



Positive and negative spillover of pro-environmental behavior: An integrative review and theoretical framework



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ABSTRACT

A recent surge of research has investigated the potential of pro-environmental behavior interventions to affect other pro-environmental behaviors not initially targeted by the intervention. The evidence evaluating these spillover effects has been mixed, with some studies finding evidence for positive spillover (i.e., one pro-environmental behavior increases the likelihood of performing additional pro-environmental behaviors) and others finding negative spillover (i.e., one pro-environmental behavior decreases the likelihood of additional pro-environmental behaviors). Different academic disciplines have investigated this question, employing different methodologies and arriving at divergent findings. This paper provides a unifying theoretical framework and uses the framework to review the existing research on pro-environmental behavior spillover. Our framework identifies different decision modes as competing mechanisms that drive adoption of initial pro-environmental behaviors, with different consequences for subsequent pro-environmental behaviors, leading to positive, negative, or no spillover. Attribution of the initial pro-environmental behavior to either an external motivator (e.g., a price signal) or internal motivator (e.g., self-identity) also matters. In addition, the characteristics of and similarity between initial and subsequent pro-environmental behaviors can be expected to moderate predicted spillover effects. We explore the implications of our model for policymakers and practitioners, and suggest key areas where future research on the topic would be most beneficial.

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Examination of behavioral interventions to promote energy efficiency and other pro-environmental behaviors has revealed our limited understanding of *behavioral spillover*, that is, the effects of an intervention on subsequent behaviors not directly targeted by it (Poortinga et al., 2013). Knowledge of spillover effects is important for energy and environmental policy, as growing concern over anthropogenic climate change and the limited success of comprehensive national and international policy measures have generated a renewed interest in strategies that promote efficiency

and conservation through behavior modification (Dietz et al., 2009; Kunreuther and Weber, 2014; Steg and Vlek, 2009). Many scholars have advocated for consideration of research on behavioral interventions in the design of climate policies (AAAS, 2011; Allcott and Mullainathan, 2010; Vandenbergh et al., 2011). If promotion of one pro-environmental behavior (PEB) raises the likelihood that individuals will adopt other PEBs (i.e., *positive spillover*), increased investments in such policies may be warranted. If, on the other hand, successful interventions induce individuals to reduce other PEBs (i.e., *negative spillover*), such interventions may be less desirable or may need to be redesigned.

Unfortunately, to date research on spillover effects has generated mixed and at times conflicting results, and studies are spread across disconnected literatures from diverse disciplines. The purpose of this paper is to provide a comprehensive, interdisciplinary review to clarify the conditions under which

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positive or negative spillover might be expected and to serve as a resource for both researchers and policymakers. We synthesize findings that address the question of whether and under what conditions positive and negative spillover occurs, as well as the magnitude of spillover effects. We also propose a theoretical framework that predicts and organizes these findings, and we discuss policy implications. Finally, we conclude with a proposed research agenda to address critical gaps within the spillover literature.

1. Spillover defined

We define spillover as an effect of an intervention on subsequent behaviors not targeted by the intervention. Intervention here is used in its broadest sense to include any attempt to encourage behavior change such as: a request to perform a new behavior, public education campaign, tax incentive, provision of “green” infrastructure such as curbside recycling, and regulatory policy. For example, spillover occurs when implementation of a local plastic bag tax not only affects plastic bag consumption, but also recycling behavior. Spillover effects can be both negative and positive. Negative spillover occurs when the successful increase in one PEB is associated with a reduction in another PEB (Thøgersen and Crompton, 2009), for example, a drop in participation in a recycling program in response to the introduction of a bag tax. Positive spillover occurs when an increase in one PEB is associated with an increase in another PEB (Austin et al., 2011; DEFRA, 2008), for example, an increase in recycling products in response to the introduction of a bag tax.

Although a number of different labels have been used to reference spillover effects and related phenomena (e.g., rebound effects, moral licensing, gateway effects, identity effects, and single action bias), we intentionally use the more general term “spillover” to avoid tying this phenomenon to a specific set of behaviors (e.g., energy use) and to acknowledge that these effects can be both positive and negative. Furthermore, although spillover is most commonly discussed in terms of actual behaviors, in this review we also consider spillover from behavior to policy support. Recently, some scholars have raised pertinent questions as to whether the widespread promotion of “green” behaviors that have little impact on environmental outcomes on their own could actually undermine public support for more effective policy measures (Thøgersen and Crompton, 2009; Wagner, 2011a, 2011b). We also discuss this potential negative byproduct of pro-environmental interventions below.

2. Implications for law and policy

Our interest in this paper is in spillover as it manifests at the level of the individual consumer or household in response to an environmental intervention, rather than purely economy-wide rebound effects such as the widely cited Jevons paradox (Alcott, 2005; Jevons, 1866)—the idea that as energy production becomes more efficient, the relative cost of per unit of energy drops, therefore leading to a rise in overall usage. Economy-wide rebound effects are a reflection of behavior in the aggregate in response to market fluctuations of the price of energy and other goods. Our goal in this review is to characterize behavioral patterns in response to programs or policies that target individuals or households. We do this to open up the “black box” of the individual to develop a theory of what generates spillover and under what conditions positive or negative spillover is likely to be observed. A deeper understanding of the psychological mechanisms and personal and situational triggers of spillover effects can then be used to improve program and policy design.

The design of successful laws and policies often requires insights that are generalizable across a sufficiently large population to allow scalable, widespread application (Posner, 2000; Scott, 2000). This is particularly true for energy and environmental policies, which may require behavior change by thousands or millions of individuals or households to achieve meaningful effects (Dietz et al., 2009). In the absence of a robust research base, isolated studies and intuitions about likely spillover effects from adoption of PEB often play a large role in energy and environmental policy debates (e.g., Jenkins et al., 2011; Tierney, 2011). Spillover research can better inform energy and environmental policy if it accounts for insights from relevant social science disciplines and examines spillover effects in realistic settings. This should enable development of generalizable insights about when negative or positive spillover effects may occur, the magnitude of such effects, and how to reduce negative spillover and increase positive spillover.

In addition, the existing literature often focuses on identifying spillover effects, but policymakers need to know not just that spillover effects occur, but also the net effects of an intervention after accounting for negative or positive spillover. For example, an effective information campaign that increases purchases of carbon offsets for electricity use will reduce carbon emissions (e.g., Jacobsen et al., 2012). Some purchasers of offsets may, however, also increase electricity use, resulting in additional carbon emissions (Jacobsen et al., 2012). Although the negative spillover (in the form of increased electricity consumption) is important, the issue of most concern to policymakers is the net effect of the intervention after accounting for the emissions reduction associated with the offsets and the emissions increase associated with the negative spillover. Concluding that a policy is ineffective because it results in some negative spillover without taking into account the net effects of the policy is problematic (Gillingham et al., 2013; Jacobsen et al., 2012).

3. Review of existing literature

In our review of the literature, we searched for articles that related to the broad topic of spillover based on searches in Google Scholar for “spillover,” “gateway effects,” “rebound effects,” “moral licensing,” “single action bias,” etc. We do not claim that every article written on the topic is included, but we have made a concerted effort to include the most relevant literature and believe we have accomplished this goal.

In general, evidence of spillover can be found in two types of studies. The most commonly cited research in the psychological literature on spillover investigates cross-sectional correlations among multiple PEBs (e.g., Berger, 1997; Weber, 1997). Although this research typically does not examine behavior in response to an intervention (and therefore does not necessarily meet our definition of spillover), the findings from this body of work are highly relevant to this discussion. More direct evidence comes from research that experimentally manipulates whether someone performs an initial behavior and then observes the effect on a subsequent behavior. Such studies are more difficult to carry out, but some initial forays into experimental and longitudinal work have been conducted (e.g., Baca-Motes et al., 2013; Thøgersen and Ölander, 2003; Tiefenbeck et al., 2013). This work has shown mixed results, with some studies demonstrating negative spillover, others finding positive spillover, and still others showing no effects (e.g., Reams et al., 1996). It should be noted that much of this work was conducted by researchers examining related phenomena such as rebound effects, moral licensing, single action bias, consistency, and identity effects rather than spillover per se. Nevertheless these studies provide suggestions about possible mechanisms (mediators as well as moderators) behind spillover effects.

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