No crowding out among those terminated from an ongoing PES program in Colombia

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Abstract

This paper presents novel evidence of no crowding out, of either motivations or donations, among those terminated from an ongoing program of payments for ecosystem services (PES) in Colombia. PES programs have risen in number. However, claims about perverse impacts after programs end could inhibit their growth. PES end for different reasons (planned duration, budget reduction, issues in implementation) and in different ways (some participants or all). An expressed concern for PES is that receiving payments lowers conservation, after PES end, if participants' intrinsic motivations for conservation are 'crowded out' by financial incentives. We test for crowding out by an ongoing program in which some but not all contracts were terminated. We see no evidence of crowding out, since neither the motivations nor the donations for the terminated farmers are significantly different than for non-PES land owners (and this is robust to matching on levels of assets, residence on farm past donation behavior, main economic activity, and participation in collective activities). Our results add evidence from an actual PES to literature questioning the relevance, importance and even sign of crowding effects.

Keywords: *payments for ecosystem services, crowding, motivations, conservation, Colombia*

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1. Introduction

Payments for Ecosystem Services (PES) have received great interest recently, as one instrument for mitigating climate change and conserving water, forests, and biodiversity. Worldwide, currently there are over 550 active PES programs transferring US$36 billion (Salzman et al., 2018), while other PES programs unsurprisingly have already ended, since many PES programs never intended to pay forever. Quite often, some or all contracts within a PES program end for programmatic, technical, budgetary, and political reasons: within Colombia, armed conflict has interrupted payments (Moros et al., 2020); PES in Ecuador was unexpectedly suspended for two years (Etchart et al., 2020; Hayes et al., 2021); in Mexico, hundreds of early beneficiaries were not renewed due to budgets and changes in eligibility (Izquierdo-Tort, 2020). Similarly, in the specific case we study in Colombia many early beneficiaries were terminated by the PES program itself, due to changes in the geographical criteria for eligibility.

Payments which end, it is hypothesized (Rode et al., 2015), could undermine PES' goals by reducing private non-monetary motivations to conserve ('motivational crowding out'). PES' cumulative impact could then be negative − even if economic incentives temporarily increased the desired behaviors − if having been paid in PES lowers, below the no-PES level, one's private post-PES pursuit of PES' goals (Agrawal et al., 2015; Chervier et al., 2019; Maca-Millán et al., 2021; Muradian et al., 2013).

Any 'fairness effects' are another reason motivations and behavior might shift negatively or positively regarding PES. If only a sub-set of PES contracts are terminated, then fairness concerns could add to the issues above in further reducing private desires to contribute to PES' goals. Specifically, it could be worse if the neighbors' PES payments do not end. That is, farmers might choose to no longer privately undertake conservation not only because being paid distracted them from their prior public orientation but also because they think it is unfair that their neighbors are still paid while they are not. Conceptually, in Self-Determination Theory individual perceptions of fairness are a sub-moderator, linked with autonomy and social-relatedness (Ezzine-de-Blas et al., 2019). If former PES participants see termination as unfair, this could lower social-relatedness, resulting in 'motivational crowding per justice considerations'. Yet if terminated participants do not see exclusion as unfair, as was the case for some exclusion rules in Alpízar et al. (2017, 2015), there is no reason for autonomy or social relatedness to shift. Those papers find negative effects on donations if exclusion is based on prior environmental behaviors − versus random selection or technical criteria – specifically, excluding based on high pro-sociality ('taking this for granted'). Bernal-Escobar et al. (2021) builds on this in a

lab-in-the-field experiment with Colombian farmers, exploring 'unfairness spillovers' from PES only for neighboring areas. They find such exclusion reduces conservation, after the PES had ended, when perceived as unfair by PES non-recipients, in particular when those farmers are averse to inequality.

Yet some lab-in-the-field studies see no behavioral 'crowding out' from payments ending (Andersson et al., 2018; Handberg and Angelsen, 2019; Kaczan et al., 2019; Lliso et al., 2021; Salk et al., 2017). Other studies even find some behavioral 'crowding in' (Andersson et al., 2018; Moros et al., 2020; Narloch et al., 2012). Such results motivate empirical inquiries about the outcomes within actual PES. Building upon all of these lines of work, we present the first evidence based on selective contract terminations within an actual PES program. This PES ended a subset of the participants' contracts based on shifts in technical eligibility criteria. We use this setting as one initial natural experiment to assess the impacts on terminated participants.

The PES we study is "*Yo Protejo, Agua para Todos*" ("I protect, water for everyone") in Colombia, specifically in Cundinamarca. We created new behavioral outcomes for studying pro-environmental preferences by soliciting *donations* to NGOs that work on forest conservation as well as by surveying participant *motivations*, with questions based on Self-Determination Theory (Ryan and Deci, 2000). We focus on participants terminated after its 1st phase, while including participants who continued to be paid in its 2nd phase. For comparison, we collected data for landowners who were not participants yet who live in the same areas in which the PES was implemented and satisfy the eligibility criteria.

PES termination could in principle 'crowd out' the private desire to conserve, in which case one might expect lower donations and motivations for terminated participants than for people never in the PES. Yet for our new behavioral outcome, *donations*, we find no significant differences between terminated PES participants and landowners never in PES. Further, we find no differences in *motivations* across those terminated from the PES, those retained, and those not involved. Thus, behavior and motivations evidence for an actual PES termination does not support a conclusion of conservation 'crowding out' via PES. This result is robust to matching the subjects on differences in land owned, residence on farm, and past donation behavior (Figure S2 and Table S4), as well as additionally including main economic activity, and participation in collective activities (Figure S3 and Table S5). Supporting that result, those terminated did not report disappointment or see their exclusion as unfair.

In sum, our study contributes to emerging empirical literatures questioning the relevance, importance and even sign of crowding (see Akers and Yasué, 2019 for a review) as well as fairness considerations

in PES (Bernal-Escobar et al., 2021; Wells et al., 2020; Wunder et al., 2020, 2018), among other domains of action (for lack of crowding-out from payments on vaccinations see Schneider et al., 2023). That said, we note up front that a limitation on this evidence is having only post-intervention data, and in this setting, as is often the case, participants self-selected into this PES (not a random treatment allocation).

2. Cundinamarca's PES Program

Colombia has a national PES regulation and a target of 1 million hectares by 2030 to be implemented via decentralized initiatives. In 2015, Cundinamarca department launched the first publicly funded PES scheme ("I protect, water for all"), before the national government had issued its PES regulation. This PES made substantial economic transfers to its participants. The PES participants in our sample reported receiving a median of total PES transfers of 3.3 times their monthly income levels.

This PES has had 3 phases, with design changes over time including shifts in environmental targeting (Table 1), following some form of adaptive management. Its shifts can be explained by three factors: (i) evidence of limited ecological connectivity during the 1st phase of the program; (ii) the involvement of a new and experienced stakeholder as an operating agency; and (iii) shifts in national environmental regulations that affected the goals driving the ongoing implementation of the scheme (Moros, 2019).

This scheme's "logic of removal" was based on shifts in environmental criteria. Phase 1 (2015-2016) paid 277 landowners to preserve forests and fence water sources. Phase 2 (2016-2017) kept only 140 of those former participants, given new geographical criteria based on ecological corridors. Phase 3 (2018-2022) had new goals, including a focus on a new set of municipalities, resulting in only 26 initial participants being retained (Moros, 2019). Our data were all collected between Phases 2 and 3.

While participants could not have been sure a 3rd phase would be implemented (and the eligibility criteria for a Phase 3 were being debated at Patrimonio Natural), there could have been expectations that the program would be continued in some way. However, after a participant had been terminated, renewed participation was not to be expected. Importantly, removal after Phase 1 or Phase 2 was *not* a function of any conservation choices by these land owners during Phase 1, i.e., of land uses on plots. In fact, the operating agency communicated to all involved, and emphatically, that removals were due to new geographical criteria that favored ecological connectivity. Field technicians informed removed participants that their contracts were not being renewed specifically because of the program's new

ecological targeting strategy. That these terminations seem exogenous to choices offers an opportunity to study effects of some being excluded from an actual PES program while others continue to be paid.

Table 1 **Cundinamarca PES program's characteristics, by phase**

	PHASE 1: 2015 - 16	***PHASE 2: 2016 - 17***	***PHASE 3: 2018 - 22***
# municipalities	49	30	18
# enrolled plots	341	177	257
# enrolled hectares	6.465	3.928	7.791
# participants	277	140	180
# of prior excluded	---	137	114
# of prior retained	---	140	26
Contract Length	8-17 months	6-8 months	11-16 months
Payments Amount	US$ 130-200 / hectare / year	US$ 130-200 / hectare/ year	US$ 20-200 / hectare/ year
Payments Type	cash	cash & in-kind	cash & assistance
Payments Differ	no	no	Yes
Payments Duration	temporary	temporary	temporary
Payment Ex-Ante?	30% at agreement	30% at agreement	30% at agreement
Conditioned On?	activities	activities	activities, results
Training Workshops?	no	yes	yes

Source: Own elaboration based on official program records.

3. Methods

3.1. Field Design

We conducted field research in October and November of 2018, recruiting participants via phone calls for a face-to-face survey on opinions per environmental issues. We took experimenter demand effects seriously, emphasizing that this was research by the Universidad de los Andes (in Bogota, Colombia). In our protocol, researchers introduced themselves as part of a research team, independent of the PES. When we first approached any potential subject, via a phone call, we used a script. Then if somebody agreed to participate in the survey, when we visited them at their farms in order to conduct the donation experiment in person, again we identified ourselves as university researchers (using a script) and we explicitly mentioned that the data were to be used exclusively for research purposes.

We contacted participants in Phase 1 and Phase 2 of this PES, in addition to the nearest landowners who had forest in the same area yet were not in the program ("non-members"). Thus, our non-member

controls live in the ecological areas identified by the program and they fulfill the eligibility criterion of formally owning a forest plot. For PES participants, we used official registers with phone numbers, aided by Patrimonio Natural, the operating agency. From the 277 potential participants in the PES: 78 could not be reached as their numbers were invalid, wrong or not working; 61 agreed to participate but could not be reached in the field interviews; and 15 refused to participate, having sold their land, being uninterested or being unavailable. This yielded 123 study participants who had been in the PES.

We set appointments for one-on-one interviews at their plots or in nearby villages. For non-members, once the interviews with PES members were finished, we visited the nearest owned forest plot, where we asked non-member households about willingness to participate in this activity. During these visits, again interviewers introduced themselves as researchers from Universidad de los Andes conducting independent research on environmental opinions. We tried hard to not be linked to the PES program, though of course we cannot eliminate the possibility that, in their minds, people connected us to PES. That said, it is also worth noting that both current and former PES participants have frequent contacts with the technical team of Patrimonio Natural. Thus, we believe that it was quite clear to them all that the interviewers from Universidad de los Andes were not a part of the organization funding the PES.

We compensated interviewees for their time (20,000 Colombian Pesos, ~ US$5). We then offered an option to donate any of that compensation to one of three national environmental NGOs (Tropenbos, Fundación Gaia, and Fundación Omacha) which aim to conserve and sustainably manage forests. We matched (1:1) the donations made by our participants and then transferred those funds to the NGOs. Our aim was an incentivized measure for people's willingness to do something for the environment, i.e., one that is not subject to hypothetical bias and overstatements of values − as can be common in contingent valuation methods (Hausman, 2012). In our sample, 24% of participants (48 out of 203) had donated before to an NGO, at least once and 16% (33 out of 203) knew at least one of the environmental NGOs to whom they could donate in our study. These NGOs were intentionally national (rather than international) NGOs.

Interviews included recall questions concerning participants' experiences with PES − with half of the participants randomly assigned to answer before and half after donating (with no impact on donations; see SM Table S9). We also asked about socio-demographics, opinions on this PES, overall interest in and perceptions of local environmental governance, trust, and motivations (links to questionnaires are in Supplementary Section S3). We follow Moros et al. (2019) in distinguishing six pro-environmental

motivations[1]: (1) internal; (2) social; (3) monetary; (4) fines; (5) external locus of control; (6) amotivation. Non-member subjects had the same one-to-one interview (except, of course, no recall questions about PES or terminations).

3.2. Data

The resulting sample had 56 people who participated in this PES but only in Phase 1, due to contracts being terminated ("Members-Terminated", MT), and 67 people in Phase 1 who had also continued as Phase 2 participants ("Members-Retained", MR). Lastly, we had 80 rural landowners who were not in PES while being from the same area ("Non-Members", NM). We sampled the whole population of PES members and as many landowner controls as the logistics and budget constraints permitted, to allow matching on attributes for analyses. Given our sample, the analyses presented in the manuscript are powered to detect differences in donations larger than 3525 Pesos − which would correspond to a 'medium-sized effect' in a sense of roughly 0.5 standard deviations – employing conventional power (80%) and significance (5%) levels in comparing MT to NM.[2]

To test for differences between sub-samples in the observable characteristics, we used t-tests. We find that MT and MR do not differ significantly (joint F-Test: $F_{22,\ 100}$=1.07, p=.4), consistent with terminations being programmatic versus, e.g., based on the characteristics of initial PES participants.

However, MT ($F_{26,\ 109}$=1.81, p=.02) and MR ($F_{27,\ 119}$=1.88, p=.01) differ from those never in PES (NM). MT and MR had bigger plots, were less likely to be only farmers (versus cattlemen or formal employees as well) and less likely to live on the farm (Supplementary Table S1). Such differences are not surprising if participants select into the program. Some such differences also could be relevant for donations. Thus, to start we control for observable characteristics within our analyses, initially simply within regressions then by pre-matching on farm size, residence on farm, and past donation behavior (Figure S2 and Table S4), as well as in addition main economic activity, and participation in collective

[1] (1) Internal is an average of the following 4-point Likert-Type survey items (Cronbach's α=0.72): *"Guilt from damaging the forest.", "Joy from taking care of the Forest.", "Regret if I damage the forest.", "I feel proud to take care of the forest."* (2) Social is an average of these 4-point Likert-Type items (Cronbach's α=0.57): "*My neighbors would criticize me if I damage the forest.", "The people closest to me would be upset with me if I knock down the forest.";* (3) Monetary is based on: *"Take care of the forest only if paid."* (4) Motivated by fines is based on: *"I do not damage the forest for fear of fines that the environmental authority can give me."* (5) External LoC is based on: *"There is very little we can do to reduce deforestation."* (6) Amotivation is based on: *"There is no point in protecting the forest."*

[2] The analyses presented in the Supplementary Material based on matching are powered to detect differences in donations larger than 4151 Pesos employing conventional power (80%) and significance (5%) levels in comparing MT to NM.

activities (Figure S3 and Table S5), before doing regression analysis on the matched sample. This matching strategy has low explanatory power (7% with the 3 first variables, 13% with the 5 variables) for the selection process into the PES program. It is possible that environmental attitudes or motivations from before the launch of this program would have had significant explanatory power, but those data are not available.

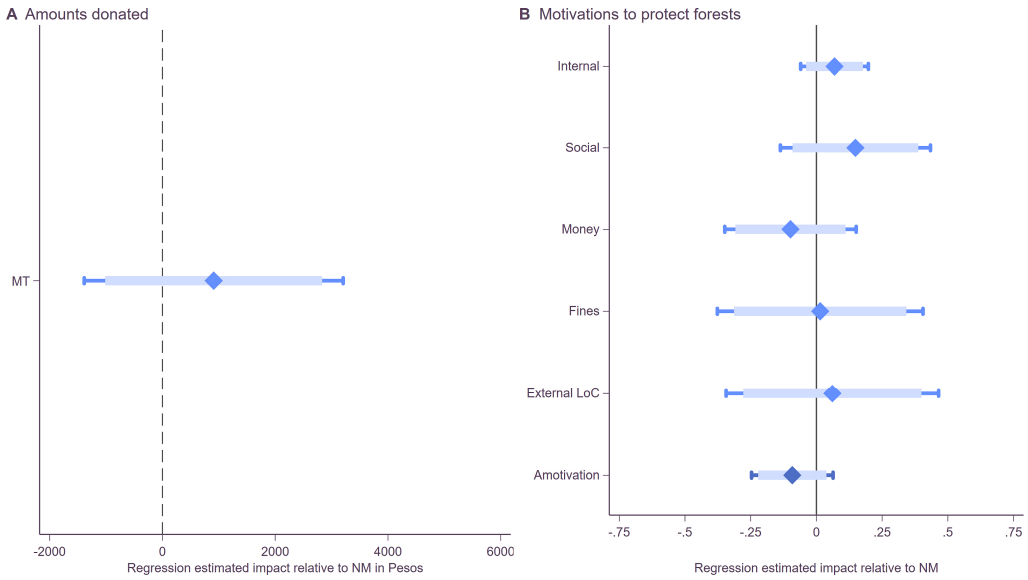
Having only post-intervention donations behavior, we cannot use outcomes differencing to control for unobservable characteristics relevant for donation and linked to selection. However, data from the questionnaires show that self-reported previous donations to charitable organizations and knowledge regarding the NGOs they could donate to in this study are balanced across our groups (Supplementary Table S1). This it gives us some confidence that our donation results may not be driven mainly by unobservable characteristics related to broad across-group variations in pro-social tendencies.

4. Results

4.1. Does termination crowd out donations or related motivations?

Most participants gave positive amounts for forest conservation (only 14 of 203 gave nothing). Thus, we focus on donations' amounts (intensive margin), not the likelihood of donation (extensive margin). Figure 1, Panel A communicates our estimates resulting from an ordinary least squares regression in which we control for observed difference in socioeconomics, trust, community involvement, and prior experiences with the NGOs that were included in the donation task. Our main result is that donations by MT (terminated from PES) are not below NM (never members of PES). In fact they are *above*, if not significantly (β=909; p=0.43; 95% CI=-1,387, 3,205), consistent with no crowd-out for terminated participants relative to never-PES. (For results using donations by MR, see Supplementary Table S2.)

Figure 1. **Donation and Motivation Outcomes: Terminated From PES (MT) vs. Never In PES (NM)**



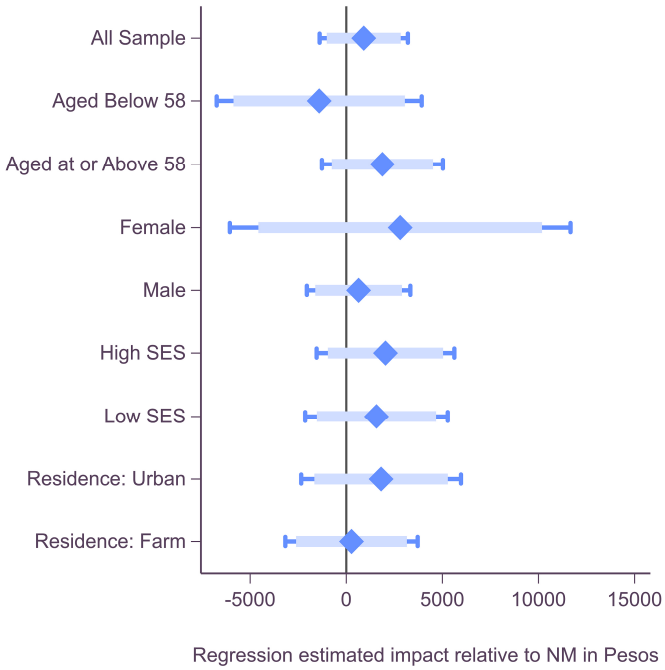
Notes: Regression-estimated effects (ordinary least squares) of MT relative to NM. Panel A shows effects on donations while panel B shows the estimates on motivations. Heteroskedasticity robust standard errors were used to compute 95% (thin bars) and 90% (thick bars) confidence intervals. In addition, we control for MR, gender, age, education, household income, number of farms, farmland size (in ha), residence on farm, general trust, community trust, family trust, participation in community organizations (civic, political, productive). For the donations model, we also include their experiences with the three different NGOs they could donate to. The stars indicate whether differences are statistically significant at the following levels: *** p<0.01, ** p<0.05, * p<0.1. Full regression outputs and robustness checks are reported in Supplementary Table S2 to S6.

To address potential selection issues, i.e., differences linked to voluntary decisions to join in the PES, we match to remove differences in land sizes, residence on farm, past donation behavior, main economic activity, and participation in collective activities, between MT and NM (section S2 in the Supplementary Material). These factors are correlated with PES participation or significant predictors of donations. Regression analysis on the matched sample – which improved balance in these covariates – shows the same result: donations not differing significantly between MT and NM (using various matching approaches, Supplementary Table S4 and Table S5).

Yet, these are not the only factors driving participation, and motivations may as well be relevant. Regarding conservation motivations, though, Panel B of Figure 1 shows no differences across groups. We find no significant differences between the MT and NM groups, including in doing regressions using the matched sample (see Supplementary Table S6). One potential explanation is the consistently

high internal motivations to protect forests (Cronbach's alpha=0.72) – see, e.g., the average scores of 3.82 out of 4 on a Likert-scale, for four statements, with 69% completely agreeing with all four.[3]

Figure 2. **Donations BY Sub-group: Terminated From PES versus Never In PES**



Notes: We plot the estimated donation amounts for the MT group for the full sample, same as in Figure 1**.** Panel A, and use sample splits based on sociodemographic factors relative to non-participants (NM). Estimates are from ordinary least square regressions controlling for MR, gender, age, education, household income, number of farms, farmland size (in ha), general trust, community trust, family trust, participation in community organizations (civic, political, productive) and experiences with the three different NGOs they could donate to. Heteroskedasticity robust standard errors were used to compute 95% (thin bars) and 90% (thick bars) confidence intervals. The stars indicate whether differences are statistically significant at the following levels: *** p<0.01, ** p<0.05, * p<0.1. Full regression outputs, including MR, reported in Supplementary Table S8.

Next, we break down Figure 1's Panel A result – no difference in average donations − to see if any sub-groups differed in donations. We consider age, gender, income, and residence being urban or on a farm. Figure 2, using these sample splits, shows our main result of no difference between terminated (MT) and non-members (NM) is consistent across subgroups. (For MR see Supplementary Table S8.)

4.2. Additional support for no crowding out

[3] Asking whether motivations explain donations (Supplementary Table S7), we find donations are negatively correlated with stronger social motivations (peer pressure) to protect the forest. Using sample splits, this is mainly driven by NM. It is potentially consistent with substitution beyond the actions one takes on one's own land and acting to affect other land.

Additional evidence supports a lack of crowding out, for motivations or donations, due to having been terminated from this actual PES. First, terminated participants (MT) if anything are a bit *more* satisfied with this PES program (Mann–Whitney U (MWU) test z_{121}=3.06, p=.002) than those retained (MR). Based on field discussions, we believe one explanation for this may be that Phase 1 paid 100% in cash and that this approach was viewed more positively than Phase 2's mix of cash and in-kind payments[4].

Second, among terminated participants (MT), those who know someone still being paid by the PES are slightly more satisfied (MWU test z_{55}=1.80, p=.071). Theories of inequity aversion might predict exactly the opposite. This is consistent, however, with not only a lack of significant crowding out but also lower satisfaction with the PES program's 2nd phase, as just discussed – such that any terminated participant who knows a retained participant might assess his own PES experience as relatively better.

Third, we find no evidence of self-reported increases in tree cutting by the terminated (MT) group, with only four reporting cutting trees, compared to five among the retained (MR) – even though those still in PES might well feel pressure not to cut at all. Fourth, terminated participants (MT) perceive the selection process as fairer (MWU test z_{103}=2.72, p=.007) than do retained participants (MR).

Finally, making PES and termination salient prior to the donation decision – via question ordering – did not influence donations (Supplementary Table S10). All of these data point in the same direction: terminated participants do not express hard feelings, or relatively negative experiences, with this PES.

5. Conclusion

Given limited budgets for environmental conservation, PES designers have good reason to consider who gets paid, and for how long; then potentially revisit these questions throughout a PES program. These are key design choices and, in some cases, a natural part of an adaptive-management approach.

This can motivate targeting across space, e.g., trying to exclude all of the locations where forest would remain anyway, in order to encourage forest that is additional to baseline (Pfaff and Robalino, 2012). Other forms of spatial targeting aim for agglomerations or critical masses of forest habitat, to generate ecological connectivity, a rationale not directly related to conservation activities by PES participants and one which was central in the Cundinamarca PES we studied. Over time, those who pay generally do not appear to intend to pay forever. PES ending for everyone, or selective termination of only some

[4] Participants may not even want long-term contracts, versus land-use flexibility (Balderas Torres et al. 2013; Engel 2016).

PES contracts, is likely to be a common phenomena. To the best of our knowledge, we presented the first evidence concerning impact on conservation choices of selective termination from actual PES.

Our results suggest no crowding out, either of conservation motivations or of donations, due to having received payments which ended. Conservation donations for terminated members are (insignificantly) *above* those by landowners in the same area who were never in the PES. Terminated PES participants do not even report more negative opinions about this PES program than participants who still get paid. Self-reported conservation motivations are not significantly different across any of the three groups. Improved understandings of all temporal spillovers of these types can help within future PES designs. That said, in light of Alpizar et al. (2015), caution is required in extrapolating results to where compensation is not offered due to higher past private conservation ('taking it for granted'). Further, and consistent with this lack of negativity and with 'crowd-in spillovers' to other behaviors, those still retained in the PES donated significantly more in our study (see Supplementary Table S2).

These initial empirical results for terminations from an ongoing PES do, though, face data limitations that future studies could try to overcome in order to increase the ability to sharply attribute causality to termination from the PES. What we measure is a combination of selection into the PES program (controlled for in the analyses using only observables), any crowding, and perhaps endowment effects from the PES payments. These will all inherently be part of voluntary participation within temporary PES.

Also, we were limited to 123 actual PES participants (67 retained, 56 terminated) and a random selection of controls (n=80) among nearby landowners that yielded differences in observable characteristics (such as gender, incomes, or farm size) relative to PES participants. We controlled for these differences in regressions and through matching on key variables that differed between groups that also explained variation in donations or participation in the PES program. Future studies could benefit from data prior to PES implementation (and randomizing payments). Those could help to identify baselines for environmental motivations and behaviors of PES members. Future research should also address the relevance of the relationships, communication content and channels between agencies managing PES programs and the communities where they operate.

In addition, as for any experiment, our results could be influenced by experimenter demand effects, i.e., ways in which participants' behaviors responded to our presence or, in principle, our responses.

That issue too could be improved upon in future studies, with standard repeated measures of daily behaviors, i.e., more natural mechanisms for measuring landowners' pro-environmental preferences.

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Supplementary Information for

"No crowding out among those terminated from an ongoing PES program in Colombia"

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The supplementary materials are organized as follows: In supplementary section S1, we show balancing between PES participants and non-participants. In section S2, regression outputs, additional analyses and robustness checks are provided. In section S3 links to the Questionnaire are provided.

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S1 Balancing across groups

We use a joint test for orthogonality to check whether there are significant differences in terms of observables between the three groups – on average. T-tests are used to identify the mean differences of single variables. The MT (joint F-Test $F_{(26, 109)}$=1.81, p=0.02) and MR groups ($F_{(27, 119)}$=1.88, p=0.01) differ significantly from NM. MT do not significantly differ from MR ($F_{(27, 95)}$=0.98, p=0.5). MT and MR differ in the same ways from NM: bigger farms; less likely to be only farmers; more likely to participate in community.

Table S1. *Balances Across Groups*

	(1) **NM**	(2) **MT**	(3) **MR**	T-Test Differences		
Control variables	Mean/SE	Mean/SE	Mean/SE	(1)-(2)	(1)-(3)	(2)-(3)
Female (=1)	0.225	0.357	0.284	-0.132*	-0.059	0.074
	[0.047]	[0.065]	[0.055]			
Age (years)	58.813	59.089	56.851	-0.277	1.962	2.239
	[1.745]	[1.378]	[1.747]			
Max primary education (=1)	0.500	0.429	0.433	0.071	0.067	-0.004
	[0.056]	[0.067]	[0.061]			
Monthly HH income (PPP adjusted)	1259.636	1735.088	1438.698	-475.453	-179.063	296.390
	[285.452]	[323.648]	[205.176]			
Number of farms	1.613	1.607	2.104	0.005	-0.492**	-0.497**
	[0.135]	[0.172]	[0.169]			
Size of farmland (in ha)	15.554	55.274	48.190	-39.719**	-32.636***	7.083
	[3.189]	[19.715]	[8.943]			
Current residence: Farm (=1)	0.725	0.500	0.537	0.225***	0.188**	-0.037
	[0.050]	[0.067]	[0.061]			
People dependent on him/her	2.288	2.714	2.478	-0.427	-0.190	0.237
	[0.242]	[0.228]	[0.219]			
Economic activity						
Farmer (=1)	0.463	0.250	0.224	0.212**	0.239***	0.026
	[0.056]	[0.058]	[0.051]			
Cattlemen (=1)	0.138	0.196	0.194	-0.059	-0.057	0.002
	[0.039]	[0.054]	[0.049]			
Merchant (=1)	0.037	0.125	0.030	-0.087*	0.008	0.095**
	[0.021]	[0.045]	[0.021]			
Employee (=1)	0.113	0.232	0.224	-0.120*	-0.111*	0.008
	[0.036]	[0.057]	[0.051]			
Other (=1)	0.250	0.196	0.299	0.054	-0.049	-0.102
	[0.049]	[0.054]	[0.056]			
Community involvement & attitudes						
Member Civic Organization (=1)	0.200	0.268	0.254	-0.068	-0.054	0.014
	[0.045]	[0.060]	[0.054]			
Member Productive Organization (=1)	0.212	0.232	0.284	-0.020	-0.071	-0.051
	[0.046]	[0.057]	[0.055]			
Political and community participation	3.150	3.089	3.060	0.061	0.090	0.030
	[0.104]	[0.143]	[0.127]			
Participation in collective activities	1.688	1.964	1.866	-0.277	-0.178	0.099
	[0.109]	[0.127]	[0.110]			
Never collective activities (=1)	0.588	0.357	0.403	0.230***	0.185**	-0.046
	[0.055]	[0.065]	[0.060]			
Most people can be trusted	2.400	2.482	2.761	-0.082	-0.361*	-0.279
	[0.151]	[0.180]	[0.143]			
Trust in people from community	3.112	2.929	3.075	0.184	0.038	-0.146
	[0.163]	[0.185]	[0.146]			
Trust in family only	3.612	3.554	3.552	0.059	0.060	0.001
	[0.156]	[0.196]	[0.176]			
Citizens responsible for bad government	3.325	3.357	3.478	-0.032	-0.153	-0.120
	[0.100]	[0.123]	[0.109]			

Experience with NGOs						
Knows: TropenBos (=1)	0.037	0.071	0.030	-0.034	0.008	0.042
	[0.021]	[0.035]	[0.021]			
Knows: Gaia (=1)	0.087	0.125	0.119	-0.037	-0.032	0.006
	[0.032]	[0.045]	[0.040]			
Knows: Omacha (=1)	0.025	0.036	0.045	-0.011	-0.020	-0.009
	[0.018]	[0.025]	[0.025]			
Never donated (=1)	0.787	0.768	0.731	0.020	0.056	0.037
	[0.046]	[0.057]	[0.055]			
Donated once before (=1)	0.125	0.054	0.090	0.071	0.035	-0.036
	[0.037]	[0.030]	[0.035]			
Donated many times (=1)	0.087	0.179	0.179	-0.091	-0.092	-0.001
	[0.032]	[0.052]	[0.047]			
Observations	80	56	67			
F-test of joint significance (F-stat)				1.814**	1.881**	0.979
F-test, number of observations				136	147	123

Notes: We test for differences across all observed characteristics using a joint F-test of orthogonality between each of the three groups. Statistical significance levels of F-Tests and T-Tests are indicated by stars: *** p<0.01, ** p<0.05, * p<0.1.

S2 Additional results and robustness checks

Donations

An additional comparison finds that the PES participants who were retained donate significantly more than terminated PES participants or non-members. This was not directly affected by incentives in PES and it suggests crowding-in 'spillovers', to other behaviors, during payments for forest management. Participants retained by the PES program donated significantly more than non-PES (MR above NM: β=3,423; p<0.01; 95% CI=1,134, 5,713) and MT (β=2,515; p=0.05; 95% CI=-35, 5064). Sub-samples suggest the groups underlying this difference are younger, female, wealthier, and urban (Table S7).

While it might at first thought seem unsurprising that those who face incentives in the PES do more conservation than those not in PES, being in this PES does not directly affect monetary incentives to donate in our study. The recipient NGOs in the donation task are completely unrelated to the official PES. Any effect on donations from being in the PES must be due to some spillovers to other behaviors.

We can speculate. This could reflect a form of selection on unobservables carried out by the program, retaining those with greater environmental motivations − yet that is hard to see, as shifts in criteria followed technical geographic goals (ecological corridors). Coming to the observable characteristics, looking across these dimensions MR and MT did not differ (joint F-Test: $F_{(22, 124)}$=2.21, p=.003).

Perhaps this could result from farmers' decisions in light of their perceptions. Participants might, for instance, be associating our study with the actual PES program, in some fashion, and so feel pressure to donate. Yet we introduced this exercise as a research study by universities and we do not believe that participants would think that authorities would learn about their choices (into or within our study).

More likely might be that those still being paid (MR) are grateful to be in the conservation program and they (un-) consciously reciprocate their PES payments by donating more to conservation NGOs. Seemingly consistent with this interpretation, i.e., this version of 'crowding-in spillover' to donations, we find positive correlations between payments received and donations (MR r = 0.42, MT r = 0.24).

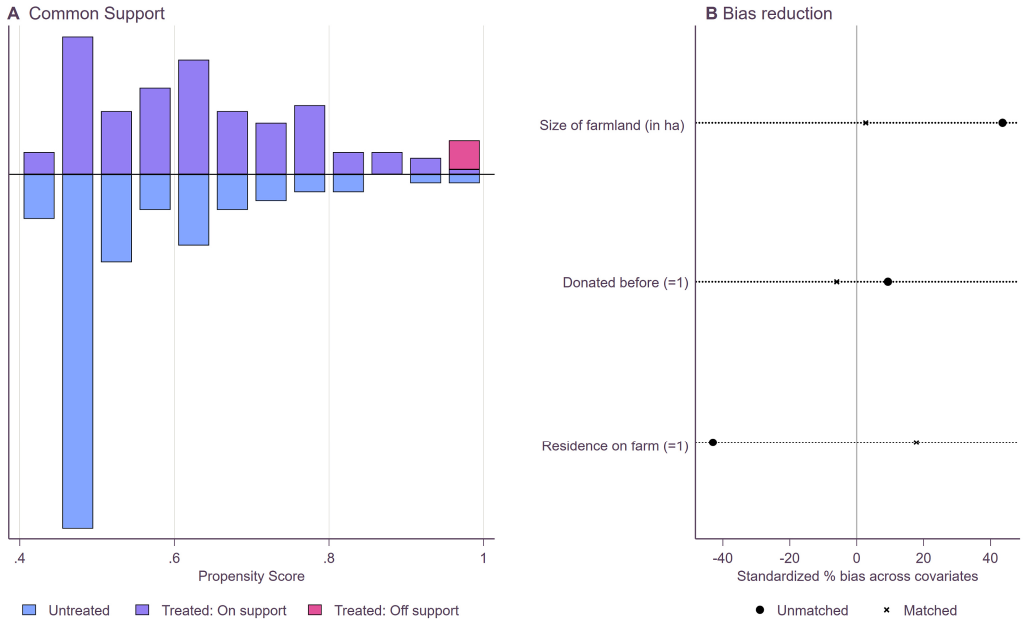
Table S2. *Donations across groups*

	DV: Donation Amount [0, 20.000]				
Explanatory variables	(1)	(2)	(3)	(4)	(5)
MT	1,771.43	788.16	1,854.71	1,362.81	909.11
	(1,164.55)	(1,116.13)	(1,162.93)	(1,152.14)	(1,163.64)
MR	4,222.39***	3,455.14***	4,026.22***	3,813.16***	3,423.68***
	(1,187.64)	(1,083.14)	(1,192.58)	(1,192.69)	(1,160.44)
Socioeconomics					
Female (=1)		30.50			-52.87
		(1,114.73)			(1,278.30)
Age (years)		-45.68			-60.06
		(31.87)			(36.82)
Max primary education (=1)		-1,618.17			-1,172.53
		(1,100.80)			(1,270.03)
Monthly HH income (PPP adjusted)		1.13***			1.12***
		(0.21)			(0.25)
Number of farms		172.09			152.66
		(453.80)			(502.89)
Size of farmland (in ha)		8.52*			9.46*
		(4.35)			(5.06)
Residence on farm (=1)		-14.25			133.92
		(1,016.38)			(1,154.32)
Trust & community involvement					
Most people can be trusted			451.76		271.33
			(504.13)		(533.16)
Trust in people from community			31.90		63.91
			(502.86)		(529.04)
Trust in family only			-698.31*		-117.45
			(362.11)		(348.26)
Member Civic Organization (=1)			-876.30		-2,310.79*
			(1,375.12)		(1,203.10)
Member Productive Organization (=1)			2,296.90*		1,689.92
			(1,375.96)		(1,310.35)
Political and community participation			260.53		474.25
			(535.53)		(512.55)
Never collective activities (=1)			544.85		861.23
			(1,101.92)		(1,121.20)
Experience with NGOs					
Knows: TropenBos (=1)				2,241.03	2,710.56
				(2,361.62)	(2,074.11)
Knows: Gaia (=1)				2,121.81	1,966.99
				(1,621.49)	(1,620.45)
Knows: Omacha (=1)				4,120.10	2,605.31
				(3,169.05)	(2,686.59)
Donated once before (=1)				1,843.47	-263.83
				(1,886.25)	(1,672.45)
Donated many times (=1)				3,739.38**	504.19
				(1,635.25)	(1,573.42)
Constant	6,800.00***	8,470.57***	6,685.51***	5,869.67***	6,357.69**
	(668.71)	(2,318.40)	(2,521.62)	(716.91)	(3,069.23)
Observations	203	203	203	203	203
R-squared	0.06	0.28	0.11	0.14	0.33
Adjusted R-squared	0.053	0.249	0.069	0.106	0.252
Joint F-tests (p-value):					
Socio-economics		0.000			0.000
Trust & Involvement			0.116		0.153
Experience with NGOs				0.002	0.350

Notes: The table shows regression-estimated effects (ordinary least squares regression) of the Terminated and Member group relative to non-members. Using a stepwise regression approach, we introduce sets of variables to explain variation in donation amounts. The last column includes all explanatory variables in one regression. Heteroskedasticity robust standard errors were used. The stars indicate whether differences are statistically significant at the following levels: *** p<0.01, ** p<0.05, * p<0.1.

Given the limited observations in the NM group, we use nearest-neighbor propensity score matching with replacement to estimate the average treatment effect in the treated (ATT) which likely differs in our study from the average treatment effect (ATE) due to self-selection of people into the PES program. Thus, we try to adjust the NM group to resemble to PES group by dropping members of the NM group that are too different from PES members. Using nearest neighbor matching (in case of ties we include both NM observations), we match on variables that differed between both groups and potentially explain variation in donations: size of farmland, whether the respondent lives on the farm, and past donation behavior.

Figure S1. *ATT: Overlap and bias reductions*



Notes: Panel A shows the area of common support of propensity scores between the NM and PES groups. Panel B shows how much differences between both groups are reduced in each matched upon variable.

For the matched sample, we use 45 out of 80 observations of the NM sample. Each PES observation is matched on average to 2.5 NM observations (median=2, max.=8). Five PES members were off the common support and excluded from the analysis, as their propensity scores were higher than the highest score in the NM group see Figure S1.We see that differences in all three variables between NM and PES participants are significantly reduced through matching. In the unmatched sample, land size, residence on farm and donation behavior explain 7% of the variation of PES participation. Land size is positively and the other two are negatively correlated with having participated in the PES. In the matched sample, these variables explain less than 1% in the participation variation and the median bias is reduced from 43% to 6%.

On average, the PES member group does not significantly differ from the NM group after matching (joint F-Test $F_{(27, 135)}$=1.39, p=0.12). The PES group is slightly more likely to include females, and less likely to include farmers and people who did not engage in collective activities in the past year, see Table S3 below.

Table S3. *Balance after matching*

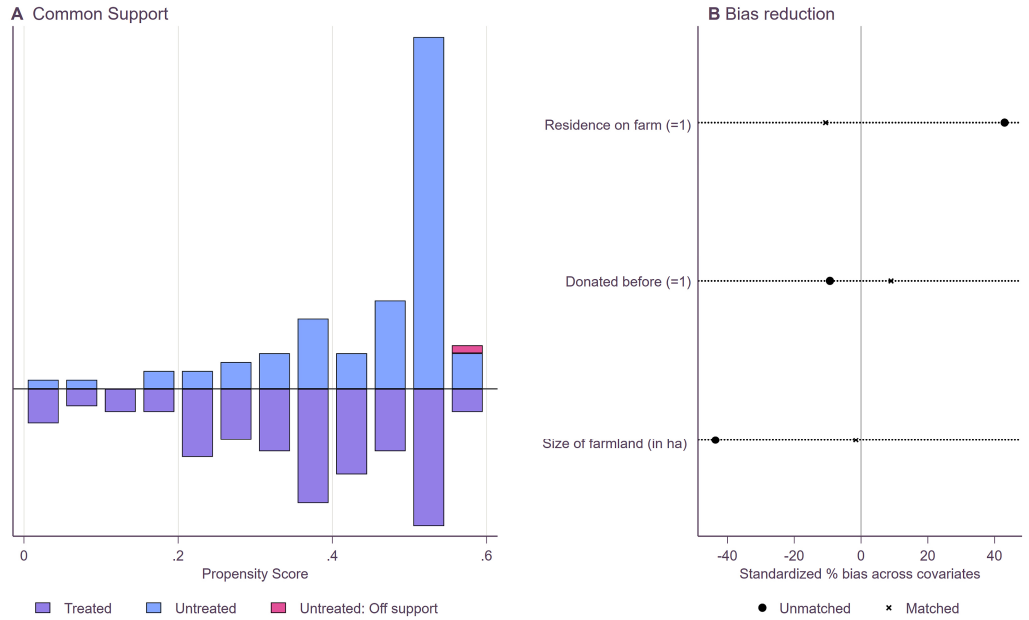
	NM (1)	PES Members (2)	
Control variables	Mean/SE	Mean/SE	(1)-(2)
Female (=1)	0.200	0.331	-0.131
	[0.060]	[0.043]	
Age (years)	55.467	58.305	-2.838
	[2.379]	[1.068]	
Max primary education (=1)	0.400	0.441	-0.041
	[0.074]	[0.046]	
Monthly HH income (PPP adjusted)	1763.028	1555.713	207.315
	[490.070]	[190.110]	
Number of farms	1.889	1.805	0.084
	[0.221]	[0.116]	
Size of farmland (in ha)	24.523	32.986	-8.462
	[5.298]	[3.426]	
Current residence: Farm (=1)	0.533	0.534	-0.001
	[0.075]	[0.046]	
People dependent on him/her	2.444	2.585	-0.140
	[0.356]	[0.162]	
Economic activity			
Farmer (=1)	0.422	0.246	0.176**
	[0.074]	[0.040]	
Cattlemen (=1)	0.178	0.195	-0.017
	[0.058]	[0.037]	
Merchant (=1)	0.044	0.076	-0.032
	[0.031]	[0.025]	
Employee (=1)	0.156	0.229	-0.073
	[0.055]	[0.039]	
Other (=1)	0.200	0.237	-0.037
	[0.060]	[0.039]	
Community involvement & attitudes			
Member Civic Organization (=1)	0.178	0.246	-0.068
	[0.058]	[0.040]	
Member Productive Organization (=1)	0.311	0.254	0.057
	[0.070]	[0.040]	
Political and community participation	3.222	3.042	0.180
	[0.131]	[0.097]	
Participation in collective activities	1.667	1.890	-0.223
	[0.135]	[0.085]	
Never collective activities (=1)	0.578	0.398	0.179**
	[0.074]	[0.045]	
Most people can be trusted	2.267	2.636	-0.369
	[0.199]	[0.116]	
Trust in people from community	3.022	3.008	0.014
	[0.221]	[0.119]	
Trust in family only	3.556	3.576	-0.021
	[0.205]	[0.132]	
Citizens responsible for bad government	3.333	3.424	-0.090
	[0.146]	[0.084]	
Experience with NGOs			
Knows: TropenBos (=1)	0.022	0.051	-0.029
	[0.022]	[0.020]	
Knows: Gaia (=1)	0.111	0.119	-0.008
	[0.047]	[0.030]	
Knows: Omacha (=1)	0.022	0.042	-0.020
	[0.022]	[0.019]	
Never donated (=1)	0.733	0.763	-0.029
	[0.067]	[0.039]	
Donated once before (=1)	0.133	0.068	0.066
	[0.051]	[0.023]	
Donated many times (=1)	0.133	0.169	-0.036
	[0.051]	[0.035]	
Observations	45	118	

F-test of joint significance (F-stat)	1.387
F-test, number of observations	163

Notes: We test for differences across all observed characteristics using a joint F-test of orthogonality between both groups. Statistical significance levels of F-Tests and T-Tests are indicated by stars: *** p<0.01, ** p<0.05, * p<0.1.

Additionally, we estimate the average treatment effect in the untreated (ATU) by trying to adjust the PES participant group to the NM group by dropping participants from the PES group. For the matched sample, we use 43 out of 123 PES observations. Each PES participant observation is used on average 1.7 times (median=1, max.=8). One NM group member was off the common support and excluded from the analysis, as his propensity score was higher than the highest score in the PES group, see Figure S2. Again, we see that differences in these variables are significantly reduced via matching. In the matched sample, these variables only explain less than 1% in the participation variation and the median bias is reduced from 43% to 9%.

Figure S2. *ATU: Overlap and bias reduction*



Notes: Panel A shows the area of common support of propensity scores between the NM and PES groups. Panel B shows how much differences between both groups are reduced in each matched upon variable.

Using only the matched samples that were on common support, we find that the ATT for the MT group is smaller (β=413; p=0.75; 95% CI=-2,104, 2,931) and the ATU is larger (β=3,185 p=0.10; 95% CI=-640, 7,011) than estimates using the full unmatched sample (see model 5, Table S2) but remains statistically insignificant across all model specifications. Simply controlling for the propensity score and using inverse probability treatment weights (IPTW) yield estimates that remain insignificant for the MT group compared to the NM group. The estimates for the MR group differ similarly but remain significant across all four model specifications.

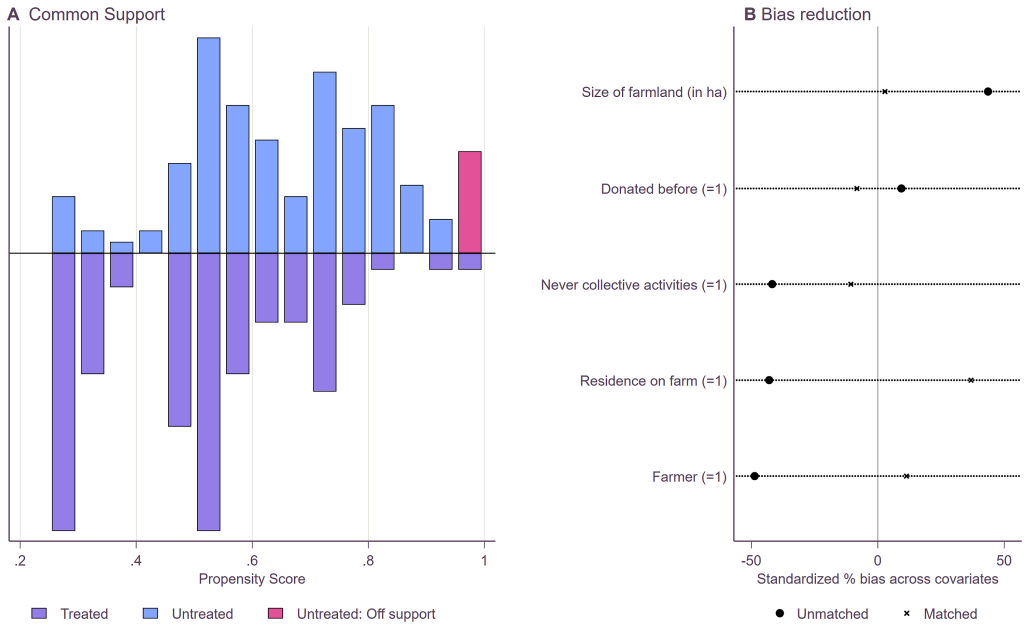
Table S4. *Donations across groups using matching, propensity score and IPTW*

	DV: Donation Amount [0, 20.000]			
	ATT	ATU	Control for propensity score	IPTW
Explanatory variables	(1)	(2)	(3)	(4)
MT	413.12	3,185.15	853.58	515.86
	(1,274.92)	(1,932.35)	(1,184.63)	(1,187.60)
MR	2,981.57**	6,687.80***	3,316.61***	2,834.12**
	(1,261.43)	(1,820.05)	(1,227.99)	(1,187.81)
Socioeconomics				
Female (=1)	3,494.20***	-805.68	9.44	-1,123.76
	(1,337.37)	(1,560.78)	(1,315.02)	(1,359.20)
Age (years)	-73.15*	-88.76*	-60.75	-39.88
	(40.28)	(49.76)	(36.84)	(36.15)
Max primary education (=1)	762.71	-764.29	-1,144.77	-2,221.65
	(1,247.74)	(1,752.47)	(1,281.23)	(1,375.15)
Monthly HH income (PPP adjusted)	1.01***	1.41***	1.11***	1.00***
	(0.18)	(0.29)	(0.25)	(0.20)
Number of farms	29.37	-313.58	141.59	54.38
	(462.75)	(682.12)	(505.58)	(438.52)
Size of farmland (in ha)	47.43**	0.46	8.02*	25.14*
	(19.98)	(26.02)	(4.57)	(12.88)
Residence on farm (=1)	555.57	2,503.21	448.86	554.22
	(1,181.45)	(1,741.02)	(1,619.64)	(1,176.38)
Propensity score			2,064.03	
			(6,688.89)	
Constant	4,182.90	6,246.02	4,992.88	10,597.74***
	(3,446.30)	(4,266.82)	(5,442.13)	(4,009.32)
Weight	Frequency	Frequency	None	IPTW
Cluster (individual)	163	122	203	203
Observations	236	158	203	203
R-squared	0.39	0.41	0.33	0.33
Adjusted R-squared	0.33	0.32	0.25	0.25
Socio-economics	0.00	0.00	0.00	0.00

Notes: The table shows regression-estimated effects (ordinary least squares regression) on donations of MT and MR relative to NM. For model 1 we only used the matched sample where we kept all 118 out of 123 PES participant observations that were on common support (ATT), while for model 2 we kept 79 out of 80 NM observations that were on support (ATU) and adjust the regression output using probability weights. In model 3 we simply control for the propensity control and in model 4 we use inverse probability treatment weighting (IPTW) without dropping any observations. In all models we additionally control for the general trust, community trust, family trust, participation in community organizations (civic, political, productive), past donation behavior, and whether they knew the NGOs they could donate to. Standard errors are clustered at the individual level. The stars indicate whether differences are statistically significant at the following levels: *** p<0.01, ** p<0.05, * p<0.1.

As a second robustness check, we match do not only match on variables correlated with donation behavior (size of farmland, whether the respondent lives on the farm, and past donation behavior) as before but also participants willingness to engage in collective actions and their main economic activity being farming. For the matched sample, we use 44 out of 80 observations of the NM sample. Each PES observation is matched on average to 1.4 NM observations (median=1, max.=7). Nine PES members were off the common support and excluded from the analysis, as their propensity scores were higher than the highest score in the NM group see Figure S3.We see that differences in all three variables between NM and PES participants are significantly reduced through matching. In the unmatched sample, land size, residence on farm and donation behavior explain 13% of the variation of PES participation. Land size is positively and the other four variables are negatively correlated with having participated in the PES. In the matched sample, these variables explain 3% in the participation variation and the median bias is reduced from 43% to 11%.

Figure S3. *ATT: Overlap and bias reductions*



Notes: Panel A shows the area of common support of propensity scores between the NM and PES groups. Panel B shows how much differences between both groups are reduced in each matched upon variable.

Table S5. *Donations across groups using matching, propensity score and IPTW*

	DV: Donation Amount [0, 20.000]			
	ATT	ATU	Control for propensity score	IPTW
Explanatory variables	(1)	(2)	(3)	(4)
MT	972.93	1,647.98	822.36	641.32
	(1,069.18)	(2,265.75)	(1,159.64)	(1,144.35)
MR	3,573.81***	2,273.97	3,290.90***	2,951.92**
	(1,108.89)	(1,756.62)	(1,217.89)	(1,198.45)
Socioeconomics				
Female (=1)	1,328.58	821.70	-33.21	-893.65
	(1,290.26)	(1,632.95)	(1,288.94)	(1,388.78)
Age (years)	-46.80	-37.93	-60.60	-47.81
	(40.09)	(40.57)	(36.82)	(35.21)
Max primary education (=1)	-1,309.46	-1,313.44	-1,075.38	-1,844.41
	(1,235.91)	(1,628.67)	(1,304.57)	(1,294.23)
Monthly HH income (PPP adjusted)	1.05***	1.45***	1.11***	1.02***
	(0.16)	(0.24)	(0.25)	(0.22)
Number of farms	110.89	-864.00	134.73	24.20
	(349.47)	(587.42)	(501.81)	(415.18)
Size of farmland (in ha)	9.14	62.53**	8.43*	21.16*
	(17.84)	(27.34)	(4.75)	(11.57)
Residence on farm (=1)	1,617.13	4,595.71**	429.04	151.71
	(1,272.61)	(1,899.46)	(1,387.42)	(1,089.39)
Propensity score			1,870.47	
			(4,821.12)	
Constant	5,300.73*	222.16	4,834.95	10,237.20***
	(3,121.38)	(4,445.86)	(5,225.34)	(3,877.86)
Weight	Frequency	Frequency	None	IPTW
Cluster (individual)	158	107	203	203
Observations	228	136	203	203
R-squared	0.40	0.38	0.33	0.31
Adjusted R-squared	0.34	0.26	0.25	0.23
Socio-economics	0.00	0.00	0.00	0.00

Notes: The table shows regression-estimated effects (ordinary least squares regression) on donations of MT and MR relative to NM. For model 1 we only used the matched sample where we kept all 114 out of 123 PES participant observations that were on common support (ATT), while for model 2 we kept 68 out of 80 NM observations that were on support (ATU) and adjust the regression output using probability weights. In model 3 we simply control for the propensity control and in model 4 we use inverse probability treatment weighting (IPTW) without dropping any observations. In all models we additionally control for the general trust, community trust, family trust, participation in community organizations (civic, political, productive), past donation behavior, and whether they knew the NGOs they could donate to. Standard errors are clustered at the individual level. The stars indicate whether differences are statistically significant at the following levels: *** p<0.01, ** p<0.05, * p<0.1.

Motivations to protect forests

For motivations we find no significant difference between MR and NM, see below.

Table S6. *Motivations across groups*

VARIABLES	Internal (1)	Social (2)	Money (3)	Fines (4)	External LoC (5)	Amotivation (6)
MT	0.07	0.15	-0.10	0.01	0.06	-0.09
	(0.07)	(0.14)	(0.13)	(0.20)	(0.20)	(0.08)
MR	0.05	-0.22	0.18	-0.15	-0.20	-0.10
	(0.07)	(0.16)	(0.13)	(0.20)	(0.20)	(0.07)
Socioeconomics						
Female (=1)	0.08	-0.12	-0.05	-0.26	-0.27	0.04
	(0.05)	(0.16)	(0.10)	(0.17)	(0.19)	(0.07)
Age (years)	0.00	-0.00	0.00	-0.01*	0.02***	0.00
	(0.00)	(0.01)	(0.00)	(0.01)	(0.01)	(0.00)
Max primary education (=1)	-0.05	0.20	0.21	0.54***	0.10	0.07
	(0.07)	(0.17)	(0.13)	(0.19)	(0.22)	(0.10)
Monthly HH income (PPP adjusted)	0.00	0.00	-0.00	-0.00	0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Number of farms	-0.06	-0.01	0.02	0.06	-0.18***	-0.02*
	(0.04)	(0.04)	(0.04)	(0.06)	(0.06)	(0.01)
Size of farmland (in ha)	0.00	-0.00	0.00	-0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Residence on farm (=1)	0.02	-0.03	-0.00	0.16	0.38*	0.00
	(0.07)	(0.15)	(0.12)	(0.18)	(0.20)	(0.08)
Trust & community involvement						
Most people can be trusted	-0.03	-0.07	0.06	0.02	-0.00	-0.00
	(0.02)	(0.05)	(0.05)	(0.07)	(0.08)	(0.03)
Trust in people from community	0.03	0.08	-0.03	0.05	-0.10	-0.02
	(0.02)	(0.06)	(0.05)	(0.07)	(0.08)	(0.03)
Trust in family only	0.00	-0.04	0.02	0.06	0.10	0.02
	(0.02)	(0.05)	(0.04)	(0.06)	(0.06)	(0.03)
Member Civic Organization (=1)	0.01	-0.10	-0.00	-0.04	-0.28	0.02
	(0.07)	(0.16)	(0.13)	(0.21)	(0.22)	(0.06)
Member Productive Organization (=1)	0.07	0.06	0.04	0.18	0.09	0.01
	(0.07)	(0.16)	(0.13)	(0.19)	(0.21)	(0.06)
Political and community participation	0.00	0.03	-0.01	-0.15*	-0.04	-0.03
	(0.03)	(0.07)	(0.05)	(0.09)	(0.09)	(0.04)
Never collective activities (=1)	-0.09	-0.14	-0.01	0.36*	0.06	-0.02
	(0.07)	(0.13)	(0.12)	(0.19)	(0.18)	(0.07)
Constant	3.78***	3.51***	0.97***	2.04***	1.56***	1.11***
	(0.20)	(0.43)	(0.36)	(0.58)	(0.54)	(0.24)
Observations	203	203	203	203	203	203
R-squared	0.09	0.09	0.08	0.21	0.20	0.07
Adjusted R-squared	0.007	0.006	0.000	0.137	0.136	-0.008
Socio-economics	0.438	0.908	0.399	0.000	0.000	0.226
Trust & Involvement	0.197	0.521	0.975	0.229	0.111	0.901

Notes: The table shows regression-estimated effects (ordinary least squares regression) for the different motivations to protect forests. Heteroskedasticity robust standard errors were used. The stars indicate whether differences are statistically significant at the following levels: *** p<0.01, ** p<0.05, * p<0.1.

Table S7. *Motivations across groups: Matched sample (ATT only)*

Explanatory variables	Internal (1)	Social (2)	Money (3)	Fines (4)	External LoC (5)	Amotivation (6)
MT	-0.01	0.16	-0.00	-0.10	-0.07	-0.08
	(0.06)	(0.15)	(0.12)	(0.21)	(0.26)	(0.09)
MR	-0.02	-0.14	0.26*	-0.22	-0.31	-0.11
	(0.08)	(0.16)	(0.13)	(0.20)	(0.24)	(0.09)
Socioeconomics						
Female (=1)	0.12	-0.27	-0.09	-0.32	-0.43**	0.01
	(0.07)	(0.18)	(0.12)	(0.20)	(0.20)	(0.11)
Age (years)	0.01	-0.00	-0.01	-0.01	0.02**	-0.00
	(0.00)	(0.01)	(0.00)	(0.01)	(0.01)	(0.00)
Max primary education (=1)	-0.22	0.00	0.54**	0.47*	-0.14	0.32
	(0.18)	(0.27)	(0.26)	(0.27)	(0.28)	(0.25)
Monthly HH income (PPP adjusted)	-0.00	0.00	0.00	-0.00	0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Number of farms	-0.06	-0.04	0.02	-0.04	-0.12	-0.02
	(0.03)	(0.06)	(0.04)	(0.06)	(0.09)	(0.02)
Size of farmland (in ha)	-0.00	-0.00**	0.00	0.00	-0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Residence on farm (=1)	0.08	0.04	-0.15	0.12	0.62***	-0.09
	(0.10)	(0.17)	(0.15)	(0.20)	(0.21)	(0.13)
Trust & community involvement						
Most people can be trusted	-0.02	-0.07	0.06	-0.08	-0.04	0.01
	(0.02)	(0.05)	(0.04)	(0.10)	(0.10)	(0.03)
Trust in people from community	0.04	0.15**	-0.06	0.20**	-0.08	-0.04
	(0.03)	(0.06)	(0.05)	(0.09)	(0.10)	(0.04)
Trust in family only	0.04	-0.04	-0.03	0.17**	0.13	-0.04
	(0.05)	(0.07)	(0.06)	(0.07)	(0.08)	(0.06)
Member Civic Organization (=1)	-0.03	-0.17	0.13	0.14	-0.02	0.04
	(0.08)	(0.19)	(0.16)	(0.27)	(0.31)	(0.07)
Member Productive Organization (=1)	0.09	0.12	-0.02	0.30	-0.13	-0.07
	(0.08)	(0.16)	(0.12)	(0.22)	(0.30)	(0.07)
Political and community participation	-0.03	-0.03	0.09	-0.15*	-0.12	0.02
	(0.05)	(0.08)	(0.07)	(0.09)	(0.10)	(0.07)
Never collective activities (=1)	-0.18**	-0.12	0.15	0.50**	-0.04	0.09
	(0.09)	(0.16)	(0.12)	(0.20)	(0.27)	(0.09)
Constant	3.67***	3.60***	1.12***	1.51**	1.84***	1.32***
	(0.29)	(0.52)	(0.41)	(0.58)	(0.67)	(0.37)
Weight	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency
Cluster ID	163	163	163	163	163	163
Observations	236	236	236	236	236	236
R-squared	0.17	0.15	0.17	0.33	0.20	0.16
Adjusted R-squared	0.108	0.086	0.110	0.276	0.147	0.102
Socio-economics	0.232	0.166	0.495	0.001	0.000	0.556
Trust & Involvement	0.097	0.110	0.760	0.017	0.200	0.827

Notes: The table shows regression-estimated effects (ordinary least squares regression) on motivations of MT and MR relative to NM. Here we only used the matched sample (ATT) and adjust the regression output using frequency weights. Standard errors are clustered at the individual level. The stars indicate whether differences are statistically significant at the following levels: *** p<0.01, ** p<0.05, * p<0.1

How do motivations relate to donations?

Donations negatively correlated with higher perceived peer-pressure to protect forests. This effect is mainly driven by NM. However, all motivations are jointly insignificant in explaining variation of donation amounts as indicated by the joint F-Test.

Table S8. *Correlation of motivations with donation amounts*

	DV: Donation Amount [0, 20.000]			
	Full	NM	MT	MR
Explanatory variables	(1)	(2)	(3)	(4)
MT	996.70			
	(1,143.58)			
MR	2,961.57**			
	(1,228.80)			
Motivations to protect the forest				
Intrinsic (enjoy, care, regret, proud)	1,493.37	1,955.14	1,013.06	-2,934.02
	(2,322.46)	(3,295.74)	(4,882.60)	(2,991.51)
Social (peer pressure)	-1,937.76**	-3,271.00**	-1,899.89	660.68
	(787.65)	(1,240.10)	(2,390.59)	(1,395.27)
External: Payments	-897.13	-172.03	-1,029.23	-1,039.20
	(805.95)	(1,505.14)	(5,385.52)	(1,545.92)
External: Fines	-156.18	497.37	-1,275.85	189.58
	(438.86)	(862.61)	(1,405.64)	(1,240.20)
External: LoC	-391.01	-607.16	-765.93	-278.70
	(474.73)	(835.76)	(1,409.93)	(947.21)
Amotivation	-86.14	-1,013.78	-2,190.68	-4,261.37
	(1,347.16)	(2,141.67)	(7,990.39)	(6,213.16)
Constant	9,477.28	3,644.97	4,439.04	21,664.58
	(9,096.97)	(15,011.39)	(20,246.52)	(16,733.58)
Additional controls	Yes	Yes	Yes	Yes
Observations	203	80	56	67
R-squared	0.38	0.46	0.65	0.68
Adjusted R-squared	0.288	0.211	0.359	0.479
Joint F-test (p-value): Motivations to protect the forest	0.105	0.307	0.733	0.948

Notes: The table shows the correlations of motivations measured using survey items with donations for the entire sample and for each group using sample splits. Heteroskedasticity robust standard errors were used to compute confidence intervals. We account for the following observables: gender, age, education, household income, number of farms, farmland size (in ha), residence on farm, general trust, community trust, family trust, participation in community organizations (civic, political, productive) and experiences with the three different NGOs they could donate to. The stars indicate whether differences are statistically significant at the following levels: *** p<0.01, ** p<0.05, * p<0.1.

Heterogeneous effects

Table S9. *PES participation effect on donations across socioeconomics characteristics*

	DV: Donation Amount [0, 20.000]								
	Full sample	Age<58	Age≥58	Female	Male	High SES	Low SES	Urban	Rural
Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
MT	909.11	2,039.59	1,570.06	2,804.59	640.84	-1,409.52	1,879.35	1,811.58	271.20
	(1,163.64)	(1,801.34)	(1,862.09)	(4,369.67)	(1,360.00)	(2,675.27)	(1,583.77)	(2,078.02)	(1,735.69)
MR	3,423.68***	5,119.88***	1,026.98	9,713.36**	1,542.32	5,278.96**	1,888.31	7,138.83***	-153.84
	(1,160.44)	(1,941.45)	(1,954.32)	(3,944.98)	(1,375.41)	(2,396.66)	(1,494.32)	(2,105.77)	(1,662.01)
Socioeconomics									
Female (=1)	-52.87	1,712.16	428.80	.	.	-1,279.56	1,254.92	-204.95	1,133.66
	(1,278.30)	(1,910.46)	(2,086.37)			(2,328.23)	(1,726.35)	(2,177.75)	(1,679.96)
Age (years)	-60.06	-95.04	13.25	33.96	-106.97**	31.67	-34.52	-43.08	-89.26*
	(36.82)	(61.50)	(49.71)	(118.35)	(47.81)	(90.43)	(85.11)	(59.27)	(51.59)
Max primary education (=1)	-1,172.53	-293.22	-1,448.01	-3,835.57	530.08	-1,834.51	-81.44	-3,279.80	2,152.26
	(1,270.03)	(2,111.96)	(2,117.69)	(2,453.28)	(1,609.12)	(2,266.95)	(1,895.14)	(2,019.92)	(1,700.04)
Monthly HH income (PPP adjusted)	1.12***	0.82***	4.27	1.20**	1.22***	1.09**	1.18***	0.85***	1.98
	(0.25)	(0.27)	(5.87)	(0.46)	(0.37)	(0.50)	(0.44)	(0.27)	(1.22)
Number of farms	152.66	266.22	-477.80	-2,034.96	280.23	-620.31	681.58	89.90	241.58
	(502.89)	(813.88)	(1,088.13)	(1,861.32)	(642.28)	(749.24)	(820.82)	(765.48)	(919.51)
Size of farmland (in ha)	9.46*	4.58	53.16	39.64	7.42	14.52	-2.66	16.35	4.92
	(5.06)	(15.22)	(73.99)	(89.84)	(5.31)	(8.87)	(18.91)	(18.11)	(25.83)
Residence on farm (=1)	133.92	609.97	2,283.21	3,680.96	-199.42	-994.39	283.89	.	.
	(1,154.32)	(1,725.36)	(2,141.49)	(4,355.72)	(1,306.31)	(2,216.80)	(1,528.07)		
Trust & community involvement									
Most people can be trusted	271.33	-40.26	50.88	-721.08	737.78	571.65	291.44	-215.53	512.84
	(533.16)	(984.98)	(573.37)	(1,373.41)	(600.67)	(1,107.38)	(557.57)	(931.85)	(636.02)
Trust in people from community	63.91	977.55	-367.17	843.00	-406.88	-137.80	15.35	757.97	-677.25
	(529.04)	(897.08)	(583.47)	(1,212.29)	(614.45)	(1,031.79)	(598.54)	(868.92)	(605.87)
Trust in family only	-117.45	439.07	-398.45	190.69	11.88	838.32	-598.13	-296.35	127.32
	(348.26)	(555.95)	(518.60)	(924.59)	(428.17)	(719.37)	(517.69)	(684.26)	(475.81)
Member Civic Organization (=1)	-2,310.79*	-2,699.14	-4,323.46*	-4,848.37	-2,281.36*	-1,997.36	-2,444.00	-4,394.36*	-2,550.39
	(1,203.10)	(1,990.39)	(2,371.91)	(5,050.63)	(1,234.34)	(2,939.95)	(1,630.22)	(2,349.07)	(1,724.01)
Member Productive Organization (=1)	1,689.92	3,403.12*	1,888.72	-3,859.13	2,249.43	2,749.20	1,429.76	3,467.31	2,083.18
	(1,310.35)	(2,025.34)	(2,796.78)	(5,079.89)	(1,486.55)	(2,578.76)	(1,869.44)	(2,289.96)	(1,878.91)
Political and community participation	474.25	626.71	296.55	433.70	467.00	832.67	420.43	-542.09	1,562.30**
	(512.55)	(776.47)	(765.16)	(1,552.28)	(613.50)	(1,005.50)	(689.21)	(827.01)	(648.98)
Participation in collective activities	861.23	1,122.69	377.84	235.06	470.98	2,148.47	546.85	-421.54	1,723.64
	(1,121.20)	(1,814.20)	(1,912.86)	(3,310.64)	(1,345.67)	(2,221.09)	(1,588.04)	(1,693.04)	(1,637.73)
Experience with NGOs									
Knows: TropenBos (=1)	2,710.56	-1,053.21	3,479.29	7,415.84	1,412.60	2,738.40	3,149.04	4,824.49*	202.78

	(2,074.11)	(5,135.75)	(3,441.64)	(7,507.55)	(2,509.40)	(7,731.94)	(3,838.14)	(2,612.08)	(3,844.98)
Knows: Gaia (=1)	1,966.99	2,122.79	2,031.17	3,932.24	2,132.49	134.70	1,470.70	873.21	1,692.87
	(1,620.45)	(2,513.33)	(2,851.44)	(6,074.71)	(1,809.86)	(5,367.77)	(1,765.25)	(2,569.36)	(2,961.03)
Knows: Omacha (=1)	2,605.31	7,185.54*	-3,908.93	-290.00	4,891.60	1,482.17	4,505.43	3,898.19	736.03
	(2,686.59)	(3,893.28)	(5,297.23)	(9,630.49)	(3,219.27)	(5,205.90)	(5,541.38)	(3,374.91)	(5,027.21)
Donated once before (=1)	-263.83	2,494.97	888.45	-1,625.10	266.64	119.79	-517.15	-1,139.32	319.77
	(1,672.45)	(2,692.71)	(2,247.25)	(6,895.65)	(2,088.87)	(2,789.28)	(3,590.23)	(2,424.72)	(2,852.04)
Donated many times (=1)	504.19	2,048.07	-7,302.46*	-1,040.77	2,312.64	512.72	1,440.89	-1,441.18	4,647.16
	(1,573.42)	(1,742.39)	(3,720.96)	(3,970.34)	(2,093.16)	(3,026.23)	(2,457.21)	(1,902.75)	(2,857.46)
Constant	6,357.69**	2,452.34	3,614.33	-246.80	8,243.99**	-911.43	5,109.71	8,466.23	3,020.34
	(3,069.23)	(5,374.66)	(5,575.22)	(8,217.87)	(3,568.57)	(6,874.48)	(5,567.47)	(6,753.24)	(3,450.00)
Observations	203	105	98	57	146	94	109	81	122
R-squared	0.33	0.40	0.24	0.49	0.37	0.32	0.45	0.55	0.30
Adjusted R-squared	0.252	0.250	0.025	0.201	0.265	0.124	0.321	0.399	0.159
Joint F-tests (p-value):									
Socio-economics	0.000	0.014	0.757	0.066	0.000	0.043	0.087	0.001	0.373
Trust & Involvement	0.350	0.382	0.645	0.851	0.356	0.772	0.703	0.268	0.209
Experience with NGOs	0.153	0.179	0.302	0.812	0.141	0.999	0.335	0.188	0.701

Notes: The table shows regression-estimated effects (ordinary least squares regression) with the donation amount as the dependent variable. The last column includes all explanatory variables in one regression. Heteroskedasticity robust standard errors were used. The stars indicate whether differences are statistically significant at the following levels: *** p<0.01, ** p<0.05, * p<0.1.

Recall treatment

The joint F-Test for orthogonality suggests that the random assignment of the recall worked to balance out differences between group doing the recall before and after the donation task ($F_{(22, 100)}$=1.22, p=.25).

Table S10. *Balancing by recall timing*

	(1) After Donation	(2) Before Donation	T-Test Differences
Explanatory variables	Mean/SE	Mean/SE	(1)-(2)
Female (=1)	0.270	0.367	-0.097
	[0.056]	[0.063]	
Age (years)	59.032	56.650	2.382
	[1.491]	[1.734]	
Max primary education (=1)	0.444	0.417	0.028
	[0.063]	[0.064]	
Monthly HH income (PPP adjusted)	1786.610	1350.022	436.588
	[292.829]	[219.568]	
Number of farms	1.841	1.917	-0.075
	[0.155]	[0.192]	
Size of farmland (in ha)	63.416	38.815	24.601
	[18.481]	[7.509]	
People dependent on him/her	0.556	0.483	0.072
	[0.063]	[0.065]	
Economic activity			
Farmer (=1)	0.222	0.250	-0.028
	[0.053]	[0.056]	
Cattlemen (=1)	0.175	0.217	-0.042
	[0.048]	[0.054]	
Merchant (=1)	0.111	0.033	0.078*
	[0.040]	[0.023]	
Employee (=1)	0.270	0.183	0.087
	[0.056]	[0.050]	
Other (=1)	0.190	0.317	-0.126
	[0.050]	[0.061]	
Community involvement & attitudes			
Member Civic Organization (=1)	0.222	0.300	-0.078
	[0.053]	[0.060]	
Member Productive Organization (=1)	0.238	0.283	-0.045
	[0.054]	[0.059]	
Political and community participation	3.032	3.117	-0.085
	[0.139]	[0.128]	
Participation in collective activities	1.794	2.033	-0.240
	[0.109]	[0.126]	
Never collective activities (=1)	0.429	0.333	0.095
	[0.063]	[0.061]	
Most people can be trusted	2.603	2.667	-0.063
	[0.156]	[0.166]	
Trust in people from community	2.905	3.117	-0.212
	[0.158]	[0.170]	
Trust in family only	3.571	3.533	0.038
	[0.173]	[0.197]	
Citizens responsible for bad government	3.413	3.433	-0.021
	[0.119]	[0.112]	
	63	60	
F-test of joint significance (F-stat)			1.217
F-test, number of observations			123

Notes: We test for differences across all observed characteristics using a joint F-test of orthogonality between treatment and control group. Statistical significance levels of F-Tests and T-Tests are indicated by stars: *** p<0.01, ** p<0.05, * p<0.1.

We find no significant effect on donations based on the timing of the recall task.

Table S11. *Effects of recall on donations*

	DV: Donation Amount [0, 20.000]				
Explanatory variables	(1)	(2)	(3)	(4)	(5)
Recall before donation	-707.69	1,564.72	-191.36	-126.02	1,113.11
	(1,946.31)	(1,898.65)	(2,149.39)	(1,975.21)	(2,059.65)
MR	2,069.70	3,885.49**	1,990.30	2,328.80	2,553.53
	(1,925.24)	(1,828.06)	(2,171.87)	(1,861.89)	(2,129.60)
Recall x MR	811.52	-3,139.94	-183.86	101.89	-1,826.43
	(2,785.46)	(2,573.95)	(3,046.91)	(2,808.56)	(2,891.89)
Socioeconomics					
Female (=1)		901.21			1,492.30
		(1,692.93)			(1,904.33)
Age (years)		-96.31**			-119.58**
		(47.78)			(57.39)
Max primary education (=1)		-2,747.32			-1,220.31
		(1,668.36)			(1,889.35)
Monthly HH income (PPP adjusted)		1.16***			1.14**
		(0.39)			(0.43)
Number of farms		759.46			992.26
		(628.74)			(601.59)
Size of farmland (in ha)		5.44			7.43
		(4.75)			(6.76)
Residence on farm (=1)		-1,102.86			-1,823.65
		(1,379.50)			(1,578.10)
Trust & community involvement					
Most people can be trusted			975.81		688.52
			(778.20)		(813.35)
Trust in people from community			342.80		639.78
			(821.62)		(818.64)
Trust in family only			-1,150.88**		-266.40
			(545.52)		(559.46)
Member Civic Organization (=1)			-2,632.03		-3,895.47**
			(2,012.46)		(1,789.86)
Member Productive Organization (=1)			3,299.53*		4,176.61**
			(1,972.81)		(1,766.80)
Political and community participation			-281.86		228.80
			(800.75)		(795.14)
Participation in collective activities			503.35		1,924.22
			(1,707.26)		(1,598.34)
Experience with NGOs					
Knows: TropenBos (=1)				695.72	370.03
				(4,070.32)	(2,570.54)
Knows: Gaia (=1)				2,563.38	2,532.32
				(2,178.18)	(2,005.33)
Knows: Omacha (=1)				8,757.61***	5,993.72*
				(3,055.96)	(3,100.43)
Donated once before (=1)				1,070.15	-2,060.83
				(3,206.38)	(2,317.63)
Donated many times (=1)				2,444.32	53.92
				(2,119.53)	(1,973.25)
Constant	8,900.00***	11,405.88***	9,954.01***	7,453.23***	7,630.61
	(1,317.90)	(3,406.27)	(3,725.37)	(1,304.37)	(4,666.35)
Observations	123	123	123	123	123
R-squared	0.03	0.32	0.14	0.13	0.45
Adjusted R-squared	0.002	0.258	0.060	0.068	0.327
Joint F-tests (p-value):					

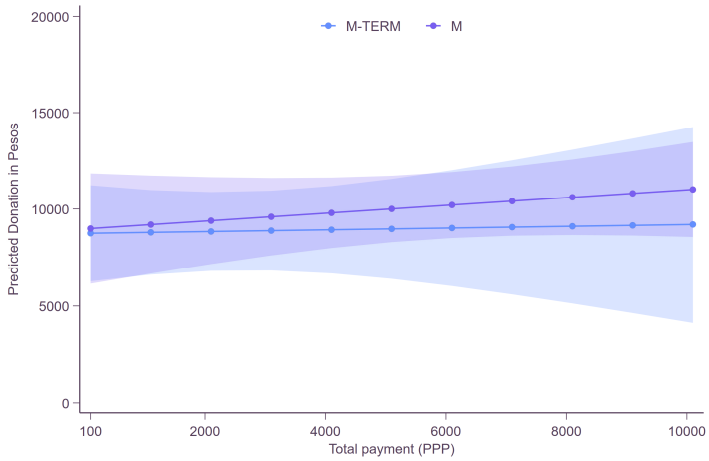
Socio-economics	0.000			0.000
Experience with NGOs			0.000	0.157
Trust & Involvement		0.028		0.043

Notes: The table shows regression-estimated effects (ordinary least squares regression) of the Terminated and Member group relative to non-members. Using a stepwise regression approach, we introduce sets of variables to explain variation in donation amounts. The last column includes all explanatory variables in one regression. Heteroskedasticity robust standard errors were used. The stars indicate whether differences are statistically significant at the following levels: *** p<0.01, ** p<0.05, * p<0.1.

Additional survey evidence

Figure S4 shows the relationship between predicted donations and the total amount of PES payments received. There are no statistically significant differences in the strength of this correlation for MR and MT.

Figure S4. *Predicted donations by received PES payments*



Notes: Plotted are the predicted donation amounts across different level of payments for MT and MR with 95% confidence intervals. Predicted marginal effects are based on a least square regression controlling for gender, age, education, household income, number of farms, farmland size (in hectares), general trust, community trust, family trust, participation in community organizations (civic, political, productive) and experiences with the three different NGOs they could donate to.

S3 Questionnaire

The translated questionnaire is available in the replication repository:

https://github.com/IvoSteimanis/pes_colombia