Behavioral economics and payments for ecosystem services: finally some free lunches

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1. Introduction

Perspectives offered by economics now permeate the vocabulary and to a lesser but meaningful extent the practice of biodiversity conservation, with a major focus on quantifying ecosystem service (ES) values and implementing mechanisms for including them in economic decision-making (TEEB 2009). Payment for ecosystem services (PES), in which ES beneficiaries compensate individuals or communities for increasing ES supply (Wunder 2005) is among the most mainstreamed of these mechanisms. Actual applications include hundreds of small scale projects and multiple national initiatives, and range from compensating communities for livestock loss by endangered predators (Hill and Bonham 2005; Zabel et al. 2013), to serving as the national-level mechanisms for ensuring water supply or reducing deforestation as part of a global approach to address climate change (Alix-Garcia et al. 2015; Pagiola 2011).

The logic underlying interest in PES is compelling: conservation frequently imposes costs at the local or national levels. There is little scope for poor rural people to stop carrying out the legal activities from which they derive their livelihoods unless they have a good alternative. Because total benefits from conservation frequently outweigh costs (Balmford and Whitten 2003; Bruner et al. 2009), there is great potential for PES transactions to make conservation itself a much-needed development alternative.

Despite this potential, land coverage by national incentive programs in developing countries is arguably significant only in Costa Rica (6.7%) and Ecuador (5.6%) (Wunder 2013; authors' calculations from PSB 2015). While evaluations in Costa Rica and Mexico suggest that programs can have a meaningful impact on reducing deforestation where risk of clearing is high (Arriagada et al. 2012; Alex-Garcia and Wolff 2014), it is also clear that costs are a major barrier to expanding coverage and increasing impact by paying more per hectare (Solis and Malky 2015, Espinoza *in press*, Wunder 2013).

In this context, opportunities to increase ES provision without paying more are particularly important. This article highlights a set of such opportunities derived from better incorporating the non-monetary determinants of economic decision-making into PES design. Economic decision-making is far more complex than rational individual comparisons of financial costs and benefits (Ostrom 1990; Kahneman 2011). It also accounts for issues such as trust, fairness, and others' perceptions. Moreover, because many of these decision-making preferences are understood and follow a predictable pattern, they can be incorporated (or tested for incorporation) in policy in relatively simple ways, with potentially substantial effects (Thaler and Sunstein 2009).

A growing body of literature related to PES (Alpizar et al. 2015; Ferraro 2014; Zabel et al., 2013) and other incentive programs (e.g., Ashraf et al. 2014, Fryer et al. 2012, Duflo et al. 2011, Mellström and Johannesson 2008) makes clear that building these non-monetary decision-making preferences into PES design can allow a given budget to achieve more for conservation and for people's satisfaction with the transaction. Conversely, failing to do so can have unintended negative effects on these same objectives.

Several reviews highlight this opportunity (Ferraro 2014, Jack et al., 2008). However, incentive program policy makers and implementers in developing countries do not yet have an easily accessible roadmap to the set of non-monetary factors that may make agreements valuable and attractive to potential ES providers. This article seeks to provide such a roadmap to some of the most important behavioral preferences that could be incorporated in PES design related to both increasing the incentive to enroll, and to complying with commitments after signing up.

We do not comprehensively consider the basic design elements of national PES programs, including ownership requirements, amount of payment, contract duration, obligations, and penalties, that also affect the attractiveness of enrolling. Instead, we address them only as they relate to behavioral factors. Further, we do not review the growing body of non-behavioral recommendations for improving PES impact on deforestation (e.g., see Alix Garcia and Wolff 2014; Boener 2014; Arriagada et al. 2012; Wunscher 2008; Armsworth et al. 2012). However, given growing concern about additionality even in programs that have not typically focused on it, we also consider overlap between behavioral factors and spatial targeting of deforestation risk, as well as paying more to people whose land is at higher risk for clearing or who face higher costs of implementation.

Sources of information include the published literature related to incentives within and beyond PES, derived from both field study and laboratory experiments. We necessarily make recommendations that extrapolate from limited findings. In light of unclear external validity, in many cases our recommendations contain suggestions for basic research to design implementation. With this goal in mind, research suggestions are geared towards means to most straightforwardly and cost effectively generate the needed information.

2. Non-monetary determinants of economic decision-making

This section reviews a set of determinants of economic decision-making beyond the amount of payment that are likely central to impact and participant satisfaction in PES. For each, we describe the relevant determinant of behavior, give examples of implementation, and suggest means for incorporation into PES including research to determine specific elements of design where appropriate. We summarize findings at the end of the section (Table 1), including for each determinant of decision-making a summary of the underlying psychology, relevance to PES, opportunities for incorporation into PES design, possible research approach for determining design specifics, and a rank ordering of priority for inclusion.

2.1 Intrinsic motivation

Contrary to predictions based on purely self-interested, "rational" models of behavior, people routinely volunteer, donate organs, cleanup beaches, and so on. Laboratory experiments in which people play public goods games similarly find that they contribute a meaningful portion of a given endowment to the public good in the initial round of play regardless of who they are playing with (see review by Chaudhuri 2011). Such choices can be ascribed to intrinsic motivation for some degree of pro-social behavior. In the context of this paper, the pro-social choice of relevance is the decision to forego the individual (and frequently short term) benefit of clearing forest or overexploiting natural resources, to ensure a larger overall benefit for the community or society more broadly (Cardenas 2000, Bowles and Polania 2012).

Psychology, laboratory experiments, and field studies show that external incentives may in some cases "crowd out" these intrinsic motivations, for instance through replacing social norms with financial ones, creating doubt about the motivation of the doer, or implying some bad news about the task (Benabou and Tirole 2006, Bowles 2008). As a result, incentives in some contexts decrease pro-social behaviors. They may also decrease motivation in the long-term as people update their beliefs about the desirability of the behavior (Gneezy et al. 2011). Some examples: school children doing volunteer fundraising for charity in Israel collected more money without an external payment than with one (Gneezy and Rustichini 2000); potential blood donors in Sweden donated half as frequently when they were paid to do it (for women only, men were unaffected) (Mellström and

Johannesson 2008); Swiss residents' willingness to have a nuclear waste facility in their neighborhood dropped from ~50% to ~25% after they were offered an incentive payment for accepting (Frey and Oberholzer-Gee 1997).

Conversely, some elements of intrinsic (or at least non-monetary) motivation can be supported within incentive programs. One of these is motivation based on the esteem of others (Benabou and Tirole 2006), which can be enhanced by making voluntary contributions to a pro-social cause more visible. Ashraf et al. (2014) compared means to motivate barbershops to sell condoms as part of HIV prevention efforts in Zambia. They found that providing a "thermometer" that visibly tracked sales, and hanging these outside of shops more than doubled sales as compared to no incentive or a financial reward. Considering the use of image motivation to dissuade undesirable choices, Espinoza (*in press*) found that communities participating in Bolivia's COMSERBO Program perceive the potential penalty of having their community named publicly in the event of non-compliance as a significant incentive to live up to contractual obligations, equivalent to a loss of more than 30% of the annual average compensation provided by the program.

Concern about PES crowding out intrinsic motivations to conserve has received much attention in the past few years (e.g., Muradian et al. 2013 and response by Wunder 2013). However, a review of empirical findings (Rode et al. 2013) concluded that the overall evidence is still inconclusive. However, it may tentatively be concluded at least that where there is transparency, for instance because communities participate in incentive design (Engel 2014) or where participants are determined by auctions (Jindal et al. 2013), intrinsic incentives are less likely to be undermined.

In this context, the most obvious recommendation – to choose payment structures that least displace intrinsic motivation for conservation – is also the one for which the strategy is least clear. We believe that a research-based implementation focus is particularly relevant here, testing at least the differences in impact resulting from cash versus in-kind incentives, and individual versus community level payments. A range of research approaches have been suggested for exploring these issues (see review in Rode 2013). We are partial to the use of experimental games in this context, given their relative ease and low cost of application, as well as generation of valuable space for participants to reflect on the natural resource management challenges they face (Zuluaga 2014; Moreno-Sánchez et al, 2015).

A second recommendation is to make use of image motivation. Following Ashraf et al. (2014), PES agencies could seek to make more visible, through local press or relevant medium, the names of communities whose compliance with contract commitments is exemplary, or, following Espinoza (*in press*) whose compliance is not. In this case, learning-based implementation would be straightforward: PES agencies could randomly seek to motivate compliance though image motivation to some of their participants, with impact assessment based on change in observed compliance as compared to those who did not receive the same feedback.

2.2 Preference for social norms

People weigh the decisions of others when making their own choices, and are more likely to choose behaviors that appear to be the norm (see review in Ferraro et al. 2011). Policies have used norm-based messaging to effectively impact behavior for decades, focusing in particular in the last decade on social comparisons as a means to establish that desired choices are valid (Ferraro et al. 2011). As a simple illustration, Goldstein et al. (2008) showed that on hotel room placards requesting that guests re-use linens, messages emphasizing that a large percentage of guests reused their towels

(i.e., establishing re-use as the norm) decreased requests for washing by almost 10% over the standard placard, which appeals to guests only on the grounds of environmental protection.

Evaluating different messages to reduce residential water consumption in Atlanta during drought, Ferraro and Price (2013) found that technical advice alone had little impact on behavior, while combining technical advice with provision of information on median water consumption (i.e., a social comparison) and an appeal to act for the good of society resulted in a 4.8% decrease in consumption. Furthermore, impacts persisted, although at a reduced level, after the program was discontinued (Bernedo et al. 2015). Alpizar and Martinsson (2010) found that providing an apparent norm for voluntary donations by visitors to Playa Blanca in Costa Rica's Cahuita National Park increased contributions by up to 25% (mean contribution $1.47 with no message compared to $1.85 with a message stating that "the most common donation is $2").

Counter-productive norms can also be signaled inadvertently. A study on preventing theft of petrified wood in Arizona's Petrified Forest National Park found that signs that imply that poor behavior is the norm ("Many past visitors have removed the petrified wood from the park, changing the state of the Petrified Forest'') resulted in approximately four times more theft than signs simply telling people not to remove wood (Cialdini et al. 2006).

The predilection to base choices on what is perceived as the existing norm of behavior suggests several potential lines of action for PES. First, communications can seek to establish compliance with agreed commitments as the norm. Such messages may have a place in particular in contexts where descriptions are provided to groups of participants around the state of program implementation. Following Cialdini et al. (2006), messages emphasizing the high percentage of participants who live up to their commitments may support compliance by emphasizing that it is the choice made by the significant majority. Conversely, messages emphasizing problems may be counterproductive. We expect that the issue of compliance will become ever more relevant as monitoring improves, enrolled areas currently beyond the economic frontier become accessible (see Solis and Malky 2015; Espinoza *in press*), and more active targeting results in the inclusion in PES programs of areas subject to greater pressure for deforestation. The impact of different messages could be tested with relative ease, by randomly assigning promising message variants (plus a control) to different groups of participants.

Second, it will be valuable to focus on success (however defined) in the initial period after new programs are launched. Doing so may establish for all involved that doing their part is the norm, and generate a self-reinforcing mechanism for continued good performance. This issue may be particularly important where agreements are more complex and conditional incentives themselves face important hurdles to generating motivation (Wunder 2013). Ecuador's Socio Manglar Program, launched in 2014 to expand the country's National Incentive Program into mangroves, is illustrative. Under the program, incentives are given at the communal level, and are conditional on compliance with obligations acquired in taking communal sustainable use concessions, which in turn include elements of monitoring and sustainable management (Acuerdo Ministerial Nº 198). Supporting other motivations to manage concessions effectively in this sort of context may be particularly important.

Third, where the ES buyer is not a government entity investing in the public good, it may be valuable to foment the formation of groups where paying for the ES in question can be established as the norm. This issue is discussed further in the following section, as it also relates to perception of fairness and conditional cooperation.

2.3 Fairness and reciprocity

As noted above, laboratory experiments show that people playing public goods games often start with some level of donation or similar cooperative behavior, depending on the nature of the simulation. Next, many people behave as conditional cooperators, that is, they adjust their contribution according to their perception of the fairness of what others are doing, contributing more when others do, and *vice versa*. When repeatedly playing with the same people, players can in some cases reach and sustain a high level of cooperation based on each player contributing a perceived fair share (Kesser and Winden 2000). This finding reinforces the suggestion that forming groups of ES buyers may be valuable, in this case because awareness of each other's payments could reinforce members' decisions to pay for relevant services.

On the other hand, a few shirkers in a group contributing to a public good can rapidly decrease the motivation of the entire group (Fehr and Falk 2002). People can become so irritated by perceived unfair behavior on the part of others that in laboratory experiments they are willing to incur a cost to punish them even where the cost of punishing exceeds any increased benefit from the public good (Fehr and Gachter 2000).

Evidence of concern about fairness and negative reaction to a lack of it is again not limited to laboratory experiments. Using a field experiment in Costa Rica, Alpizar et al. (2015), showed that targeting incentives to individuals who would not have donated to conservation otherwise (and thereby explicitly not incentivizing those who would have contributed voluntarily) provoked a fairness-based backlash: targeting increased conservation among those incentivized, but those who lost access to incentives decreased their contributions to an extent that overall impacts of the incentive program were close to zero.

Following literature on negotiation approaches that lead to mutual satisfaction with outcomes (e.g., Fisher and Ury 1981), our main recommendation for avoiding negative reactions due to perceived unfairness is to ensure that the amount of and eligibility for payment payments is justified by a standard perceived by participants as legitimate, such ineligible parties do not feel treated unfairly. Given likely communications challenges, we believe that as a starting point, national and regional programs especially should focus their targeting efforts at a coarse spatial scale and pay uniform prices in eligible regions (perhaps disaggregated for visible and easily understood levels of commitment), rather than attempting to price discriminate at a finer scale, which would likely be harder to justify. Within priority areas, effort not to pay those who would have conserved anyway may be counterproductive. Survey-based research proposing different hypothetical scenarios could also readily be used to design standards based on understand perceptions of potential participants regarding fairness and legitimacy (following Kahneman et al. 1986).

Second, in the case of incentives paid to communities, where fairness concerns can include differences in opportunity cost between community members, or capture of an unfair share of benefits by elites, it may be useful to provide all or part of incentives in the form of in-kind public goods (Sommerville et al. 2010). Communities with strong internal processes for distributing incentives can also overcome fairness challenges related to incentives (Zabel et al. 2013). Finally, use of auctions to allocate PES contracts, which is attractive on efficiency grounds, seems also to increase transparency and motivation to comply with agreements (Jindal et al. 2013, Ajayi et al. 2012). PES programs willing to experiment with a new mechanism could readily test the use of auctions to allocate contracts, both in terms of overall program efficiency, and with a few simple questions on perceived fairness as compared to other approaches.

2.4 Reference dependence and loss aversion

Gains and losses of equal monetary value are not valued the same: loss is perceived as much worse across a wide range of issues. Pioneering experimental work by Kahneman et al. (1990) showed that participants randomly given coffee mugs demanded more than twice as much to sell them as people who did not get mugs were willing to pay. This experiment has been repeated for numerous goods. For instance, surveys suggest that wage decreases are viewed as much more unfair than failure to give a raise of equal value (Kahneman et al. 1986); studies of price elasticity for eggs and orange juice show that response to price increases is greater than to price decrease (i.e., loss is disliked more than gain) (studies reviewed by Camerer 2000).

Policies have recently begun to make use of this characteristic. Benartzi and Thaler (2004) show that workplace savings were significantly increased (from 3.5 percent to 13.6 percent) by a savings product that allows people to increase their contributions as a percentage of future salary increases rather than as a percentage of current salary. This effect is due in part to design that avoids the perception of loss. Fryer et al. (2012) found a significant effect on student performance of a teacher incentive program in which a bonus was given upfront, but had to be returned if performance did not improve. Incentives paid as a bonus contingent on performance in the same context were not effective.

Loss aversion suggests several potential design elements for PES. One is already likely in effect – once incentives are established as part of providers' perceived point of reference, their loss due to non-compliance is likely to be viewed through the lens of loss aversion and therefore worth more than initial offer of the same payment. PES programs can strengthen this incentive (alongside others), by ensuring that transgressions of contracts is monitored and does in fact result in termination of payments. Requiring that a percentage of previous payments be returned would strengthen loss aversion based incentives version, as long as they could be enforced.

Second, emphasizing for potential ES buyers that without intervention they may lose a valuable service could help invoke loss aversion to increase willingness to pay. On the seller side, to the extent that management choices under PES will protect additional ES of benefit to sellers themselves, as is the case for many non-timber forest products, emphasizing the potential loss of these ES in the absence of sustainable management could also boost suppliers' perception of the value for themselves of participating in a PES agreement (Moreno-Sánchez et al 2015). However, given that many ES valuations do not impact decision-making (Kushner et al. 2012), research is needed to better understand how to make such communications effective. One likely cost-effective option for designing relevant communications strategies is to test, using a simple contingent valuation approach, whether potential participants' willingness to accept payment for enrolling their land changes if they are provided with information regarding the value of ES at risk in the absence of improved management.

Third, PES programs should be careful to avoid invoking loss aversion by either making previously eligible people ineligible, or reducing payment amounts. It is likely that part of the negative reaction observed by Alpizar et al. (2015) was provoked by a design in which participants lost access to benefits they previously received, rather than having simply never had access to them in the first place. At its simplest, this recommendation suggests caution in increasing payment amounts. More involved implementation strategies might borrow from the private sector, which for instance frequently uses careful descriptions to suggest that price decreases are temporary, until the relevant company is sure they are going to be used in perpetuity. This approach avoids disproportionate negative reaction to loss, in this case related to price increase.

Fourth, following Benartzi and Thaler (2004), buyers or increased financial contributions may be best sought in good economic years, when beneficiaries, whether individuals, companies, or Finance Ministries, are less likely to perceive payments as a loss of existing resources.

2.5 Default preference

When making decisions, people exhibit a preference for whichever option would take effect if they didn't actively make a choice. This preference expresses itself in contexts ranging from retirement contributions (Benartzi and Thaler 2004) to organ donation (Johnson and Goldstein 2004). In the latter case, consent in Germany, which requires citizens to opt-in to donation, was 12%, while in culturally similar Austria, which requires citizens to opt-out, consent is 99%. Ferraro (2014), describes an experiment underway at the time of writing, in which the United States Conservation Reserve Program (US CRP) is assessing the impact of changing the default environmental practices to be implemented by participants, comparing the current situation where no practices are checked by default and the participant checks those they will carry out, to a situation in which the most appropriate practices are checked by default and the participant must uncheck those they do not want to do.

Beyond shifting the default in PES programs with a voluntary menu of conservation options such as the US CRP, other possible applications of this issue cover the range of potentially flexible elements of a contract, and might even include indicating willingness to participate in the types of research suggested in this study.

Table 1: Important non-monetary elements of economic decision-making and options for including them in PES design

Determinant	Description	Relevance to PES	Opportunities for inclusion in PES design	Research to design	Priority for implementation
Intrinsic motivation	Most people have some level of existing motivations to forego personal gain for the good of society	Intrinsic motivation contributes to communal resource management and environmentally responsible behavior more broadly. External incentives may displace these intrinsic motivations.	- choose incentive structures that least displace intrinsic motivation for conservation - make more visible the names of participants whose compliance with contract commitments is exemplary	- experimental games to test differences in contribution to the public good in the presence incentive variants - randomized test of the impact of publicizing names of exemplary compliance	Fifth: likely important but potentially hard to address, including different reactions in different contexts
Social norms	People weigh the decisions of others when making their own choices, and are more likely to choose behaviors that appear to be the norm	Communications can positively or negatively affect the choice to comply with (and possibly sign up for) agreements by signaling norms of behavior	- use communications highlighting high levels of compliance to establish a positive norm - focus on early success to establish for all that doing their part is the norm - create groups where paying for the ES in question can be established as the norm	- randomized test of the impact of assigning promising message variants to different groups of participants.	First: likely significant impacts from communications even where unintentional; easy to improve and test
Fairness and reciprocity	Perceptions of fairness in market transactions affects willingness to behave in a prosocial way	Perceived unfairness in eligibility or payment amount criteria could result in non-participants conserving less than they would have without the PES program	- ensure that the amount of and eligibility for payment payments is justified by a standard perceived by participants as legitimate - for incentives to communities incentives in the form of in-kind public goods can reduce perception of unfairness in internal allocation of incentives	- surveys of perceived fairness of different hypothetical standards	Second: of central importance to improved targeting of deforestation risk. Impossible to settle on perfect criteria, but improvements possible

Determinant	Description	Relevance to PES	Opportunities for inclusion in PES design	Research to design	Priority for implementation
Reference dependence and loss aversion	Losses are perceived as worse than gains of the same monetary value	PES incentives will have a greater impact once participants are receiving them. Changes in design (amount, eligibility) the decrease benefits may provoke a disproportionate reaction	- ensure that transgression of contracts is monitored and results in loss of incentives - emphasize to buyers and sellers the potential ES of not participating - avoid where possible making previously eligible people ineligible, or reducing payment amounts - focus on good economic years when seeking to increase scope of payments	- contingent valuation to test whether potential participants' willingness to accept payment for enrolling their land changes if they are provided with information regarding the value of ES at risk	Fourth: impact unclear but basic applications are straightforward
Default preference	Where people face choices, the action that would happen if they made no active selection is preferred	Where there are variants to be selected by participants, the default option will be extra attractive	- carefully choose the default in PES programs with a voluntary menu of conservation performance or options		Third: easy to apply but scope for impact unclear

3 Conclusion

This study reviews several of the basic non-monetary factors at play in economic decisions. We argue that incorporating an understanding of these into PES design offers significant scope to both increase uptake of agreements and help ensure compliance with commitments, without increasing costs. This conclusion is not intended to imply that the fundamental logic of PES – providing benefits sufficiently large as to make foregoing economic activity attractive – is wrong. But PES can accomplish conservation more efficiently, and with potentially greater satisfaction on the part of participants, by considering these additional factors.

Several opportunities seem particularly clear. Among them: 1) use communications that make good performance visible, taking advantage of image motivation and preference for societal norms to generate additional incentives to comply with agreements; 2) ensure that criteria used to determine program eligibility and/or payment levels are simple and likely to be perceived as fair; 3) use caution and where appropriate careful communications around making existing participants ineligible or reducing the amount of incentive provided; and 4) take advantage of good economic times, and where appropriate of the existence of relatively small and similar groups of beneficiaries, to increase scope of payment for services. For all four themes, PES programs' ability to make use of the underlying behavioral issues would be greatly improved by focused and relatively low-cost research carried out either before implementation or using experimental designs to learn by actually testing alternatives.

Effective incorporation in PES design of the other issues mentioned here appears more complex but may nonetheless be impactful. In particular, we highlight the importance of avoiding the displacement of existing incentives, and supporting recipients of communal payments in developing benefit sharing arrangements that are perceived internally as fair. However, these too could likely be readily and rapidly informed by research. Accordingly, we conclude that the time is ripe for far broader incorporation of non-monetary incentives into PES programs. Doing so, with appropriate caution, is likely to allow PES to achieve significantly more conservation and participant satisfaction without increasing costs.

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