



Crowding-in or crowding-out?

A conceptual framework to understand motivations in payments for ecosystem services

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Abstract

Payments for Ecosystem Services (PES) are economic incentives to foster conservation while providing a source of local development through direct cash payments. Existing literature underlining the pros and cons of implementing PES for nature conservation have overlooked the issue of motivation crowding-out, i.e. the loss of intrinsic motivations in payments' beneficiaries. The very nature of PES that seek to enhance environmental conservation efforts through externally imposed regulations and monetary payments is predicted by evidence stemming from social psychology studies as highly detrimental for intrinsic motivations and therefore a potential cause of long term failure of PES environmental outcomes. The Self-determination Theory (SDT) posits that any externally imposed economic incentive presents a risk of decreasing intrinsic motivations and increasing external motivations –a phenomenon called motivation crowding-out. A loss in intrinsic motivation means a less internally motivated individual and a potential decrease in performance in achieving a task, aggravated once the external incentive disappears. Avoiding or minimising such potential detrimental effects calls for a better understanding of the internal psychological factors that trigger motivation crowding-in and crowding-out.

In the present paper we discuss existing empirical evidence from social psychology and behavioural economics on the impacts of economic incentives on internal motivations. Drawing from SDT we propose a conceptual framework to understand the causal path from PES implementation to motivation crowding-in and crowding-out. The conceptual framework explains that changes in motivations are caused by how a person's need-satisfaction is modified, through the activation of four psychological factors or moderators by PES implementation: competence, autonomy, social relatedness and environmental relatedness. We discuss how PES implementation, such as payment type, verbal rewards, monitoring and sanctioning, participatory design, might harm or enhance intrinsic motivations.

1. Introduction

Monetary and non-monetary incentives have become increasingly advocated and used to foster biodiversity conservation and – more generally - sustainable management of natural resources. A salient approach in this regard are the so-called Payments for Ecosystem Services (PES), which consist of getting users of certain ecosystem services (e.g. watershed regulation, soil conservation, carbon sequestration) to channel money and in-kind incentives, i.e. payments, to the service providers (e.g. land owners or managers), who should in exchange implement practices that result in increased provision of such services. PES users are diverse, and they have to date involved governments, private actors (e.g. hydropower companies), multilateral organizations and NGOs

of various kinds. Providers of ecosystem services have been mostly farmers and rural communities worldwide, and also occasionally NGOs managing land. PES schemes are subsequently diverse in implementation scales and scope –from state-run programs to very local projects- and funding sources–i.e. public or private. The rationale underlying all PES schemes is that land managers will voluntarily participate if the incentives received up-front or ex-post are sufficiently attractive to undertake the required activities to provide the ecosystem services. Under such neo-classical economics framing, the land manager is a rational actor that will calculate the benefits and costs of conservation and act upon accordingly, in line with the axioms of the principal-agent incentive theory (Laffont and Martimort, 2002). PES advocates and early practitioners thus emphasize that PES schemes should be *efficient*, i.e. they provide a given conservation outcome at the minimum costs. A necessary condition for this to hold is that payments are *additional*, i.e. payment would not be given for the provision of services that would happen anyway; payments should target land managers who will adopt conservation practices and increase their conservation effort in exchange of the provided incentives (Engel et al, 2008; OECD, 2010).

In spite of its theoretical simplicity and appeal, empirical research and practical experiences have increasingly shown that PES implementation has been a “messy” endeavor, in which the socio-political and cultural complexities of the countries, territories and localities where PES are implemented have taken central stage in a number of implementation issues (Muradian et al. 2010). First, regarding opportunity costs, revealing their real value for ES providers has proved challenging given the lack of information in rural settings of developing countries (Kosoy et al., 2007; Wunscher et al., 2008; Borrego and Skutsch, 2014) and the asymmetry of information between government bodies and farmers in industrialized countries -in spite of the use of auction systems- (Claassen et al., 2008). Second, since participating actors have lobbied for the inclusion of other complementary goals, such as the provision of flat payments regardless of land opportunity costs and the inclusion of broad eligibility criteria, targeting of PES receptors usually does only partially follow efficiency and additionality principles (Bich-Thuy et al., 2011; Shapiro-Garza, 2013, Sims et al., 2014). Third, the incentive theory based on the rationality of individual economic agents to maximize individual profits does not always fit with PES schemes where participants are often moved by intangibles and non-profit objectives. For example, in the global South in contexts where land is entitled to rural communities, populations still collectively make decisions about natural resource management. Collective action has in some of these cases aided PES schemes in achieving environmental outcomes at a lower cost, since the terms of exchange have been negotiated with a collective rather than with multiple individual landowners (McCarthy et al., 2001). However, the existence of collective action has also resulted in operational challenges, such as identifying who should be the subject of compensation –as well as of liability in case of non-compliance- and understanding how social norms favor or undermine PES objectives. Fourth, the recognition that PES receptors are socio-politically heterogeneous, i.e. diverse in terms of land rights endowments, ethnicity, gender and others, has been a motivation for some to argue that PES implementation cannot be disentangled from the pursuit of contextual, procedural and distributive justice and equity issues (Pascual et al., 2014). Fifth, although evidence has shown that communities and farmers’ groups participating in PES can be successful in biodiversity conservation (Garcia-Alix et al., 2015; Costedoat et al., 2015), they can also contribute to reify existing injustices in access to income and other material assets if PES

don't alter pre-existing inequitable institutional status-quo (Corbera et al. 2007; Vatn, 2010; Rico et al., 2011). Finally, PES critics have gone a step further and argued that PES represent a neoliberal form of conservation, which supports an utilitarian view of ecosystems (McCauley, 2006), commodifies complex ecosystem functions (Arsel and Buscher, 2012 ; Peluso, 2012; McAfee, 2012; Kosoy and Corbera, 2010) and runs the risks of undermining existing conservation practices based on non-monetary reasons (Rico et al., 2013). In this regard, an increasing number of scholars are pointing at the possibility that payments might crowd out or weaken previously existing and non-monetary driven motivations for conservation (Rode et al., 2014). Others, in contrast, are suggesting that payments might, in some contexts, crowd in or reinforce intrinsic motivations for sustainable resource management (Baard et al., 2004; Le Grand, 2006; Meyer and Gagné, 2008). Analyzing what causes behavioral effects and in which direction PES changes motivations is essential to improve projects' and policies' efficiency, including avoiding negative time-lagged effects on motivations that would endanger the long term permanence of positive environmental outcomes (World Bank, 2015). That is the focus of this Special Issue.

In this introductory article, we present a conceptual framework to understand why PES might contribute to crowding-in or crowding-out of individual motivations for conservation. We first review existing knowledge in social psychology and experimental economics, to identify which factors can modulate motivations in relation to PES implementation (section two). We then put together these factors into a conceptual framework, encompassing a set of psychological factors, described as moderators in social psychology, which can be activated to crowd in or crowd out motivations depending on individuals' characteristics, the PES design and the institutional context (section three). Finally, we discuss how PES features can potentially affect motivations, as predicted by the conceptual model and drawing on the research results of the special issue articles (section four). We conclude highlighting some yet unexplored analytical questions (section five).

2. An overview of motivational crowding theories

2.1. Insights from social psychology

Social psychology has richly contributed to develop the theoretical building blocks for understanding human motivations. Motivations can be generally defined as the underlying attitudes that give rise to, guides, and maintains goal-oriented behaviors (Ryan and Deci, 2000a). They are in turn constituted of intrinsic and extrinsic elements. Intrinsic motivations refer to doing something because it is inherently interesting or enjoyable, while extrinsic motivations are driven by (potential) rewards or punishments by others, such as money, grades or in-kind payments, as well as by (potential) punishments (Ryan and Deci, 2000b). The interest of social psychology in understanding human motivations can be traced back to a combination between the theory of *locus of control* (Rotter, 1954; 1966) and the theory of *perceived locus of causality* (deCharms, 1968). While the former discusses if a person perceives the control of her (his) life as being dependent on internal or external actors or factors, the second discusses how a determined behavior emerges. The Cognitive Evaluation Theory (CET) results in turn from the combination of these two theories and was the first theory to formally refer to motivation crowding. CET

states that a person will feel more intrinsically motivated if she (he) perceives the locus of causality of performing an action as being internal, in order to fill her (his) need of competence and autonomy. This framework predicts that any externally driven economic incentive to achieve an outcome will erode autonomy and therefore decrease intrinsic motivations (Deci, 1975). An expanded framework of CET is the Self-Determination Theory (SDT), which deepens the comprehension of which internal psychological factors, described as moderators in SDT, explain the loss of intrinsic motivations by considering not only autonomy but also the feeling of competence and the self-perception of our interactions with others (Deci and Ryan, 1991; Ryan and Deci, 2000a). SDT states that the activation of the above three psychological moderators, competence, autonomy and social relatedness, which can be activated individually or in combination, drives internal need satisfaction. The way our need satisfaction is altered will in turn trigger the individual's psychological response. Competence relates to the capacity to accomplish a task but also to personal development –i.e. acquiring new skills. Relatedness refers to the quality of one's relations with others and the perception one has on how the others perceive one-self. Autonomy, as explained by the CET, refers to the sense of being internally in control of decisions and actions. SDT theory also postulates the existence of a *self-determinacy continuum* that allows for external regulations or incentives to be internalized over a continuum from demotivation to intrinsic motivation. In this continuum, motivation crowding-out is the relative “move” induced by the norm or incentive towards the demotivation extreme. In contrast, motivation crowding-in implies “moving” in the opposite direction (Gagné and Forest, 2008). Although alternative theories to understand motivation crowding-in and –out exist (see e.g. Lepper et al., 1973), SDT has been acknowledged by many contemporary social psychologists as a very accurate explanatory framework (Festré and Garrouste, 2014). We will thus use it as the guiding building block towards a detailed understanding of the links between PES and motivation crowding.

SDT scientific community has extensively tested such hypotheses using laboratory experiments – mostly with undergraduate psychology students-, and through a few natural field experiments (Festré and Garrouste, 2014). In their widely cited review, Deci et al. (1999a) undertook a meta-analysis of 128 studies exploring the motivation crowding effect of verbal versus tangible (money) incentives given upon task engagement, task completion or performance. The usual measure of intrinsic motivations in laboratory experiments is the time spent in the experiment task during a free choice period. In their review, Deci and colleagues highlight that rewards decreased intrinsic motivations overall, but that crowding-out had a varying intensity and sometimes did not even occur. For example, verbal incentives increased intrinsic motivations but only for college students when compared with children. All tangible incentives decreased intrinsic motivations, although performance contingent were the ones decreasing intrinsic motivations the less. The study overall concludes that although monetary incentives caused more frequently motivation crowding-out, they can also steer motivation crowding-in depending on the experiment's design features and the extent to which implementation affects need satisfaction through competence and personal development, autonomy and social relatedness. As noted earlier, SDT posits that the feedback between need-satisfaction moderators and external regulations results in motivations to move along the self-determinacy continuum. Critically, the self-determinacy continuum allows us to understand that incentives can de facto be “externalized” by the individual, i.e. felt as imposed and undermining intrinsic motivations, but

also “internalized”, i.e. internally appropriated, depending on the characteristics of the incentives like the type of task to be accomplished (e.g. boring vs. stimulating), the individual’s social characteristics (e.g. the level of education, gender, age), as well as the interpersonal context, including the institutional context and cultural values. We will further develop the implications of this theoretical framework for PES in section three.

2.2. Insights from behavioral economics

Titmuss (1970) was the first economist to intuitively describe the existence of intrinsic preferences that could be undermined by external incentives when dealing with blood donation. Since then, a large number of economic experiments in the education, industry and health sectors have demonstrated intrinsic motivations and external economic incentives to be inter-linked (Frey and Oberholzer-Gee, 1997; Gibbons, 1998; Frey and Jegen, 2011; Gneezy et al., 2011). Whereas experimental economics have frequently shown that external incentives induced motivational crowding-out, the opposite process has also been described (Le Grand, 2006). Frey and Jegen (2001) for example, provide a list of experiments from laboratory studies by both psychologists and economists that corroborate the eventual existence of motivation crowding-in when external interventions via monetary incentives or punishments are applied. Other economists have found that intrinsic motivations can counter-intuitively weaken if incentives are targeted at fostering cooperation (Ostrom, 2000; Houser et al., 2008; Bracht and Feltovich, 2008) and reciprocal behavior (Fehr and Gächter, 1997; 2002; Fehr and Schmidt, 2000). Seemingly, payments that substitute boring tasks can also crowd-out social norms (Gneezy and Rustichini, 2000). In contrast, it has been found that economic payments that recognize pro-social values – e.g. in volunteers- or the competence to perform a task can increase individuals’ effort and intrinsic motivations (Thomas et al., 2009; Fiorillo, 2011). Concerning blood donation, Le Grand (2006) considers that payments and motivations follow a S-shaped curve: While a little payment increases participation, at some point the pay is so high that it replaces intrinsic motivations, and then very high payments are required to boost blood supply again. Sanctions and monitoring – a key feature of PES- can crowd out intrinsic motivations if they are perceived as a signal of distrust and a limitation of autonomy, in particular when work settings involve interpersonal relationships (Fehr and List, 2002; Dickinson and Villeval, 2008; Ellingsen and Johannesson, 2008; Falk and Kosfeld, 2006). Nevertheless, transparent control will limit free-riding and increase the feeling of fairness of the reward, partially offsetting motivational crowding-out (Dickinson and Villeval, 2008). As noted previously, PES theory is based on economic efficiency principles, i.e. land managers should be compensated the exact– no more no less - level of opportunity costs of conservation. This assumption assumes a monotonic function between the agents’ effort and the incentive or payment level to explain the link between incentives and performance (Gibbons, 1998; Lazear, 2000). This is an important difference between the focus of experiments in behavioral economics and social psychology studies: Whereas the former has focused in explaining the effects of external regulations and motivations on performance, SDT studies have only approached the issue of performance when rewards are withdrawn and motivations drop below the baseline level, and therefore decreasing performance - a phenomenon known in social psychology as the *undermining effect* (Deci et al., 1999b). Recent SDT literature shows a positive relationship between increased intrinsic motivations and performance (Gagné and Forest, 2011).

With regard to the environmental sector, economic experiments to describe behaviors have flourished in the last two decades and particularly in the areas of industrial and water pollution management, waste management and recycling, and mobility and consumption decisions (Frey, 1992; 1993; Frey and Oberholzer-Gee, 1997; Bowles, 2008). Bowles and Polania-Reyes (2012) review 50 cases covering psychology and natural resources laboratory and framed field experiments, with few cases of natural field experiments in the education and economic sectors. They conclude that whereas motivational crowding-out is the most frequent outcome, crowding-in also occurs. Research on the effects of policy instruments for biodiversity and ecosystem services conservation on motivation crowding is even more recent. Rode et al. (2014) review 19 empirical studies dealing with the impacts of tradable quotas, environmental taxes, subsidies and PES for biodiversity conservation on resource managers' motivations. They identify a total of seven psychological mechanisms inducing motivation crowding-out and four mechanisms leading to crowding-in. Among the studies reviewed, eight relate to PES schemes. In line with Bowles and Polania-Reyes (2012), the authors suggest that motivation crowding-out is more frequent than crowding-in, although the latter is proportionally reported more frequently in PES than in quotas, taxes and subsidies. Such insights should be taken with caution since Rode et al.'s sample is limited. Overall, findings in the experimental economics literature dealing with the environmental sector are in line with the main principles of SDT, with need-satisfaction moderators, economic incentives and social norms interacting in non-linear and discontinuous ways, and moving personal motivations along a continuum separating extrinsic and intrinsic motivations. In Table 1 below, we compare Bowles and Polania-Reyes (2012) and Rode et al.'s (2014) psychological mechanisms with the more general phenomena described by SDT. This allows making evident the connection between these mechanisms and SDT theory and, in particular, to identify what moderator or combination of moderators might play at activating a particular psychological mechanism.

Psychological mechanism as from Polania-Reyes (2012) and Rode et al. (2014)	Correspondence with the SDT theory (internal moderators and <i>processes</i>)	Linking psychological mechanisms with SDT
Crowding-out		
Control aversion	Autonomy	Locus of causality seen as external to one-self provokes a perception of loss of independence and autonomy.
Frustration	Combination of moderators at play depending on the causes.	The observed psychological mechanism refers to an overall decrease in need satisfaction derived from the combination of all internal moderators.
Warm glow effect (people's internal satisfaction when acting on a voluntary basis)	Combination of moderators at play depending on the causes.	Same phenomenon as above.

Image motivation	Relatedness	Image motivation refers to the personal understanding of the perception the others have on oneself.
Release from moral responsibility	Relatedness	Moral responsibility is related with the perception of procedural fairness, as part of the relatedness moderator.
Frame shifting	<i>Externalization process</i>	Frame shifting occurs when personal motivations move along the self-dependency continuum towards external motivations.
Changes in values and mindsets	<i>Undermining process</i>	Long term motivation crowding-out.
Crowding-in		
Social recognition - Self-esteem	Competence and relatedness	This mechanism refers to the combination of two moderators: The recognition of one-self competence and the perception the others have on such.
Reinforced positive attitudes	Competence and relatedness	Same phenomenon as above.
Prescriptive effect	<i>Internalization process</i>	Frame shifting towards intrinsic regulation.
Reinforcement perceived as fair	Relatedness	Reinforced perception of distributive fairness.

Table 1. Comparison between SDT theory posits and the psychological mechanisms described by Bowles and Polania-Reyes (2012) and Rode et al. 2014.

Interpreting motivation crowding psychological mechanisms in the environmental and biodiversity sectors through the lens of SDT allows us to highlight that some psychological mechanisms refer to the combination of moderators described by SDT, while others correspond to more general phenomena in social psychology, such as the internalization process and the undermining effect. The psychological mechanisms are therefore a signal of the changes in the individual's need-satisfaction as a result of the expression of internal moderators after being stressed by PES design and implementation characteristics, within a specific personal and inter-personal context. In the next section we propose a conceptual framework based on SDT that explicates how PES design, personal and inter-personal characteristics together with psychological mechanisms interact along a *motivation pathway* to enhance extrinsic or intrinsic motivations.

3. A conceptual framework to understand motivational crowding in PES

Although unidirectional psychological mechanisms are a useful anchor point to understand how and why motivations change, we suggest that their combination with SDT can provide a more encompassing picture of motivational crowding in PES. Figure 1 presents a conceptual framework that combines SDT and insights from experimental economics to understand and analyze motivational crowding in PES. The framework (i) includes the existence of pro-

environmental behavior, not present in social-psychology studies; and (ii) proposes a causal path from PES implementation to motivational change and environmental performance.

The framework incorporates the concept of *environmental relatedness* to account for the pro-environmental behavior described in empirical studies (d’Adda, 2011; Greiner and Gregg, 2011; Fisher, 2012). While SDT takes into account pro-social behavior through the concept of social relatedness, pro-environmental behavior has not been studied, probably due to the limited thematic scope of social psychology studies. The framework also assumes that PES features such as monitoring and sanctioning, type and amount of economic rewards, interaction with local and larger institutions, and mechanisms for collective action will cognitively impact need-satisfaction moderators of the person receiving the payment. Therefore, we hypothesize that the activation of one or several of such satisfaction moderators will trigger one or several psychological mechanisms depending on how the brain valuation system integrates extrinsic stressors together with intrinsic values (Murayama et al., 2010). Both motivational crowding-in and crowding-out can occur altogether, which explains a possible neutralization or offsetting phenomenon. The final balance between motivational crowding-out and crowding-in will move the individual’s motivations towards the fully intrinsic or extrinsic extremes of the self-dependency continuum.

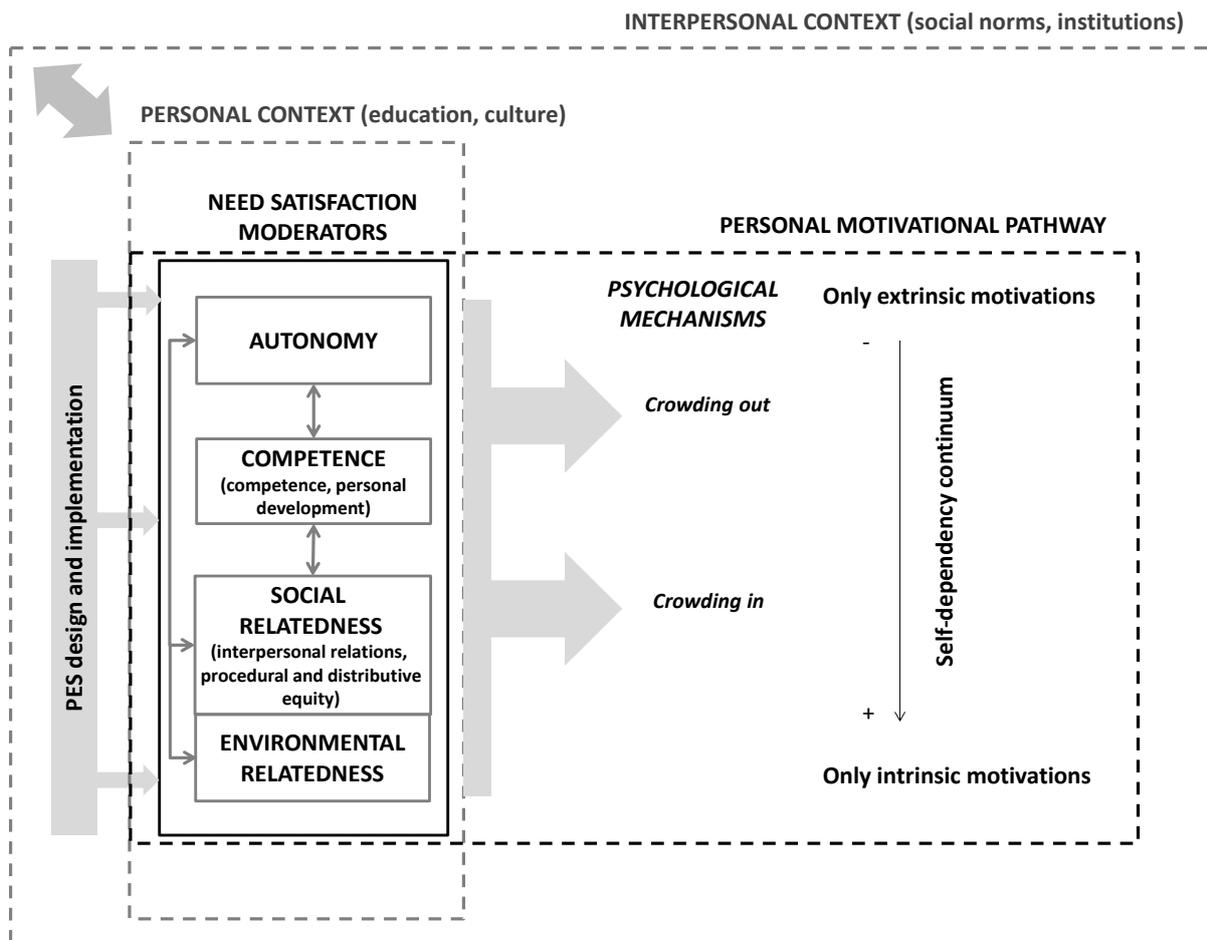


Figure 1. Motivation crowding pathways in PES. Need satisfaction sub-moderators are in parenthesis.

PES design and implementation are identified in the framework as the triggering phenomenon, i.e. we hypothesize that the way in which payments, monitoring, participation and interpersonal relations are designed and implemented in the PES scheme will activate in a particular fashion the individuals' need-satisfaction moderators. Subsequently, need-satisfaction moderators will respond to the interaction of (i) PES implementation with the individual personal context and (ii) the latter with the larger inter-personal and institutional setting (e.g. highly neo-liberalized vs state-regulated economy). The central valuation brain system will integrate these different feedbacks as increased or decreased need satisfaction and as a result launch one or several psychological mechanisms. These psychological mechanisms express motivational crowding-in or crowding-out, and, correspondingly, an increase in intrinsic motivations in the first case and an increase in extrinsic motivations in the second case. Increased internal satisfaction will foster more effort and efficiency, resulting in improved PES performance compared to the no-PES baseline. Decreased internal satisfaction will on the contrary result in externally motivated effort and a resulting performance below the internal satisfaction scenario. Thus, understanding how PES design affects need-satisfaction moderators appears as the cornerstone for predicting the impact of PES on motivations. Indeed, PES design can be steered towards fostering intrinsic or extrinsic motivations. For example, Roldan et al. (2013) and van Noordwijk (2012) highlight the potential of PES to act as a collective action catalyzer and figure 1 makes explicit the causal path behind such assumption. Collective action can improve the social relatedness and autonomy of individuals participating in PES –as a group or as single landowners- if, for example, they can decide the type of reward, who should get involved and how, and how resource management should be undertaken and monitored. If all or some of these conditions are met, local “providers” of ecosystem services might not necessarily challenge adjusting payments to opportunity costs or paying against performance, while favoring intrinsic motivations need-satisfaction moderators. Likewise, reciprocity behavior can be key in maintaining or strengthening social relatedness and collective action. This can be achieved through workforce exchange (Solarte, 2013) or student exchange (Agarwal et al., 2007). In contrast, if in-kind or in-cash rewards are imposed and the terms of recognition, participation and distribution are defined a priori by implementers, it is likely that the PES scheme contributes to undermine land managers' perception of autonomy, thus increasing the chances of crowding-out.

4. Preventing an impact of PES design on intrinsic motivations.

Table 2 summarizes the way PES design features can affect personal need satisfaction moderators. We present, drawing from the SI case studies and available literature, the type of PES design features that might erode intrinsic motivations altogether with the changes that would enhance motivation crowding-in.

PES feature	SDT moderator	Design predicting motivation crowding-in	Design predicting motivation crowding-out
Payment amount (cash and in-kind)	Competence and social relatedness (distributive equity)	(i) Payments are seen by beneficiaries as recognition of their effort and <i>savoir faire</i>	(i) Participation payments not recognizing heterogeneity of opportunity costs and

		(ii) Adjustment of payments to performance if protection is stronger than expected	(ii) Benefiting altogether beneficiaries with and without opportunity costs (Rico et al., 2011)
Verbal reward	Competence and social relatedness (interpersonal relationships)	Verbal communication stating success over achieving expected or higher results	Absence of verbal rewards
Task type	Competence (personal development)	Stimulating and aligned with personal hopes and life development plans	Boring and not aligned with personal development (Yungdee and Corbera, 2015)
Payment design process	Autonomy (sense of who has the control)	Bottom-up approach: Making all stakeholders participate in the design to choose the type of reward (Grolleau and McCann, 2012)	Non-participatory top-down approach (Muñoz-Piña et al., 2008)
Social equity as side objectives	Social relatedness (sense of fairness and equity)	Favoring the most social and environmental vulnerable populations (Pascual et al., 2014)	Benefiting the richer and the most powerful
Monitoring and sanctioning	Autonomy (sense of who has the control) and social relatedness (sense of fairness and equity)	Sanctioning free riders creates a sense of justice. (Claassen et al., 2008)	PES participants feel frustration if free riders are not controlled (Rodríguez de Francisco et al., 2013)
Collective action (including collective payments)	Social relatedness (sense of trust and reciprocity)	Specific actions to foster collective action: collective monitoring, payments through collective work, exchange of students, conflict resolution through consensus (Agarwal et al., 2007; Sommerville et al., 2010; Solarte, 2013).	Individualist conservation tasks. Conflict resolution through top-down sanctioning (Clements et al., 2010).

Table 2. Expected impact of PES design and implementation on individuals' internal satisfaction and motivations under SDT. References to this SI are in bold.

5. Conclusion

Evidence in this SI shows that PES schemes take place in different institutional settings and with participants sharing very different educational and cultural socio-economic interests, which play an important role in explaining how payments affect motivations. Thus, knowing the motivations and preferences of PES participants and how they differ is a first step in order to align program

design with internal motivations and thus define and implement social and environmental safeguards (Ituarte-Lima et al., 2014). In turn, aligning PES design with intrinsic motivations means to take care of what drives personal need-satisfaction through autonomy, competence and relatedness. We suggest a number of practical design characteristics that have the potential to minimize the negative impact of PES on intrinsic motivations or even enhance them. Having a bottom-up participatory approach to reach an agreement on why, where and how to compensate is a must-to first step. Payment options should be wider than imposed monetary payments and cover a variety of options apart from money, including agricultural and forestry investment plans and other educational or health in-kind benefits. This would allow for individuals to control the way they want their effort to be reflected and rewarded and also favor the personal development hopes specific to each individual. Higher payments for those who make efforts beyond the baseline scenario will also reinforce the feeling of competence and fairness. Sanctioning and control will naturally erode feelings of autonomy, but such negative impact will be minimized if they are perceived as fair to tackle free-riders. In this regard, an active communication strategy will play an important role, both publicly explaining why sanctions are made and thanking participants that have complied with the contract, as a form of verbal reward. Social relatedness can be reinforced through trust and reciprocity such as making payments in the exchange of labor force –the ES beneficiaries collaborate in doing the conservation tasks in the parcels of the providers of ES-, and favoring other sources of social-environmental awareness like student trips. The beneficial effect of reciprocity and trust on social relatedness will nevertheless not be achieved without a backup at the institutional level: a PES that reinforces ongoing power and wealth asymmetries will undoubtedly result in decreased intrinsic motivations, while the opposite will have a strong leverage effect on the overall need-satisfaction of participants.

Future research needs to understand the different ways in which PES design will affect need-satisfaction moderators –competence, autonomy and relatedness- and in which way they interact to trigger motivation crowding-out and crowding-in psychological mechanisms. To achieve this it will be needed to systematize and model these moderators and controlling for personal and institutional factors. In turn, to systematize PES impacts in motivations will need an active engagement between social psychologists, economists and practitioners and a research agenda that includes counterfactual studies as well as PES natural and framed field experiments at local and regional levels.

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