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The impact of attitudes and behavioral costs on environmental behavior: A natural experiment on household waste recycling

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ABSTRACT

Numerous studies have shown the importance of incentives as well as of attitudes in explaining pro-environmental behavior. Reported attitude effects, however, are generally rather small and exhibit considerable variation among studies. Different theoretical perspectives can account for this finding: whereas theories of rational action suggest additive effects of costs and attitudes, the low-cost hypothesis and dual-process theories imply interaction effects – in different directions, resulting from different mechanisms. The present study tries to overcome the shortcomings of past research by using advanced statistical methods to test competitive hypotheses in the context of post-consumer waste recycling. We utilize data from a natural experiment on recycling participation in Cologne/Germany (n = 1882) in which the incentive structure for recycling changed due to the conversion of the recycling scheme from a drop-off system to curbside collection. In order to avoid self-selection bias, we conducted pre- and post-treatment surveys and applied conditional fixed-effects regression models. We found that curbside collection had a strong impact on recycling participation and attitudes had a moderate effect. The interaction is negative but statistically insignificant. Our findings contradict the low-cost hypothesis and provide some evidence that environmental concerns moderate the effect of the recycling scheme. We cannot, however, reject the rational choice proposition of mere additive effects.

Over the last few decades, numerous studies have come out investigating individual determinants of environmental behavior. This research has led to several stable findings, in particular that the existence of favorable behavioral opportunities and of an appropriate incentive structure is of great importance for environmentally sound behavior (see e.g. Dunlap and Scarce, 1991; Stern, 2000; Kollmuss and Agyeman, 2002; Diekmann and Preisendörfer, 2003). The link between attitudes and behavior (Liska, 1974; Ajzen and Fishbein, 1980; Weigel, 1983) is empirically well established, but research is less coherent regarding attitudes to modify environmental behavior. Although the impact of environmental concern is always positive, there is tremendous variation in the magnitudes of the correlations and in their statistical significance (see, e.g., the meta-analyses by Hines et al., 1986; Bamberg and Möser, 2007).

We seek to contribute to the state of research by presenting an empirical study of household waste recycling. Waste recycling is important from a policy perspective because it exhibits great potential for energy and resource conservation, and helps to protect the environment by reducing the amount of waste to be land-filled or incinerated.[1] From a sociological point

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[1] Notwithstanding the positive consequences of household waste recycling, some negative effects should be kept in mind: first, the processing of recyclables may lead to harm to workers at recycling centers or residents of villages where recycling centers are located (see e.g. Pellow, 2002). Second, from an environmentalist perspective, the reduction of waste and recyclables as well as the direct re-usage of materials is favorable to post-consumer recycling.

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of view, two types of approach can be distinguished: one focusing on macro-structural aspects, the other dealing with micro-sociological and decision-analytical theories, respectively. A macro-structural analysis would ideally study why, when, and how environmental protection schemes are implemented; in this stream of research, approaches such as ecological Marxism (see e.g. Schnaiberg and Gould (1994) and O'Connor (1996) for general arguments; Schnaiberg et al., 2001 provide an interesting study on recycling) and ecological modernization (Mol et al., 2009; Fisher and Freudenburg, 2001) have proved extremely helpful. From a decision-analytical perspective the implementation of policies designed to increase participation in recycling activities should be based on a detailed understanding of the determinants of environmental behavior. In this paper we start from given structural changes and provide a micro analysis that studies why and how changes in the structural context of opportunities influence individual behavior (and therefore lead to aggregate changes in the human–environment interaction). To enhance our understanding of environmental behavior and the effects of macro-structural changes, we test competing hypotheses on the joint effect of environmental attitudes and behavioral cost on behavior based on different decision theoretical models – variants of rational choice, dual-process theories and the low-cost hypothesis (see e.g. Opp, 1999; Chaiken and Trope, 1999; Diekmann and Preisendörfer, 2003). The latter two approaches lead to the presumption of an interaction between attitudes and behavioral cost. We therefore address two questions that are important from a decision theoretical point of view: to what extent is environmental behavior influenced by incentives and opportunity structures, and to what extent by attitudes? Further, how is the attitude–behavior link structured?

Although there have been several studies on recycling (e.g., Tonglet et al., 2004; Ando and Gosselin, 2005; Do Valle et al., 2005; Palatnik et al., 2005), only a few investigated the interplay of opportunity structures, behavioral cost, and attitudes in detail. Furthermore, the field experiments found in the literature attempted to identify the effects of changes in behavioral cost (i.e. a change in the collection scheme) by using a one-stage design without pre-treatment observation (see e.g. Derksen and Gartrell, 1993; Guagnano et al., 1995). Such a design, however, is prone to bias and does not allow a reliable estimation of treatment effects. In the present study, we overcome these methodological limitations by using data from a natural experiment on recycling participation: between 2006 and 2008, the household recycling scheme in Cologne, Germany was transformed from a drop-off scheme (containers at street corners) to a curbside pickup scheme (bins in the houses). Since the conversion was implemented stepwise, that is, one district after another, we were able to set up an experimental design with pre- and post-treatment surveys, and use conditional fixed-effects panel-regression models to compensate for unobserved heterogeneity. We are thus able to estimate the effect of changing behavioral opportunities even under the condition of a non-randomized experiment.

The paper is structured as follows: In the next section we discuss different decision theoretical approaches that may shed light on the aforementioned puzzle of high variability in attitude effects on environmental behavior (1). These approaches are used to derive testable, mutually exclusive hypotheses (2). We then give some background information on the setting of the field experiment and describe the experimental design (3). After a description of the data and methods used (4), we present the empirical results (5). Finally, we discuss our results with regard to the respective theoretical perspectives and outline some policy implications (6).

1. Theory and state of research

The central question of this paper is how institutional change – the implementation of a new recycling scheme – leads to changes in recycling rates. The following theoretical considerations can be subsumed under the broader class of structural individualist explanations (see Coleman, 1990; Udehn, 2002). Structural individualism explains macro phenomena with recourse to individual behavior and aggregation of individual actions (see especially Coleman, 1990, pp. 1–23). The analytical part of this paper focuses on micro-level decision theories and studies how the implementation of curbside recycling affects recycling participation. A thorough explanation of recycling behavior should consider cost-benefit aspects as well as attitudes. At least three theoretical perspectives try to integrate these concepts: a wider rational choice approach, the low-cost hypothesis, and dual-process theories or framing models. We chose these three approaches – in the form presented below – as they *commonly* address the integration of behavioral cost and attitude effects in some way, but substantially *differ* in the theoretical mechanism as well as in their empirical predictions. We are aware that there are other theoretical perspectives that may lead to similar predictions. However, it is not the aim of this paper to engage in debates about multiple theorizations, but rather to empirically test fundamentally competing hypotheses.

1.1. Rational choice

Rational action models and the subjective expected utility (SEU) theory explain human behavior as the result of a choice among alternatives. Rational choice proposes that an actor is subject to certain (societal and individual) constraints that restrict the alternatives an actor can choose from. Given these constraints, the individual evaluates the action alternatives with respect to subjectively expected consequences and the subjective probability of these consequences. He or she then chooses the alternative that optimally satisfies his or her preferences (see Fishburn, 1981; Opp, 1999, p. 173). These basic considerations leave wide scope for interpretation, extension and specification. Opp (1999) differentiates between 'wide' and 'narrow' varieties of rational choice. Narrow approaches conceptualize the actor as *homo oeconomicus*. Among other things