

# The Effects of Rewards on Spillover in Environmental Behaviours: Monetary vs Praise Rewards

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## Abstract

The paper focuses on the so-called spillover effect in the environmental domain, or the tendency of individuals adopting a specific green behaviour to behave environment-friendly also in other, not related contexts. Different psychological mechanisms explaining this process have been singled out in literature (e.g.: Self Perception Theory, Cognitive Dissonance Theory, etc). However, there is no general agreement neither on the strength nor on the drivers of spillover. The study provides a value added to literature by analyzing the role played by specific factors (so far neglected) in hindering or spurring spillover: monetary and non-monetary rewards. A real-life experiment is carried out on a sample of undergraduate students from Aarhus University (Denmark), based on a panel study with online surveys filled in twice: before and after the experimental intervention. The latter consists of encouraging the uptake of a specific green behaviour (purchase of sustainable products) for a period of 6 weeks, investigating the effects on different behavioural domains and the role played by incentives. Results show how the nature of incentives has a relevant direct impact on the behaviours being incentivized, whereas no significant spillover effect to other behavioural domains is detected.

**Keywords:** Spillover, Sustainability, Rewards, Motivation

## I. Introduction

We do not inherit the earth from our ancestors: we borrow it from our children.

The underlying assumption of this famous saying is that we need to take action to preserve and improve the social and environmental heritage that our generation will pass onto future ones. All actors at different levels of society ought to feel involved in the process, from policy makers and corporations to single individuals, who can (and must) play a relevant role by adopting sound behaviours in their everyday lives: ethical behaviours at the individual level represent indeed the core element and the basis for a switch to ethical societies at large.

I here focus on ethical behaviours dealing with the issue of sustainability, as I investigate how different *green* behaviours connect to, and influence, each other. I refer to positive *spillover* as to the phenomenon (and related psychological mechanisms) according to which the uptake of a green behaviour in a given domain *spills over*, increasing the chances of other environmentally sound behaviours being carried out in different, not correlated domains.

The study that I hereby present is part of a broader research project on pro-environmental spillover. First, I investigated the existence itself of a positive contamination between green behaviours, with the results of my analyses corroborating the spillover hypothesis<sup>1</sup>. Then, building on such preliminary evidence, I focus on the role played by external drivers like monetary and non-monetary incentives in spurring or hindering spillover. The choice of the specific driver to be investigated reflects the need to fill a gap in the literature on spillover: to my knowledge, only one empirical study assessed the role played by rewards in such framework, albeit from a different perspective (Evans et al. 2013).

The work is hence organized as follows: after an introductory paragraph providing a theoretical framework to spillover, a literature review on the effects of rewards on motivation and behaviour is presented. Then the research hypotheses are specified and the methodology of the study, as regards both research design and data collection, is described in detail. The results of the data analysis are reported and discussed, with concluding remarks on the limitations of the study and ideas for further research.

## II. Spillover: theoretical background

The literature on spillover is vast and growing, as numerous studies analyzed the strength of positive contamination between pro-environmental behaviours investigating whether going green in one domain acts like a *nudge*, leading to environmentally sound behaviours in other domains.

No general agreement has been reached as regards the existence of positive spillover. Some scholars suggest that behaviours are not correlated, so that what individuals do in one domain has no effect in other domains (Gray 1985, Pickett et al. 1993, McKenzie-Mohr et al. 1995). Others speculate that individuals contributing to the environmental cause in a specific domain believe they have provided a *fair contribution*, diminishing their willingness to behave consistently in other domains. This psychological mechanism, which is referred to as *contribution ethics* (Guagnano et al. 1994, Kahneman et al. 1993, Thøgersen and Crompton 2009), could lead to negative spillover, and get exacerbated by self-serving biases overemphasizing the effective contribution provided to the environmental cause (Pieters et al. 1998).

This brief outline indicates that the hypothesis of a positive spillover between pro-environmental behaviours is not universally accepted in the academic community; however,

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<sup>1</sup> The paper focusing on this part of the project has been submitted to an international journal and is currently under review (co-author: John Thøgersen)

most of the studies on the topic suggest that green behaviours are indeed positively correlated (Berger 1997, Scott 1977, Kals et al. 1999, Maiteny 2002, De Young 2000, Frey 1993). There is a number of psychological models and theories that support and explain the spillover hypothesis.

According to Self-Perception theory, we use our past behaviours as cues of our own dispositions (Bem 1972). If I do something green, I develop a self-image of a person caring about the environment, so that it is likely that I will use this as a reference for future behaviours. Consistently with Self-Perception theory, the *foot-in-the-door* paradigm (Freedman and Fraser 1966) suggests that people carrying out a small request first are more likely to comply with more demanding requests later. A possible explanation is that the first task acts like a nudge, with individuals using it as a guide for subsequent behaviours.

According to Cognitive Dissonance theory (Festinger 1957), individuals tend to act consistently across behaviours since inconsistent behaviours cause feelings of discomfort: for instance, if I am environmentally responsible in the realm of green purchasing, I would feel uncomfortable in behaving unsustainably in the domain of recycling, and so on. The theory is consistent with a vast body of empirical investigations even in the environmental domain (Dickerson et al. 1992, Aitken et al. 1994).

Knowledge theories focus on how a learning-by-doing process can increase environmental awareness which in turn can drive sustainable behaviours also in domains different from those where such knowledge and capabilities originated, although some scholars suggest that the role of awareness should not be overemphasized (see Kollmuss and Agyeman 2002 for a review on the topic).

Lastly, while most of the literature on pro-environmental spillover is clearly linked to one of the above mentioned theoretical frameworks, it should be noted that there are studies with an *implicit* theory on spillover (Diekmann and Preisendörfer 1998). If it is safe to infer that awareness, self-perception and consistency are relevant factors in shaping spillover trajectories, there are indeed other elements that might be taken into consideration, both internal like values and norms (Thøgersen and Ölander 2003) and external like incentives, whose effects are the subject of the present paper.

### III. The effects of rewards on intrinsic motivation and behaviour

Rewards represent a broad and heterogeneous family. I focus on two specific categories: monetary rewards (consisting of a financial incentive to carry out an activity) and verbal (or praise) rewards, consisting on praising the individual for an activity and providing positive performance feedback. Rewards have an impact on the motivation of individuals. By intrinsic motivation I consider the doing of an activity for its inherent satisfactions rather than for some separable consequence (Ryan and Deci, 2000). Extrinsic motivation, on the other hand, refers to whenever an activity is done in order to attain some separable outcome (Ryan and Deci 2000), so that the carrying out of the activity is spurred by its instrumental value rather than intrinsic enjoyment.

The ultimate effect of external (monetary or praise) rewards on intrinsic motivations and behaviour is still an object of debate, as it is still equivocal whether the latter can be hindered, or spurred, by the former (Cameron, Banko and Pierce 2001, Cameron and Pierce 1994, Deci, Koestner and Ryan 1999, 2001). Indeed, controversy characterized the debate since the early 1970s, when decades of behaviourist dominance in motivation research (according to which reinforcements such as external rewards are the best motivators of behaviour) was challenged by cognitive explanations of motivation.

Cognitive evaluation theory (Deci 1975, Deci and Ryan 1980) specifies the factors determining variability of intrinsic motivation, based on the assumption that individuals evaluate a task basing on its capability to satisfy human need to be competent and in control.

Self-determination theory (Deci and Ryan 1985) incorporates cognitive evaluation theory, but is broader in scope. Self-determination theory suggests that the three core psychological needs of individuals are needs for competence (or effectance), relatedness, and autonomy. “People are inherently motivated to feel connected to others within a social milieu (relatedness), to function effectively in that milieu (effectance), and to feel a sense of personal initiative in doing so (autonomy)” (Deci and Ryan 1994). Cognitive evaluation theory can hence be considered a sub-theory of self-determination theory, specifically focused on those factors hindering or spurring intrinsic motivation. It suggests that intrinsic motivation can be either increased or decreased by rewards according to two properties of the latter, namely information and control, and how they affect our self-determination and perception of competency. As regards the informational aspect of a reward, cognitive evaluation theory predicts that intrinsic motivation will be enhanced if the reward itself conveys the message that the person is competent. On the other hand, the controlling aspect may lead to the sense of uneasiness that people usually perceive when they feel being controlled from the outside. Locus of causality is the degree to which individuals perceive their behaviour to be self-determined rather than driven from other people. If outside pressures are perceived, people may feel an external locus of causality. Rewards perceived as controlling might hence lead to an outward shift of the locus of causality, and a subsequent undermining of intrinsic motivation. It is hence important to analyze the type of reward contingency to determine whether a reward is to be perceived as informational or controlling and, if both aspects are salient, further factors have to be considered in making predictions (Deci et al. 2001).

Praise rewards usually enhance perceived competence and subsequently motivation. If people engage in a given behaviour specifically to gain praise, however, a controlling element emerges, thus decreasing intrinsic motivation (Deci et al. 2001). Tangible rewards such as monetary incentives, on the other hand, are usually (yet not necessarily) perceived as controlling and aiming at inducing people to adopt behaviours they would not adopt in the absence of the reward, thus undermining intrinsic motivation. Moreover, tangible rewards can be either expected or unexpected (Deci et al. 2001), and task-non contingent, task-contingent and performance-contingent (Ryan et al. 1983). The expected vs unexpected reward dichotomy is relevant insofar rewards have motivational implications only as long as individuals are aware they are getting them (that is, rewards are expected), so that they may engage in a behaviour (also) to obtain the reward. In such a case, intrinsic motivation to perform the task could be undermined. Task non-contingent rewards do not require performing a task per se, as they are linked to other reasons such as experiment participation. Task contingent rewards, on the other hand, require performing the task while performance contingent rewards require not only performing an activity, but also meeting given standards, criteria or scores. Task contingent rewards can be further disaggregated in completion contingent rewards and engagement contingent rewards according to whether engagement alone in an activity is required, or also completion of the task itself.

Cognitive Evaluation theory originally developed in the fields of educational research and motivation in organizations, but its insights can be easily adapted to a broad range of domains characterized by the interaction between rewards and intrinsic motivation, including environmental behaviours (Koestner et al. 2001, Pelletier 2002, Thøgersen 2003). Moreover, notwithstanding the relevant role played by rewards, it has to be stressed that cognitive evaluation theory applies to the effects of many other external factors as well, such as evaluations (Smith 1975), deadlines (Amabile et al. 1976), competition (Deci et al. 1981) and externally imposed goals (Mossholder 1980).

The empirical evidence supporting Cognitive Evaluation theory is growing. In his seminal work on the issue, Deci conducted two laboratory and one field experiment, investigating the effects of rewards on intrinsic motivation (Deci 1971). The laboratory experiments showed

that different types of incentives had different effects on the intrinsic motivation of individuals: whereas monetary incentives diminished motivation and effort, the opposite happened for non-monetary incentives such as verbal praise and positive feedback. Deci's hypothesis has been backed by the outcome of the field experiment as well, as monetary rewards proved to be counterproductive from the point of view of intrinsic motivation. Pritchard and colleagues conducted a similar study in 1977 to test Deci's hypothesis, and the results of their laboratory experiment confirmed that monetary rewards decreased the motivation to perform a given activity. Interestingly, these results are common also to studies carried out on young individuals like nursery school babies. In a 1975 experiment where children completing a simple task were divided in three groups (with expected reward, unexpected reward and no reward respectively), Lepper and Greene found that children in the expected reward condition decreased in intrinsic motivation whereas those in the other two conditions maintained it.

Since the 1970s, numerous studies on the rewards-motivation relationship have been carried out, as well as different meta-analyses on the topic. Most of these works lead to results consistent with cognitive evaluation theory, and external rewards playing a downgrading role on intrinsic motivation (Rummel and Feinberg 1988, Wiersma 1992, Tang and Hall 1995, Deci et al. 2001). The meta-analysis of Tang and Hall is the more comprehensive meta-analysis conducted, with a review of 50 studies that overcame shortcomings that limited the reliability of previous works (such as the lack of contingent-non contingent, or expected-unexpected disaggregation of rewards).

It has to be pointed out that Cognitive Evaluation theory received critiques, as well. The work of Cameron, Pierce and colleagues (Cameron and Pierce 1994, Cameron et al. 2001) reached the conclusion that rewards seemingly have no impact on intrinsic motivation (if not enhancing it altogether), baldly suggesting the abandoning of Cognitive Evaluation theory. Many scholars argued however that such critiques are not well grounded (see Kohn 1996, Lepper et al. 1996, Ryan and Deci 1996), since the meta-analysis of Cameron and Pierce was invalid and its conclusions false. Many flaws reportedly undermined the reliability of the results, such as the emphasis on boring tasks (which by their very nature have little to no intrinsic motivation) or failure to include studies showing negative effects of reward on performance.

In light of the various flaws in these meta-analyses, Deci, Koestner and Ryan (1999) teamed up to compose the most comprehensive meta-analysis of the time on rewards, where 128 studies were examined. The results show how verbal rewards are indeed capable of increasing intrinsic motivation (see Blanck et al. 1984, Koestner et al. 1987, Ryan 1982, Sansone et al. 1989), unless they are administered in a controlling manner, in which case the opposite effect is found. Deci and colleagues also state that unexpected rewards do not decrease intrinsic motivation, probably because participants do not feel controlled from the outside, as they are not performing the task to actually get the reward. As regards tangible expected rewards, they appear to have a substantial undermining effect, which can be ascribed to both over-justification (our tendency to diminish motivation when we are provided with an extrinsic reason to do something we would do even in the absence of such incentive) and the uneasy feeling of being controlled deriving from incentives that thus undermine our feelings of self-determination (see Deci et al. 1999, Deci and Ryan 1985). While the latter explanation fits within the Cognitive Evaluation theory framework, the over-justification effect (Lepper et al. 1973, Lepper and Greene 1975) is largely based on attribution (Kelley 1967) and self-perception (Bem 1972) theories. Motivation and performance are believed to be influenced by the perceptions we hold about the inner causes of our own behaviour. When external controls are present, individuals tend to ascribe their own behaviour to an external agent, and this undermines their own motivation. In the case of rewards such as monetary incentives,

perceptions shift from accounting behaviour as self-initiated to considering it as sparked from the outside, and people feel they are facing too many reasons (or justifications) to perform an activity so that the role of intrinsic motivation gets discounted and motivation itself decreases. Even assuming that rewards have a hindering effect on intrinsic motivation, the overall effect will depend on the relative strength of two forces operating in opposite directions: the motivating power of the incentive and the decrease in intrinsic motivation (Frey 1997).

The risk of offsetting the benefits of a reward such as financial incentives by means of decreased intrinsic motivation is relevant as far as environmentally sound behaviours are concerned. Thøgersen, in a study on differentiated garbage fees, reaches similar conclusions: monetary rewards may re-frame the environmental issue into a cost-benefit calculation sphere, so that such negative effects offset positive impacts of rewards on attitudes and behaviour (Thøgersen 1994). Frey invokes the term crowding out to describe a scenario where extrinsic motivation involving external rewards is at odds with intrinsic, or behavioural, motivation. Crowding in, on the other hand, refers to the case when intrinsic and extrinsic motivation work in the same direction. Not only does Frey (1993) recognize that crowding out effect undermines intrinsic motivation to perform a task; he stresses how the effect could also spillover to other domains not affected by the reward, if the individual finds it hard to distinguish motivations according to such different domains. Hence policy makers in the environmental field should be careful with pricing as a strategy to shift people environmental behaviours, as this could not only hinder intrinsic motivation and undermine the behaviour object of the reward, but such negative effect could spill over to other (not rewarded) environmental behaviours as well, multiplying the detrimental impacts of the policy. Conditions facilitating spillover range from similarity of domains (with respect to both material content and processes) to the social and religious incentive to adapt similar intrinsic motivation to all spheres of life.

Motivation crowding effect and motivation spillover effect represent two limits to policies encompassing extrinsic rewards that have to be carefully taken into consideration, as to avoid possible counterproductive effects. Crowding out effects contradict a traditional rational choice model (Becker 1976, Coleman 1990), according to which behaviour is determined by preferences and constraints only. Extrinsic monetary rewards cause a shift in relative prices (constraints), thus resulting in changes in behaviour: behavioural changes are here assumed to be extrinsically motivated. Frey suggests that also another type of behavioural incentive should be taken into consideration, and intrinsic motivation. Neoclassical economics, on the other hand, takes preferences as given and thereby implicitly assumes that monetary rewards have no effects on intrinsic motivation.

As already mentioned, according to Cognitive Evaluation theory monetary incentives could under given circumstances enhance intrinsic motivation. Facilitating conditions are represented by the capability of the reward to boost individuals' perceived competence (what Bandura -1982- calls self-efficacy, typically achieved through feedbacks on the performance), or the reward itself being perceived as not controlling. In a 2003 study on weight dependent garbage fees (Thøgersen 2003) it was found that such rewards have a positive effect, and the result is due not only to the price effect, but also (and perhaps mostly) to an increase in perceived self-efficacy and personal norms regarding the specific environmentally desirable behaviour. The author suggests that a further explanation could refer to the fact that the small incentive provided is considered as an insufficient justification to recycle, making new adopters of the behaviour adjust their attitudes as to be more consistent with the new behaviour.

## IV. Research questions and methods

The study aims at shedding light on the influence of incentives on behavioural patterns, at different levels of analysis. I first focus on the direct effects of financial and praise rewards on the specific behaviour being incentivized, which is represented by green purchasing. I expect that monetary incentives (even if limited to very small amounts) support the purchase of green products more than praise rewards, and I test this speculation by means of the following research hypothesis:

H1) The direct effect of incentives in spurring the adoption of a pro-environmental behaviour is stronger for monetary rewards compared to praise rewards.

The core of the study is represented by the role played by different types of incentives on spillover between pro-environmental behaviours; in other words, the focus shifts to the indirect effect of incentives on green behaviours other than those directly incentivized. Reading Self Determination and Cognitive Evaluation Theory in the light of the spillover hypothesis, one could expect spillover to be stronger for praise group members, as individuals incentivized to purchase green products by means of monetary rewards have their intrinsic environmental motivation hindered, with negative repercussions on the spillover process.

The second research hypothesis to be tested is hence the following:

H2) Pro-environmental spillover is stronger when triggered by praise rather than monetary incentives.

As the aim of the study is to shed light on the variation over time of consumer behavioural intentions within the domain of sustainability, the methodology consists of a panel study based two waves of online surveys, administered before and after the experimental intervention. Participants are undergraduate students from Aarhus University in Denmark, recruited in June and October 2012 through mailing lists of the Departments of Business Administration and Business Communication. The recruiting message specified that students volunteering in the project might have to purchase specific products for a short period of time, as the experimental manipulation consisted in spurring participants to purchase green products for a period of six weeks and to keep track of their purchasing patterns by means of a shopping diary. A total of 80 complete shopping diaries with receipts were returned, so that the sample used for the present analyses is composed of 80 students ( $n=80$ ).

The sample was randomly split into two sub-groups. Monetary group members ( $n_m=46$ ) were incentivized to purchase green products by means of financial incentives consisting of two elements: a sum covering the extra costs sustained for the purchase of green products and the chance to win 1000 DKK in a final lottery draw. Praise group members ( $n_p=34$ ) received instead emails praising their effort and stressing the beneficial effects for the common good of a shift to environmentally conscious purchasing patterns. Specific attention was devoted in framing messages (in equal number and frequency for both groups) so that they were not perceived as controlling, as this would have hindered intrinsic motivation.

The questionnaire investigated a broad range of topics dealing with the relationship between participants and sustainability; as regards the present study, the main piece of information refers to the intrinsic motivation and intention of individuals to carry out pro-environmental behaviours. Intentions to act in a pro-environmental way are assessed with respect to a battery of environment friendly behaviours, using the format: How likely do you think you will do "X" in the next occasion, if you have the chance to do so? (where "X" stands for each behaviour), rated on a 7-point scale ranging from 1 = very unlikely to 7 = very likely. The behaviours cover the domains of transport mode, recycling, energy/water conservation and green purchasing, which are the main macro-categories in most research on pro-environmental behaviour and spillover (see Thøgersen and Ölander 2003).

Participants received the link to the online survey (using Qualtrics) by email and they could choose between a Danish and an English version. After filling out the first questionnaire, establishing the baseline, experimental interventions were deployed. Participants were encouraged to buy organic food and other eco-labeled products for a period of 6 weeks. I choose this as the source behaviour because it represents a class of behaviours where money is naturally involved and the consumer typically needs to bear extra costs, like the premium-price required for the purchase of such products. For 6 weeks, participants were asked to record their purchases within a specified set of product categories in a shopping diary, specifying whether they opted for an environment-friendly version (e.g. organic milk vs traditional milk, etc). Receipts had to be kept to allow crosschecking at the end of the experiment. Once the six weeks elapsed, a second questionnaire (exact replication of the first) was mailed to participants. This allows us to gain insights into the effects of the intervention and possible spillover between behaviours. Incentives were terminated at this point and participants were de-briefed thanking them for their participation in the study and informing them that they might be contacted in the upcoming weeks for some follow-up questions.

## V. Results and discussion

I first consider the direct effect of different types of rewards on purchasing patterns. Table 1 illustrates the average number of items (and, in brackets, of *green* items) purchased by participants in both monetary and praise groups for each of the 10 product categories analyzed in the shopping diaries.

Table 1: Average number of (green) items purchased

Average n of (green) items purchased	Monetary group	Praise group	Total
Milk	8,57 (5,70)	6,18 (2,09)	7,55 (4,16)
Yoghurt	2,57 (1,39)	1,94 (0,68)	2,30 (1,09)
Eggs	2,09 (0,89)	1,94 (0,82)	2,03 (0,86)
Meat	6,33 (1,22)	4,88 (0,44)	5,71 (0,89)
Vegetables	12,52 (4,17)	10,18 (1,76)	11,53 (3,15)
Fruit	9,35 (2,52)	7,74 (1,26)	8,66 (1,99)
Detergents for house	1,09 (0,39)	0,65 (0,26)	0,90 (0,34)
Soaps personal hygiene	2,02 (0,63)	1,59 (0,62)	1,84 (0,63)
Kitchen paper	0,35 (0,22)	0,35 (0,03)	0,35 (0,14)
Toilet paper	0,93 (0,50)	0,85 (0,24)	0,90 (0,39)

Individuals receiving monetary rewards purchase more green products than individuals receiving praise rewards: on average, each participant of the monetary group purchased 17.63 green items during the six weeks of the experiment, compared with only 8.20 of those in the praise group. Differences are large for some items (such as milk, meat, vegetables or kitchen paper) and smaller for others (such as eggs and detergents for personal hygiene). I then focus on the relative share of green products purchased, rather than on their absolute numbers. The mean percentages of green products purchased by participants in the monetary and praise groups are 35.54% and 22.06%, respectively: while over one third of products purchased by

individuals spurred by financial incentives to buy green are indeed environment-friendly, the figures drop to just over one fifth in the case of individuals spurred by praise rewards.

To assess the significance of these preliminary results, I carry out an analysis of variance where the dependent variable is represented by the percentage of green products purchased by each participant and the independent variable is represented by the treatment group of pertinence (monetary vs praise). There is indeed a significant difference between the monetary and the praise group on percentages of green products purchased ( $F=7.523$ ,  $p<.01$ ,  $partial\ eta\ squared=.088$ ). Monetary incentives are much more effective than praise incentives in spurring individuals to adopt a sustainable behaviour like purchasing green products.

These findings are consistent with a broad literature on consumer behaviour and with empirical evidence gathered in a wide set of domains ranging from eating at restaurants (Jang and Mattila 2005) to responding to survey requests (Church 1993), and so on. In the domain of purchase a useful distinction has to be made between hedonic and utilitarian products (Hirschman and Holbrook 1982, Dhar and Wertenbroch 2000): *we use goods in two ways (...), as symbols of status and simultaneously as instruments to achieve some end-in-view* (Hamilton 1987). Evidence in literature suggests that while for utilitarian goods the effect of monetary rewards is stronger, for hedonic products it is non-monetary rewards which are more effective (Liao et al. 2009). The product items that participants have been asked to purchase are not easy to be placed in either of the two categories, as they encompass features typical of both hedonic and utilitarian goods and being thus eligible for a *borderline* status. Even typical utilitarian products like detergents or kitchen paper should be handled with care before being labeled as such in this specific setting, since the overarching goal of environmental protection embodies a role trespassing the boundaries of mere functionalism and use. Future research should first investigate in depth how participants perceive the green products object of the study, and then test whether there are significant differences regarding the effects of different types of rewards on purchasing patterns.

As regards the *indirect* effects of rewards on behavioural patterns, I investigate whether monetary and praise rewards impact differently on the uptake of pro-environmental behaviours *other* than those directly incentivized (i.e. on positive pro-environmental spillover). I consider as target behaviours those for which a positive spillover was found in Study 1: *switching off the lights when exiting room as last person, turning off the water while soaping and while brushing teeth, and recycling batteries*. Table 2 illustrates the descriptive statistics on the evolution over time in participants' behavioural intentions to carry out each of the four target behaviours.

Table 2: Evolution over time of behavioural intentions

	Monetary Group			Praise Group		
	t1	t2	$\Delta t2-t1$	t1	t2	$\Delta t2-t1$
Turn off lights	6,63	6,70	0,07	6,65	6,74	0,09
Turn off water while brushing teeth	6,46	6,59	0,13	6,74	6,71	-0,03
Turn off water while soaping in the shower	4,65	4,67	0,02	4,56	5,21	0,35
Recycling batteries	4,91	5,41	0,50	5,47	5,35	-0,12

Consistently with the results of Study 1 on the existence of positive spillover, there is a generalized trend towards an increase in behavioural intentions to behave environment-friendly with the only exceptions of behavioural items on *saving water while brushing teeth* and *recycling batteries* for praise group members. However, if we consider the differences

between monetary and praise group members, there is no clear pattern emerging as in two target behaviours (*turning off water while brushing teeth* and *recycling batteries*) people treated with monetary incentives experience stronger leaps in behavioural intentions, while in other two target behaviours (*turning off the light when exiting room as last person* and *turning off water while soaping*) the opposite happens.

To test the statistical significance of these differences, I conduct a one-way between-groups analysis of covariance: the independent variable is represented by the treatment group (monetary vs praise), while the dependent variable consists of participants' scores on behavioural intentions for the four target behaviours administered after completion of the intervention. Participants' scores on the same question administered before the intervention are used as the covariate in the analysis, to control for pre-existing differences between the groups. Table 3 illustrates the results of the analysis:

Table 3: Statistical analysis

Item	$\Delta_{\text{mon}}-\Delta_{\text{pra}}^2$	F	p	Partial $\eta^2$
Turning off light when exiting as last person	-.02	.081	.776	.001
Turning off water while brushing teeth	.16	.018	.894	.000
Turning off water while soaping	-.33	2.921	.091	.037
Recycling batteries	.62	1.397	.241	.018

The picture emerging is controversial and there is no general trend regarding which type of incentives is more effective in triggering a positive spillover to other domains. Furthermore, the differences in leaps of behavioural intentions between participants in the monetary and praise conditions are not statistically significant as can be inferred by the high p values (with the partial exception of the behavioural item *turning off water while soaping*, showing marginally significant differences). According to my data the two groups do not differ significantly as regards changes in intentions to perform sustainable behaviours other than those directly spurred by the incentives: spillover is not affected by the type of rewards (monetary or praise) triggering it.

Few other studies have been carried out on the topic, to date. Swim and Bloodhart (2013) conducted lab experiments investigating whether pro-environmental spillover is affected by praise and admonishment for acting green or not, respectively. Results show that praising participants for their pro-environmental behaviour (taking the stairs instead of the elevator) only produces a modest and indirect spillover towards other, not related green behaviours (turning off lights and monitor at the end of the experiment). The authors suggest that the modest result *may be attributable to a lack of internalization of admonishment and praise*, as *participants may not have felt pride for taking the stairs because their decision was not based upon its environmental or social implications* (Swim and Bloodhart 2013). Evans and colleagues (2013) conducted lab experiments investigating spillover from a source behaviour represented by carpooling to a target behaviour represented by recycling. Participants in two experimental conditions received environmental and financial information about the benefits of carpooling, respectively. Results suggest that the spillover to the target behaviour (that is, throwing the paper with carpooling information in a recycling bin at the end of the experiment) is stronger when self-transcending reasons are made salient.

<sup>2</sup> it represents the difference between the mean variations (before to post experiment) in monetary and praise group participants (on a 1 to 7 scale). Positive values indicate that the willingness to uptake the specific green behaviour increased more (decreased less) in the monetary group

The scattered empirical evidence on the role played by different incentives on pro-environmental spillover seems to be consistent (especially in the case of Evans and colleagues) with the theoretical background suggesting that praise messages (or incentives) increase intrinsic motivation to perform other pro-environmental behaviours, while financial incentives undermine such motivation. A thorough comparison of such evidence with the results of my study is hindered by relevant differences both at the methodological and theoretical level: for instance, my experiment represents the first empirical investigation trespassing laboratory boundaries, with financial incentives being directly correlated to the degree of uptake of the source behaviour. However, what emerges from my experiment seems in contrast with the results of the above-mentioned studies, as no clear pattern suggesting the relevance of the type of incentives as predictors of spillover emerges. Only for one of the four observed behaviours (*turning off water while soaping*) there is a marginally significant effect of incentives, suggesting that praise rewards indeed spur pro-environmental spillover more than monetary rewards.

In conclusion, my experiment suggests that the nature of incentives only plays a marginal role in shaping spillover trajectories, which are seemingly more affected by internal factors such as values or habits<sup>3</sup>. However, this result has to be handled with care as many factors might have affected the outcome of the experiment. As Swim and Bloodhart suggest, lack of internalization of the self-transcending vs self-interested appeal of the rewards could eliminate the effects on intrinsic motivation advocated by Self Determination and Cognitive Evaluation theories. Moreover, the specificity of the source behaviour (green purchasing) suggests that future research adopting the same methodology should address the hedonic-utilitarian dichotomy as to investigate whether the effects of incentives on spillover are mediated by which feature of products (hedonic or utilitarian) is perceived as salient by participants.

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<sup>3</sup> As emerging from the results of my preliminary study on spillover within the current research project

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