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Methodological and Ideological Options

Including Value Orientations in Choice Models to Estimate Benefits of Wildlife Management Policies

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ABSTRACT

Value orientations towards wildlife affect the way people perceive nature and their connection with animals. In particular, the social psychological literature within the environmental field suggests that there are two main orientations of people towards wildlife: mutualism and domination. This body of literature has shown how wildlife value orientations can serve as predictors of attitudes and behaviours towards wildlife and form the foundation of human-wildlife conflicts. A common approach in the non-market valuation literature is to include information on attitudes and values in the deterministic part of the utility function, leading to problems of endogeneity bias. To avoid this, analysts have recently shifted their attention to approaches based on latent variables. This paper presents an application of a latent variable and latent class model, to understand how latent orientations influence choices, in a case study in the Italian Alps. The intuition is that different underlying individual value orientation affects preferences and the level of willingness to pay and should be therefore considered in choice models. The latent variable is used to explain class membership of respondents. Results indicate that the latent variable has a significant effect in class allocation and that the hybrid model performs better than a simple two class model. Results provide guidance on the social acceptability of management interventions and can support public decision-makers in the modulation of wildlife management policies for balancing the needs of conservation and outdoor recreation, explicitly considering existing human-wildlife conflicts.

1. Introduction

Conservation of wildlife is of primary importance worldwide, due to the alarming rate of biodiversity loss affecting many natural areas. The population of several species has sharply decreased, mainly due to hunting and habitat depletion. Economic valuation of biodiversity with stated preference methods, within this framework, may be extremely beneficial to inform policy makers about people's attitudes and preferences towards management alternatives. It is well-recognised in the literature that, when making choices in the environmental field, people are led by several cognitive variables, such as attitudes, values and social norms. In particular, value orientations (VOs) seem to play an important role in the individual choice process. Wildlife VOs are defined as representing broad, cultural ideological believes, that orient and provide personal meaning to basic values related to wildlife (Teel and Manfredo, 2010). In the literature, it is possible to identify two main orientations towards wildlife (Manfredo, 2008): dominance and mutualism. People with a dominant orientation tend to think that wildlife should be managed for the benefits of mankind. On the other hand, a person with a mutualism orientation place humans and animals nearly on the same level; animals are seen as creatures deserving rights and care.

Choice experiments (CE) are typical examples of techniques aiming at studying how people make choices. Value orientations affect choices, which means that they should be therefore taken into account by the analyst in CE surveys. A common approach in the non-market valuation literature is to use information about attitudes and values, which are collected by means of Likert scales, in the deterministic part of the utility function. However, such indicators are likely correlated to other non-observed individual characteristics, thus leading to problems of endogeneity bias (Hess and Stathopoulos, 2013). For the cited reasons, latent variable methods are gaining popularity. Such methods acknowledge that what is observed is only answers to VO questions and not the real orientation. In this vision, a latent variable is included in

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the model, in order to explain simultaneously the behaviour of the respondent in the stated choice survey and in the value orientation questions. Value orientations are no longer in the deterministic part of the utility function but treated as dependent variables, estimated simultaneously to the choice model, thus eliminating problems connected with endogeneity.

In this paper, we apply the latent variable approach in a CE hybrid estimation for valuing tourists preferences for endangered species management. The main methodological contribution is to include specific value orientations as measures of individual attitudes in the set of structural equations. We expect that value orientations are linked to willingness to pay (WTP) and that they can be used to explain preference heterogeneity for wildlife conservation. Structural equations are modelled as ordered logit, while the choice model with a latent class model. The latent variable is used as explanatory variable for the value orientation and then enters the choice model in the class allocation function. We show how the inclusion of value orientations can improve WTP estimates, with relevant policy implications. The method is applied to a case study about wildlife management in the Italian Alps, the Province of Trento (Trentino). We consider three wildlife species, i.e. wolf, lynx and salamander, and we ask to a sample of local tourists whether they are willing to pay for an increase in their population. Wolves and lynx were naturally abundant in Trentino until the end of the 19th century. Later on, due to hunting and bad habitat conditions, their population decreased rapidly, bringing to their extinction. In recent years, the increased habitat quality provoked a natural return of some specimen from close areas, but their number is not enough to assure reproduction. At the same time, the case of salamander is interesting as well. In fact, a particular sub-species of Salamander, called salamander of Aurora, lives only in a limited area of Trentino and in a valley of a neighbouring region. Establishing a viable population for these species is a primary challenge for local decision-makers, in order to assure a long-lasting conservation, in this context the investigation of tourist preferences might help in designing more effective policies.

2. Value Orientation Theory

Human-wildlife relationships and interactions derive from the cognitive basis that forms human thought and behaviour towards wildlife (Teel and Manfredo, 2010). A cognitive hierarchy model has been developed to study the cognitive foundation of these relationships (Fulton et al., 1996; Manfredo, 2008; Teel and Manfredo, 2010; Whittaker et al., 2006). This theory is based on the value–attitude–behaviour model (Homer and Kahle, 1988), focusing on the fact that cognition exists on different linked levels of abstraction. The cognitive hierarchy model includes values at the base, then going higher in the hierarchy VOs, attitudes and norms, behavioural intentions and behaviours. Values are the most abstract cognitions in the human mind, they are few in numbers, slow to change, central to beliefs and transcend to situations. The values of a person are shaped in the early years of life and are strongly influenced by the sociological context. Going up through the cognitive hierarchy, cognitions become more numerous, quick to change, peripheral and specific to situations. Value orientations are networks of basic and core beliefs that serve as intermediary between values and attitude (Manfredo, 2008). They are reflective of the cultural ideology (Manfredo et al., 2009) and provide a contextual meaning for values within a given domain of interest such as wildlife (Teel and Manfredo, 2010). Since they are less abstract than values, VOs can better explain specific thoughts and behaviours. A first articulated classification of attitudes towards wildlife was proposed by Kellert (1980). In more recent years, the literature has suggested that people tend to show mainly two different and opposing VOs towards wildlife: mutualism and domination (Manfredo, 2008; Manfredo et al., 2009; Teel and Manfredo, 2010; Teel et al., 2010). A domination orientation stems from a utilitarian view of the relationship between humans and wildlife; it follows that wildlife should be managed for human benefit. Domination is one of the oldest VO showed by the humankind. A person with this VO tends to believe in the human mastery over the animals and is more prone to accept control measures resulting in death or harm to wildlife and more likely to engage in behaviours such as hunting and fishing. On the other hand, a person with a mutualism orientation tends to place humans and animals nearly on the same level; animals are seen as creatures with their own personalities and emotions. Such people recognize also that animals need care and have rights. A strong mutualism orientation render people less likely to accept control measures towards wildlife, as well as management options involving killing or hurting specimens but more likely to exhibit behaviours such as wildlife viewing and feeding. Mutualism is strongly related to the modernization, to the importance of wildlife's non-consumptive value and seems more consistent with a biocentric philosophy (Manfredo et al., 2016). The dualism mutualism-domination can be viewed in economic terms as utilitarian versus intrinsic views (Rolston, 1994; Rolston III, 1983). The dichotomy is usually seen as a continuum and the two different wildlife VOs often occurs in various levels. According to Teel and Manfredo (2010), gradients between these two main orientations can be found; in particular these authors suggest two other subclasses: distance and pluralism. The distant orientation includes people who do not care or who do not care very much about wildlife. On the other hand, pluralists do not show a particular orientation and their opinions on wildlife can be influenced by the contingent situation.

Several studies have demonstrated that wildlife VOs can serve as a predictor of attitudes towards wildlife (Hartel et al., 2015), wildlife management options (Kansky et al., 2016; Sponarski et al., 2015; Hermann et al., 2013; Jacobs et al., 2014), wildlife viewing (Manfredo et al., 2016; Teel et al., 2010) and towards hunting (Hrubes et al., 2001; Gamborg and Jensen, 2017) and fishing (Riepe and Arlinghaus, 2014). This body of research has shown that a specific behaviour towards wildlife can be explained by different VOs, and that VOs are at the basis of the conflicting attitudes for wildlife management actions, but none of these studies have used an economic approach. VOs can be linked to the economic theory of value as ideals affecting choices and actions. Steinhoff (1980) and subsequently Brown (1984) offered an interesting preference-related theory of value. They distinguish between *held values* and *assigned values*. A held value is the basis for preference about things, a 'conception of the preferable' (Brown 1984, p.232), a first order preference affecting second order preferences (i.e. choices and actions). Examples of held values provided by Brown are model of behaviour (e.g., bravery), end-states and qualities. In contrast, assigned values is the economic value of an object. Held values are values of the subjects and assigned values are of the objects. Within this framework, we can think about VOs as held values affecting WTP, i.e. economic values assigned to wildlife.

3. Brief Overview of Biodiversity in CE

Non-market valuation techniques, and CE in particular, have been extensively used in valuing biodiversity. Most of the available studies do not focus on the economic valuation of biodiversity but rather on a single species (Pearce, 2001). For example, Han et al. (2010) implemented a CE survey, for assessing tourists' perceived best management alternative for the conservation of the goral, in Woraksan National Park (South Korea). Similarly, Hanley et al. (2003) evaluate the benefits provided by wild geese. Delibes-Mateos et al. (2014) considered the quantity of partridges likely to be shot in game activities as an attribute, while another attribute was the possibility to have additional (not specified) species. CE applications, in which several species are included in the study as different attributes, are less common in the literature. Hanley et al. (2010) evaluate simultaneously the worth of two Scottish species, namely hen harries and golden eagle, estimating people's WTP for an increase in their populations. Di Minin et al. (2013), investigate people's WTP for conserving several endangered species in South Africa, including lions, leopards, rhinos and buffaloes.