particular so for the eastern sites, Nordsjælland and to some extend Møn. Thus, westerners actively deselect the site of Nordsjælland as also indicated in the ranking experiment (Table 3). The easterners, however, do not show the same dis-affinity for sites in the western nor the eastern part of the country.

These results clearly reflect two aspects rooted in the national perception of the Danish landscape and nature and the regional sub-cultures of Denmark — which turns out to be quite decisive in the preferences for some of the key potential sites for a national park. The first and dominant aspect is the perception is that truly authentic and natural large landscapes are found primarily in Jutland, the western part of Denmark. Originating in the national romantics of the 19th century, Jutland (the west) has been pointed out as the 'authentic', 'rough' and 'wild' part of Denmark (e.g. Andersen, 1859; Hoffmann, 1924; Friis, 1936). Also Thomson (2003), in a study of 20th century literature, points at this difference as important for the national self-image. This may explain why parks in Jutland are valued higher among all respondents including those in the east.

The second aspect is the difference in self-perception and perception of the people in other parts of the country. In particular the sub-culture in the west considers the east with some suspicion and envy. The capital is located in the east and it is the most densely populated area, both leading to the favouring of this area with public funds and investments.[7] Thus, people in the west may feel that Copenhagen has had more than its fair share of public projects.

These two effects, a culturally rooted view of where 'true nature' is to be found, and the westerners distaste for supporting projects close to the capital, could very well be reasons for the geographical differences found which cannot be explained by proximity nor by environmental quality effects.

5.4. Anchoring Effects

An additional contribution of the study is a test for anchoring effects. It is noteworthy that we are able to uncover evidence of anchoring effects even for the fairly small and subtle systematic variations in design, which we have applied here. The results indicate that the issues of starting-point bias and anchoring much discussed in the CV literature (cf. Section 2.3) carry over rather generally to the CE method. Our results can be interpreted also as lending support to theories on preference formation, like the shift model discussed by Alberini et al. (1997) and the recent range model of Flachaire and Hollard (2007) developed to explain anchoring in CV studies. Similar patterns are sometimes interpreted as learning. However, in our case, we have tested for differences in scale by choice set number and by the different splits, and found no such differences, implying that unobserved variance is constant across these treatment differences. This is contrary to what would be expected under a learning hypothesis. Hence, we are inclined to conclude that our results mainly reflect anchoring.

The attributes most affected by anchoring were the generic attributes, i.e. the ASC, 'Extra initiatives for special plants and animals' and 'Extra nature protection' — but only to a small extent 'Extra roads and paths'. This suggests that the effect of anchoring is to put a premium on all major attributes of the good, and not only a level premium, e.g. through the ASC, caused by the respondents accepting higher-priced alternatives *ceteris paribus*. As pointed out by Flachaire and Hollard (2007), the presence of anchoring effects does not necessarily exclude the possibility of obtaining central estimates of the true WTP. This, however, will only be the case if the researcher avoids introducing a systematic bias through their design. It is sometimes suggested in discussions among practitioners that the first

[7] A phenomenon termed 'Københavneri'. Searching for 'Københavneri' at www.google.dk on the 16th of July 2009 caused 4740 hits — mainly concerned with aspects of decision makers allegedly favouring the Copenhagen area or ignoring the west.

choice sets evaluated by the respondent should not be 'too difficult' and they should be 'easy to accept' in order not to prompt too many non-responses or protest bids. Based on our results, such an approach should be avoided, as it implies a significant downward anchoring bias. This is predicted also by the theoretical model of response and preference formation proposed by Flachaire and Hollard (2007). Thus, we recommend that a random design is applied.

5.5. Identification of non-demanders in a screening question before the choice sets

As a new design feature, we included a question prior to the choice sets, asking the respondents whether they would be willing to pay extra income tax at all for the establishment of a national park. The intention was to avoid the overestimation of WTP resulting from having a large number of true non-demanders and hence zero-bidders select the status quo alternative (or feeling morally obliged to select one or more of the (cheaper) alternatives (see, e.g. Jacobsen et al., 2009). We did not test specifically for the effect of this, but compared to other studies in Denmark (Jacobsen et al., 2008, 2009; Hasler et al., 2007) the number of true zero-bidders identified here exceeds the number of sequential status quo choosers from similar CEs. This might indicate that not taking into account a possible spike at zero (Kriström, 1997) also in CE would cause an upward bias in the WTP measures. Further support is given by the fact that having screened for zero-bidders, we see very few sequential status quo choosers — much fewer than in the comparable Danish studies. Apart from this, excluding zero-bidders from the econometric model, as done in the above analyses, may reduce variation of the single parameters of interest and improve inference efficiency.

5.6. Some caveats and limitations

It is possible that we could have brought about stronger effects of the interaction terms between environmental attributes and site by putting even more emphasis on the differences in potentials of the different sites, e.g. with respect to biodiversity or recreational use. This approach would, however, run the risk of superimposing expert preferences on and overruling inherent preferences of the respondents. Another issue is whether respondents were able to distinguish between the four sites presented to them or if they did in fact apply less than perfect attribute processing rules to these (Hensher and Rose 2009); a topic we leave for further research. Finally, a direct test of the effects of the zero-bid question implemented here would be of interest.

6. Concluding remarks

A political process with the aim of establishing one or more new national parks in Denmark gave us the unique possibility of performing an unusual *a priori* study of the establishment of a national park in a location not yet decided at the time of the study. The study has shown that preferences for the different sites seem to reflect mainly cultural views of what nature is and where nature is found, as well as differences in regional views on where such public projects should be undertaken. This stresses the importance of interpreting stated values in a contemporary cultural setting and it further adds to the difficulty of transferring values from a study site to a policy site. It also implies that studies implementing valuation results in conservation policy evaluation (e.g. as Strange et al., 2007), should take care not only to consider environmental values.

In addition, our study also makes a contribution to the literature on anchoring, documenting that this is also a distinct problem in CE studies affecting WTP estimates for most attributes. Furthermore, we report on our experience with the inclusion of a zero-bidder screening question prior to the choice set part of the survey instrument.

As a final comment, we may report on the actual choice of national park sites: a decision of which national park to establish was first made in June 2007 — and the choice fell on Thy. It is one of the parks ranked intermediate in the present survey, but it benefits from local support and ease of implementation as most of the area is state owned. In January 2008, it was decided to establish four more parks, namely Mols Bjerge, Vadehavet, Nordsjælland and one which was not included in the present survey — Skjern Å.

Acknowledgements

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Appendix A

National parks in Denmark?

A short description of four Danish pilot projects.

National park Thy

The pilot project covers the western part of Thy along the west coast. The basis for nominating Thy as a pilot project are areas with coastal heathland, plantations, and large lakes.

Nature protection

More than half of the area is preserved by preservation regulation or other form of protection, among others the nature protection act. The large coherent areas with coastal heathland is habitat for rare plant and animal species and they are unique both nationally and internationally.

Special nature and outdoor recreation

The Western Thy is habitat for special animals and plants, which are attached to the dune heath, and there are breading cranes and a large population of red dear in the undisturbed nature areas. In the area there are possibilities for swimming, hiking, windsurfing, and see undisturbed nature. Primitive camps for overnight stays and marked hiking and biking path make the area accessible.

National park Møn

The basis for nominating the north eastern Møn as a pilot project is the special geology and nature. It covers two core areas and an area in between which is mainly agricultural land.

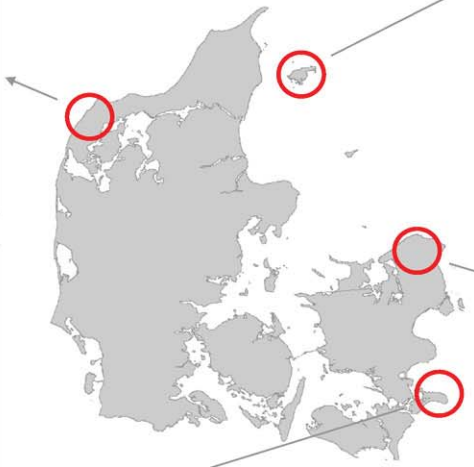
Nature protection

The Western part is a bird protection area and the eastern part is protected by the nature protection act as well as by international protection rules. The two protected areas are separated by agricultural land and thereby migration of animals and plants are impeded.

Special nature and outdoor recreation

In the area are rare orchid species, birds and butterflies, and som of eastern Denmarks largest salt meadows. A lime rich subsoil around Møn's cliffs are basis for commons and a varied and unique forest. There are good possibilities for hiking, sailing, orienteering and angling in the area. There is a net of bike and hiking paths which gives access to the area.

Foto: AgroLIT / E. W. Larsen.



Marine National park Læsø

The sea around Læsø is the basis for the nomination of this project. Here is a large variation in depth of the sea and geological structures with among other, stone reefs, bobbling lime pillars, and coral reefs which makes a basis for a large variation of nature types and thereby diversity of animals and plants.

Nature protection

Parts of the waters around Læsø are today bird protection areas.

Foto: K. Krogstrup.

Special nature and outdoor recreation

The marine nature types in the waters around Læsø are important habitats for blue lobster, small sharks, seals and porpoise. Furthermore, the flat southern part of the island is an important breeding place for many wading birds. There are many hiking, riding and biking paths in the nature of the island, and there are possibilities for practising different forms of water sport, e.g. diving and sailing.

National park The Kings' Nordsjælland

The basis for nominating Nordsjælland as a pilot project are the large state owned forests and nature areas, which are scattered over all north eastern Sjælland. The area around Gribskov and Esrum Sø will form the fore of a possible national park, which will include both nature areas and agricultural land.

Nature protection

In Nordsjælland there are several protected areras. However, these areas lies isolated in the landscape and surrounded by agricultural land, whereby migration of animals and plants are impeded.

Special nature and outdoor recreation

The Nature in Nordsjælland is typical for East Denmark, with old broadleaved forests, large lakes and agricultural land. Varying soil conditions and many lakes gives a large variation for plants, and many species exists here which are endangered in Denmark. The area is specifically important for the population of goldeneyes, and also red dear and sika are extended in the large forest areas. There are many visitors from Copenhagen and the cities around.

National parks in Denmark?

A short description of four Danish pilot projects.

Pilot projekt Lille Vildmose National park

The basis for this pilot project is the raised bog in Lille Vildmose, which is the largest intact raised meadow in Western Europe. The area is located south east of Ålborg and contains forest areas and a coast with beaches and beach ridges. The core in a national park will be Lille Vildmose as well as two protected forest areas.

Nature protection

I 2005 the core part of the area is expected to be preserved by law. The preservation means that the present nature is protected against future changes. Furthermore, large parts of the area are an international nature protection area for specific birds, animals and plants.

Special nature and outdoor recreation

Raised bogs are nutrient poor nature areas with a special plant society which does not exist in other places. Lille Vildmose is habitat for the only breeding golden eagle pair in Denmark, and in the forests are wild boar and red dear. The forests and parts of the bog are partially closed for the public. The beaches and beach ridges in the area gives possibilities for swimming and hiking, and there are an active summerhouse and camping environment.

National park Vadehavet

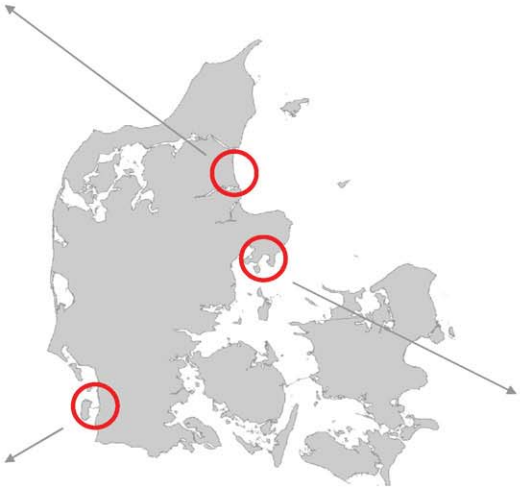
The area around Vadehavet is nominated as a potential national park and covers the area from Varde in North to Tønder in South, including Mandø and Rømø. The basis for nominating Vadehavet as a potential national park is that it is one of the worlds most valuable tide areas.

Nature protection

The area is today a habitat area and a bird protection area and is part of an international protection cooperation.

Special nature and outdoor recreation

The population of flatfish and common seal in the North Sea is depending on Vadehavet as a breeding area. At the same time the area is of determining importance as a rest and overwinter location for more than 50 species of wading birds.
It is, with a few exceptions, legal to walk all over the area, so there are good possibilities for experiencing nature.



The National park Mols Bjerge

The Southern part of Djursland and adjecent sea areas are the point of departure for this pilot project. The Southern part of Djursland is one of the most hilly and varied areas of Denmark with large range of hills around Ebeltoft, Kalø Vig and Begtrup Vig.

Nature protection

The area already contains a lot of larger and smaller preservations. However, the preserved areas are isolated in the landscape surrounded by agricultural land and thereby migration of animals and plants are impeded.

Special nature and outdoor recreation

There are many different nature types such as heath, commons, untouched broadleaved forest, grassing forest, meadows, bogs, lakes and salt meadows. There is a large variation in plant and animals and many rare and endangered species in the nature areas, e.g. butterflies and birds such as garganey and barn owl. The greatest attractions in the area are Mols Bjerge and Kalø castle ruin, but also the coasts on Djursland are visited by both swimmers and anglers.

Appendix A (*continued*).

Appendix B

10. Do you prefer Choice 1, Choice 2 or No national park?

(Mark one)

(The money have to be taken from your normal budget, and you will therefore have less money available for other things)

	Choice I	Choice II	No national park
Location of the national park	Thy	Mols Bjerge	
Nature preservation	Little extra effort	Some extra effort	
Extra initiatives for special plants and animals	Yes (Crane and red deer)	Yes Butterflies and barn owl	
Paths	No more paths	More paths	
Yearly extra income tax for your household	700 kr.	50 kr.	0 kr.
Choose only one of the possibilities	... . ☐	☐	☐

How certain were you of your choice?	*Very certain*	*Certain*	*Uncertain*	*Very uncertain*	*Don't know*
... .	☐	☐	☐	☐	☐

Appendix C

Estimated models with interaction effects between generic attributes and sites. Random parameter error component logit models. Simulations are based on 1000 Halton draws.

	Interaction with extra road and paths		Interaction effect with extra effort for specific plants and animals		Interaction effect with nature protection	
	Parameter	*t*-value	Parameter	*t*-value	Parameter	*t*-value
Variable						
ASC	2.094	9.42	2.093	8.93	2.286	9.44
Møn	0.416	2.14	0.248	1.16	0.253	1.18
Thy	0.174	0.88	0.367	1.77	0.330	1.43
Nordsjælland	−0.150	−0.67	−0.344	−1.45	−0.167	−0.63
Mols Bjerge	0.307	1.46	0.558	2.53	0.299	1.20
Lille Vildmose	0.846	4.58	0.542	2.72	0.872	3.96
Vadehavet	0.675	3.46	0.632	3.07	0.431	1.85
Nature protection	0.439	5.10	0.445	5.30	0.086	1.09
Extra effort for specific plants and animals	1.138	13.72	1.006	5.56	1.156	13.56
Extra road and path	0.133	0.75	0.174	1.89	0.137	1.51
Extra road and paths x..		0.00				
...Møn	−0.099	−0.41	0.281	1.02	0.063	0.57
...Thy	0.252	0.95	−0.235	−0.84	−0.021	−0.17
...Nordsjælland	0.109	0.40	0.446	1.57	0.033	0.27
...Mols Bjerge	0.209	0.80	−0.313	−1.10	0.058	0.49
...Lille Vildmose	0.001	0.00	0.605	2.29	−0.015	−0.13
...Vadehavet	−0.144	−0.58	0.060	0.21	0.142	1.25
Price	−0.002	−31.13	−0.002	−30.17	−0.002	−29.91
Standard deviations						
Møn	1.429	7.17	1.348	6.97	1.420	6.85
Thy	1.279	6.99	1.259	6.77	1.051	4.64
Nordsjælland	1.923	9.77	1.886	8.91	1.940	9.92
Mols Bjerge	1.558	7.74	1.503	7.14	1.593	7.63
Lille Vildmose	1.351	7.41	1.290	7.05	1.381	7.76
Vadehavet	1.607	9.13	1.445	7.57	1.605	8.88
Nature protection	0.680	4.50	0.645	4.09	0.316	5.36
Extra effort for specific plants and animals	0.762	6.09	0.727	5.12	0.823	7.03
Extra road and Path	0.778	5.08	0.754	4.77	0.836	5.92
Extra road and paths x..						
...Møn	0.373	0.50	0.285	0.36	0.351	1.89
...Thy	0.508	0.85	0.882	2.05	0.492	3.10
...Nordsjælland	0.758	1.37	1.077	2.64	0.150	0.40

Appendix C (*continued*)

	Interaction with extra road and paths		Interaction effect with extra effort for specific plants and animals		Interaction effect with nature protection	
	Parameter	*t*-value	Parameter	*t*-value	Parameter	*t*-value
Standard deviations						
...Mols Bjerge	0.478	0.82	0.975	2.45	0.231	1.02
...Lille Vildmose	1.011	2.62	1.200	3.56	0.186	0.69
...Vadehavet	0.754	1.50	1.472	4.59	0.290	1.32
Sigma*10	2.800	14.08	2.847	14.17	2.853	13.89
Number of observations/Pseudo R^2	4866	0.302	4866	0.305	4866	0.301
Log-likelihood/R^2 adjusted	3729	0.300	−3718	0.302	−3735	0.299
Restricted LL/X2	−5346	3233	−5346	3256.47	−5346	3221

Appendix D

Estimates for three orderings of the same choice sets. A random parameter error component logit model. WTP reported in DKK (1 € = 7,4 DKK) per household per year. Simulations are based on 1000 Halton draws. Confidence intervals were estimated by the Krinsky–Robb procedure (Krinsky and Robb 1986, 1990) with 10,000 replications.

	Version 1	Random			Version 2	Large first			Version 3	Small first		
	Parameter	*t*-value	WTP	Confidence interval for WTP	Parameter	*t*-value	WTP	Confidence interval for WTP	Parameter	*t*-value	WTP	Confidence interval for WTP
Variable												
ASC	1.773	5.06	887	(571–1202)	2.740	6.23	1631	(1152–2111)	1.718	5.01	604	(379–828)
Møn	0.248	0.98	124	(−124–372)	0.481	1.85	286	(−13–586)	0.305	1.08	107	(−86–301)
Thy	0.119	0.45	59	(−203–322)	0.002	0.01	1	(−313–315)	0.853	2.94	300	(99–500)
Nordsjælland	−0.407	−1.27	−203	(−521–114)	−0.236	−0.70	−141	(−540–259)	0.364	1.21	128	(−83–339)
Mols Bjerge	0.675	2.29	338	(48–627)	0.135	0.47	81	(−262–423)	0.422	1.38	148	(−66–363)
Lille Vildmose	0.909	3.91	455	(223–686)	0.749	3.07	446	(164–728)	0.841	3.02	296	(103–489)
Vadehavet	0.365	1.44	183	(−66–432)	0.684	2.84	407	(130–684)	0.862	2.64	303	(82–524)
Nature protection	0.372	2.46	186	(39–333)	0.500	3.65	298	(136–460)	0.467	2.78	164	(50–278)
Extra effort for specific plants and animals	1.197	8.76	599	(468–729)	0.973	7.56	580	(443–716)	1.202	6.75	422	(310–535)
Extra road and Path	0.239	1.54	119	(−33–272)	0.179	1.11	107	(−82–295)	0.112	0.65	39	(−81–160)
Price	−0.002	−17.99			−0.002	−18.86			−0.003	−15.46		
Standard deviations												
Møn	1.428	3.64			1.362	4.84			1.525	4.13		
Thy	1.496	5.17			1.074	3.50			1.107	2.87		
Nordsjælland	2.076	5.56			2.232	5.86			1.325	4.16		
Mols Bjerge	1.940	6.17			1.303	3.14			1.437	4.00		
Lille Vildmose	1.375	5.00			1.118	3.92			1.658	4.59		
Vadehavet	1.323	4.64			1.405	4.39			2.103	7.06		
Nature protection	0.552	1.66			0.438	1.20			0.946	3.97		
Extra effort for specific plants and animals	0.743	3.81			0.575	2.33			1.200	5.70		
Extra road and Path	0.905	4.62			0.652	2.32			1.051	3.51		
Sigma*10	2.638	8.17			3.051	6.973			2.609	7.24		
Number of obs.	1731				1568				1567			
Pseudo R^2	0.297				0.316				0.316			
Log-likelihood	−1337				−1179				−1177			
R^2 adjusted	0.293				0.311				0.316			
Restricted LL	−1902				−1723				−1722			
χ^2	1130				1087				1089			

References

Adamowicz, W., Boxall, P., Williams, M., Louviere, J., 1998. Stated preference approaches for measuring passive use values: choice experiments and contingent valuation. American Journal of Agricultural Economics 80, 64–75.

Alberini, A., Kanninen, B., Carson, R., 1997. Modeling response incentive effects in dichotomous choice valuation data. Land Economics 73 (3), 309–324.

Amigues, J.P., Boulatoff, C., Desaigues, B., Gauthier, C., Keith, J.E., 2002. The benefits and costs of riparian analysis habitat preservation: a willingness to accept/willingness to pay contingent valuation approach. Ecological Economics 43, 17–31.

Andersen, H.C., 1859. Jylland mellem tvende have (Jutland between two seas). Folkehøjskolens Sangbog. 1972, 15th edition. Foreningen for højskoler og landbrugsskoler, Odense, pp. 714–715.

Bateman, I.J., Day, B.H., Dupont, D., Georgiou, S., Louviere, J., Morimoto, S., Wang, P., 2004. Preference formation in choice experiments: task awareness and learning in the cognitive process. European Association of Environmental and Resource Economics, Thirteenth Annual Conference, Budapest, Hungary, June 25–28, 2004. 23 pp.

Bateman, I.J., Burgess, D., Hutchinson, W.G., Matthews, D.I., 2008. Learning design contingent valuation (LDCV): NOAA guidelines, preference learning and coherent arbitrariness. Journal of Environmental Economics and Management 55, 127–141.

Carlsson, F., Kataria, M., 2008. Assessing management options for weed control with demanders and non-demanders in a choice experiment. Land Economics 84 (4), 517–528.

Carlsson, F., Martinsson, P., 2001. Do hypothetical and actual marginal willingness to pay differ in choice experiments? Application to the valuation of the environment. Journal of Environmental Economics and Management 41, 179–192.

Carson, R.T., Mitchell, R.C., 1995. Sequencing and nesting in contingent valuation surveys. Journal of Environmental Economics and Management 28, 155–173.

Czajkowski, M., Hanley, N., 2009. Using Labels to Investigate Scope Effects in Stated Preference Methods. Environmental and Resource Economics 44, 521–535.

Dellaert, B.G., Brazell, J.D., Louviere, J.J., 1999. The effect of attribute variation on consumer choice consistency. Marketing Letters 10, 139–147.

Dziegielewska, D.A., Mendelsohn, R., 2007. Does "No" mean "No"? A protest methodology. Environmental and Resource Economics 38, 71–87.

European Commission, 2008. Environment fact sheet: Natura 2000. European Commision, 4pp. [http://ec.europa.eu/environment/nature/info/pubs/docs/nat2000/factsheet_en.pdf] Downloaded August 13 2009.
Ferrini, S., Scarpa, R., 2007. Designs with a priori information for nonmarket valuation with choice experiments: a Monte Carlo study. Journal of Environmental Economics and Management 53 (3), 342–363.
Flachaire, E., Hollard, G., 2007. Starting point bias and respondent uncertainty in dichotomous choice contingent valuation studies. Resource and Energy Economics 29, 183–194.
Friis, A., 1936. Danmarks Store Øer (Denmark's Large Islands), Volume 1. Gyldendal, Copenhagen. 358 pp.
Giraud, K.L., Loomis, J.B., Johnson, R.L., 1999. Internal and external scope in willingness-to-pay estimates for threatened and endangered wildlife. Journal of Environmental Management 56, 221–229.
Greene, W.H., Hensher, D.A., 2007. Heteroscedastic control for random coefficients and error components in mixed logit. Transportation Research part E: Logistics and Transportation Review 43 (5), 610–623.
Hailu, A., Adamowicz, W.L., Boxall, P.C., 2000. Complements, substitutes, budget constraints and valuation. Environmental and Resource Economics 16, 51–68.
Halstead, J.M., Luloff, A.E., Stevens, T.H., 1992. Protest bidders in contingent valuation. Northeastern Agricultural and Resource Economics 21, 160–169.
Hanley, H., Colombo, S., Kriström, B., Watson, F., 2009a. Accounting for negative, zero and positive willingness to pay for landscape change in a national park. Journal of Agricultural Economics 60 (1), 1–16.
Hanley, H., Ready, R., Colombo, S., Watson, F., Steward, M., Bergmann, E.A., 2009b. The impacts of knowledge of the past on preferences for future landscape changes. Journal of Environmental Management 90, 1404–1412.
Hasler, B., Jacobsen, J.B., Lundhede, T.H., Martinsen, L., Thorsen, B.J., 2007. Extending the scope of the scope test in choice experiment studies. Paper presented at the 15th Annual Conference of the European Association of Environmental and Resource Economists. Jume 27–30, Thessaloniki, Greece.
Hearne, R.R., Salinas, Z.S., 2003. The use of choice experiments in the analysis of tourist preferences for ecotourism development in Costa Rica. Journal of Environmental Management 65, 153–163.
Hensher, D.A., Rose, J.M., 2009. Simplifying choice through attribute preservation or non-attendance: implications for willingness to pay. Transportation Research Part E: Logistics and Transportation Review 45, 283–590.
Hensher, D.A., Rose, J.M., Greene, W.H., 2005. Applied Choice Analysis: A Primer. Cambridge University Press, Cambridge, UK.
Hoffmann, K., 1924. The Danish song, Folkehøjskolens Sangbog, 1972, 15th edition. Foreningen for højskoler og landbrugsskoler, Odense.
Holmes, T.P., Boyle, K.J., 2005. Dynamic learning and context-dependence in sequential, attribute-based, stated-preference valuation questions. Land Economics 81 (1), 114–126.
Jacobsen, J.B., Thorsen, B.J., Boiesen, J.H., Anthon, S., Tranberg, J., 2006. Værdisætning af syv mulige nationalparker i Danmark [Valuation of seven potential national parks in Denmark]. Arbejdsrapport 28, Skov og Landskab, KVL, Frederiksberg. 63 pp.
Jacobsen, J.B., Boiesen, J.H., Thorsen, B.J., Strange, N., 2008. Valuing biodiversity at habitat-level: quantitative measures vs. "iconised" species. Environmental and Resource Economics 39, 247–263.
Jacobsen, J.B., Lundhede, T.H., Thorsen, B.J., 2009. Are Economists Valuing Biodiversity at Gun-Point? Investigating Willingness To Pay for Increasing Wildlife Populations beyond Species Preservation. Unpubl. workingpaper. Available from authors.
Jakobsson, K.M., Dragun, A.K., 2001. The worth of a possum: valuing species with the contingent valuation method. Environmental and Resource Economics 19, 211–227.
Jensen, F.S., 2003. Friluftliv i 592 skove og andre naturområder. Skovbrugsserien nr. 32-2003 (Recreational Use of 592 Forests and Other Nature Areas). Skov and Landskab, Copenhagen, Denmark.
Johnson, F.R., Desvousges, W.H., 1997. Estimating stated preferences with rated-pair data: environmental, health, and employment effects of energy programs. Journal of Environmental Economics and Management 34 (1), 79–99.
Krinsky, I., Robb, A.L., 1986. On approximating the statistical properties of elasticities. Review of Economics and Statistics 68, 715–719.
Krinsky, I., Robb, A.L., 1990. On approximating the statistical properties of elasticities: a correction. Review of Economics and Statistics 72, 189–190.
Kriström, B., 1997. Spike models in contingent valuation. American Journal of Agricultural Economics 79, 1013–1023.
Kuhfeld, W.F., 2004. Marketing Research Methods in SAS. Experimental Design, Choice, Conjoint, and Graphical Techniques. SAS 9.1. Edition. TS-694. SAS Institute Inc., Cary, NC., USA, 782 pp.
Ladenburg, J., Olsen, S.B., 2008. Gender-specific starting point bias in choice experiments: evidence from an empirical study. Journal of Environmental Economics and Management 56, 275–285.
Larsen, F.W., Petersen, A.H., Strange, N., Lund, M.P., Rahbek, C., 2008. A quantitative analysis of biodiversity and the recreational value of potential national parks in Denmark. Environmental Management 41, 685–695.
Lehtonen, E., Kuuluvainen, J., Pouta, E., Rekola, M., Li, C.-Z., 2003. Non-market benefits of forest conservation in Southern Finland. Environmental Science and Policy 6, 195–204.
Li, C.-Z., Kuuluvainen, J., Puota, E., Rekola, M., Tahvonen, O., 2004. Using choice experiments to value the Natura 2000 Nature Conservation Programs in Finland. Environmental and Resource Economics 29, 361–374.
Loomis, J.B., Gonzalez-Caban, A., 1998. A willingness-to-pay function for protecting acres of spotted owl habitat from fire. Ecological Economics 25, 315–322.
Lundhede, T.H., Olsen, S.B., Jacobsen, J.B., Thorsen, B.J., 2009. Handling respondent uncertainty in choice experiments: evaluating recoding approaches against explicit modelling of uncertainty. Journal of Choice Modelling 2, 1–30.
McFadden, D., 1974. Conditional logit analysis of qualitative choice behaviour. In: Zarembka, P. (Ed.), Frontiers in Econometrics. Academic Press Inc, New York, pp. 105–142.
Nunes, P.A.L.D., 2002. The Contingent Valuation of Natural Parks: Assessing the Warm-glow Propensity Factor. Edward Elgar Publishing Ltd., Cheltenham.
Petersen, A.H., Larsen, F.W., Rahbek, C., Strange, N., Lund, M.P., 2005. Nature values of Danish National Parks. A quantitative analysis of biodiversity in potential Danish National Parks. Center for Makroøkologi, Københavns Universitet, Copenhagen. 137 pp.
Rolfe, J., Bennett, J., Louviere, J., 2000. Choice modelling and its potential application to tropical rainforest preservation. Ecological Economics 35, 289–302.
Savage, S.J., Waldman, D.M., 2008. Learning and fatigue during choice experiments: a comparison of online and mail survey modes. Journal of Applied Econometrics 23 (3), 351–371.
Scarpa, R., Rose, J.M., 2008. Design efficiency for non-market valuation with choice modelling: how to measure it, what to report and why. The Australian Journal of Agricultural and Resource Economics 52, 253–282.
Scarpa, R., Ferrini, S., Willis, K., 2005. Performance of error component models for status-quo effects in choice experiments. In: Scarpa, R., Alberini, A. (Eds.), Applications of Simulation Methods in Environmental and Resource Economics. : The Economics of Non-Market Goods and Resources, vol. 6. Springer, Dordrecht, The Netherlands, pp. 247–273.
Scarpa, R., Willis, K., Acutt, M., 2007. Valuing externalities from water supply: status quo, choice complexity, and individual random effects in panel kernel logit analysis of choice experiments. Journal of Environmental Planning and Management 50 (4), 449–466.
Scarpa, R., Thiene, M., Marangon, F., 2008. Using flexible taste distributions to value collective reputation for environmentally friendly production methods. Canadian Journal of Agricultural Economics 56 (2), 145–162.
Sievänen, T., Arnberger, A., Dehez, J., Jensen, F.S., 2009. Monitoring of forest recreation demand. In: Bell, S., Simpson, M., Tyrvainen, L., Sievänen, T., Pröbstl, U. (Eds.), European Forest Recreation and Tourism. A handbook. Taylor and Francis, London, pp. 105–133.
Strange, N., Jacobsen, J.B., Thorsen, B.J., Tarp, P., 2007. Value for money: protecting endangered species on Danish heath lands. Environmental Management 40, 761–774.
Swait, J., Adamowicz, W., 2001. The influence of task complexity on consumer choice: a latent class model of decision strategy switching. The Journal of Consumer Research 28 (1), 135–148.
Thomson, C.C., 2003. Danmarkshistorier: National Imagination and Novel in Late Twentieth-Century Denmark. PhD-thesis, University of Edinburgh, Scotland, 347 pp. [http://eprints.ucl.ac.uk/1940/1/Microsoft_Word_-_CC_Thomson_PhD_Edinburgh_2003_rtf.pdf]. Downloaded August 13, 2009.
Train, 2003. Discrete Choice Methods with Simulation. Cambride University Press, Cambridge. 334 pp.
Train, K., Sonnier, G., 2005. Mixed logit with bounded distributions of correlated partworths. In: Scarpa, R., Alberini, A. (Eds.), Applications of Simulation Methods in Environmental and Resource Economics. The Economics of Non-Market Goods and Resources 6. Springer, Dordrecht, The Netherlands, pp. 117–134.
von Haefen, R.H., Massey, D.M., Adamowicz, W.L., 2005. Serial nonparticipation in repeated discrete choice models. American Journal of Agricultural Economics 87 (4), 1061–1076.
Wilhjelm Committee, 2001. En rig natur i et rigt samfund (A Rich Nature in a Rich Society). The Wilhjelm Committee, Danish Forest and Nature Agency, Copenhagen. 121 pp.
Zandersen, M., Termansen, M., Jensen, F.S., 2007. Testing benefit transfer of forest recreation values over a twenty-year time horizon. Land Economics 83, 412–440.