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Issue: *Ecological Economics Reviews***Pro-environmental behavior****Rational choice meets moral motivation**Rama Mohana R. Turaga,<sup>1</sup> Richard B. Howarth,<sup>2</sup> and Mark E. Borsuk<sup>1</sup><sup>1</sup>Thayer School of Engineering, Dartmouth College, Hanover, New Hampshire, USA. <sup>2</sup>Environmental Studies Program, Dartmouth College, Hanover, New Hampshire, USA

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The determinants of individual behaviors that provide shared environmental benefits are a longstanding theme in social science research. Alternative behavioral models yield markedly different predictions and policy recommendations. This paper reviews and compares the literatures from two disciplines that appear to be moving toward a degree of convergence. In social psychology, moral theories of pro-environmental behavior have focused on the influence of personal moral norms while recognizing that external factors, such as costs and incentives, ultimately limit the strength of the norm-behavior relationship. Rational choice models, such as the theory of planned behavior in social psychology and the theories of voluntary provision of public goods in economics, have sought to incorporate the effects of personal norms and to measure their importance in explaining behaviors, such as recycling and the demand for green products. This paper explores the relationship between these approaches and their implications for the theory and practice of ecological economics.

**Keywords:** pro-environmental behavior; moral motivation; value orientation; personal norms; norm-activation; environmental public goods

**Introduction**

In this era of serious and potentially catastrophic global environmental change, inducing pro-environmental behaviors (PEBs) in individuals, is one of the important challenges in the path to sustainability.<sup>1</sup> Accordingly, studying the determinants of PEB has long been a topic of interest for a broad spectrum of social science disciplines including economics, sociology, anthropology, and psychology. Jackson<sup>2</sup> discusses this literature as it relates to sustainable consumption. The philosophical and methodological foundations vary so much across disciplines that it is often difficult to find a common ground to develop an integrated understanding of behavior.

In the last few years, however, there has been a degree of convergence between two strands of the literature: theories of moral motivation in social psychology, and economic models of the voluntary provision of public goods. These two fields oper-

ate on different assumptions regarding the motivations for pro-social behavior. Increasingly, however, each has been recognizing the value of insights from the other. In addition, there has been a growing interest in incorporating moral norms into the rational choice models of social psychology. In this paper, we review some history and recent trends in both social psychology and economics to identify areas for further integration of rational choice models with the theories of moral motivation. Our focus is on individual behaviors and the role of personal moral norms in influencing those behaviors.

This set of issues is of considerable importance to ecological economics, which is concerned with understanding and managing the environmental impact of economic activities. Ecological economists have long viewed the *homo economicus* framework employed in standard microeconomics to be oversimplified and, in salient respects, unrealistic.<sup>3</sup> In addition, the field has emphasized the importance

of moral considerations in both understanding economic behavior and in the design of governance regimes that appropriately reflect prevailing social values.<sup>4–7</sup> Indeed, the study of PEB has emerged as a significant stream of the ecological economics literature.<sup>8–11</sup> Our goal here is to provide a synthetic review of the pertinent theoretical and empirical literature.

The paper is organized as follows. The next section reviews the social psychology literature on PEB. The section that follows reviews the economic models of the private provision of public goods as they relate to PEB. In the final section, we conclude by outlining the implications of the insights from our review for the theory and practice of ecological economics.

### **Moral theories of pro-environmental behavior in social psychology**

Environmental social psychology has developed a variety of theoretical approaches to study PEBs or conservation behaviors (see Ref. 12 for a review of these approaches). In this section, we will limit our attention to two of the most coherent, well-accepted, and empirically supported theories of moral motivation: norm-activation theory and value-belief-norms (VBN) theory. These theories are also the ones invoked most often in rational choice models of environmental economics and social psychology and are thus relevant to our purpose.

#### **Norm-activation theory**

In a series of articles, Shalom Schwartz<sup>13–15</sup> advanced a theory of moral decision making to explain individuals' altruistic behavior. This theory, known as the norm-activation theory, was originally applied to explain helping behavior. It has since been extended to altruistic pro-social behavior in general, including PEB.<sup>16,17</sup>

The fundamental proposition of the norm-activation theory is that the activation of personally held moral norms influences pro-social behavior. In the context of helping behavior, Schwartz<sup>13</sup> proposed two preconditions for the activation of personal norms:

1. the individual must be aware that her action has consequences for the welfare of others ("awareness of consequences" or AC), and

2. the individual must feel a personal responsibility to undertake that action ("ascription of responsibility" or AR).

However, according to this theory, the activation of personal norms is not a sufficient condition for pro-social behavior. The activated norms may yet be neutralized, either because the individual denies the consequences of her actions on others or denies the responsibility to take action.

In one of the more detailed explanations of norm-activation theory, Schwartz<sup>15</sup> outlined the sequence of cognitive steps involved in the moral decision-making process of an individual. The first step is the activation step, followed by obligation, defense, and response. The activation step begins with the awareness that there is a state of need and that there are actions that could address that need. The activation step is complete when the individual believes that he has the ability to relieve the need and ascribes some responsibility to himself to take action. This process generates feelings of moral obligation due to the activation of personally held moral norms.

In Schwartz's theory,<sup>15</sup> personal moral norms are constructed in specific action situations and reflect the expectations that people hold for themselves. Schwartz recognizes that these self-expectations are derived from socially shared norms: "individual expectations arise or are learned from shared expectations in social interaction, and they are modified in the singular interaction history of each person" (p. 353).<sup>14</sup> Violation of a personal norm results in guilt, self-deprecation, or loss of self-esteem while conformity results in pride, enhanced self-esteem, or security.<sup>14</sup> In this sense, conformance with norms is a positive source of personal utility. In any given situation, personal moral norms are constructed by reference to previously internalized general norms and values, which are more stable and do not depend on specific situations. Schwartz<sup>15</sup> suggests that, because people differ in the relative importance they attach to particular values and general norms, the activation of personal norms would generate different intensities of moral obligation in different people in the same action situation. That is, the more important the norms and values relevant to a specific action are to the individual, the stronger is the feeling of moral obligation to act.

The feelings of moral obligation need not necessarily translate into an altruistic action, however. According to Schwartz,<sup>15</sup> taking an altruistic action involves social, physical, and psychological costs to the individual. However, violating the activated personal norms by not taking the action involves moral costs in terms of guilt, self-deprecation, and loss of self-esteem. In the defense step, if the costs of performing the action are as high as (or more than) the costs of violating the activated personal norms, the individual would attempt to reassess and re-define the situation in order to neutralize the activated norms and avoid taking action. This increases utility by reducing cognitive dissonance. Norm neutralization could occur primarily through either (i) denial of the state of need of the other person or (ii) denial of the individual's responsibility to respond to the need. If the generated feelings of moral obligation, however, are intense enough to outweigh the nonmoral costs of action, norm-activation leads to altruistic action.

Schwartz presented empirical support for his theory from a variety of settings, including volunteering to donate bone marrow,<sup>13,14</sup> volunteering time to campaign for increased welfare payments,<sup>18</sup> and volunteering time to read to blind children.<sup>19</sup>

### Norm-activation theory and PEB

In the 1970s, as the adverse consequences of environmental degradation to humans became increasingly apparent, environmentally responsible behavior was viewed as a form of altruistic behavior.<sup>20</sup> For example, Van Liere and Dunlap hypothesized that "to the extent that concern for the well-being of other humans is aroused, we would expect traditional moral norms which regulate interpersonal behavior to influence environmental behaviors as well" (p. 175).<sup>16</sup> Based on this argument, norm-activation theory was extensively applied to explain a variety of PEBs.

The empirical research on the application of norm-activation to PEBs has studied two types of behaviors. The first type is household behaviors, such as littering,<sup>20</sup> yard-burning,<sup>16</sup> buying lead-free gasoline,<sup>21</sup> household energy conservation,<sup>17</sup> and recycling.<sup>22</sup> The second type of behavior is support for environmental protection, such as signing a petition for tougher environmental regulations<sup>23,24</sup> and

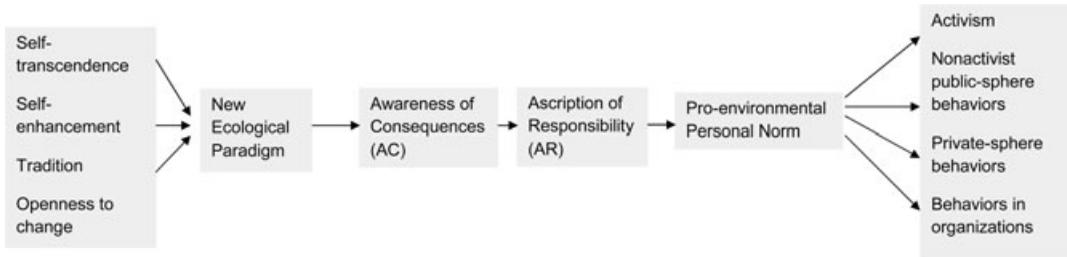
willingness to pay (WTP) extra taxes for environmental protection.<sup>25</sup>

The initial set of empirical studies tests whether the norm-activation theory is applicable in the context of PEBs. These studies generally find that, as predicted by the norm-activation theory, people with high AC of their actions and who demonstrate some AR to themselves for those consequences are more likely to engage in PEBs. However, our review of the frequently cited empirical studies of norm-activation theory reveals that few studies test the model in a comprehensive manner. For example, some studies do not measure the personal norms and thus implicitly assume that the relationship between AC and AR and behavior is due to the activation of personal norms relevant to the behavior under study.<sup>16,20</sup>

A few studies<sup>20</sup> use only zero-order correlations of AR and AC with behavior, and some studies do not consider the interaction between AC and AR in activating the personal norms.<sup>17</sup> This is in contrast to Schwartz's<sup>13</sup> formulation of the theory, which suggests that if people hold personal norms relevant to the behavior under study, those norms influence behavior only if both the AC and AR are high. Finally, some studies consider only one of AC or AR in testing the relationship between personal norms and behavior (e.g., Hopper and Nielsen,<sup>22</sup> who tested only the variation in only AC in influencing the relationship between personal norms and recycling behavior). Overall, in spite of these limitations in methodologies, the applicability of norm-activation theory to PEBs appears to be well-accepted.

### Value-belief-norms theory

In his explanation of the construction of personal norms in an action situation, Schwartz<sup>15</sup> suggested that norms are constructed by reference to a stable set of underlying values relevant to the action. The norm-activation literature on pro-environmental action assumes altruism or concern toward other human beings as the value orientation that is relevant for norm construction in the context of environmental behavior. In the early 1990s, however, Stern *et al.*<sup>26</sup> argued that in addition to the personal norms based on altruistic values toward other human beings (which they call "social-altruistic" value orientation), norms based on self-interest ("egoistic" value orientation) and altruism toward other



**Figure 1.** Variables and their causal ordering in VBN theory (adapted from Stern *et al.*, 1999<sup>28</sup>).

nonhuman species (“biospheric” value orientation) also guide individuals’ pro-environmental action. In addition, they hypothesized that egoistic and biospheric personal norms are activated in the same way that altruistic personal norms are activated within norm-activation theory.<sup>27</sup>

Stern *et al.*<sup>28</sup> further developed this idea of the three value orientations guiding environmental action and proposed a more comprehensive VBN theory. First, the VBN theory generalizes the norm-activation theory to incorporate, in addition to the altruistic values, the egoistic and biospheric value orientations into personal norms. In this formulation, people’s personal norms are activated when they believe that environmental conditions have consequences (AC) to the “attitude objects” they value and that they can take action (AR) to reduce those consequences to the valued objects.<sup>29</sup> The attitude objects are self, other human beings, and non-human species,<sup>29</sup> corresponding to egoistic, social-altruistic, and biospheric orientations, respectively.

Second, the VBN theory hypothesizes that the AC and AR beliefs are shaped by general beliefs about human–environment interactions, such as the New Environmental Paradigm (NEP) perspective of Dunlap and Van Liere,<sup>30</sup> and a more stable set of basic human values, such as self-transcendence, self-enhancement, and tradition.<sup>31</sup> Figure 1 shows the variables and their hypothesized causal ordering in VBN theory. The causal ordering is based on previous empirical work on PEB in social psychology.<sup>a,32</sup> To summarize, the hypothesized causal chain in the VBN theory “moves from relatively stable, central elements of personality and belief

structure to more focused beliefs about human environment relations, the threats they pose to valued objects, and the responsibility for action, finally activating a sense of moral obligation that creates a predisposition to act” (p. 85).<sup>28</sup>

### Empirical literature on values, beliefs, norms, and behavior

In general, the empirical social psychology literature distinguishes among four types of PEBs<sup>b,33</sup> (i) environmental activism, such as active involvement in environmental organizations and demonstrations, (ii) nonactivist behaviors in the public sphere, which include “environmental citizenship” behaviors, such as petitioning on environmental issues and supporting policies that protect the environment, (iii) private-sphere environmentalism (e.g., green consumerism), and (iv) other environmentally significant behaviors including individual behavior in organizations. Much of the empirical research on VBN focuses on environmental citizenship (see, e.g., the Steg *et al.*<sup>34</sup> study in which the PEB is the acceptability of policies to reduce household carbon emissions) and consumer behaviors (e.g., Nordlund and Garvill,<sup>35</sup> who study willingness to reduce personal car use).

The substantial empirical literature supports many of the individual hypothesized relationships among the variables in the VBN theory although only a few studies test the full set of causal relationships.<sup>28,34</sup> The early literature tested both the direct influence of the basic human value types of Schwartz<sup>31</sup> on PEBs and the indirect influence of values through specific beliefs about the consequences

<sup>a</sup>It is important to note that, according to the theory, each variable may have a direct effect on variables more than one level downstream.

<sup>b</sup>Some studies challenge the idea of distinct environmental behaviors and propose a single, general measure of ecological behavior: the General Ecological Behavior scale.<sup>82,83</sup>

of environmental problems. The general finding with regard to direct influence of values is that self-transcendent (biospheric and altruistic) value types are positively related to PEBs and self-enhancement (egoistic) value types are negatively related.<sup>29,36–38</sup> Specific beliefs about adverse consequences of environmental problems (AC) have a positive influence on PEBs. This relationship appears to be especially strong when the beliefs are about consequences to self and biosphere.<sup>26,29,39</sup>

A few studies include attitudes measured by the NEP scale to test their influence on PEBs. The NEP scale<sup>30</sup> was originally proposed as a 12-item scale that measured an “ecological” worldview, which includes concepts, such as nature’s delicate balance and the ability of humans to upset that balance, limits to the growth of human societies, and the rejection of humans’ right to rule over nature.<sup>40</sup> The scale was later extended to 15 items by adding two other dimensions: rejection of human exemptionalism (which reflects the idea that humans are exempt from the constraints placed by nature) and the possibility of an ecocrisis.<sup>40</sup>

Consistent with VBN theory’s specification, there is empirical evidence that basic values shape NEP attitudes; specifically, altruistic-biospheric values are positively related to NEP attitudes while egoistic and traditional values have a negative relationship with NEP.<sup>41,42</sup> In general, the NEP attitudes also predict PEBs; stronger attitudes are associated with greater tendency to engage in pro-environmental action.<sup>41,43</sup>

Although the role of personal norms is one of the central themes of VBN theory, many fewer studies measure personal norms and test their relationship with behaviors. Following the conceptualization of norm-activation theory,<sup>15</sup> personal norms are typically measured as feelings of moral obligation to undertake a pro-environmental action. The handful of studies that test the relationship find a strong positive influence of personal norms on behavior.<sup>28,34,38</sup> In fact, the empirical analysis of Stern *et al.*<sup>28</sup> shows that personal norm is the only statistically significant variable, among the full set of causal variables hypothesized to influence behaviors, in predicting all three types of behaviors they studied: consumer behavior, willingness to sacrifice, and environmental citizenship.

While much of the evidence to date supports the relationships articulated in VBN theory, one recent

study has found that some of the theoretical relationships might not be well-specified. Kaiser *et al.*<sup>44</sup> employed confirmatory structural equation modeling to assess the overall fit of the VBN model to data on a general measure of ecological behavior and found an acceptable overall fit. However, large discrepancies in modeling the correlations between variables as well as a poor fit to the more theoretically substantial part of the model led them to conclude that VBN theory is underspecified. In particular, the authors found the influence of NEP worldview on AR, personal norms, and conservation behavior to be “insufficiently covered” (p. 2166).<sup>44</sup>

### Limits of moral norm-activation

An interesting finding from the literature is that the explanatory power of values, beliefs, and norms—sometimes collectively termed “internal processes”<sup>45</sup>—appears to be a function of the type of behavior. The models that test environmental citizenship behaviors have a stronger explanatory power than models of consumer behavior.<sup>28,41,43</sup> This difference may partly reflect the influence of “external factors”<sup>17,45</sup> that place limits on personal norm-behavior relationship. For example, it is perhaps less costly to sign a petition to support an environmental cause than it is to pay a price premium on a green product, and thus, activated personal norms are less constrained in the former case.

The importance of external factors in limiting the norm-behavior relationship has long been recognized in the social psychology literature of pro-environmental action. One of the earlier papers<sup>17</sup> studies the influence of both the internal processes and external variables (e.g., costs of performing action and demographic variables) in the context of household energy conservation. They find that the predictive power of norms was stronger for inexpensive and easier behaviors, such as changing temperature settings, than for actions involving major investments in energy efficiency; the expensive investments are strongly influenced by explicit judgments of costs and benefit.

Further evidence for the influence of external factors comes from a natural experiment on curbside recycling.<sup>45</sup> These authors propose an A-B-C model of behavior according to which behavior (B) is determined by the interaction between attitudes (A) and external conditions (C). One implication of this

formulation is that attitudes do not explain behavior at the extremes of external conditions. The empirical analysis shows that AR predicts recycling behavior only for households without curbside bins; it had no effect on behavior for those households with bins because it was convenient for everyone to recycle irrespective of whether or not their personal norms are activated.

In summary, the moral theories in social psychology literature emphasize the role of moral norms and beliefs about environmental conditions and personal responsibility in predicting PEB. The research, however, recognizes the limits placed by external and contextual factors on the norm-behavior relationship. These types of actual or perceived limits on behavior are a central element of the theory of planned behavior.

### Theory of planned behavior

Another social psychological theory used to explain PEB is the theory of planned behavior (TPB). In contrast to the emphasis on moral considerations in norm-activation models, TPB adopts a rational decision-making framework. A central concept in TPB is the individual's *behavioral intention*, an attribute assumed to capture the motivational factors that influence behavior and hence assumed to be the immediate antecedent to actual behavior. In general, the stronger the intention to perform a behavior, the stronger the likelihood of actually performing that behavior. However, according to TPB, the element of *perceived behavioral control* (PBC) interacts with the relationship between behavioral intention and actual behavior. PBC represents the individual's perception of the ease or difficulty with which the

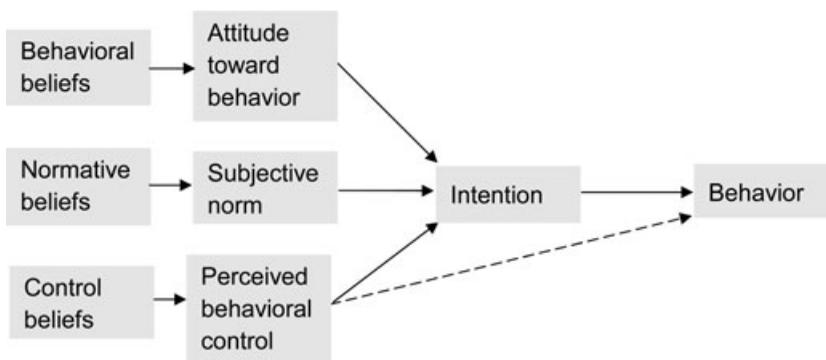
individual can perform a behavior. While some behaviors might be under the volitional control of the individual, the performance of many other behaviors is constrained by the resources and opportunities available.<sup>46</sup>

In TPB, PBC is also believed to positively affect the behavioral intention along with two other factors: attitude toward the behavior and subjective (social) norms related to the behavior (Fig. 2). In general, the more favorable are the individual's attitudes and subjective norms toward the behavior, the stronger is the behavioral intention.

### Role of beliefs within TPB

The three factors hypothesized to predict behavioral intention—attitudes, subjective norms, and PBC—are in turn postulated to be influenced by three corresponding beliefs: *behavioral beliefs*, *normative beliefs*, and *control beliefs*.<sup>46</sup> In this framework, each behavioral belief has an outcome or an attribute associated with the performance of a behavior. Further, the individual places a subjective value or weight on the outcome that would result from each belief. The attitude toward a behavior then is assumed to be proportional to the weighted sum of all the outcomes.

According to TPB, “normative beliefs are concerned with the likelihood that important referent individuals or groups approve or disapprove of performing a given behavior” (p 195).<sup>46</sup> The strength of each normative belief is weighted by the individual's motivation to comply with the referent in question (e.g., family, neighbors), and the weighted sum of the beliefs represents the subjective norm. Finally, control beliefs shape the actor's perception



**Figure 2.** Relationships among variables in the theory of planned behavior (adapted from Ajzen, 1991<sup>46</sup>).

of resources and opportunities available to perform the behavior. Like the other two factors, PBC is assumed to be a sum of the strength of control beliefs weighted by the power the actor perceives for each control belief.

### TPB, moral norms, and PEB

TPB has been extensively used to explain and predict behaviors in a variety of domains (see Refs. 46 and 47 for an overview). With respect to PEB, TPB has been used to explain behaviors, such as waste recycling, water conservation, and green consumerism (see Ref. 48 for a review in the environmental domain). In recent years, there has been a growing interest in environmental social psychology to incorporate personal moral norms within the rational framework of TPB.<sup>49–51</sup> This interest partly reflects the growing acceptance of moral norm activation models within social psychology.

Efforts to incorporate moral norms into the TPB can be broadly classified into three types. In the first, moral norms are assumed to be a fourth and independent factor influencing behavioral intention.<sup>52</sup> The empirical evidence for this type of specification is mixed. Studying four types of environmentally relevant behaviors, Harland *et al.*<sup>49</sup> found that adding moral norms to the three usual TPB variables significantly increased the explanatory power of their behavioral models. However, in a study predicting environmental behavior according to a 65-item General Ecological Behavior scale, Kaiser and Gutscher<sup>53</sup> found that moral norms do not add significant explanatory power to TPB. Finally, in studying public transportation use among university students, Heath and Gifford<sup>50</sup> found that moral norms significantly affected behavioral intention before the introduction of a “reduced fare” program (U-Pass) but not after introduction of the program.<sup>50</sup>

In the second type of effort to incorporate moral norms into TPB, moral norms are assumed to act indirectly through attitudes toward behavior rather than having a direct effect on behavioral intentions.<sup>51</sup> Limited empirical evidence provides support for this hypothesis. Kaiser *et al.*<sup>44</sup> tested both hypotheses—moral norms as antecedents to behavior and moral norms as antecedents to attitudes toward behavior—in the context of conservation behavior and found that the latter hypothesis adds more to the explanatory power of the TPB model. In

another study, Kaiser<sup>51</sup> found a strong correlation between moral norms and attitude toward conservation behavior and suggested that the two concepts lack discriminant validity. Then the author tested two different models of TPB: moral norms as antecedents to attitudes and moral norms as substitutes to attitudes. They found that both models are empirically equally valid, supporting their claim that moral norms and attitudes are not conceptually different. Much more research is needed, however, to robustly establish that moral norms are simply antecedents to attitudes.

A third type of effort attempts to combine TPB and VBN theory into a single framework. In a meta-analysis of 46 studies, this approach found that personal moral norms explain a significant (52%) amount of the variation in PEB intentions.<sup>54</sup> However, another study combining TPB, VBN, and the theory of interpersonal behavior found that personal moral norms have no influence on behavior after controlling for intention.<sup>55</sup> Yet, a third study used step-wise regression to find that variables representing the personal moral norms of VBN theory and PBC of TPB were the only two variables significant in predicting PEB.<sup>56</sup>

Clearly, many recent studies have attempted to incorporate moral norms into the rational framework of TPB, and the empirical research largely supports the idea that moral norms play an important role in PEB. However, at this stage, there appears to be little agreement on the exact formulation of the role of moral norms within the TPB framework, and many of the models seem to be rather ad hoc. Economic models, the subject of the next section, appear to have a more established rational basis for inclusion of moral norms.

### Economic models of PEB

In economics, pro-social behaviors, such as PEB, are typically modeled as the private provision of public goods.<sup>57</sup> The standard assumption in economic models is that individuals act to maximize individual utility in conformance with the *homo economicus* model. This is often interpreted as meaning that behaviors are driven strictly by egoistic motivations. The implication of this assumption for public goods, such as environmental quality, is that the incentive for free riding leads to the sub-optimal provision of public goods.<sup>58</sup> This prediction, however, is at odds

with empirical data on voluntary contributions to charities and a variety of other public goods, such as the Red Cross and public broadcasting.<sup>59,60</sup>

In order to account for this discrepancy between theoretical predictions and empirical observations, economists have extended the standard models to incorporate “impure altruism” as a motivation that drives the private provision of public goods. In these models, some individuals derive a “warm glow” benefit from their own contribution to the public good, in addition to the benefits from the provision of the collective public good.<sup>60</sup> Thus, individuals with a taste for this warm glow will contribute to the public good, albeit for egoistic reasons. Much of the literature that followed Andreoni<sup>60</sup> attempted to identify, within the self-interest framework, sources of the private benefits of voluntary action and reasons for different tastes across individuals. Hypothesized sources have included “prestige”<sup>61</sup> and “social approval.”<sup>62,63</sup>

### Integration of moral motivation and utility maximization

In recent work in behavioral economics, Brekke *et al.*<sup>64</sup> propose a theoretical framework that, although in some ways similar to the impure altruism models, suggests that the utility from the act of giving is motivated by moral reasoning rather than pure self-interest. In this model, individuals derive benefit from maintaining a *self-image* as a socially responsible person. The self-image is determined by comparing one’s voluntary effort to the individual’s view of “morally ideal” effort; self-image increases as the actual effort moves closer to the morally ideal effort.

According to Brekke *et al.*,<sup>64</sup> morally ideal effort for an individual is that effort that would maximize social welfare if everyone else in society contributed the same effort to the public good. This formulation is linked to the Golden Rule in the Judeo-Christian tradition and to generalizability principles, such as Kant’s categorical imperative. This model, however, recognizes that a person’s willingness to act on moral motives is determined by the tradeoffs between the benefits of maintaining the self-image and the costs of contributing to that effort. This type of behavioral model explains the apparent contradiction between the predictions of impure altruism models and the empirical evidence that economic incentives some-

times decrease voluntary contributions to the public good.

Building on Brekke *et al.*,<sup>64</sup> Nyborg *et al.*<sup>65</sup> applied the insights from the moral norm-activation model of Schwartz<sup>13</sup> to individuals’ decision to buy green products. In this model, self-image is a function of the collective external benefits of contributing to the public good and the extent to which buying green products is perceived as an individual responsibility. Perception of responsibility is not based on social sanctions but on internalized moral norms, such as fairness and reciprocity. This model predicts multiple equilibria: either everyone or no one buy green products. The model also employs methods from evolutionary game theory to analyze the dynamics of green product adoption. The policy implication of this model is that advertising campaigns or other modes of information provision could increase the adoption of green products if they are targeted to strengthen the beliefs about green products’ environmental benefit and the share of others purchasing green products. An empirical application of this model to green electricity programs in Sweden supports the hypothesis that the perceived responsibility and perceived external benefits of buying green electricity influences the individuals’ decision to buy green electricity.<sup>66</sup> More empirical analyses are needed to test this theory.

### Differing values and attitudes as sources of heterogeneity across individuals

In the past few years, theoretical and empirical literature in environmental economics has been increasingly recognizing the role of non-egoistic motivations in people’s environmental behavior. In particular, these studies incorporate differences in values and attitudes toward the environment as factors that explain heterogeneity in PEBs. One such study, focused on environmentally beneficial agricultural practices, modeled individuals as either selfish hedonists, egoistic hedonists, altruists, or imperfect altruists, based on individual characteristics, values, beliefs, and attitudes.<sup>67</sup> Selfish hedonists derive utility only from profits; egoistic hedonists care about both profits and the warm glow benefits of a contribution to the public good; altruists’ utility is derived from profits and the aggregate quantity of public good; finally, imperfect altruists derive

utility from profits, their own contribution, and the aggregate quantity of the public good.

The theoretical model of Weaver<sup>67</sup> makes predictions regarding the “environmental effort,” or contribution to the public good, under different motivational assumptions. Empirical results from Pennsylvania support the prediction that selfish hedonists (the typical actor in standard economic models) will respond only to factors related to profits while other individuals are willing to forego profits to contribute to the public good.

An empirical analysis of individuals’ spending on a solar energy program in Switzerland provided evidence for both warm glow effects and altruistic motivations while purely egoistic motivations did not influence spending on solar energy.<sup>68</sup> In this study, individuals are assumed to obtain warm glow benefits if they are willing to spend on buying solar energy, irrespective of the impact of their action on improving the environment. Altruistic individuals are assumed to participate in solar energy program because of the belief that their action improves the environment.

Kahn<sup>69</sup> analyzes the differences between “greens” and “browns”<sup>c</sup> on a variety of consumer behaviors, including gasoline consumption, use of SUVs, commuting choices (such as using public transit and walking), and demand for hybrid vehicles, and finds strong evidence for the hypothesis that greens are more likely to engage in environmentally responsible consumer behaviors than browns. Kotchen and Moore<sup>70</sup> classify households as conservationists and nonconservationists, assuming that only conservationists satisfy the norm-activation model of Schwartz.<sup>13</sup> This model<sup>70</sup> predicts that, based on standard utility maximization, the conservationists should exhibit “voluntary constraint” (consume less conventional electricity than the nonconservationists) because of the guilt associated with conventional electricity consumption. Nonconservationists, on the other hand, should reduce their consumption of green electricity to compensate for its additional costs. An empirical study, utilizing data on electricity consumption before and after the introduction of green energy pro-

gram in Michigan, supports these theoretical predictions. Conservationists, defined as those with a membership in an environmental organization, consume 9% less conventional electricity than non-conservationists on average.

Chouinard *et al.*<sup>71</sup> assume that individuals have two discrete utility functions—one representing preferences over only personal interest (ego-utility) and the other based on moral and social interests (s-utility). The individuals with preferences over both forms of utility do not maximize either component but choose a compromise quantity, depending on which of the two preferences is stronger. The model assumes that “the choice mechanism searches for some sort of ‘best’ choice, but it is explicitly not required to generate a complete and transitive preference ordering” (p. 74).<sup>71</sup> A WTP study for adoption of conservation practices in a sample of farmers shows evidence for behaviors that place stewardship over self-interest; some farmers are willing to forego some profits to adopt conservation practices.

Kotchen and Moore<sup>72</sup> investigate variables that influence individual decisions to participate in a green electricity program. This study considers three different participation mechanisms: a voluntary contribution mechanism (VCM), a flexible green tariff mechanism (GTM), and an all-or-nothing GTM and examines (i) how different variables affect the participation in different mechanisms and (ii) whether the provision of environmental public good differs depending on the choice of mechanism. VCM involves contributions to fund green electricity generation while GTM involves buying green electricity at a price premium. The theoretical model in this study utilizes a standard individual utility maximization framework in which preference heterogeneity is characterized by a set of “taste” parameters. The model predicts that participation depends on income and heterogeneous “tastes” while the size of green tariff under GTM affects the relative provision of the amount of environmental public good across different mechanisms.

In their empirical study, Kotchen and Moore<sup>72</sup> model heterogeneity in “tastes”<sup>d</sup> as differences in altruistic attitudes and the concern for environment

<sup>c</sup>Kahn<sup>69</sup> used percent share of green party voters in California census tracts as a proxy for the difference between greens and browns.

<sup>d</sup>Theoretically, the heterogeneity in tastes can be potentially modeled in other ways—for example, differences in the desire for prestige or social approval.

(measured by the NEP scale). The empirical study found that, in addition to household income, both of these attitudes are strongly and positively related to participation. Interestingly, although stronger altruistic and environmental attitudes are associated with the higher likelihood of participation, only income affects the size of contribution to the environmental public good.

A related study combines economic and social psychological theories to test the factors influencing participation in a solar energy program in Michigan.<sup>57</sup> Consistent with the authors' expectations, both the psychological variables and the economic variables affect participation. Stronger altruistic attitudes and environmental attitudes (NEP attitudes), along with higher income, strongly influence participation. In addition, the rank-ordering of various motives for participation in green electricity program reveals that biocentric motive is more important than social altruism or egoism.

Finally, another new study combines, in an economic theoretical framework, economic factors with social and moral norms to examine their influence on the self-reported recycling behaviors among Norwegian residents.<sup>73</sup> Opportunity cost of time to recycle is the economic variable assumed to affect recycling behavior. The paper concludes that: "Even though the largest effects on household recycling efforts comes from money incentives and the number of fractions collected by the municipalities, several of the norm-based incentives contribute significantly to Norwegian household recycling efforts" (p. 512).<sup>73</sup>

### WTP for environmental public goods

Stated willingness to contribute to environmental improvements or to pay higher taxes is often used as an indicator of PEB in the social psychology literature.<sup>37,41</sup> In environmental economics, stated preference methods such as contingent valuation (CV) elicit WTP to estimate nonuse values of environmental goods. Nonuse value arises if an individual values an environmental good independent of any observable use.<sup>74</sup> Such nonuse values, originally proposed by Krutilla,<sup>75</sup> include existence value, option value, and bequest value.

Much of the criticism around the CV methodology for nonuse values centers on the question of whether the CV method can reliably measure the

stated WTP to reflect the "economic motives" of the respondents.<sup>74</sup> Failure to do so, according to the critics, would mean that nonuse values do not count for cost-benefit analyses.<sup>76,77</sup> Although this debate—whether the noneconomic motives for WTP should be considered in policy analysis—continues, recent CV research has increasingly been recognizing and incorporating the noneconomic motives of individuals' WTP for environmental goods. In particular, a number of studies have begun to incorporate insights from the social psychology literature on PEB.

Two recent studies<sup>78,79</sup> incorporated environmental and altruistic attitudes, in addition to the standard variables, such as income, to explain the WTP for nonuse values. These studies show conflicting results with regard to influence of environmental and altruistic attitudes on WTP. Kotchen and Reiling<sup>78</sup> found a relatively strong relationship between attitudes and WTP while Cooper *et al.*<sup>79</sup> did not find any relationship. The second difference between the two studies is on whether the distribution of bid responses (protest zero, zero, and positive WTP) is related to NEP attitudes. Cooper *et al.*<sup>79</sup> did not find any relation while Kotchen and Reiling<sup>78</sup> showed that individuals with stronger pro-environmental attitudes are more likely to give a firm yes/no answer.

Two other CV studies<sup>9,80</sup> use alternative measures of environmental attitudes, based on the concepts developed in the social psychology literature, to study the influence of noneconomic motives on WTP. Spash<sup>80</sup> differentiates consequentialist economic beliefs from rights-based economic beliefs and hypothesizes that the former are associated with egoistic values orientations and the latter with social altruism and biospheric value orientations. The other hypothesis is that WTP is strongly related to rights-based environmental attitudes. The study generally found empirical support for their hypotheses except that WTP is more strongly related to egoistic-altruistic orientations rather than the hypothesized social altruistic and biospheric orientations. The other study<sup>9</sup> has results consistent with Spash<sup>80</sup>—biospheric orientation is less related to WTP than other value orientations.

### Discussion and conclusions

The *homo economicus* model of standard microeconomics is based on the assumption that human

behavior is determined by a strict concern for individual self-interest. This model implies that achieving cooperation to garner nonrival benefits should be quite difficult in the absence of strong institutions that align individual incentives with the common good. While the *homo economicus* model has an important degree of descriptive power and heuristic appeal, it can not account for empirical observations concerning the prevalence of voluntary PEBs. Purely self-interested consumers would not recycle, drive hybrid-electric vehicles, or buy green products when doing so involved increased costs or inconvenience. And yet these and related behaviors are readily observed facts of life.

As we have seen, social psychology provides several related moral frameworks for understanding and modeling PEB. First, the norm-activation theory developed by Schwartz<sup>13–15</sup> suggests that PEBs should arise when people (a) are aware of the consequences of their decisions for environmental quality and (b) accept a responsibility to do their share to achieve shared benefits. This emphasizes the key roles played by both cognition and moral judgment. Second, the VBN model developed by Stern *et al.*<sup>28</sup> provides a sophisticated theory of how environmental behaviors are tied to deep-seated values orientations. Empirical research suggests that PEB is most common among people whose core values are “social altruistic” and/or “biospheric.” “Egoists,” in contrast, behave in a manner that is more consistent with the *homo economicus* model. Third, Ajzen’s<sup>46</sup> TPB emphasizes the role of PBC in the relationship between attitudes and behavioral intention. There have been many recent attempts to modify this fundamentally rational choice theory to incorporate moral norms. This approach adds a new dimension to the analysis of PEB with a growing array of empirical studies.

In economics, the “warm glow” model of Andreoni<sup>60</sup> suggests that people voluntarily contribute to the provision of public goods because the act of giving itself provides a source of individual utility. While Andreoni’s work<sup>60</sup> constituted an important step forward, it abstracts away from the core insights derived from the psychological theories discussed above. To address this gap, Brekke *et al.*<sup>64</sup> constructed a model in which individuals (a) first consider how they would behave in an ideal world characterized by perfect cooperation and (b) experience disutility when their actual behavior departs

from the ideal. This approach brings moral deliberation and judgment into the framework of rational choice modeling, helping to bridge the gap between economic theory and behavioral realism.

In economics, empirical research on the determinants of PEB has generated a lively and significant literature. On the one hand, voluntary PEB plays a decisive role in explaining the pervasive participation in recycling programs in many industrialized countries. On the other hand, only small minorities of households purchase green electricity products or drive hybrid-electric vehicles. PEBs are most likely to arise when the presumed benefits are directly apparent to the decision maker and when the cost and inconvenience of taking action are small. This fits well with the basic predictions of norm-activation theory.

What are the implications of these findings for future research in ecological economics? First, the literature in question provides insights regarding the development of transdisciplinary models that tie together economic, psychological, and moral considerations. This stands in contrast with the abstract and sometimes counterfactual predictions of the *homo economicus* model. That said, this area of research involves both precise, highly articulated theoretical models and carefully constructed statistical studies. So achieving psychological realism may increase rather than decrease the demands placed on researchers.

Second, the reality of PEB has interesting and potentially important implications for environmental governance. In some cases, introducing incentive-based policies, such as Pigouvian taxes, can crowd out voluntary PEBs.<sup>81</sup> When people reach the judgment that the government has assumed responsibility for protecting the environment, this can undercut the role played by social norms and moral motivation. Given Schwartz’s theory<sup>14,15</sup> of norm-based motivation, a more appropriate intervention might involve attempts to change beliefs. However, even the social psychology literature agrees that there are limits to norm-based motivation and that realigning incentives is often essential in achieving desired policy outcomes. Accordingly, policies aimed at inducing behavioral change that benefits the environment may need to combine economic incentives with information and education to change beliefs. According to Schwartz,<sup>14</sup> the relevant beliefs are those concerning the adverse consequences

of environmental degradation and the role of personal responsibility in addressing those consequences. This concurs with a major theme in ecological economics, according to which achieving an appropriate relationship between economic and ecological systems requires the creation of carefully structured institutions.

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## Conflicts of interest

The authors declare no conflicts of interest.

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