



Distance decay and spatial preference heterogeneity

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Side event EAERE 2017

Spatial Dimensions of Stated Preferences

Athens 28.06.2017



Observation I:

Demand for spatially explicit results

- Ecosystem service value mapping
 - Demanded by policy-makers
 - And data driven – having access to spatial ecological data
- Most mapping exercises are not explicit about the mechanism generating the spatial value heterogeneity – using ad-hoc measures for allocating values (e.g. Schägner et al 2013, Paracchini et al 2014)



Observation I: Spatial heterogeneity

- Reminder: The main spatial factors determining the value
 - Spatial variability of the quality of the ecosystems (climate, soils, etc)
 - Distance (and infrastructure) between ecosystems and users/non-users
 - The spatial configuration of ecosystems (substitute and complementary ecosystems)
 - Spatial preference heterogeneity of users/non-user
- Mapping services: marginal values relevant for policy
 - Substitution and complementarity gets important



Observation II

Distance decay (users/non-users)

- Distance decay : Closer to a site evaluated => higher WTP of protecting or improving site
 - Confirmed in plenty of empirical studies
- It is argued that distance decay is stronger for users of a site than non-users (e.g. Bateman et al 2006) due to transport costs:
- Empirical evidence is less clear e.g.:
 - Jorgensen et al. (2013): stronger distance decay for non users (explanation: not accounting for future use)
 - Schaafsma et al. (2013) In some case users have less strong distance decay (explanation: not accounting for distance decay, endogeneity of users...)



Observations

Distance decay (users/non-users)

The typical model estimated

$$WTP = \alpha + \beta x + \gamma \text{ distance} + \delta \text{ user} + \theta \text{ user} * \text{ distance} + \varepsilon$$

Expected results

$\gamma < 0$, Distance decay for non-users (attachment, knowledge, option value[?])

$\delta > 0$: Higher WTP for users

$\theta < 0$: Higher distance decay for users due to transport costs

Users : access costs < use value

If preference heterogeneity in population=> share of users will decrease with distance

Ignoring the decision to be user induce estimation bias as decision to be user depends on *WTP*.

Is this a problem? – depend on the use of the data – if we want to measure changes in quality – yes it is a problem

Also the issue of self-selecting into questionnaire depending on distance (Bateman et al 2006)



We need to consider feedback

- Can the spatial heterogeneity of preferences or and use of non-market good and services be regarded as “given” when evaluating policy scenarios?
- a question of
 - General versus partial equilibrium (e.g. Kuminoff et al 2013)
 - Non-price equilibria for non-marketed goods (Phaneuf et al. 2009)
 - Sorting models (e.g. Klaiber and Phaneuf 2010)
 - So-called “Parsons effect” Bateman et al. 2006 cf. Parsons (1991)

“If people consider proximity to recreation sites in making decisions about where to live, they, in effect, are choosing the price they will face for visits to that site. Certainly, individuals that favor recreation will be inclined to reside closer to recreation sites than individuals that do not”

=> May influence estimation (need of instrumental variables)

=> Structural models for policy evaluation



Is feedback important ?

An example

- Do we have evidence of the *Parsons effect* ?
- Do individuals with strong preferences locate close to recreational sites?
- Is it an important issue empirically?

- Discrete choice experiment assessing preferences for forest structure and recreation facilities in Lorraine (Abildtrup et al 2013 ECO ECON)
- In the statistical design of choice experiment the distance is exogenous



Imperical test of sorting wrt. to preferences for forest recreation

Estimated individual-specific WTP for different characteristics and facilities.

Hypothesis :

Positive correlation between individual-specific WTP of forest characteristics and facilities and the access to forests with such characteristics and facilities

If yes, an indications of spatial sorting – should be accounted for estimation and welfare analyses

$$MWTP = a \cdot x + b \cdot access_z \cdot z + e$$

x: other control variable

z: forest attribute

access : number of forests within 10 km with attribute z present



Imperical test of sorting wrt. to preferences for forest recreation

Variable	Parameter	Standard error	P> z
Access _{broadleaf} *Broadleaf	47.5	89.5	0.5950
Access _{mixed} *Mixed tree species	84.6	67.3	0.2090
Access _{one_hike} *One hiking path	78.3	70.8	0.2690
Access _{more_hike} *More hiking path	101.1	119.6	0.3980
Access _{park_or_picnic} *Parking or picnic	57.7	85.5	0.5000
Access _{park_and_picnic} *Parking and picnic	402.8*	244.2	0.0990

$N=651$, $a=7$ (4557 observations)

R^2 within = 0.70, R^2 between = 0.04, R^2 overall = 0.67

Hausman test

$\chi(8) = 11.90$ (p=0.31)

Breusch and Pagan (test for random effects)

$\chi(1) = 15.39$ (p=0.0001)



Empirical test - discussion

- We did not find sorting according to preferences for forest recreation
- Even with strong preferences for outdoor (forest) recreation many other factors may influence where you choose to live.
- Need to test more directly



Preference for residential location

- Hypothetical choices of residential location in Grand Nancy 2013 (Tu et al. 2013 Landcape and Urban Planning)

A Discrete choice experiments in Grand Nancy 2013

- Face-to-face interviews
- Attributes:
 - Distance to forest
 - Distance to Urban park
 - Size of apartment
 - Price/rent



Preference for residential location

Imagine that, at the time you did choose your current residence, the following two other alternatives existed. Assuming that all other characteristics stay the same, only these five attributes vary. Which residence would you have chosen among the three options?"

Attributes	Current house	Alternative 1	Alternative 2
Distance to forest	Current distance	2 km further	Current distance
Distance to park	Current distance	500 m further	1000 m further
Scenic view of green spaces	Current view	No view	With view
Size of the house	Current size	10% more	10% more
Price/rent of the house	Current price/rent	15% less	5% less
I prefer (choose only one please!) →	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Results

Variable	WTP space	
	Estimates	Std. Err.
ASC	0.0745***	0.024
Distance to forest	0.009	0.012
Distance to park	-0.409***	0.097
View of greenspace	0.099***	0.023
Surface of housing	0.005**	0.002
Surface of housing*Surface of housing	-9.51e-06***	3.86e-06
Distance to forest *number of visits in forests	-0.018**	0.009
Distance to Park * Own private garden	0.143*	0.079
Distance to Park * Income	0.158***	0.041
Owner*ASC	0.114***	0.036
Owner*Distance to Park	0.329**	0.150
Owner*income*Distance to Park	-0.245***	0.069
Nb. of respondents = 180, Nb. of choice observations = 540		
McFadden's Pseudo R ² = 0.2586, log likelihood at convergence = -438.4082, Significance level: ***: 1%; **: 5%; *: 10%.		



Insights

- Access to recreational sites matters for location choice but depend on substitutes (e.g. private garden)
- Correlation between recreational activities and WTP to live close to forests



Conclusion: perspectives

- Model explicitly location choice when significant changes in access to amenities
- Sorting models – but complicated to estimate (instrumental variables) (see Klaiber and Phaneuf 2010)
- Potential pathway: use SP data (choice experiments) to identify effects of endogenous variables and combine with spatial data for simulations



Thank you for your attention

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