DEPARTMENT OF FOOD AND RESOURCE ECONOMICS
UNIVERSITY OF COPENHAGEN

IFRO Working Paper

Do public works programs crowd-out pro-environmental behavior?

Empirical evidence from food-for-work programs in Ethiopia

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2017 / 13

IFRO Working Paper 2017 / 13

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JEL-classification: D03, D64, D82, Q57

Published: December 2017

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Do public works programs crowd-out pro-environmental behavior? Empirical evidence from food- for-work programs in Ethiopia

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December 2017

Abstract

The Ethiopian food for work program typically induces forest conservation work. While economic outcomes have been studied before, little is known about the program's environmental impact. We run a choice experiment among Ethiopian farmers eliciting preferences in a hypothetical afforestation program that mimics the Ethiopian food-for-work program. We find that introducing food incentives *decreases* willingness to participate in the program and participation rate increases with an increase in the proportion of individuals selected for food incentive. We also find that the crowding-out effect is stronger when food incentive recipients are selected based on income compared to lottery-based selection. Our data points to pro-social signaling as the most likely channel for the crowding-out effect. These results suggest that (1) food-for-work programs could have unintended negative environmental effects and (2) directions for design reform that could mitigate this.

Keywords: Crowding-out; Food-for-work program, Pro-environmental behavior; Selection; Pro-social signaling;

JEL-codes: D03, D64, D82, Q57

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1. Introduction

Large-scale public works programs are increasingly used as a means to reduce poverty and vulnerability of the poor in many developing countries. The objective of these programs is to reduce food insecurity and poverty while at the same time creating employment and investment in local infrastructure and resources (Subbarao et al., 2013). The Ethiopian Productive Safety Net Program (PSNP) was launched in 2005 and is now the second largest social protection program in Sub-Saharan Africa after South Africa. Food-insecure households receive food/cash transfers in return for working on public projects and households who cannot provide labor receive a direct transfer. Many of the public projects include environmental activities such as afforestation, soil conservation, and rehabilitation of degraded lands. These projects are supposed to have a positive impact on the environment and local natural resources (Samuel, 2006). Many PSNP projects try to do this by supplementing pre-existing voluntary community works on rehabilitation and conservation of the environment. However, there is an ongoing debate on the potential crowding-out effects of extrinsic incentives (Frey, 1997; Bénabou and Tirole, 2006, 2011; Gneezy et al., 2011). These studies find that the introduction of incentives may interact with pre-existing intrinsic motivation, thereby crowding-out pre-existing voluntary behavior and co-operation. If something like this is happening in PSNP project areas there is a risk that the program instead of supplementing voluntary community works on rehabilitation and conservation of the environment may end up dissolving and replacing them.

While there is a substantial literature on the effect of Ethiopian food-for-work (FFW) program on the local and nation-wide economy[1], little is known about its impact on the environment. Gebremedhin and Swinton (2003) find that FFW program undermines private soil conservation investment when the project involves constructing soil conservation structures on private lands but not on public lands. Others (Asrat, 1995; Hoben, 1996; Abdulai et al., 2005; WFP, 2007) suggest that the program may have counterproductive environmental effects by undermining collective action and creating an incentive for increased land degradation with the expectation of future food-for-work programs.[2] This is in fact in line with recent studies that suggest that incentives, while decreasing the cost of participating in

[1] Previous studies that evaluate the impact of Ethiopian food-for-work program on various economic outcomes indicate mixed evidence (e.g., Maxwell et al., 1994; Barrett et al. 2004; Dercon and Krishnan, 2004; Abdulai et al., 2005; Gelan, 2007; Bezu and Holden, 2008; Tadesse and Shively, 2009; Gilligan and Hoddinott 2007; Gilligan et al., 2009; Andersson et al., 2011; Alem and Broussard, 2017).

[2] A recent study by Andersson et al. (2011) finds a positive effect of PSNP on private tree holding.

environmental activities, may worsen the environmental status by crowding-out environmental virtues (Vatn, 2010; Chervier et al., 2017) and undermine social norms and weaken collective action (Ostrom, 2000; Cleaver, 2000; Fehr and Falk, 2002; Vatn, 2009; Kerr et al., 2011).[3]

In this paper, we ask: Is there a crowding-out effect of food incentives on pro-environmental behavior among Ethiopian farmers targeted by FFW programs such as PSNP? We conduct a choice experiment among Ethiopian farmers eliciting preferences in a hypothetical afforestation program that mimics the Ethiopian FFW program. We ask individuals for their willingness to participate in the hypothetical afforestation program (framed as 5 days labor contribution) under incentivized and non-incentivized cases. The incentive is framed as 20kg of wheat for individuals at the bottom of the wealth distribution, varying the share of food recipients from 20 to100 percent. We find that participation rate declines when food incentives are introduced pointing to crowding-out effect of extrinsic incentives. The share of individuals in willing to participate in the program increases with an increase in the share of food incentive recipients.

We also ask individuals for their willingness to participate in a program, in which the incentive is now framed as 20kg of wheat for randomly selected participants, again varying the share of recipients from 20 to 100 percent. We do this because some studies suggest that crowding-out effects of extrinsic incentives may depend on their design (Gneezy et al., 2011) and understanding this is crucial for policy design in biodiversity conservation and environmental protection and rehabilitation (Banerjee and Shogren, 2012;Goeschl and Perino, 2012; Rode et al., 2015).[4] We find similar results as in the income-based selection, but the crowding-out effects are lower. Our results point to pro-social signaling as the main mechanism for these crowding-out effects. We show that the crowding-out effect is mainly driven by people who have higher income, previously donate money to help others, and normally participate in pro-social activities, which is consistent with the idea that the introduction of food incentive dilutes the signal of being pro-social and the idea of

[3] Others have pointed to a long lasting negative consequence that once incentives are used going back to normative appeal may not work (Gneezy and Rustichini, 2000b).

[4] Other studies suggest the role of size of the incentive (Gneezy and Rustichini, 2000b), local institutions (Vatn, 2010; Sommerville et al., 2010), and whether there is a strong pre-existing norms of collective action (Benabou and Tirole, 2006; Kerr et al., 2012) on crowding-out effects.

stigmatizing food incentive recipients for being poor and dependent.[5] Other patterns in our data are also either consistent with the signaling mechanism or inconsistent with other possible crowding mechanisms suggested in the literature.

This paper contributes to the literature on the impact of FFW programs. We uncover preferences and behavioral implications of incentives closely mimicking those implied by FFW programs among farmers who are actually targeted by these programs. Although done in a hypothetical experiment, this provides strong suggestive evidence that crowding-out effects could be present in FFW programs and pro-social signaling is the underlying mechanisms driving these results. We believe that these results have important policy implications on the design of environmental programs (e.g., framing and dissociation of food-for-work programs from environmental activities) that aim to foster pro-environmental behavior and collective action. Our results suggest that FFW programs could have unintended negative environmental effects and potential policy suggestions to mitigate unintended effects of FFW and other environmental programs. This is particularly important for Ethiopia given the countries ambitious climate resilient green economy strategy (CRGE), in which it country plans to rehabilitate 3 million ha of land (2 million ha of afforestation and 1 million ha of reforestation) by 2030 and pledges to restore 15 million ha of degraded and deforested lands by 2025.

The remainder of the paper is organized as follows. In section 2 we present a behavioral framework and discuss how incentives may crowd-out pro-environmental behavior by affecting prosocial signaling. Section 3 presents the data description and empirical strategy while section 4 presents estimation results. Section 5 concludes and discusses some policy implications.

2. Behavioral framework

Recent evidence shows that incentives sometimes crowd-out pro-social behavior. The introduction of monetary incentives has been found to affect blood and charitable donations negatively (Titmuss', 1970; Meier, 2007; Mellstrom and Johannesson, 2008), reduce previously unpaid work (Heyman and Ariely, 2004; Ariely et al., 2009; Gneezy and Rustichini, 2000b), parents timely pick-up of their children from a day-care center (Gneezy

[5] This is in line with the literature on incentives and endogenous norms (Benabou and Tirole, 2006) as well as the stigma effect of welfare dependence (Lindbeck et al., 1999; Dufwenberg and Lundholm, 2001).

and Rustichini, 2000a), reduce demand for green goods (Perino et al., 2013; Kahsay et al., 2014), and decrease participation in environmental woks (Kerr et al., 2012; Chervier et al., 2017). Bénabou and Tirole (2006) show that individuals are motivated by intrinsic, extrinsic, and reputation motives. Pro-social behavior serves as a way to signal one's pro-social preferences. Thus, extrinsic incentive may sometimes crowd-out pro-social behavior because it weakens the signal of pro-social motives that is sent when one undertakes pro-social behavior.[6]

This idea resonates with the case that we are investigating. The Ethiopian FFW program was supposed to complement pre-existing voluntary community works on rehabilitation and conservation of the environment by reducing cost of participating in these activities. Yet, FFW may also undermine pro-environmental behavior. Without incentives, participation in voluntarily environmental works may signal that participants have pro-environmental preference. If this is the case, the introduction of food incentive, in line with Bénabou and Tirole (2006), may dilute the signal of being pro-environmental as observers can no longer distinguish whether the behavior is motivated by pro-social preference or the food incentive. For instance, Kerr et al. (2012) find that participants in an environmental program indicated dissatisfaction when incentives were introduced. In addition, the fact that FFW program participants are selected based on their income status implies that participation could also send a stigmatizing signal of being 'poor and dependent' similar to the stigma effect of welfare dependence (Lindbeck et al., 1999; Dufwenberg and Lundholm, 2001).

We, therefore, hypothesize that incentives crowd-out pro-social behavior by weakening pro-social signaling. Our hypothesis that FFW incentives generate crowding-out through signaling mechanisms has three empirical implications (predictions) that we test in our empirical investigation: 1) Contribution to environmental good increases with an increase in the share of people who are selected to receive food incentive; 2) Crowding-out effect of the food incentive is lower under a lottery-based selection than income-based selection: and 3) the crowding effects are driven by people who are actively involved in pro-social activities (e.g., donating money to help others).

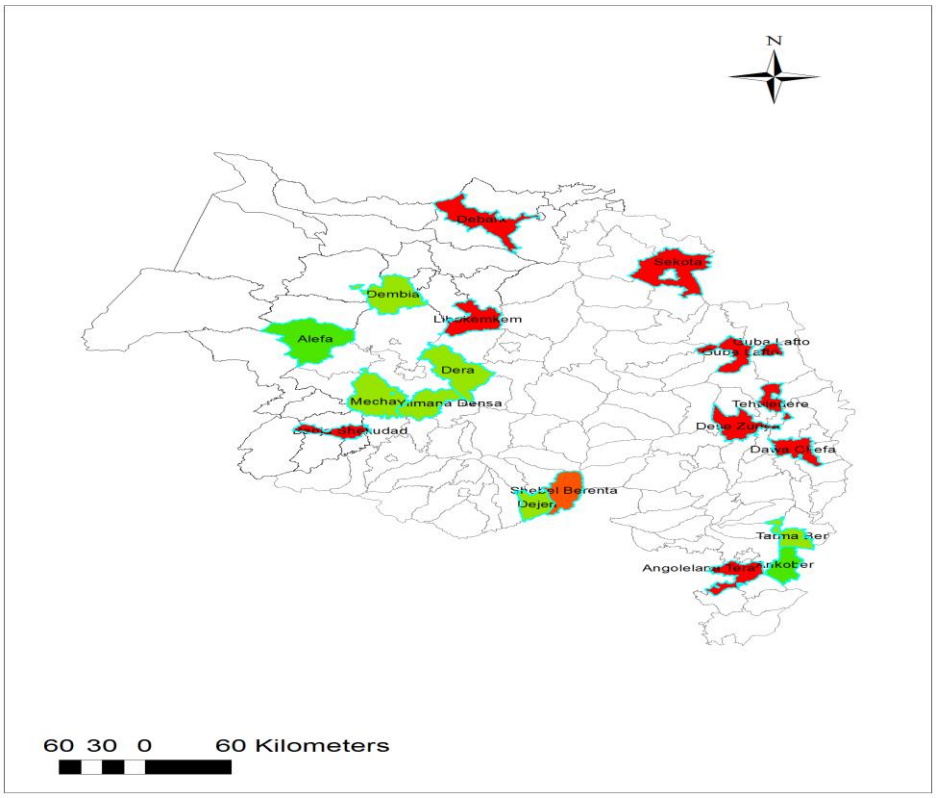
[6] Other channels through which incentives affect pro-social behavior include by changing the decision environment from a social to a monetary frame (e.g., Gneezy and Rustichini, 2000b; Heyman and Ariely, 2004); affects preferences directly (e.g., Deci, 1975; Frey, 1997); and destroys trust (e.g., Falk and Kosfeld, 2006; Fehr and List, 2004).

3. Data and econometric method

3.1. Data source and sample description

The data we use for this paper comes from a cross-sectional household survey which is undertaken in 2016 to study the behavior and welfare outcomes of recognized[7] farm households. The study is based on smallholders in the Amhara Regional State, Ethiopia. The regional state was organized into 10 administrative zones and 169 districts. The districts were further decentralized into 3437 local administrative *Kebelles*[8](3018 rural *kebelles* and 419 urban *kebelles*).The data is collected from 18 randomly drawn districts (primary sampling units) where 28 rural *Kebelles* are randomly drawn as Enumeration Areas (EA). Hence, the survey covered all recognized smallholders and 15 randomly selected non-recognized farmers in the selected Enumeration Areas which resulted in a total of 840 sample households. A 2.5 percent non-response rate is documented and is attributed to the absence of household heads during the survey period.

Figure 1. Map of study sites in Amhara regional state



[7]Recognized farm households, in this particular context, refers to households which are publicly recognized and/or awarded by the government for their success in improving their livelihood and/or adoption of productivity enhancing technologies, natural resource conservation, farm management practices and rural entrepreneurship.
[8]Kebele is the smallest administrative unit in Ethiopia

The dataset contains information on, among others, households' socio-economic characteristics and preferences. In addition, the survey questionnaire included measures of individual's pro-environmental preference in which three sets of questions were asked about individuals' willingness to participate in a hypothetical afforestation program which aims at increasing forest cover and environmental rehabilitation.

First, participants in the survey are asked for their willingness to participate (contribute labor) in a 5 days tree planting program without incentives. Of the total sample, about 95.7 percent have chosen to contribute in the afforestation program. Then, they are asked for their willingness to participate in the same afforestation program if the government were to provide 20 kg wheat for randomly selected participants with varying shares of recipients (20, 50, 80, and 100 percent).[9]In this case, the share of study participants who have chosen to contribute have significantly declined to 76.4 percent (which corresponds to the initial 20 percent share of recipients of the 20 kg wheat). However, the share has consistently increased in response to the increase in the share of recipients of the 20kg wheat (see Table 1). The mean contributions are significantly different from each other except that the mean contribution when the share of recipients is 20% is not significantly different from the mean when the share is 50%.

Table 1: Distribution of participation decision in the afforestation program

Incentive design	**Share of contributors (%)**
Contribution, free	95.72
Contribution, with food incentive (random selection)	
20% recipients	76.53
50% recipients	78.24
80% recipients	81.66
100% recipients	88.75
Contribution, with food incentive (income-based selection)	
20% recipients	63.81
50% recipients	65.53
80% recipients	68.54
100% recipients	76.53

[9]The selection of 20 kg of wheat as an incentive is based on the experience of food-for-work programs in Ethiopia.

Finally, individuals are asked for their willingness to participate in the same afforestation program if the government were to provide the 20 kg wheat for participants at the bottom of the wealth distribution with varying shares of recipients (20, 50, 80, and 100 percent). Under this particular design, the share of study participants who have chosen to contribute have radically dropped to only 63.7 percent (which corresponds to the initial 20 percent share of recipients of the 20 kg wheat). Nevertheless, the share of contributors increased in response to the increase in the share of recipients of the 20 kg wheat. Again, the mean contributions are significantly different from each other except between 20% and 50% and between 50% and 80%.

Based on the three sets of questions described above, contribution to the environmental program is measured as a binary participation decision {0, 1} of households and the incentive variable is constructed from and assumes integer values of {0, 1, 2, 3, and 4}. The '0' incentive level represents the 'no incentive' scenario while the non-zero incentive levels represent 'with incentives' scenario in which the values 1 to 4 correspond to the share of recipients. Table 2 below presents summary of demographic and socio-economic controls and correlates of individual participation decision.

Our observation at the raw data clearly shows that (1) food incentives crowds-out participation in the hypothetical afforestation program; (2) participation increases in response to an increase in the share of food incentive recipients; and (3) the contribution level under the two distinct incentive designs is significantly different: contribution with random selection for incentives (84.2 percent) and contribution with income-based selection for incentives (74 percent).

One concern with our study is a potential hypothetical bias (List and Gallet, 2001; Murphy et al., 2005) since we are asking for individual's willingness to participate in a hypothetical afforestation program. Yet, studies that compare lab experiments and stated preference surveys find mixed evidence regarding hypothetical bias. While some studies (Lusk and Schroeder, 2004; Johansson-Stenman and Svedsäter, 2008, 2012; Alem et al., 2016) find differences in willingness-to-pay between stated preference survey and lab experiment, others (Shogren et al., 1996; Carlsson and Martinsson, 2001; Chang et al., 2009) find similar willingness-to-pay estimate from both methods. Similarly, Bertrand and Mullainathan (2001) find that stated behavior predicts actual economic outcomes. Moreover, respondents

experience and context seem to matter for hypothetical bias of stated preference survey (Cameron and Englin, 1997; Carlsson, 2010). Given the familiarity of our respondents with afforestation program with and without food incentives, we believe that any bias resulting from the hypothetical nature of our program is likely to be very small.

Table 2: Descriptive statistics

Variable	**Observations**	**Mean**	**Standard Dev.**
Contribution under lottery-based selection	4090	0.842	0.365
Contribution under income-based selection	4089	0.740	0.439
Age	4095	46.341	10.163
Religion	4095	0.855	0.352
Marital Status	4095	0.961	0.194
Household Size	4095	6.160	1.747
Gender	4095	0.963	0.188
Literacy	4095	0.661	0.474
Education	4095	2.033	3.039
Income	4095	24612.6	66556.72
Social network	4095	0.763	0.425
Risk preference	4095	3.148	2.996
Land	4095	4.171	3.456
Livestock	4095	4.971	3.347
Recognition	4095	0.497	0.500

Note: The variables include religion (1 if Orthodox, 0 otherwise); gender (1 if male, 0 otherwise); literacy (1 if subject can read and write, 0 otherwise); educations is measured as the number of years of schooling; income is the total annual income measured in Ethiopian Birr; social network (1 if a member to groups, organizations, networks, or associations, 0 otherwise); risk preference measures the number of safe choices before a switch in an incentivized risk experiment; livestock is measured as the total number of live animals; recognition (1 if subject is recognized/win award, 0 otherwise); and land is measured in timad (a local measure) and one timad is approximately 0.25 hectares.

3.2. Econometric method and identification strategy

Our identification strategy exploits the participation decision in the afforestation program of survey participants for the two different incentive designs as it is briefly summarized and described in the previous sub-section. We use a simple regression of contribution levels on incentives and estimate the following equation:

$$Y_i = \beta_0 + \beta_1 * incentive + \beta_2 X_i + \alpha_z + \varepsilon_i \quad (1)$$

Where, Y_i is the contribution decision (1 if yes, 0 otherwise); X_i stands for other demographic and socio-economic covariates of households' participation decision in the environmental work. The parameter 'β_1', which is our main parameter of interest, captures the effect of food incentives on the willingness to participate in our hypothetical government afforestation program. $\beta_2$captures the effect of other covariates while α_z capturesvillagelevel fixed effects. $\varepsilon_i$captures other unobserved factors that may contribute to heterogeneity in households' decision to participate in the afforestation program.

We first estimate equation (1) to identify the crowding-out effect of food incentive by constructing a binary indicator $food\ incentive\{0,1\}$ for both income-based and lottery-based selections. We then estimate equation (1) to identify the effect of increasing the share of food incentive recipients by constructing a categorical indicator $food\ incentive\{0,1,2,3,4\}$, corresponding to *no food incentive* and 20-100% share of food incentive recipients, for both income-based and lottery-based selections. We estimate linear probability and probit models for equation (1) since our dependent variable is a binary participation decision.

4. Results

Table 3 below presents estimation results on the effect of introducing food incentives on individual's willingness to contribute labor to an afforestation program. Columns (1)–(4) and (5)-(8) present estimation results when the food incentive involves income-based and lottery-based selections, respectively. In columns (1) and (5), we present a basic model with only the incentive variable. In columns (2) and (6), we add socio-demographic controls while in columns (3) and (7), we include village level fixed effects. Finally, in columns (4) and (8) we present estimation results limiting the observations to cases without incentive and an incentive with 20% share of recipients.

The results clearly indicate that individuals are less likely to participate in afforestation programs when food incentives are introduced. This is in line with previous literature (cited above) that shows that incentives sometimes crowd-out pro-social behavior. For instance, Frey and Oberholzer-Gee (1997) find that the percentage of respondents who agreed to accept a nuclear waste repository significantly dropped when compensation was offered as compared to a condition without compensation. Similarly, in a field experiment conducted in Tanzania, Kerr et al. (2012) find that low payment for natural resource conservation results in a lower participation rate than no payment at all suggesting crowding-out effects.

Table 3: OLS estimates on the effect of food incentive on contribution level

	Income-based selection				Lottery-based selection			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Food incentive[a]	-0.271***	-0.280***	-0.280***	-0.327***	-0.144***	-0.145***	-0.145***	-0.190***
	(0.011)	(0.011)	(0.011)	(0.018)	(0.010)	(0.010)	(0.010)	(0.016)
Probit: Marginal effects	-0.373***	-0.384***	-0.384***	-0.325***	-0.194***	-0.193***	-0.200***	-0.196***
	(0.023)	(0.025)	(0.025)	(0.017)	(0.019)	(0.019)	(0.020)	(.017)
Age		-0.003***	-0.002***	-0.000		-0.002***	-0.001**	-0.001
		(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Religion		0.126***	0.042	0.031		0.106***	-0.019	0.005
		(0.021)	(0.046)	(0.058)		(0.019)	(0.033)	(0.051)
Married		0.002	0.018	0.002		-0.017	-0.025	-0.022
		(0.035)	(0.035)	(0.051)		(0.026)	(0.026)	(0.042)
Household size		0.007*	0.006	0.005		0.008**	0.008**	0.006
		(0.004)	(0.004)	(0.006)		(0.003)	(0.003)	(0.005)
Gender		-0.072**	-0.065*	-0.049		-0.029	-0.012	-0.001
		(0.035)	(0.034)	(0.048)		(0.028)	(0.028)	(0.043)
Education		-0.008***	-0.007***	-0.006*		-0.001	0.000	-0.000
		(0.002)	(0.003)	(0.003)		(0.002)	(0.002)	(0.003)
Network		0.030*	0.040**	0.042*		0.052***	0.057***	0.057***
		(0.016)	(0.017)	(0.023)		(0.014)	(0.014)	(0.022)
Risk		0.006**	0.004*	-0.001		0.000	-0.000	-0.003
		(0.002)	(0.002)	(0.003)		(0.002)	(0.002)	(0.003)
Land		-0.001	0.000	-0.002		0.000	-0.000	0.001
		(0.002)	(0.002)	(0.003)		(0.002)	(0.002)	(0.002)
Livestock		-0.008***	-0.006**	-0.003		-0.008***	-0.011***	-0.008***
		(0.002)	(0.002)	(0.003)		(0.002)	(0.002)	(0.003)
Ln(income)		-0.030***	-0.024***	-0.017*		-0.023***	-0.021***	-0.013
		(0.006)	(0.006)	(0.009)		(0.005)	(0.005)	(0.008)
Model farmer		0.025*	0.016	0.013		0.009	0.009	0.003
		(0.014)	(0.014)	(0.019)		(0.011)	(0.011)	(0.017)
Village fixed effect	No	No	Yes	Yes	No	No	Yes	Yes
Constant	0.957***	1.301***	1.315***	1.166***	0.957***	1.166***	1.215***	1.103***
	(0.007)	(0.070)	(0.090)	(0.125)	(0.007)	(0.064)	(0.082)	(0.122)
R-squared	0.021	0.100	0.150	0.227	0.025	0.053	0.100	0.128
Number of observations	4089	3964	3964	1586	4090	3965	3965	1586

Note; Standard errors are in parentheses. Clustering standard errors at household level doesn't change the results.
[a]Food incentive is a binary indicator constructed from the 5 different choices (0 if no food incentive, 1 if there is food incentive irrespective of the share of recipients) except for columns (4) and (8) in which the food incentive is constructed from 2 choices (0 if no food incentive, 1 if the food incentive is 20%). * $p< 0.10$, ** $p< 0.05$, *** $p< 0.01$.

They further find that group payments made through village authorities decrease participation rate in Mexico. Alpízar et al. (2017) find that excluding individuals from monetary incentives decreases pro-social behavior among the excluded ones. Chervier et al. (2017) find that payments made to local communities emphasize money-related values and increase the

likelihood of breaking conversation rule in a study that compares payment for environmental services (PES) participants and non-participants in Cambodia. In this regard, Rode et al. (2015) present an extensive review on crowding-out effects and potential channels of extrinsic incentives in general and payment for environmental services in particular. However, in line with our model prediction, the crowding-out effect decreases when the food incentive involves lottery-based selection (28 percentage points in the income-based selection vs 15 percentage point in the lottery-based selection). This result supports previous studies (e.g., Gneezy et al., 2011; Rode et al., 2015) that argue that the effectiveness of extrinsic incentives may depend on their design.

In Table 4 below we present estimation results by treating the food incentive variable as categorical instead of a binary variable. As in Table 3 above, we estimate our model with and without socio-demographic variables and village-level fixed effects. The estimated coefficient suggests that food incentive decreases participation rate. The magnitude of the effect of food incentive decreases when the share of recipients increases. This is in line with what we observed in Table 1. Individuals are more likely to participate in the proposed afforestation program when the share of food incentive recipients increases (see also Table A1 in the appendix).

Table 4 results also suggest that the potential channel for the crowding-out effect is more likely pro-social signaling. That is, incentives crowd-out the willingness to participate in the program because they negatively affect the signal of being pro-social/pro-environmental. When the food incentive is introduced for the afforestation program, an observer might think that the individual's participation is motivated by the payment not by a concern for environment, and hence signaling a higher valuation for money. However, when the proportion of people selected for payment increases, this may decrease the negative signal (higher valuation for money or poor and dependent) associated with participation. This may then induce people who are concerned about pro-social signaling to participate in the program.

Table 4: OLS estimates on the effect of food incentive on contribution level with a categorical food incentive variable

	Income-based selection			Lottery-based selection		
	(1)	(2)	(3)	(4)	(5)	(6)
Share of food incentive recipients						
20%	-0.319***	-0.327***	-0.327***	-0.192***	-0.190***	-0.190***
	(0.018)	(0.018)	(0.018)	(0.016)	(0.016)	(0.016)
50%	-0.302***	-0.311***	-0.311***	-0.175***	-0.175***	-0.175***
	(0.018)	(0.018)	(0.018)	(0.016)	(0.016)	(0.016)
80%	-0.272***	-0.280***	-0.280***	-0.141***	-0.140***	-0.140***
	(0.018)	(0.018)	(0.017)	(0.015)	(0.015)	(0.015)
100%	-0.192***	-0.201***	-0.201***	-0.070***	-0.076***	-0.076***
	(0.016)	(0.016)	(0.016)	(0.013)	(0.013)	(0.013)
Age		-0.003***	-0.002***		-0.002***	-0.001**
		(0.001)	(0.001)		(0.001)	(0.001)
Religion		0.126***	0.042		0.106***	-0.019
		(0.021)	(0.045)		(0.019)	(0.032)
Married		0.002	0.018		-0.017	-0.025
		(0.035)	(0.035)		(0.026)	(0.026)
Household size		0.007*	0.006		0.008**	0.008**
		(0.004)	(0.004)		(0.003)	(0.003)
Gender		-0.072**	-0.065*		-0.029	-0.012
		(0.035)	(0.034)		(0.028)	(0.028)
Education		-0.008***	-0.007***		-0.001	0.000
		(0.002)	(0.002)		(0.002)	(0.002)
Network		0.030*	0.040**		0.052***	0.057***
		(0.016)	(0.017)		(0.014)	(0.014)
Risk		0.006**	0.004*		0.000	-0.000
		(0.002)	(0.002)		(0.002)	(0.002)
Land		-0.001	0.000		0.000	-0.000
		(0.002)	(0.002)		(0.002)	(0.002)
Livestock		-0.008***	-0.006**		-0.008***	-0.011***
		(0.002)	(0.002)		(0.002)	(0.002)
Ln(income)		-0.030***	-0.024***		-0.023***	-0.021***
		(0.006)	(0.006)		(0.005)	(0.005)
Model farmer		0.025*	0.016		0.009	0.009
		(0.014)	(0.014)		(0.011)	(0.011)
Village fixed effect	No	No	Yes	No	No	Yes
Constant	0.957***	1.301***	1.315***	0.957***	1.166***	1.215***
	(0.007)	(0.069)	(0.090)	(0.007)	(0.064)	(0.081)
R-squared	0.071	0.104	0.160	0.038	0.066	0.105
Number of observations	4089	3964	3964	4090	3965	3965

Note; Standard errors are in parentheses. * $p< 0.10$, ** $p< 0.05$, *** $p< 0.01$.

In Table 5 below, we present heterogeneous effects. The interaction term between income and food incentive is negative and significant. This shows that the crowding-out effect is driven by individuals with a higher income which is consistent with the idea of stigmatizing selected food incentive recipients for being poor and dependent.

Table 5: OLS estimates on the effect of food incentive on contribution level with incentive-income interactions

	Income-based selection		Lottery-based selection	
	(1)	(2)	(3)	(4)
Food incentive[a]	0.045	0.045	0.082	0.082
	(0.098)	(0.097)	(0.092)	(0.093)
Age	-0.003***	-0.002***	-0.002***	-0.001**
	(0.001)	(0.001)	(0.001)	(0.001)
Religion	0.126***	0.042	0.106***	-0.019
	(0.021)	(0.046)	(0.019)	(0.033)
Married	0.002	0.018	-0.017	-0.025
	(0.034)	(0.035)	(0.026)	(0.026)
Household size	0.007*	0.006	0.008**	0.008**
	(0.004)	(0.004)	(0.003)	(0.003)
Gender	-0.072**	-0.065*	-0.029	-0.012
	(0.035)	(0.034)	(0.028)	(0.028)
Education	-0.008***	-0.007***	-0.001	0.000
	(0.002)	(0.003)	(0.002)	(0.002)
Network	0.030*	0.040**	0.052***	0.057***
	(0.016)	(0.017)	(0.014)	(0.014)
Risk	0.006**	0.004*	0.000	-0.000
	(0.002)	(0.002)	(0.002)	(0.002)
Land	-0.001	0.000	0.000	-0.000
	(0.002)	(0.002)	(0.002)	(0.002)
Livestock	-0.008***	-0.006**	-0.008***	-0.011***
	(0.002)	(0.002)	(0.002)	(0.002)
Ln(income)	-0.002	0.004	-0.004	-0.002
	(0.008)	(0.009)	(0.008)	(0.009)
Model farmer	0.025*	0.016	0.009	0.009
	(0.014)	(0.014)	(0.011)	(0.011)
Ln(income)*food incentive	-0.035***	-0.035***	-0.024**	-0.024**
	(0.010)	(0.010)	(0.010)	(0.010)
Village fixed effect	No	Yes	No	Yes
Constant	1.041***	1.055***	0.984***	1.033***
	(0.090)	(0.107)	(0.085)	(0.099)
R-squared	0.096	0.151	0.054	0.094
Number of observations	3964	3964	3965	3965

Note; Standard errors are in parentheses. [a]Food incentive is a binary indicator constructed from the 5 different choices (0 if no food incentive, 1 if there is food incentive irrespective of the share of recipients). * $p< 0.10$, ** $p< 0.05$, *** $p< 0.01$.

Moreover, looking to into the interaction term between previous pro-social participation/donation and food incentive implies that the crowding-out results are largely driven by people who normally participate in pro-social activities in their local communities and those who donate money to help others.

Table 6: OLS estimates on the effect of food incentive on contribution level with incentive-pro-social activity interactions

	Income-based selection		Lottery-based selection	
	(1)	(2)	(3)	(4)
Food incentive[a]	-0.194***	-0.275***	-0.096***	-0.140***
	(0.022)	(0.011)	(0.019)	(0.010)
Age	-0.002***	-0.002***	-0.001**	-0.001**
	(0.001)	(0.001)	(0.001)	(0.001)
Religion	0.046	0.043	-0.017	-0.018
	(0.046)	(0.046)	(0.033)	(0.033)
Married	0.029	0.019	-0.019	-0.024
	(0.035)	(0.035)	(0.026)	(0.025)
Household size	0.007*	0.006	0.009**	0.009**
	(0.004)	(0.004)	(0.003)	(0.003)
Gender	-0.065*	-0.067**	-0.013	-0.017
	(0.035)	(0.034)	(0.028)	(0.028)
Pro-social	0.027		0.012	
	(0.020)		(0.018)	
Pro-social*food incentive	-0.113***		-0.065***	
	(0.025)		(0.022)	
Donation		0.0001**		0.0001**
		(0.000)		(0.000)
Donation*food incentive		-0.0002***		-0.0002***
		(0.000)		(0.000)
Education	-0.007***	-0.007***	0.000	0.000
	(0.003)	(0.003)	(0.002)	(0.002)
Network	0.051***	0.039**	0.064***	0.056***
	(0.017)	(0.017)	(0.014)	(0.014)
Risk	0.004*	0.004*	-0.000	-0.000
	(0.002)	(0.002)	(0.002)	(0.002)
Land	0.001	0.000	0.000	-0.000
	(0.002)	(0.002)	(0.002)	(0.002)
Livestock	-0.006**	-0.006**	-0.010***	-0.011***
	(0.002)	(0.002)	(0.002)	(0.002)
Ln(income)	-0.024***	-0.024***	-0.021***	-0.022***
	(0.006)	(0.006)	(0.005)	(0.005)
Model farmer	0.022	0.017	0.013	0.011
	(0.014)	(0.014)	(0.011)	(0.011)
Village fixed effect	Yes	Yes	Yes	Yes
Constant	1.269***	1.313***	1.190***	1.216***
	(0.091)	(0.090)	(0.082)	(0.081)
R-squared	0.155	0.150	0.096	0.094
Number of observations	3964	3964	3965	3965

Note; Standard errors are in parentheses. [a]Food incentive is a binary indicator constructed from the 5 different choices (0 if no food incentive, 1 if there is food incentive irrespective of the share of recipients). * $p< 0.10$, ** $p< 0.05$, *** $p< 0.01$.

We believe that the results in Table 4-6 indicate that pro-social signaling is the likely channel. We look into other potential channels, but we did not find evidence to support these alternative explanations. First, the results may be driven by crowding-out of intrinsic motivation (Frey, 1997). However, the increase in participation rate with an increase in the share of food incentive recipients makes crowding-out of intrinsic motivation less likely to be

the channel. If the crowding-out effect was due to participants perception that the government is controlling them, as in the intrinsic motivation hypothesis, we would less likely see a change in participation rate irrespective of the share of food incentive recipients and type of selection. Second, the results could also reflect individuals' strategic reaction, i.e., individuals decide not to participate in the program after observing the percentage of individuals who will be selected for food incentive and realize that they will not be selected given their income status, particularly in the income-based selection. This implies that when the share of participants that will receive food incentive increases, we should be able to see an increase in participation among individuals in the relevant income distribution. For instance, when the share of recipients increases from 20 percent to 50 percent, we should see a positive reaction by individuals who are in the lower income distribution (20-50 percent). However, we do not see such reaction as reported in Table 7 below. We created 4 dummy variables representing 4 quantiles of income distribution (based on respondents annual income) corresponding to the 4 food incentive scenarios (shares of recipients). As we can see from the interaction terms between the share of recipients and income distribution dummies, we do not find any significant effect, if there is, it is negative. This suggests that the increase in participation rate due to the increase in share of food incentive recipients is not driven by some kind of individual's strategic reaction. We also ask our respondents to indicate their relative wealth status, which we use to construct alternative wealth quantiles. The interaction effects using this new wealth status indicator confirm our results in Table 7 below (see Appendix Table A2).

Table 7: OLS estimates on the effect of food incentive on contribution level with incentive-income quantile interactions

	Income-based selection		Lottery-based selection	
	(1)	(2)	(3)	(4)
Share of recipients				
No food incentive				
20%	-0.319***	-0.319***	-0.192***	-0.192***
	(0.020)	(0.018)	(0.017)	(0.015)
50%	-0.298***	-0.298***	-0.178***	-0.178***
	(0.023)	(0.018)	(0.019)	(0.016)
80%	-0.256***	-0.256***	-0.138***	-0.138***
	(0.023)	(0.018)	(0.019)	(0.015)
100%	-0.196***	-0.196***	-0.063***	-0.063***
	(0.022)	(0.016)	(0.018)	(0.012)
Age	-0.002***	-0.002**	-0.001**	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Religion	0.042	0.042	-0.031	-0.031
	(0.043)	(0.074)	(0.037)	(0.052)
Married	0.016	0.016	-0.043	-0.043
	(0.037)	(0.065)	(0.032)	(0.046)
Household size	0.007	0.007	0.009**	0.009
	(0.004)	(0.007)	(0.004)	(0.006)
Gender	-0.056	-0.056	0.019	0.019

	(0.039)	(0.058)	(0.033)	(0.052)
Literacy	-0.016	-0.016	-0.014	-0.014
	(0.016)	(0.027)	(0.014)	(0.024)
Education	-0.006**	-0.006	-0.000	-0.000
	(0.003)	(0.005)	(0.002)	(0.004)
Network	0.051***	0.051*	0.054***	0.054**
	(0.016)	(0.028)	(0.014)	(0.025)
Risk	0.002	0.002	-0.001	-0.001
	(0.002)	(0.004)	(0.002)	(0.004)
Land	0.000	0.000	0.000	0.000
	(0.002)	(0.004)	(0.002)	(0.003)
Livestock	-0.007***	-0.007*	-0.012***	-0.012***
	(0.002)	(0.004)	(0.002)	(0.004)
Income distribution				
First quantile (bottom 20%)	-	-	-	-
Second quantile	-0.045**	-0.045	0.043**	0.043
	(0.021)	(0.032)	(0.018)	(0.029)
Third quantile	-0.049**	-0.049	0.033*	0.033
	(0.021)	(0.034)	(0.018)	(0.031)
Fourth quantile (top 20%)	-0.084***	-0.084**	-0.019	-0.019
	(0.024)	(0.042)	(0.020)	(0.038)
Model farmer	0.023*	0.023	0.026**	0.026
	(0.014)	(0.024)	(0.012)	(0.021)
Interaction between income distribution and share of food incentive recipients				
Second quantile*50%	-0.014	-0.014	0.010	0.010
	(0.035)	(0.020)	(0.030)	(0.017)
Third quantile 80%	-0.052	-0.052***	-0.009	-0.009
	(0.035)	(0.019)	(0.030)	(0.016)
Fourth quantile*100%	0.021	0.021	-0.035	-0.035*
	(0.040)	(0.030)	(0.034)	(0.021)
Village fixed effect	Yes	Yes	Yes	Yes
Cluster standard errors[1]	No	Yes	No	Yes
Constant	1.129***	1.129***	0.998***	0.998***
	(0.076)	(0.137)	(0.065)	(0.125)
R-squared	0.157	0.157	0.112	0.112
Number of observations	4089	4089	4090	4090

Note; Standard errors are in parentheses. [1]standard errors are clustered at household level. * $p< 0.10$, ** $p< 0.05$, *** $p< 0.01$.

5. Conclusion and policy implications

Food-work-programs aimed at both development and environmental aspects by smoothing consumption of individuals during shocks (e.g., drought) and helping asset accusation, thereby reducing pressure on natural resources and rehabilitation of the environment using community labor. However, such programs may have unintended consequences, crowding-out pro-environmental behavior and undermine collective action. The World Food Program (WFP), which has been instrumental in funding food-for-work programs in Ethiopia, suggest that the program may have unintended consequences for the environment in its evaluation (WFP, 2007). In this paper, we run a choice experiment among Ethiopian farmers eliciting preferences in a hypothetical afforestation program that mimics the Ethiopian food-for-work program. We find that individuals are less likely to participate in the program when food incentives are introduced and the crowding-out effect is weaker in a lottery-based selection of

participants than an income-based selection. Moreover, individuals are more likely to participate in the program when the proportion of people selected for payment increases. Our results suggest that the potential mechanism for the crowding-out effects may be pro-social signaling.

These findings have several important implications for the country to realize its environmental ambitious objectives. First, if there is a well-functioning pre-existing voluntary work, one should avoid supplementing this with food-for-work program because of the risk of crowding-out. Instead, one can focus on infrastructure and other resource areas that are neglected by the voluntary work. In fact, WFP, it its evaluation of Ethiopian food-for-work program, suggest that the program should target other public works instead of environmental projects (WFP, 2007). Second, if it is unavoidable, our results imply that this should be done in a design that mitigates crowding-out. For instance, a lottery-based selection of participants may mitigate the crowding-out effects of the food incentive. However, this may contradict with development goals of food-for-work program. So, the quest here is to find selection criteria that do not stigmatize participants, but are correlated with income. Third, the implications of our results are also applicable to other environmental programs, such as payment for environmental services (PES) and reducing emissions from deforestation and forest degradation (REDD+). For instance, it is sometimes difficult to pay every member of a village community to protect the forest. In such situations, focusing on 'stigma-free' selection criteria or on a program in which everyone participates, but randomly selected villagers get payment, may be a viable option in terms of mitigating crowding-out effects.

Finally, we speculate that extrinsic incentives may have far-reaching environmental consequences by encouraging community-level moral hazard, lowering quality of the environmental work, and spillover effects. Instances of opportunistic behavior have been recorded in the Ethiopian food-for-work program where reported stone terraces constructed to halt soil erosion built during the day are knocked down at night in order to keep the program (Salisbury, 1992; Elliesen, 2002; Barrett, 2006). This may also have negative spillover effects on environmental protection and punishing free-riders by reducing peer pressure on individuals involved in deforestation. For instance, Tesfaye (2003) reported that community members developed the sense of 'if I do not cut the tree, others will' due to the prevalent weak social pressure. We believe that re-designing the food-for-work program as well as further institutional reforms that aim at encouraging community members' own motivation

and collective action (Shiferaw and Holden, 1999; Mazengia and Mowo, 2012; Rustagi et al., 2010) may be a away forward for sustainable management of natural resources.

References

Abdulai, A., Barrett, C. B., &Hoddinott, J. (2005). Does food aid really have disincentive effects? New evidence from sub-Saharan Africa.*World Development*, 33(10), 1689-1704.

Alem, Y., & Broussard, N. H. (2013). The impact of safety nets on technology adoption: a difference-in-differences analysis. *Agricultural Economics*.

Alem, Y., Eggert, H., Kocher, M. G., & Ruhinduka, R. D. (2016). Why (field) experiments on unethical behavior are important: Comparing stated and revealed behavior.

Alpízar, F., Nordén, A., Pfaff, A., & Robalino, J. (2017). Spillovers from targeting of incentives: Exploring responses to being excluded. *Journal of Economic Psychology*, 59, 87-98.

Andersson, C., Mekonnen, A., & Stage, J. (2011). Impacts of the Productive Safety Net Program in Ethiopia on livestock and tree holdings of rural households. *Journal of Development Economics*, 94(1), 119-126.

Ariely,D., A.Bracha, and Meier, S.(2009). Doing Good or Doing Well? Image Motivation and Monetary Incentives in Behaving Prosocially. *The American Economic Review*, 99(1), 544-55.

Banerjee,P. and Shogren, J.F. (2012). Material Interests, Moral Reputation, and Crowding Out Species Protection on Private Land. *Journal of Environmental Economics and Management*, 63(1),137-49.

Barrett, C.B., Holden, S., Clay, D. (2004).Can food-for-work programmes reduce vulnerability? In: Dercon, S. (Ed.), Insurance against Poverty. Oxford University Press, Oxford.

Barrett, C.B. (2006). Food Aid's Intended and Unintended Consequences. *ESA Working Paper*.No. 06-05, FAO.

Berhane, G., Daniel O.Gilligan, D.O, Hoddinott, J., Kumar, N., and Taffesse, A.S. (2014). Can Social Protection Work in Africa? The Impact of Ethiopia's Productive Safety Net Programme. *Economic Development and Cultural Change*, 63, (1), 1-26.

Bertrand, M., & Mullainathan, S. (2001). Do people mean what they say? Implications for subjective survey data.

Bezu, S., & Holden, S. (2008). Can food-for-work encourage agricultural production? *Food Policy*, 33(6), 541-549.

Bénabou ,R. and Tirole, J.(2003). Intrinsic and Extrinsic Motivation. *The Review of Economic Studies*, 70(3), 489-520.

Bénabou, R. and Tirole, J. (2006). Incentives and prosocial behavior. *American Economic Review*, 96(5), 1652–1678.

Cameron, T. A., &Englin, J. (1997). Respondent experience and contingent valuation of environmental goods. *Journal of Environmental Economics and management*, 33(3), 296-313.

Carlsson, F. (2010). Design of stated preference surveys: Is there more to learn from behavioral economics? *Environmental and Resource Economics*, 46(2), 167-177.

Carlsson F, Martinsson P. (2001). Do hypothetical and actual marginal willingness to pay differ in choice experiments. *Journal of Environmental Economics Management,* 41, 179–192.

Chang JB, Lusk J, Norwood FB. (2009). How closely do hypothetical surveys and laboratory experiments predict field behavior. *Am J Agric Econ,* 91, 518–534

Chervier, C., Le Velly, G., & Ezzine-de-Blas, D. (2017). When the Implementation of Payments for Biodiversity Conservation Leads to Motivation Crowding-out: A Case Study From the Cardamoms Forests, Cambodia. *Ecological Economics*.

Cleaver, F. (2000).Moral ecological rationality, institutions and the management of common property resources. *Development and Change,* 31 (1), 361–383.

Deci, Edward L. (1975). Intrinsic Motivation. New York: Plenum Press.

Dercon, S., Krishnan, P.(2004). Food aid and informal insurance. In: Dercon, S. (Ed.), Insurance against Poverty. Oxford University Press, Oxford.

Dufwenberg, M. and Lundholm, M. (2001). Social norms and moral hazard. *The Economic Journal,* 111(473): 506–525.

Ellingsen,T. and Johannesson, M.(2008). Pride and Prejudice: The Human Side of Incentive Theory.*The American Economic Review,* 98(3), 990-1008.

Elliesen, M. (2002). Imported Dependency: Food Aid Weakness Ethiopia's Self-help Capacity.D+C Development and Cooperation. International Weiterbildung und Entwicklung GmbH.

Falk, Armin, and Michael Kosfeld. (2006). The Hidden Costs of Control. *American Economic Review*, 96(5), 1611-30.

Fehr,E. and Falk, A.(2002). Psychological Foundations of Incentives. *European Economic Review*, 46(4), 687-724.

Fehr,E. and List, J.A.(2004). The Hidden Costs and Returns of Incentives-Trust and Trustworthiness Among CEOs. *Journal of the European Economic Association*, 2(5), 743-71.

Gebremedhin, B., Swinton, S.M. (2003). Investment in soil conservation in Northern Ethiopia: the role of land tenure security and public programs. *Agricultural Economics*,29, 69–84.

Gelan, A. U. (2007). Does food aid have disincentive effects on local production? A general equilibrium perspective on food aid in Ethiopia. *Food Policy*, 32(4), 436-458.

Gilligan, D.O., Hoddinott, J.(2007). Is there persistence in the impact of emergency food aid? Evidence on consumption, food security, and assets in rural Ethiopia. *American Journal of Agricultural Economics*, 89 (2), 225–242.

Gilligan, D. O., Hoddinott, J., &Taffesse, A. S. (2009). The impact of Ethiopia's Productive Safety Net Programme and its linkages. *The journal of development studies*, 45(10), 1684-1706.

Goeschl, T. and G. Perino. (2012). Instrument Choice and Motivation: Evidence From A Climate Change Experiment. *Environmental and Resource Economics*, 52(2), 195-212.

Gneezy,Uri, and Aldo Rustichini. (2000a). A Fine Is a Price. *Journal of Legal Studies*, 29(1), 1-17.

Gneezy, U. and Rustichini, A. (2000b). Pay enough or don't pay at all. *Quarterly Journal of Economics*, 115(2), 791–810.

Gneezy, U., Meier, S. and Rey-Biel, P.(2011). When and why incentives (don't) work to modify behavior. *The Journal of Economic Perspectives*, 25(4),191-209.

Heyman,J. and Ariely, D.(2004). Effort for Payment a Tale of Two Markets. *Psychological Science*, 15(11), 787-93.

Hoben, A. (1996). The cultural construction of environmental policy: Paradigms and politics in Ethiopia.

Isenman, P.J., Singer, H.W. (1977). Food aid: disincentive effects and their policy implications. *Economic Development and Cultural Change*, 25, 205–237.

Johansson-Stenman, O., &Svedsäter, H. (2008). Measuring hypothetical bias in choice experiments: the importance of cognitive consistency. *The BE Journal of Economic Analysis & Policy*, 8(1).

Johansson-Stenman, O., & Svedsäter, H. (2012). Self-image and valuation of moral goods: Stated versus actual willingness to pay. *Journal of Economic Behavior & Organization*, 84(3), 879-891.

Kahsay, G. A., Andersen, L. M., & Hansen, L. G. (2014). Price reactions when consumers are concerned about pro-social reputation (No. 2014/09). University of Copenhagen, Department of Food and Resource Economics.

Kebede, A. (1995). Ranking constraints in a community forestry and soil conservation programme, PLA Notes, Issue 22, pp.74–75, IIED London.

Kerr, J., Vardhan, M., & Jindal, R. (2012). Prosocial behavior and incentives: evidence from field experiments in rural Mexico and Tanzania. *Ecological Economics*, 73, 220-227..

Lindbeck, A., S. Nyberg and J. Weibull. (1999). Social Norms and Economic Incentives in the Welfare State. *The Quarterly Journal of Economics*, 1, 1-35.

List J, Gallet, C. (2001). What experimental protocol influence disparities between actual and hypothetical stated values. *Environ Resour Econ*, 20, 241–254.

Little, P.D.(2008). Food aid dependency in Northeastern Ethiopia: myth or reality? *World Development*, 36 (5), 860–874.

Lusk J, Schroeder T.C. (2004). Are choice experiments incentive compatible. A test with quality differentiated beef steaks, *Am J Agric Econ*, 85, 840–856.

Maxwell, S., Belshaw, D., Lirenso, A.(1994).The disincentive effect of food-for-work on labour supply and agricultural intensification and diversification in Ethiopia. *Journal of Agricultural Economics*, 45 (3), 351–359.

Mazengia.W. and Mowo, J. (2012). Role of collective actions in integrated soil and water conservation: The Case of Gununo Watershed, Southern Ethiopia. *Journal of Development and Agricultural Economics*, 4(1), 23-36.

Meier,S. (2007). Do Subsidies Increase Charitable Giving in The Long Run? Matching Donations in a Field Experiment. *Journal of the European Economic Association*, 5(6),1203-22.

Mellström,C. and Johannesson, M.(2008). Crowding Out in Blood Donation: Was Titmuss Right? *Journal of the European Economic Association*, 6(4), 845-63.

Murphy, J. J., Allen, P. G., Stevens, T. H., & Weatherhead, D. (2005). A meta-analysis of hypothetical bias in stated preference valuation. *Environmental and Resource Economics*, 30(3), 313-325. Ostrom, E. (2000). Collective action and the evolution of social norms. *Journal of Economic Perspectives*, 14(3), 137–158.

Perino, G., L.A. Panzone, and T. Swanson. (2013). Motivation Crowding in Real Consumption Decisions: Who is Messing with my Groceries? *Economic Inquiry*, 52(2), 592- 607.

Pirard, R. (2012). Market-based instruments for biodiversity and ecosystem services: A lexicon. *Environmental Science & Policy*, 19, 59-68. Rege, M. (2004). Social norms and private provision of public goods. Journal of Public Economic Theory, 6(1), 65-77. Rode, J., Gómez-Baggethun, E., & Krause, T. (2015). Motivation crowding by economic incentives in conservation policy: A review of the empirical evidence. *Ecological Economics*, 117, 270-282.

Rustagi, D., Engel, S., & Kosfeld, M. (2010). Conditional cooperation and costly monitoring explain success in forest commons management. *Science*, 330(6006), 961-965. Salisbury, L. N. (1992). Enhancing Development Sustainability and Eliminating Food Aid Dependency: Lessons from the World Food Programme, City and Regional Planning, Cornell University.

Samuel, Gebre-Selassie, (2006b). Intensification of Smallholder Agriculture in Ethiopia: Options and Scenarios. Policy Paper Prepared for the Future Agricultures Consortium and Presented at Institute Development Studies, University of Sussex, March 22-22, 2006.

Schnedler,W. (2011). You Don't Always Get What You Pay For: Bonuses, Perceived Income and Effort. *German Economic Review,* 12(1), 1-10.

Schultz, T.W.(1960). Value of U.S. farm surpluses to underdeveloped countries. *Journal of Farm Economics*, 42 (5), 1019–1030.

Seabright, P.B. (2009). Continuous Preferences and Discontinuous Choices: How Altruists Respond to Incentives. *The BE Journal of Theoretical Economics*, 9(1).

Shiferaw, B. & Holden, S. (1999). Soil Erosion and Smallholders' Conservation Decisions in the Highlands of Ethiopia. *World Development,* 27(4), 739-752.

Shogren, J. F., Fox, J. A., Hayes, D. J., & Roosen, J. (1999). Observed choices for food safety in retail, survey, and auction markets. *American Journal of Agricultural Economics*, 81(5), 1192-1199.

Sliwka,D. (2007). Trust as a Signal of a Social Norm and the Hidden Costs of Incentive Schemes. *The American Economic Review,* 97(3), 999-1012.

Sommerville, M., Jones, J. P., Rahajaharison, M., & Milner-Gulland, E. J. (2010). The role of fairness and benefit distribution in community-based Payment for Environmental Services interventions: A case study from Menabe, Madagascar. *Ecological Economics*, 69(6), 1262-1271. Subbarao, K., Del Ninno, C., Andrews, C., & Rodríguez-Alas, C. (2012). Public works as a safety net: design, evidence, and implementation. World Bank Publications.

Tadesse, G., & Shively, G. (2009). Food aid, food prices, and producer disincentives in Ethiopia. *American Journal of Agricultural Economics*, 91(4), 942-955.

Tesfaye, B. (2003). Understanding farmers: explaining soil and water conservation in Konso, Wolaita and Wello, Ethiopia, PhD Thesis, Wageningen University and Research Center.

Timuss.R. (1970).The Gift Relationship: From Human Blood to Social Policy. Allen and Unwin London.

Truelove, H.B., Carrico, A.R., Weber, E.U., Raimi, K.T., Vandenbergh, M.P.(2014).Positive and negative spillover of pro-environmental behavior: An integrative review and theoretical framework. *Global Environmental Change*, 29, 127–138.

Vatn, A. (2009).Cooperative behavior and institutions. *The Journal of Socio-Economics*, 38, 188–196.

Vatn, A. (2010).An Institutional Analysis of Payments for Environmental Services. *Ecological Economics*, 69, 1245-1252.

WFP Office of Evaluation. (2007). Full Report of the Mid-Term Evaluation of PRRO 10362.0: Enabling Livelihood Protection and Promotion, WFP Rome

Appendix

Table A1: OLS estimates on the effect of the proportion of individual selected for food incentive on contribution level

	Income-based selection			Lottery-based selection		
	(1)	(2)	(3)	(4)	(5)	(6)
Share of recipients[a]	0.041***	0.041***	0.041***	0.040***	0.038***	0.038***
	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)
Probit: Marginal effects	0.041***	0.041***	0.041***	0.041***	0.041***	0.040***
	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)
Age		-0.004***	-0.003***		-0.002***	-0.002**
		(0.001)	(0.001)		(0.001)	(0.001)
Religion		0.162***	0.054		0.138***	-0.023
		(0.026)	(0.057)		(0.023)	(0.040)
Married		-0.007	0.014		-0.030	-0.040
		(0.042)	(0.042)		(0.030)	(0.030)
Household size		0.009**	0.008		0.010***	0.011**
		(0.005)	(0.005)		(0.004)	(0.004)
Gender		-0.087**	-0.074*		-0.033	-0.009
		(0.043)	(0.040)		(0.034)	(0.033)
Education		-0.010***	-0.010***		-0.002	-0.000
		(0.003)	(0.003)		(0.002)	(0.003)
Network		0.032*	0.044**		0.060***	0.066***
		(0.019)	(0.020)		(0.017)	(0.017)
Risk		0.008***	0.007**		0.002	0.001
		(0.003)	(0.003)		(0.002)	(0.002)
Land		-0.001	0.000		0.000	-0.000
		(0.002)	(0.003)		(0.002)	(0.002)
Livestock		-0.010***	-0.007**		-0.010***	-0.013***
		(0.003)	(0.003)		(0.002)	(0.002)
Ln(income)		-0.036***	-0.028***		-0.028***	-0.025***
		(0.007)	(0.007)		(0.006)	(0.006)
Model farmer		0.025	0.015		0.005	0.007
		(0.017)	(0.017)		(0.014)	(0.014)
Village fixed effect	No	No	Yes	No	No	Yes
Constant	0.583***	1.002***	1.011***	0.713***	0.975***	1.027***
	(0.020)	(0.085)	(0.109)	(0.017)	(0.078)	(0.098)
R-squared	0.010	0.052	0.127	0.013	0.049	0.102
Number of observations	3271	3171	3171	3272	3172	3172

Note; Standard errors are in parentheses. [a] The share of recipients is a variable that ranges from 1 to 4 corresponding to the share of food recipients (20-100%). * $p< 0.10$, ** $p< 0.05$, *** $p< 0.01$.

Table A2: OLS estimates on the effect of food incentive on contribution level with incentive-wealth quantile interactions

	Income-based selection		Lottery-based selection	
	(1)	(2)	(3)	(4)
Share of recipients				
No food incentive	-	-	-	-
20%	-0.319***	-0.319***	-0.192***	-0.192***
	(0.018)	(0.018)	(0.016)	(0.016)
50%	-0.282***	-0.282***	-0.167***	-0.167***
	(0.028)	(0.028)	(0.026)	(0.025)
80%	-0.271***	-0.271***	-0.138***	-0.138***
	(0.019)	(0.019)	(0.016)	(0.016)
100%	-0.187***	-0.187***	-0.065***	-0.065***
	(0.017)	(0.017)	(0.013)	(0.013)
Age	-0.003***	-0.002***	-0.002***	-0.001**
	(0.001)	(0.001)	(0.001)	(0.001)
Religion	0.122***	0.039	0.107***	-0.024
	(0.020)	(0.044)	(0.018)	(0.032)
Married	0.002	0.019	-0.030	-0.037
	(0.035)	(0.035)	(0.025)	(0.025)
Household size	0.007*	0.006	0.007**	0.010***
	(0.004)	(0.004)	(0.003)	(0.003)
Gender	-0.069*	-0.059*	-0.005	0.012
	(0.036)	(0.035)	(0.030)	(0.029)
Education	-0.009***	-0.008***	-0.003	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)
Network	0.034**	0.041**	0.045***	0.053***
	(0.016)	(0.016)	(0.014)	(0.014)
Risk	0.004*	0.003	-0.001	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)
Land	-0.001	-0.000	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)
Livestock	-0.008***	-0.007***	-0.008***	-0.012***
	(0.002)	(0.002)	(0.002)	(0.002)
Income distribution				
First quantile (bottom 20%)	-	-	-	-
Second quantile	-0.092***	-0.067***	0.017	0.038**
	(0.020)	(0.021)	(0.019)	(0.019)
Third quantile	-0.103***	-0.085***	-0.008	0.015
	(0.026)	(0.026)	(0.023)	(0.023)
Fourth quantile (top 20%)	-0.110***	-0.081***	-0.064**	-0.036
	(0.029)	(0.028)	(0.027)	(0.027)
Model farmer	0.032**	0.023*	0.026**	0.025**
	(0.014)	(0.014)	(0.011)	(0.011)
Interaction between income distribution and share of food incentive recipients				
Second quantile*50%	-0.033	-0.033	-0.012	-0.012
	(0.036)	(0.035)	(0.032)	(0.031)
Third quantile*80%	-0.004	-0.004	-0.018	-0.018
	(0.049)	(0.049)	(0.042)	(0.041)
Fourth quantile*100%	-0.038	-0.038	-0.038	-0.038
	(0.054)	(0.050)	(0.048)	(0.047)
Village fixed effect	No	Yes	No	Yes
Constant	1.117***	1.154***	0.943***	0.993***
	(0.057)	(0.077)	(0.052)	(0.067)
R-squared	0.101	0.157	0.068	0.111
Number of observations	4089	4089	4090	4090

Note; Standard errors are in parentheses. * $p< 0.10$, ** $p< 0.05$, *** $p< 0.01$.