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# Incentives to Improve Government Agricultural Extension Agent Performance: A Randomized Controlled Trial in Bangladesh

By

Rajibul Alam
Yoko Kijima

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National Graduate Institute for Policy Studies
7-22-1 Roppongi, Minato-ku,
Tokyo, Japan 106-8677

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Md. Rajibul Alam
Ministry of Public Administration, Dhaka

Yoko Kijima
National Graduate Institute for Policy Studies, Tokyo

## Abstract

This study provides empirical evidence on how financial and non-financial incentives improve service delivery of government agricultural extension agents. A randomized control trial was conducted in 40 sub-district agriculture offices in Bangladesh, with 807 agricultural extension officers, randomly allocated into five groups (one control and four treatment). The financial incentive was a one-time monetary reward, while the non-financial incentive was recognition by the district director. In the non-financial incentive treatment, we added another treatment in which the two worst performers, instead of best, are selected for inspection. In the financial incentive, we created another treatment where the best performer is selected based on performance level. We find that financial and non-financial incentives have positive effects of equal magnitude, about one standard deviation of total performance index on average. Giving a disadvantage to better performers does not decrease effort by better performers.

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## 1. Introduction

Agricultural extension involves transferring knowledge of local and global research to farmers in order to improve their welfare (Anderson and Feder 2007). Despite the importance and the size of the services, however, farmers' access to extension services is limited (Anderson and Feder 2004). In a traditional agricultural extension model (lead farmer model), public extension agents teach knowledge to contact farmers, who are expected to spread the information to other farmers, and many countries still employ the lead farmer model (Norton and Alwang 2020). For this extension model to work, it is critical to enhance agricultural extension agents' efforts to disseminate knowledge to contract farmers. It has been argued that there is low morale among public agricultural extension agents due to low salaries and insufficient supervision (Davis et al. 2010; Davis and Alex 2020; Feder et al. 2004; Anderson and Feder 2004; Anderson and Feder 2007). However, none of the studies, to our best knowledge, investigate what incentives can enhance the effort of government agricultural extension agents.[1]

Rewards can be financial or non-financial. Benabou and Tirole (2003) and Frey (1993) show theoretically that tighter monitoring motivates workers to increase effort in the short term, but not in the long term. Demougin and Fluet (2001) show that low-powered financial incentives with precise monitoring are effective in increasing worker effort. The comparative effectiveness of financial and non-financial incentives empirically, however, remains undertested. One exception is Ashraf, Bandiera, and Lee (2014) on health worker performance in Zambia, which found that non-financial incentives (social recognition) were effective to motivate health workers to sell more than financial incentives (commission on sales).

To understand how to improve the work effort of public agricultural agents, we conducted a randomized control trial (RCT) which offered either financial or non-financial incentives to public

[1] Buehren et al. (2019) examines the impact of support programs in agricultural technical and vocational education and training colleges that help female students not to drop out and to succeed in becoming government extension agents in Ethiopia on farmers' access to extension officers. Their study evaluated the intervention in terms of the number of future agricultural extension agents. However, they did not explicitly show if the program increased the number of female extension agents and their quality; instead, they showed whether the program increased female farmers' access to extension agents soon after the project started.

agricultural extension officers (Sub-Assistant Agricultural Officers, SAAOs) in Bangladesh. In rural Bangladesh, more than 87% of the population depends on agriculture for income (World Bank, 2016, 2017). Due to the Green Revolution in the 1970s, agricultural production in Bangladesh has increased dramatically by disseminating high-yielding cereal varieties combined with irrigation and chemical fertilizers and pesticides. This intensive farming, however, has degraded soil quality, leading to low organic matter and micronutrient deficiency, which is a threat to sustainable agricultural production. To tackle these problems, agricultural extension services considering farmers' needs in terms of updated agricultural knowledge under climate change need to be delivered effectively. However, unavailability and inefficiency of SAAOs are prevalent in the field. Given that the principle of Bangladesh's New Agricultural Extension Policy states that all members of all types of rural households are entitled to extension services, devices for improving the performance of negligent SAAOs are needed. Each SAAO is assigned to a certain block and is in charge of delivering services in the block. Farmers in all the blocks have the right to receive agricultural extension services, but unless low-performing agents improve service delivery, farmers in blocks where they are in charge cannot receive service. Thus, from an equity point of view, it is desirable for improving the performance of poor-performing agents more than high-performing agents.

We covered 40 sub-district agriculture offices in Bangladesh, with 807 agricultural extension officers where offices were randomly allocated into five groups (one control and four treatment). The randomization was done at sub-district agriculture office level, as the management of agricultural extension officers is done at this level. To examine the relative effectiveness of financial and non-financial incentives and the differential impacts on low and high performers, two kinds of financial incentives, a non-financial incentive, and inspection treatments are allocated equally. Based on the government's budgetary constraints and current reward system, in our experiment, the rewards are given to two best performers. To motivate those who perform poorly, the best performer was determined based on those who improved performance most, which gives an advantage to worse performers at baseline, increasing the probability of winning. The financial incentive is a one-time

monetary reward equivalent to 20% of the monthly salary and is given to those with the highest performance improvement, while the other is given to those with the highest performance scores. The non-financial incentive is a recognition letter by the deputy director (head of the district agriculture office) given to the best performer in each office while an encouragement letter is given by the deputy director to the worst performers, who are subject to inspection.

We find that both financial and non-financial incentives as well as inspection treatment have a positive effect of equal magnitude, which is about one standard deviation of the total performance index on average. Giving a disadvantage to better performers at baseline to reduce their chance of winning does not have a demotivating effect on better performers. One may puzzle over why all the treatments have positive effects and no detectable difference across treatments is found. This can be because in the preparation stage, we asked sub-district agriculture officers (UAOs), district agriculture officers (DAOs), and SAAOs who were not in the study areas if our treatments could motivate extension agents. Especially for financial incentives, we asked about the minimum amount that was high enough to affect their behavior.

As mentioned earlier, this is the first study to examine if incentives can enhance the effort of government agricultural extension agents by conducting an RCT. Furthermore, we investigate which incentive (financial or non-financial) is more effective under what conditions and what incentive has a larger impact on poor performance agents' effort improvement. In this sense, this study complements the literature that examines the effect of agricultural training and programs to enhance information flow from contact farmers to other farmers by providing policy options to solve one element of bottlenecks in the agricultural extension model (information transfer from agricultural extension agents to contact farmers).[2]

[2] Many studies have given more attention to how to increase technology adoption by enhancing peer effects or farmer-to-farmer extension than to knowledge transfer from agricultural extension workers to contact farmers. For example, some recent studies used by RCT show that selecting contact farmers who have larger networks (Beaman et al. 2021) and similar social identity (BenYishay and Mobarak 2019); training contact farmers directly, not through extension workers (Kondylis et al. 2017); and providing a incentivized referral system for selecting potential trainees for the program (Fafchamps et al. 2020) all increase technology transfer compared with the status quo. It is found, however, that contact farmers do not adopt technologies fully and that the knowledge loss from extension workers to contact

This study also contributes to the literature that investigates how to improve service delivery in the public sector in developing countries. Although government services are critically important for poor people in developing countries, government personnel's low work morale and inefficiency has been noticed in absenteeism of medical staff in public hospitals and public-school teachers in many countries (Chaudhury et al. 2006). Public sector work requires pro-social motivation, and there is a possibility that financial incentives can demotivate such workers (Ashraf, et al. 2014). RCTs on public service delivery in health and education sectors have found performance pay (Basinga et al. 2011; Mbiti et al. 2019; Muralidharan and Sundaraman, 2011), social recognition (Ashraf et al. 2014a; Ashraf et al. 2014b), and monitoring with penalties (Banerjee et al. 2008; Dhaliwal and Hanna 2017; Duflo et al. 2012) to be effective. However, other studies found negative consequences of performance pay, which changes behaviors to focus on work related with incentives (Glewwe et al. 2010) and to manipulate records to avoid punishment (Dhaliwal and Hanna 2017). As existing studies concentrate on education and health sector service delivery, this study expands this strand of literature on the effectiveness of financial and non-financial incentives and helps generalizing the findings in public sector.

As only best performers in each office are rewarded, this reward system is close to a rank-order tournament (Lazear and Rosen 1981). According to tournament theories (Connelly et al. 2014; Eriksson 1999), more able players tend to exert more effort to win the prize than less able players. For improving less able players' performance, tournament organizers restrict more able players through rules (Knoeber and Thurman 1994). In the experiment, we test if giving better performers a disadvantage helps improve poor performers' service delivery. A reward system based on a rank-order tournament is used by many companies and there are empirical studies that examine the effect of the rank-order tournament on employee performance based on cases in the private sectors of developed countries (Conyon et al. 2001; DeVaro 2006; Eriksson 1999; Knoeber and Thurman 1994). However, few studies examine the effect of the rank-order tournament in the public sector of a developing

farmers is large (Niu and Ragasa 2018; Holden et al. 2018), and also that contact farmers do not perform actively without strong agricultural extension agents and community leaders to work with (Ragasa 2020).

country. Khan et al. (2019) finds that posting of the tax inspector based on performance is effective to improve the performance of tax inspectors in Punjab, Pakistan. However, Ashraf et al. (2014a) finds that providing rank information among the classroom in a training program for community health workers in Zambia *reduces* performance compared with control group. This suggests that award systems can have a negative effect on performance. This study provides further empirical evidence of the effectiveness of rank-order tournaments on performance in public sector workers.

The rest of the paper is organized as follows. Section 2 presents the institutional background of agricultural extension services in Bangladesh. Section 3 discusses the methodology, experimental design, and empirical methods. Section 4 reports the estimation results and the robustness checks. Finally, Section 5 concludes and presents directions for future research.

## 2. Institutional background and agriculture extension services in Bangladesh

### A. Institutional arrangement for agricultural extension services

The Department of Agriculture Extension (DAE) is the central public organization that provides agricultural crop extension services to all farmers in Bangladesh. The department has 2,000 extension personnel (managerial-level civil service officers) and 14,092 field-level extension agents stationed in 492 sub-district agriculture offices (Huber and Davis 2017). District offices act as a controlling office for sub-district agriculture offices, while the sub-district agriculture offices deliver extension services at the field level. The deputy director (DD)[3] and UAO lead the district- and sub-district-level agriculture offices, respectively.

A field-level extension agent, known as a SAAO, is responsible for delivering extension services to 1,200 farmer families (one block) on average. SAAOs are permanent and pensioned employees (ASIRP 2003; Huber and Davis 2017; Mamun-ur-Rashid and Qijie 2016). Regional agriculture offices, along with district and sub-district offices, are responsible for SAAOs' promotion and transfer within the region (DAE 2018). The performance report of SAAOs is sent to the DAE and Ministry of Agriculture via the district agriculture office.

In Bangladesh, public agriculture extension services are provided by group discussions, field demonstrations, field visits, motivational tours, training for contact farmers, a celebration of field days, individual consultation with farmers, farmer field schools, and electronic media and devices (radio, television, phone) (DAE 2018). It is common for SAAOs to provide extension services through field demonstrations, individual consultancy, and field visits with farmers. Generally, the contents and types of extension services provided by SAAOs vary based on agricultural seasons and locations. At the beginning of each season, the DAE sets targets for each type of extension service for the district agriculture offices. District offices specify the targets to each sub-district agriculture office, which in turn assign targets to block-level officers.

[3] The DD is appointed from mid-level Bangladesh Civil Service (Agriculture) cadre officers who are recruited under the competitive civil service exam. Their post at an entry level is agriculture extension officer (AEO) ($9^{th}$ grade). After 5-8 years, AEOs get promotion as UAO and become head of sub-district agriculture office ($6^{th}$ grade). After 10–15 years, UAOs get promotion to deputy director (head of the district agriculture offices).

Beyond the government, NGOs and private organizations provide extension services to farmers (ASIRP 2003; Nippard 2014). NGOs deliver extension services to micro-credit clients to bolster the poultry business and social forestry. Private organizations providing extension services are limited to selling seed and fertilizers, promoting fish hatchery, and extending irrigation facilities to farmers (ASIRP 2003). Thus, private organizations' extension services are not substitutes for public services.

**B. Incentives and monitoring in the public sector agricultural extension services**

The minimum qualification for an SAAO is a diploma in agriculture. To recruit SAAOs, the DAE advertises in the national paper, which states the location (district) of vacancy where applicants reside. The selection is based on written and oral examinations. Once selected, extension officers are posted to districts other than their home district. After a few months, extension officers are posted in their home districts, some even in their own village. The salary is fixed and increases based on job tenure and promotion. Prior to 2015, when pay scale reform was implemented, the entry-level salary of an SAAO was lower than the average income for a similar occupation (BBS 2017). In 2015, pay more than doubled and became high in the rural setting.[4]

Extension worker absenteeism is common in Bangladesh.[5] Insufficient transportation budgets are believed to be a major challenge for extension agents; however, this should not be a problem if they reside in their jurisdictional area. It is common for female extension workers to reside outside their jurisdictional village after marriage. Due to social norms and customs (purdah system), it is not easy for female farmers to work with male extension workers. To solve this dilemma, in 1996, the government enacted a policy appointing female extension workers to provide extension services to

[4] Extension workers tend to work hard to achieve the target on projects from donors, because they receive an honorarium, which is partly determined by days of training participated and field days arranged in addition to their salary from the project. From a project, SAAOs receive an honorarium of around 450–500 BDT (about 6–6.5 USD) per day. This suggests that financial incentives based on performance can be an effective policy instrument for improving extension worker performance.

[5] Workers residing outside their jurisdictional block is the main reason for absenteeism. Though all extension workers must remain in their jurisdiction block, there is no enforcement of this policy.

rural women. However, according to ASRIP (2003), only 18% of female farmers know about government extension services.

Promotion prospects for SAAOs are limited. After 20 years of work, an SAAO (11th grade) can apply for a promotion to assistant agriculture extension officer (AAEO) (10th grade). Based on performance, both UAO and DD nominate SAAOs for foreign- and national-level trainings and for the Best SAAO of the Year award (DAE, 2018).[6] Employer recognition is important for workers' careers (Dewatripont et al. 1999). This incentive may not ensure promotions or privileges while extension officers enjoy the honor. Nonetheless, the Best SAAO of the Year is selected annually, and only one extension officer receives the award. Therefore, current incentives may not be effective in improving SAAO performance.

The performance of SAAOs is monitored in two ways: infrequent and planned block inspections and weekly meetings (referred to as weekly conferences). Every month, district- and sub-district-level officers announce an inspection tour. However, according to key informant interviews, geographical dispersion makes monitoring all blocks difficult for officers. Controlling officers hardly maintain a tour plan. When extension officers are older than supervisors, supervisors have difficulty to encourage officers to achieve the target.

All SAAOs for each sub-district agriculture office are to attend the weekly meeting and to record their weekly achievements in specific books maintained in the sub-district agriculture offices. If the performance is unsatisfactory, UAOs use the weekly meeting to encourage SAAOs to increase service deliveries.[7] However, SAAOs do not lose their jobs nor are they suspended if they do not achieve the targets. While there is a policy to issue a show cause letter when SAAOs have a low

[6] In a field diary, SAAOs keep a record of extension services (i.e., how many farmers communicated for specific extension services and how many of them adopted those services). To select the Best SAAO of the Year, both UAO and DD inspect the blocks of the candidates and physically verify the performance reported (DAE 2018). The best SAAO in the nation receives a crest from the prime ministers.

[7] When there is important message from the DAE and ministry, district-level officers join the meeting to deliver a motivational speech for SAAOs and share the latest directives (DAE 2018). The performance of SAAOs is also tracked by the annual confidential report (ACR) written by AEOs, which is submitted to UAO (DAE 2018). Any poor performances indicated in the ACR affects promotion prospects.

achievement rate, it is rarely issued by the UAO. During the weekly meeting, UAOs can mention, in front of colleagues**,** low-performing SAAOs who do not achieve the target and request that they improve performance.

Often, SAAOs strive to achieve seasonal targets at the end of a season. This makes it difficult for sub-district and district offices to conduct inspection in all the SAAOs, especially as this is when sub-district and district agriculture offices are preparing the next season's plan. Therefore, changing the target period from the season (4 months) to each month can make monitoring and tracking more efficient and may enhance work performance of SAAOs.

In summary, a key problem to providing extension services efficiently is poorly motivated SAAOs. A scheme exists to enhance SAAO performance through awards, training opportunities, and promotion prospects. However, this may not be effective in encouraging poor-performing SAAOs to achieve their target, since it is rare for them to be fired or severely punished due to poor performance. Therefore, encouraging poor performers is a major issue in the Bangladesh public sector.

## 3. Methodology

### A. Experimental design

The study examines all SAAOs working in 40 sub-district agriculture offices in Bangladesh. Due to accessibility after the floods, we decided to work in 4 divisions with better access from Dhaka (Barisal, Chittagong, Dhaka, and Khulna). Before sampling districts, we excluded the districts which were seriously affected by floods in the last 6 months (in 2017) and whose agro-ecological conditions are different (i.e., hilly areas), as their agricultural activity was not regular agricultural extension service. In each division, we selected 2–4 districts depending on the number of districts remained to make the total number of districts equal to ten.[8] In each district, we selected 3–6 sub-districts depending on the number of sub-districts in each district to make the total number of sub-districts 40. After sorting sub-districts by division and district, 40 sub-district agriculture offices are divided into 5 groups (either one of the treatment or control group) by generating random numbers.[9]

At the beginning of the first weekly meeting in January 2018, UAOs requested SAAOs to furnish complete information on service delivery in December 2017. This was considered the initial performance before the experiment. At this meeting, UAOs also requested them to achieve a monthly target rather than seasonal in all sample offices. In treatment offices, UAOs announced that best performers can receive rewards.[10] At the beginning of the first weekly meeting in February 2018, UAOs requested SAAOs to report the service delivery in January 2018. This measures the post-treatment performance.

[8] We selected 1 district from Barisal division, 2 districts from Dhaka, 3 districts from Chittagong division, and 4 districts from Khulna division.

[9] Since a sub-district is equivalent to a county and there were no district-level events and trainings during the experiment and evaluation period, it is unlikely for SAAOs in control offices to be discouraged by not receiving incentives.

[10] Since our subjects are incumbent public extension officers, we need official support from the DAE. We hired a senior officer from the DAE. We sent letters to all sampled sub-district agriculture officers for their consent to conduct the experiment. All sampled sub-district agriculture offices indicated their interest to participate in the experiment. During the experiment announcement, our enumerators were present in agriculture offices. Enumerators were trained how UAOs make announcements, and AEOs convinced SAAOs to participate so that the experiment was properly conducted in all offices. In treatment offices, UAOs explained that a foreign university in partnership with the sub-district agriculture office provides rewards.

In treatment offices with financial incentive, the UAO announced that he/she would select the two best SAAOs would provide monetary incentives to them. The rewards were 3,000 BDT (about 40 USD) for the best performer and 1,000 BDT (about 12 USD) for the second-best. The monthly salary of SAAOs is 16,000 BDT on average, thus, this monetary incentive was significant. There are two treatments under financial incentive (we call them "Money1" and "Money2") where the best performers are ones with the highest percentage increase in TPI in one month (Money1) and those with the highest TPI achieved (Money 2). The former gives a chance to the poor performers in the baseline to be the best performers while the latter may give disincentive to the poor performers in the baseline, since the chance of winning the prize is low.

In treatment offices with non-financial incentives, the UAO announced the two best SAAOs and send those names to the district offices informing the DD that they are the two best (we call this treatment "Fame"). SAAOs desiring to be promoted to UAO are expected to make more efforts to improve performance. The best performers are ones with the highest percentage increase in TPI in one month similar to Money1.

In treatment offices with increased monitoring, the UAO announced the two worst SAAOs to be inspected by the DD (we call this "Inspection"). As indicated above, regular inspection is conducted by UAOs and DAOs, but not by DDs. Inspection by the DD, therefore, is rare and implies severe punishment (censure) for SAAO's poor performance. Unlike other treatments, the Inspection treatment reveals information about the worst two SAAOs in the office. To avoid censure and/or to achieve higher career goals, SAAOs try to avoid being selected as the worst. Furthermore, being labeled as the worst can induce shame. The worst performers are the ones with the lowest percentage increase in TPI in one month.[11]

To motivate initially poor-performing officers, following tournament theory prediction, initially better performers were given a disadvantage by normalizing performance at the baseline level, except Money2. It is unclear if giving a disadvantage to better performers has negative effects on their efforts

[11] We prepared Bengali scripts for all treatment and control offices. The English translation is attached in Appendix A.

a priori. Average and heterogeneous treatment effects for poor- and better-performing officers are estimated. By comparing the impact of Money1 and Money2 on poor performers, the effectiveness of giving a disadvantage to better performers in improving the performance of poor performers is tested.

In this study, the performance of SAAOs is measured by the number of farmers to whom they provided specific extension services before and after the experiment. The experiment took place in the middle of the Rabi season, when SAAOs provide extension services on four main farming activities: (i) compost ground (sites) preparation; (ii) FYM grounds (sites) preparation; (iii) vermicompost grounds (sites) preparation; and (iv) ideal seedbeds preparation for rice cultivation. The service delivery of each activity is measured by the number of farmers whom SAAOs motivated to prepare four farming activities in the last month. Since some services are more easily delivered than others, each service delivery measure was standardized by mean and standard deviation, and an overall performance measure was constructed by taking an average of the standardized values of each service. We call this measure the Total Performance Index (TPI).[12] Regarding the outcome measure, one may argue that SAAOs overstate their performance to receive the reward or avoid a censure, since performance measures are self-reported by SAAOs. However, the over-reporting problem is unlikely, as UAOs warned the SAAOs that they would issue a show cause letter for over reporting. Additionally, SAAOs reported activities records regularly and knew that UAOs would check the records and detect such cases.

**B. Estimation model**

McKenzie (2012) indicates an analysis of covariance (ANCOVA) estimation of treatment effects is better than difference-in-difference (DID) estimation when autocorrelation is low. In this study, the autocorrelation is 0.50 for the control group and 0.428 for the treatment group, and the sample size is more than 800, which means that ANCOVA has higher power than DID. Therefore, an ANCOVA

[12] For each service s, the number of service delivery provided by agent i (qi) is standardized where pre-treatment and post-treatment monthly data (t=0 and 1) are compiled and the standardized measures ($P^s_{it}$) are obtained for each agent and each time period separately for service type. For each agent i, $TPI_{it}$ is calculated by taking average of $P^s_{it}$ over s.

estimation model is used as the main specification to estimate the treatment effects on the performance of extension officers. We estimate the model below:

$$Y_{ist} = \beta_F F_s + \beta_{M1} M1_s + \beta_{M2} \mathrm{M2}_s + \beta_I I_s + \gamma X_{ist-1} + \theta O_{st-1} + \delta Y_{ist-1} + \alpha_{dt} + \alpha_{vt} + e_{ist}, \quad (1)$$

where $Y_{ist}$ is the performance (TPI) of SAAO $i$ in sub-district $s$ at time $t$ (after the experiment). F, M1, M2, and I are dummy variables for the four treatments: Fame, Money1, Money2, and Inspection, respectively. βs are treatment effects to be estimated separately for each incentive. $X_{ist-1}$ presents a set of SAAO characteristics and $O_{st-1}$ presents a set of office characteristics. $Y_{ist-1}$ indicates the lagged dependent variable at time $t$-1 (before the experiment), $\alpha_{dt}$ is district fixed effects, $\alpha_{vt}$ is division fixed effects, and $e_{ist}$ is the error term. Standard errors are clustered at the sub-district agriculture office level. As the TPI is normalized by the mean and standard deviation of the baseline control group, the treatment effects estimated by β are measured in standard deviation units.

We control for office characteristics, as tournament theory predicts that high variation of initial performance among competitors leads to increase in service delivery among more able officers. In contrast, low variation of initial performance among competitors results in similar effects on all competitors. Additionally, in our experimental setting, winning probability is different by the size of the office, since the number of winners from each office is the same.

## 4. Results

### A. Descriptive statistics and baseline balance

Table 1 shows the baseline socio-economic characteristics (gender and tenure) of the SAAOs, the number of SAAOs in sub-district agricultural office, and performance variance within the office. More than 80% of the SAAOs are male and have been in the position for an average of 15 years. The number of SAAOs in a sub-district agricultural office (office size) is approximately 23. Except for performance variance, these characteristics are comparable across the control and treatment groups. Distribution of initial performance within an office is larger in Money1 and Money2 than Control offices.

Table 2 shows total performance index before and after the experiment for the control and treatment groups.[13] There are no differences in total performance index across treatment and control groups before the experiment. This can be clearly seen in Figure 1 Panel (A). After the experiment, however, performance is significantly higher for the treatment groups than for the control group. As Figure 1 Panel (B) shows, performance distribution shifts to the right. The increase in performance index for Inspection is significantly greater than for Money1, while there is no significant difference among other treatments. Figure 1 Panel (E)–(H) indicates that each treatment affected performance distribution differently.

The last four columns compare performance index between male and female agents and between more- and less-experienced agents. There are no differences in performance index before the experiment by gender or tenure. However, female and less-experienced extension agents increased service delivery after the experiments more. This suggests that gender and tenure affect the impact of incentives on performance.

### B. Estimation Results

[13] The means of variables used to construct TPI before and after the treatment are provided in Appendix Table 1.

Column 1 in Table 3 presents the results estimated by equation 1. All four treatments have a positive and significant effect on the level of agricultural extension services provided by the agents. All the treatments increase the average performance by 0.29–0.49 standard deviations.[14] The magnitudes of the average impacts are equivalent to those found in Ashraf et al. (2014b)[15]. Although the magnitude of non-financial incentives is higher than that of financial incentives, the p-values listed in the bottom of the table indicate that the estimated coefficients between treatments are not statistically different. Thus, there is no evidence that non-financial incentives (Inspection and Fame) are more effective than the financial incentives (Money 1 and 2).[16] Furthermore, giving advantage to poor performers by using the percentage change of the performance indicator, not the level of performance, does not have detectable difference in treatment effects on average. There is a positive association between initial TPI variance and TPI and a negative association between office size and TPI, as tournament theory predicts.

Other columns show the estimation results by using subsamples to examine the effect of the treatment separately for poor and better performers. In columns 2 and 3, poor performers are categorized as the bottom 50% in each office, while in columns 4 and 5, poor performers are defined by those who had TPI lower than median TPI. As seen in columns 2 and 3, all four treatments increase the performance among both poor and better officers. Inspection treatment had slightly higher impact on poor performers than on better ones in the office. Fame and Money2 are more effective for better performers than for poor performers in the office. As shown in columns 4 and 5, all the treatments increased TPI more among poor performers than better performers As we expected, these treatments

[14] For TPI to increase by 0.48 (estimated coefficient of Fame treatment), when only one of the service delivery components, for example, the number of compost grounds, increases and the other components remained constant, the number of compost grounds needs to be increased by 1.26 (= 0.48 x 2.62, where 2.62 is the standard deviation of compost in the baseline as given in Appendix Table 2). As the mean of the number of compost grounds (demonstration plots) prepared by an agent to demonstrate how to make compost is 4.72, the magnitude of the impact is economically significant.

[15] They examined the effect of awards by taking the case of Zambia's health worker training program where its treatments are providing information on the ranking of performance (test scores) either privately or socially. They found that such interventions decrease the average performance by 0.31–0.38 standard deviations.

[16] The estimation results with each service delivery measure as an outcome variable are provided in Appendix Table 2.

motivated the poor performers more than better performers. Both in relative and absolute senses, poor performers can enhance their performance by these incentives.

### C. Heterogeneous effects

In this sub-section, we explore the differential impacts of treatments further. A first set of factors which may cause treatment effects to differ is SAAOs' preferences, since the timing of the payments differ across treatment arms. For example, the reward for Money1 and Money2 is provided immediately after the selection. The reward from Fame (future promotion) is uncertain and provides more than 10 years after the experiment if it is realized. Consideration of a new incentive differs the treatment effect. Therefore, using the SAAOs' preference measures, the heterogeneous treatment effect on performance is tested.[17] The preference measures include risk aversion, least patient, and altruism to the poor. A second set of factors affecting SAAOs' effort differently includes public sector motivation (PSM), personality traits measured by Big Five index, educational background, and proximity to farmers assigned to SAAOs.[18] The motivation among those with higher PSM can be decreased when financial incentives are provided if financial incentives crowd out motivation (Ashraf et al. 2014b). Those who live far from assigned farmers may not increase the service delivery as much as those who live closer to the farmers as the transaction costs are higher for the former than the latter.

To estimate the heterogeneous treatment effect of the experiment on performance, the following model is used:

$$Y_{ist} = \beta_F F_s + \beta_{M1} M1_s + \beta_{M2} \mathrm{M2}_s + \beta_I I_s + \beta_{FZ} F_s \times Z_{ist-1} + \beta_{M1Z} M1_s \times Z_{ist-1} + \beta_{M2Z} \mathrm{M2}_s \times Z_{ist-1} + \beta_{IZ} I_s \times Z_{ist-1} + \pi Z_{ist-1} + \gamma X_{ist-1} + \delta Y_{ist-1} + \alpha_{dt} + \alpha_{vt} + e_{ist}, \quad (2)$$

[17] This analysis is conducted by merging another survey's data. Since the experiment is designed as a policy change at DAE, we did not collect socio-economic background and other information from the SAAOs before the experiment. The merged data has 170 observations and is called the restricted sample. These measures are collected only from 22% of the whole sample. The descriptive statistics are given in Appendix Table 3.

[18] The survey instruments for measuring personality and public service motivation are provided in Appendix C.

where $Z_{ist-1}$ is a variable explained above related to SAAO's preference and effort, such as risk aversion, impatience, PSM, Big Five Index, and proximity to farmers. The coefficients of interaction terms are differences in marginal effects of each incentive for SAAOs.

The estimation results are provided in Table 4. Column 1 indicates that risk-averse agents tend to exert more effort when Fame treatment is assigned. As shown in other columns, there is no evidence that patience, altruism, Big Five Personality index, proximity to farmers, or academic performance in high school change the treatment effects. If the resource constraints that agents face were a major issue in poor service delivery, we would expect to see a larger effect of motivation for agents who live in block proximity to farmers. However, the results do not support this possibility.

## 5. Conclusion

This study examined incentives to improve service delivery of public agricultural extension officers in Bangladesh by conducting a randomized control trial. In the field, each agent is assigned to a certain block and is in charge of delivering services to farmers in the block. Although farmers in all the blocks have the right to receive agricultural extension services, those who reside in blocks where poor-performing agents are assigned currently miss the opportunity to access agricultural technology. Thus, from an equity point of view, improving service delivery of poor-performing agents is more crucial than improving that of best-performing agents. Our focus is to examine relative effectiveness of introducing financial and non-financial incentives by testing which incentive motivates low-performing extension agents to increase their performance most. As selecting the best performers at each office may not enhance efforts by the worst performers, we created treatments where the worst performers are selected for inspection and those who increased the performance most are selected for reward.

The results show that there is a positive effect of all four treatments of equal magnitude on average, which is about one standard deviation of baseline total performance index. The incentives improved the work effort among agents whose TPI is below the median score within the office and those whose TPI is below the median score within sample agents. It is also important to note that these incentives giving poor performers advantages to win the reward do not discourage better-performing agents. In heterogenous analyses, we find that among agents with higher public sector motivation, non-financial incentives seem to work better for increasing service delivery than financial incentives. One may puzzle why all the treatments have positive effects and no detectable difference across treatments is found. This can be because in the preparation stage, we asked UAOs, DAOs, and SAAOs who are not in the study areas if our treatments can motivate extension agents. Especially for financial incentives, we ask about the minimum amount that is high enough to affect their behavior. As each treatment is equally effective, one may ask which treatment a policy maker should choose if trying to incentivize these extension agents. This study compared the relative effectiveness of the treatments

based on the average impact of the treatments, not cost-effectiveness. This is because it is difficult to estimate the opportunity cost of the district directors' time. Thus, we cannot provide clear rankings of recommended incentives based on cost-effectiveness. However, in each country and setting, it is expected that barriers to introduce some of these incentives can be higher than the others. This study suggests that out of four treatments, policy makers can choose an incentive policy which is easier to implement.

In many developing countries, fiscal budgets in the agricultural sector have been declining. Introducing financial incentives may not be feasible. It is, therefore, important to manage extension workers creatively using non-financial incentives. This also indicates that not only the work morale of field workers but also the managerial abilities of control officers is key for improving service delivery.

Six months after the experiment, a short interview was conducted with the UAOs and AEOs to determine if there are negative consequences of the experiment. No dissatisfaction existed among SAAOs regarding the experiment, and no offices indicated that the experiment had negative effects on performance of SAAOs after the experiment. Three offices assigned to Money2 experiment introduced a similar incentive to increase extension services by using the sub-county officer's private money. This suggests that the research supports the "do no harm" principle.

There are limitations of this study. First, we examined only the short-term effects. The effects found in this study may decay over time. Second, we failed to test the comparative effectiveness of clarifying work duties, an emphasis on short-term (monthly) rather than long-term targets (annual, status quo), and a frequent reward system. Third, we did not have data on farmers' adoption rates of agricultural practices recommended by SAAOs or on agricultural productivity. Although we found that the financial and non-financial incentives increased the service delivery of SAAOs, access to SAAOs among small farmers is very limited in rural Bangladesh. How effective such incentive policies targeting agricultural extension officers are for increasing agricultural productivities has not been answered, in this study or in other literature. These are important research areas to be pursued further.

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Table 1: Descriptive Statistics on Baseline Characteristics of SAAOs and Sub-District Agricultural Office by Treatment Status

| Variables | Control (C) | Fame (F) | Money1 (M1) | Money2 (M2) | Inspection (In) |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Male extension agents | 0.883 | 0.829 | 0.819 | 0.868 | 0.835 |
| | (0.322) | (0.378) | (0.386) | (0.340 | (0.372) |
| Job experience (years) | 14.310 | 15.283 | 14.703 | 13.811 | 15.753 |
| | (13.050) | (12.357) | (12.010) | (12.701) | (12.437) |
| Number of SAAOs in agricultural office | 23.947 | 22.928 | 23.787 | 22.660* | 24.847 |
| | (7.366) | (6.368) | (8.507) | (6.003) | (8.884) |
| Performance variance within office | 0.196 | 0.181 | 0.256* | 0.246* | 0.212 |
| | (0.097) | (0.081) | (0.113) | (0.089) | (0.100) |
| Number of SAAOs | 171 | 152 | 155 | 159 | 170 |

Numbers in the parentheses are standard deviations. * indicates that there is a significant difference in means between treatment and control groups at 5% level.

Table 2: Index of Service Delivery (Total Performance Index) by Treatment Status

| | | Average TPI | | | |
|---|---|---|---|---|---|
| | Control | F | M1 | M2 | In |
| | (1) | (2) | (3) | (4) | (5) |
| Pre treatment | -0.181 | -0.214 | -0.155 | -0.128 | -0.145 |
| | [0.040] | [0.045] | [0.048] | [0.046] | [0.042] |
| Post treatment | -0.172 | 0.233* | 0.152* | 0.217* | 0.253* |
| | [0.048] | [0.039] | [0.047] | [0.051] | [0.047] |
| Number of Observations | 171 | 152 | 155 | 159 | 170 |

| | Male agents | Female agents | More experienced agents | Less experienced agents |
|---|---|---|---|---|
| | (6) | (7) | (8) | (9) |
| Pre treatment | -0.161 | -0.185 | -0.179 | -0.147 |
| | [0.021] | [0.055] | [0.026] | [0.030] |
| Post treatment | 0.122 | 0.192 | 0.082 | 0.192 |
| | [0.024] | [0.052] | [0.029] | [0.032] |
| Number of Observations | 684 | 123 | 437 | 370 |

The numbers in the brackets are standard errors. * indicates that the difference in means between treatment and control groups is significantly different from zero at 5% level (Column 2–5). More experienced agents are defined here as ones with more than 10 years).

Table 3: Effects of Treatments on the Performance (Total Performance Index)

| | Full sample | Poor performers (bottom 50% in each office) | Better performers (top 50% in each office) | Poor performers (bottom 50% in whole sample) | Better performers (top 50% in whole sample) |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Fame | 0.49*** | 0.45*** | 0.52*** | 0.66*** | 0.24* |
| | (0.12) | (0.11) | (0.14) | (0.10) | (0.13) |
| Money1 | 0.30** | 0.31** | 0.30* | 0.53*** | 0.04 |
| | (0.13) | (0.12) | (0.16) | (0.12) | (0.16) |
| Money2 | 0.29** | 0.24* | 0.34** | 0.40*** | 0.23* |
| | (0.12) | (0.12) | (0.13) | (0.11) | (0.14) |
| Inspection | 0.35*** | 0.39*** | 0.31** | 0.42*** | 0.20 |
| | (0.12) | (0.12) | (0.12) | (0.11) | (0.14) |
| Male | -0.03 | -0.07 | 0.03 | -0.01 | -0.01 |
| | (0.05) | (0.06) | (0.07) | (0.05) | (0.08) |
| Job Tenure | -0.00 | -0.00 | -0.00 | -0.00 | 0.00 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Initial TPI | 0.43*** | 0.39*** | 0.48*** | 0.27*** | 0.47*** |
| | (0.05) | (0.08) | (0.07) | (0.09) | (0.07) |
| Initial TPI variance | 0.63* | 0.74** | 0.46 | 1.04*** | 0.38 |
| | (0.32) | (0.33) | (0.38) | (0.29) | (0.43) |
| No. of officers at office | -0.02*** | -0.02*** | -0.02** | -0.01 | -0.02** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Constant | -0.20 | -0.15 | -0.27* | -0.51*** | -0.17 |
| | (0.15) | (0.21) | (0.15) | (0.16) | (0.19) |
| Observations | 807 | 391 | 416 | 403 | 404 |
| R-squared | 0.39 | 0.31 | 0.42 | 0.35 | 0.34 |
| (p-value)+ | | | | | |
| $\beta_F$ vs $\beta_{M1}$ | (0.23) | (0.25) | (0.29) | (0.36) | (0.24) |
| $\beta_F$ vs $\beta_{M2}$ | (0.16) | (0.06) | (0.37) | (0.01) | (0.95) |
| $\beta_F$ vs $\beta_I$ | (0.28) | (0.57) | (0.20) | (0.14) | (0.82) |
| $\beta_{M1}$ vs $\beta_{M2}$ | (0.94) | (0.59) | (0.85) | (0.31) | (0.35) |
| $\beta_{M1}$ vs $\beta_I$ | (0.77) | (0.58) | (0.96) | (0.48) | (0.41) |
| $\beta_{M2}$ vs $\beta_I$ | (0.63) | (0.19) | (0.84) | (0.81) | (0.85) |

+Wild bootstrap 999 replications. Standard errors are clustered at sub-district agriculture offices in parentheses. Division and district fixed effects are controlled for. *** p<0.01 ** p<0.05 * p<0.10.

The coefficients of Money1 between (4) and (5) are statistically different at 5% level 95% conf. interval (0.066, 0.662). Other coefficients between columns (2) and (3) and between columns (4) and (5) are not statistically different.

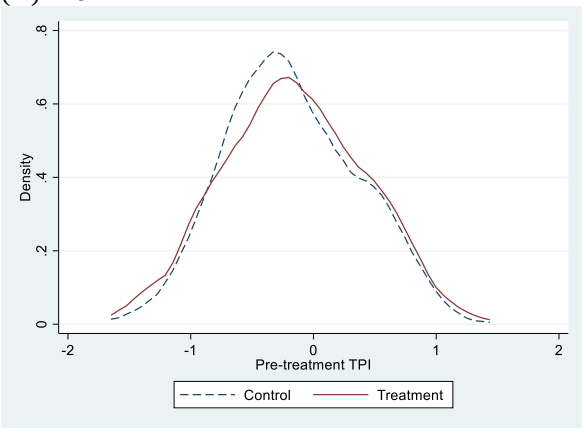
Table 4: Effects of Treatments on the Performance (Total Performance Index) (ANCOVA)

| Variables | Z=1 if Most risk averse | Z=1 if least patient | Z=1 if Altruist to poor | Z=PSM Index | Z=Big Five personality | Z=1 reside in the block | Z=1 if obtained good grade |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Fame | 0.02 | 0.54*** | 0.80*** | 0.48*** | 0.48*** | 0.49*** | 0.65*** |
| | (0.26) | (0.19) | (0.22) | (0.12) | (0.12) | (0.15) | (0.20) |
| Money1 | 0.15 | 0.56*** | 0.68** | 0.30** | 0.30** | 0.58*** | 0.47** |
| | (0.26) | (0.16) | (0.29) | (0.13) | (0.13) | (0.18) | (0.21) |
| Money2 | 0.20 | 0.31* | 0.80*** | 0.29** | 0.29** | 0.40* | 0.33 |
| | (0.30) | (0.16) | (0.22) | (0.12) | (0.12) | (0.21) | (0.23) |
| Inspection | -0.06 | 0.10 | 0.44 | 0.35*** | 0.35*** | 0.29* | 0.19 |
| | (0.28) | (0.19) | (0.27) | (0.12) | (0.11) | (0.16) | (0.21) |
| Fame × Z | 0.70*** | 0.07 | -0.03 | -0.08 | -0.05 | 0.25 | -0.09 |
| | (0.25) | (0.19) | (0.04) | (0.30) | (0.21) | (0.26) | (0.23) |
| Money1 × Z | 0.35 | -0.30 | -0.05 | -0.23 | -0.23 | -0.23 | -0.08 |
| | (0.25) | (0.21) | (0.05) | (0.27) | (0.22) | (0.26) | (0.26) |
| Money2 × Z | 0.21 | 0.01 | -0.09** | -0.40 | -0.26 | -0.12 | 0.01 |
| | (0.30) | (0.22) | (0.04) | (0.28) | (0.29) | (0.32) | (0.22) |
| Inspection × Z | 0.42 | 0.19 | -0.04 | 0.07 | 0.14 | -0.09 | 0.07 |
| | (0.26) | (0.20) | (0.04) | (0.31) | (0.27) | (0.33) | (0.25) |
| Male | -0.06 | -0.03 | -0.06 | -0.03 | -0.03 | -0.06 | -0.05 |
| | (0.09) | (0.10) | (0.10) | (0.05) | (0.05) | (0.09) | (0.10) |
| Job tenure | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Initial TPI | 0.48*** | 0.49*** | 0.47*** | 0.42*** | 0.42*** | 0.46*** | 0.46*** |
| | (0.08) | (0.08) | (0.07) | (0.04) | (0.04) | (0.08) | (0.08) |
| Initial TPI variance | 0.48 | 0.61 | 0.45 | 0.62* | 0.63** | 0.58 | 0.46 |
| | (0.56) | (0.53) | (0.54) | (0.31) | (0.31) | (0.55) | (0.56) |
| No. of officers | -0.01 | -0.01* | -0.01 | -0.02*** | -0.02*** | -0.01 | -0.01 |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Z | -0.28 | 0.01 | 0.05* | 0.01 | 0.11 | -0.04 | 0.13 |
| | (0.19) | (0.14) | (0.03) | (0.19) | (0.17) | (0.24) | (0.19) |
| Constant | 0.03 | -0.16 | -0.55* | -0.20 | -0.19 | -0.22 | -0.24 |
| | (0.27) | (0.24) | (0.30) | (0.15) | (0.15) | (0.27) | (0.26) |
| Observations | 164 | 164 | 164 | 807 | 807 | 164 | 164 |
| R-squared | 0.49 | 0.49 | 0.49 | 0.40 | 0.39 | 0.49 | 0.48 |
| (p-value)+ | | | | | | | |
| $\beta_F$ vs $\beta_{M1}$ | (0.69) | (0.92) | (0.68) | (0.21) | (0.21) | (0.66) | (0.36) |
| $\beta_F$ vs $\beta_{M2}$ | (0.59) | (0.35) | (0.99) | (0.13) | (0.15) | (0.74) | (0.22) |
| $\beta_F$ vs $\beta_I$ | (0.82) | (0.13) | (0.16) | (0.28) | (0.28) | (0.26) | (0.08) |
| $\beta_{M1}$ vs $\beta_{M2}$ | (0.90) | (0.27) | (0.70) | (0.95) | (0.94) | (0.58) | (0.59) |
| $\beta_{M1}$ vs $\beta_I$ | (0.53) | (0.10) | (0.44) | (0.77) | (0.77) | (0.16) | (0.24) |
| $\beta_{M2}$ vs $\beta_I$ | (0.45) | (0.35) | (0.14) | (0.60) | (0.61) | (0.52) | (0.53) |
| $\beta_F+\beta_{FZ} = \beta_{M1}+\beta_{M1Z}$ | (0.21) | (0.06) | (0.58) | (0.42) | (0.11) | (0.08) | (0.45) |
| $\beta_F+\beta_{FZ} = \beta_{M2}+\beta_{M2Z}$ | (0.21) | (0.31) | (0.78) | (0.26) | (0.21) | (0.10) | (0.35) |
| $\beta_F+\beta_{FZ} = \beta_I+\beta_{IZ}$ | (0.06) | (0.13) | (0.14) | (0.97) | (0.85) | (0.08) | (0.16) |
| $\beta_{M1}+\beta_{M1Z} = \beta_{M2}+\beta_{M2Z}$ | (0.71) | (0.87) | (0.81) | (0.54) | (0.86) | (0.80) | (0.67) |
| $\beta_{M1}+\beta_{M1Z} = \beta_I+\beta_{IZ}$ | (0.41) | (0.89) | (0.41) | (0.28) | (0.07) | (0.61) | (0.62) |
| $\beta_{M2}+\beta_{M2Z} = \beta_I+\beta_{IZ}$ | (0.79) | (0.89) | (0.18) | (0.13) | (0.16) | (0.76) | (0.62) |

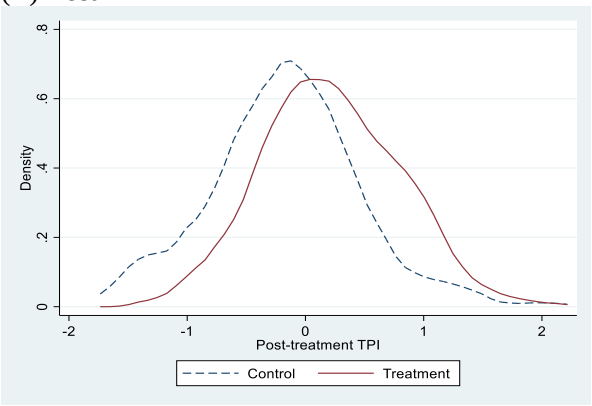
+Wild bootstrap 999 replications. Cluster standard errors by sub-district offices are in parentheses.

Division and district fixed effects are controlled for. *** p<0.01 ** p<0.05 *p<0.10.

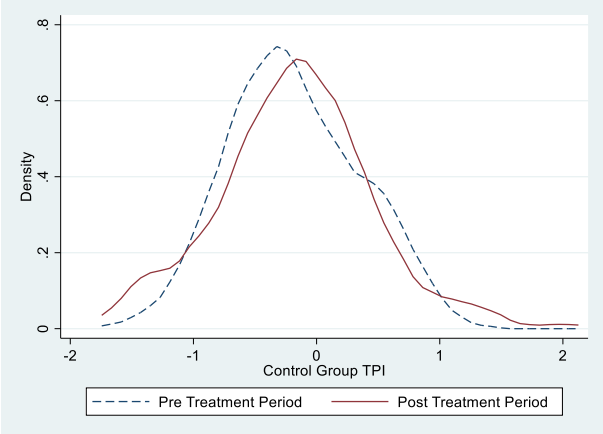
(A) Pre



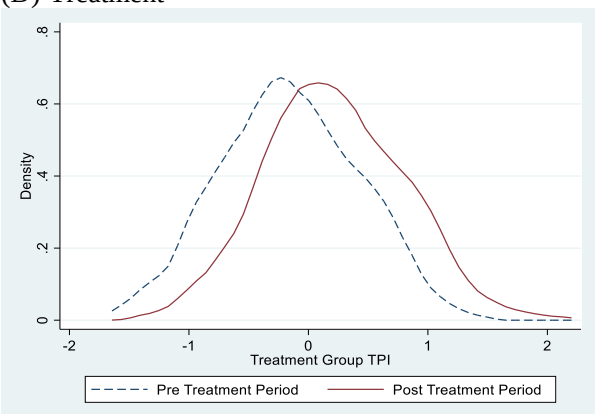

(B) Post



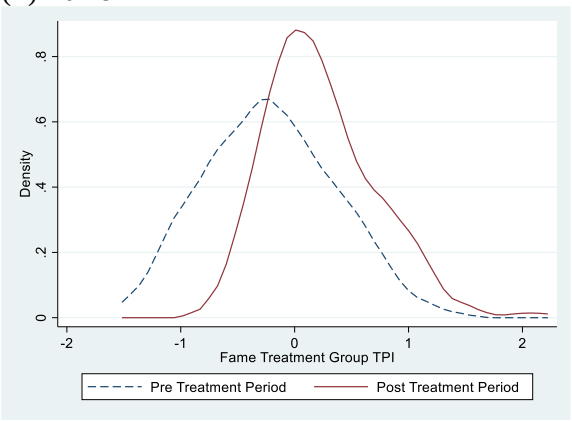

(C) Control



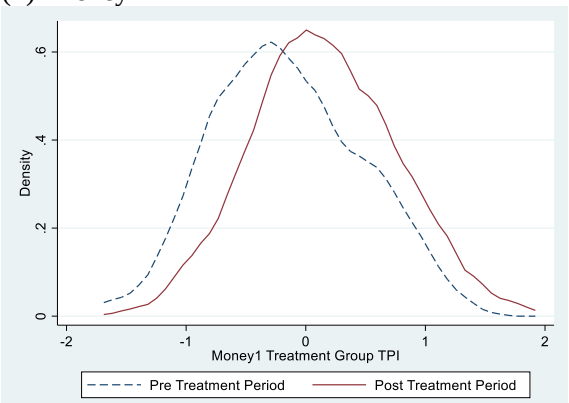

(D) Treatment



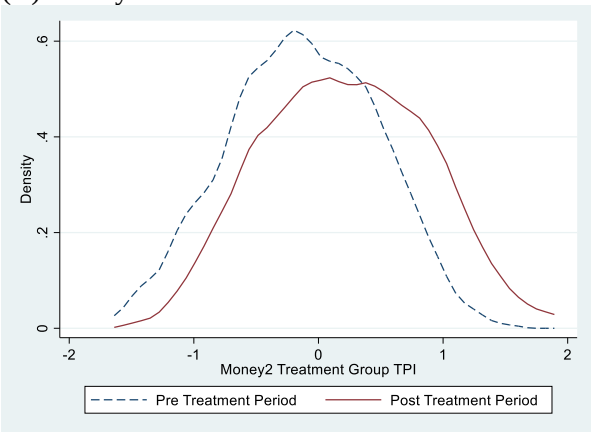

(E) Fame




(F) Money 1




(G) Money 2




(H) Inspection

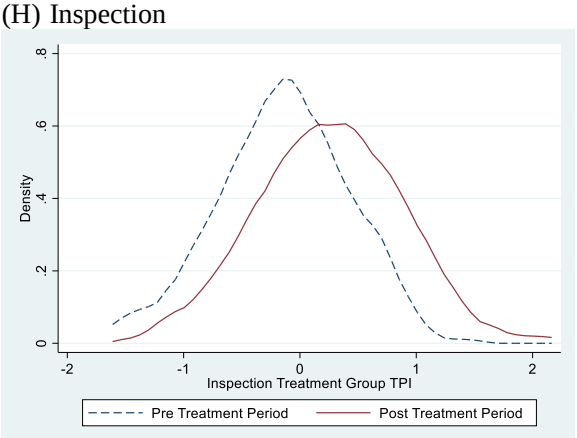



Figure 1. Total Performance Index.

Appendix Tables

Appendix Table 1: Outcome Variables

| Variables | Control | Fame (T1) | Money1 (T2) | Money2 (T3) | Inspection (T4) |
|---|---|---|---|---|---|
| Panel A. Pre-treatment | (1) | (2) | (3) | (4) | (5) |
| Number of compost grounds prepared | 4.720 | 4.796 | 5.168 | 4.993 | 4.657 |
| | [0.219] | [0.249] | [0.264] | [0.271] | [0.254] |
| Number of FYM ground preparation | 3.673 | 3.322 | 3.923 | 4.069 | 3.800 |
| | [0.165] | [0.229] | [0.230] | [0.197] | [0.212] |
| Number of Vermi ground prepared | 1.433 | 1.237 | 1.310 | 1.277 | 1.388 |
| | [0.109] | [0.110] | [0.117] | [0.115] | [0.101] |
| Percentage of Land used as Ideal Seedbeds (%) | 57.551 | 56.085 | 53.545 | 56.127 | 60.912 |
| | [2.156] | [1.737] | [2.233] | [1.854] | [2.091] |
| Panel B. Post-treatment | | | | | |
| Number of compost grounds prepared | 4.881 | 5.783* | 5.620* | 5.687* | 6.077* |
| | [0.174] | [0.245] | [0.276] | [0.238] | [0.272] |
| Number of FYM ground prepared | 3.936 | 4.934* | 5.200* | 5.704* | 4.906* |
| | [0.188] | [0.196] | [0.206] | [0.242] | [0.282] |
| Number of Vermi ground prepared | 1.485 | 2.026* | 1.942* | 1.792* | 1.788* |
| | [0.111] | [0.112] | [0.123] | [0.139] | [0.115] |
| Percentage of land under ideal seedbeds | 52.449 | 65.292* | 59.214* | 64.403* | 75.599* |
| | [2.854] | [1.889] | [1.805] | [2.734] | [2.317] |

Numbers in the brackets are standard errors. * indicates that there is a significant difference in means between treatment and control groups at 5% level. Columns 1–6 presents the means difference between the treatment and control group. Columns 6 and 7: the means difference in service delivery between males and females. Column 8 & 9: the means difference in service delivery between more experienced (more than 10 years) and less experienced extension agents.

Appendix Table 2: Standardized Service Delivery Measure (ANCOVA models)

| VARIABLES | Compost ground preparation. | FYM ground preparation | Vermi ground preparation | Ideal seedbeds preparation |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Fame | 0.39** | 0.46*** | 0.52** | 0.40* |
| | (0.16) | (0.13) | (0.20) | (0.23) |
| Money1 | 0.12 | 0.31 | 0.43** | 0.32 |
| | (0.14) | (0.18) | (0.19) | (0.24) |
| Money2 | 0.16 | 0.54*** | 0.38* | 0.05 |
| | (0.15) | (0.16) | (0.19) | (0.22) |
| Inspection | 0.36* | 0.34* | 0.28 | 0.50** |
| | (0.19) | (0.19) | (0.19) | (0.23) |
| Male | -0.06 | 0.02 | 0.00 | -0.07 |
| | (0.09) | (0.11) | (0.08) | (0.12) |
| Job Tenure | 0.00 | -0.00 | -0.00* | -0.00 |
| | (0.00) | (0.00) | (0.00) | (0.00) |
| Initial outcome variables | 0.33*** | 0.39*** | 0.57*** | 0.34*** |
| | (0.05) | (0.05) | (0.05) | (0.09) |
| Initial TPI variance | 1.56*** | 0.62 | -0.73 | 1.00 |
| | (0.56) | (0.68) | (0.51) | (1.22) |
| No. of officers | -0.02*** | -0.01 | -0.02* | -0.01 |
| | (0.01) | (0.01) | (0.01) | (0.01) |
| Constant | -0.38 | -0.41* | 0.02 | 0.19 |
| | (0.23) | (0.24) | (0.28) | (0.32) |
| Observations | 722 | 807 | 807 | 682 |
| R-squared | 0.27 | 0.27 | 0.38 | 0.40 |

The standard error is clustered at sub-district level shown in parenthesis. * $p<0.05$

Appendix Table 3: Descriptive Statistics (Restricted Sample)

| Variables | Control | Fame | Money1 | Money2 | Inspection |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Pre-treatment performance index | -0.208 | -0.367 | -0.042 | 0.054 | -0.094 |
| | [0.527] | [0.522] | [0.601] | [0.463] | [0.609] |
| Post treatment Performance Index | -0.144 | 0.177* | 0.285* | 0.395* | 0.182* |
| | [0.640] | [0.493] | [0.593] | [0.662] | [0.743] |
| Tenure | 10.194 | 15.032 | 13.057 | 15.250* | 17.133* |
| | [11.693] | [13.293] | [10.624] | [12.593] | [12.867] |
| Male | 0.778 | 0.903 | 0.771 | 0.844 | 0.833 |
| | [0.422] | [0.301] | [0.426] | [0.369] | [0.379] |
| =1 if obtained good grades | 0.528 | 0.452 | 0.486 | 0.656 | 0.633 |
| | [0.506] | [0.506] | [0.507] | [0.483] | [0.490] |
| PSM Index | 0.098 | -0.010 | 0.014 | -0.009 | -0.041 |
| | [0.463] | [0.306] | [0.485] | [0.437] | [0.521] |
| Big five Index | -0.006 | 0.110 | -0.025 | -0.044 | 0.078 |
| | [0.490] | [0.559] | [0.488] | [0.484] | [0.481] |
| =1 if least patient | 0.639 | 0.645 | 0.571 | 0.531 | 0.667 |
| | [0.487] | [0.486] | [0.502] | [0.507] | [0.479] |
| Altruism to poor | 5.278 | 4.129 | 4.200 | 4.688 | 4.900 |
| | [2.855] | [2.802] | [3.188] | [3.095] | [3.497] |
| =1 if most risk averse | 0.778 | 0.903 | 0.771 | 0.813 | 0.633 |
| | [0.422] | [0.301] | [0.426] | [0.397] | [0.490] |
| =if reside in block area | 0.417 | 0.419 | 0.657* | 0.438 | 0.467 |
| | [0.500] | [0.502] | [0.482] | [0.504] | [0.507] |
| Number of observations | 36 | 31 | 35 | 32 | 30 |

Standard deviations are in brackets. * indicates that there is a significant difference in means between treatment and control groups at 5% level.

## Appendix A: Experiment Scripts

### Script for Fame treatment

There is pressure from higher authorities for every sub-assistant agriculture officer (SAAO) to achieve their monthly target. Therefore, starting next month, with instructions from the Deputy Director (DD), we will select the two best SAAOs who increase their achievement rate the most. After selecting them, I will send a letter to the DD with their names, along with other reports. For example, if Mr. X achieved 90% in December and 100% in January, and Mr. Y achieved 60% in December and 70% in January, then the percentage increase in target achievement for Mr. X and Mr. Y is 100×10/90=11% and 100×10/60=17%, respectively. Thus, Mr. Y will be considered a better performer than Mr. X. This means agents who performed poorly in the initial period have the potential to become the highest achievers.

Please do not over-report service deliveries. If you do so, a show-cause letter will be issued. I will confirm your service deliveries in the field.

### Script for Money1 treatment

There is pressure from higher authorities for every sub-assistant agriculture officer (SAAO) to achieve the target monthly. Therefore, starting next month with instructions from the Deputy Director (DD), we will select the two best SAAOs who increased their achievement rate most. To increase service delivery, a foreign university has decided to offer a monetary reward to the two best achievers. The best achiever will get 3,000 BDT, and the second-best achiever will get 1,000 BDT. I will select the two best SAAOs who increase their achievement most. For example, if Mr. X achieved 90% in December and 100% in January and Mr. Y achieved 60% in December and 70% in January, then the percentage increase in target achievement for Mr. X and Mr. Y is 100×10/90=11% and 100×10/60=17%, respectively. Mr. Y will be considered a better performer than Mr. X. This means agents who performed poorly in the initial period have the potential to become the best achievers.

Please do not over-report service deliveries. If you do so, a showcause letter will be issued. I will confirm your service deliveries in the field.

**Script for Money2 treatment**

There is a pressure from higher authorities for every sub-assistant agriculture officer (SAAO) to achieve the monthly target monthly. Beginning next month, according to an instruction from the Deputy Director (DD), we will select the two best SAAOs. To increase service delivery, a foreign university has decided to offer money to the two best achievers. I will select the two best SAAOs based on increased percentage of achievement. For example, Mr. X achieved 90% in December and 100% in January. Mr. Y achieved 60% in December and 70% in January. Mr. X will be considered a better performer than Mr. Y. The best achiever will get 3,000 BDT, and the second-best achiever will get 1,000 BDT.Please do not over-report service deliveries. If you do so, a showcause letter will be issued. I will confirm your service deliveries in the field.

**Script for Inspection treatment**

There is a pressure from higher authorities for every sub-assistant agriculture officer (SAAO) to achieve their monthly target. Beginning next month, according to an instruction from the Deputy Director (DD), I will prepare a list of SAAOs ranked by achievement rate. I will select the worst two performers based on who increased their achievement rate the least and send their names to the DD. For example, if Mr. X achieved 90% in December and 100% in January, and Mr. Y achieved 60% in December and 70% in January, then the percentage increase in the target achievement for Mr. X and Mr. Y is 100×10/90=11% and 100×10/60=17%, respectively. Mr. Y will be considered a better performer than Mr. X. This means agents who performed poorly in the initial period have the potential to become the best achievers.

Please do not over-report service deliveries. If you do so, a showcause letter will be issued. I will confirm your service deliveries in the field.

## Appendix B: Variables

For the data analysis, the following variables were used:

- Age of SAAO: Calculated based on self-reported birthdate of respondent.
- Experience as SAAO: Number of years working in current job.
- Female: =1 if SAAO is female, 0 otherwise.
- Young: =1 if the age of the SAAO is lower than the median age, 0 otherwise.
- Office size: Number of SAAOs in a sub-district agricultural office.
- Initial poor performers: =1 if the SAAO scored below the median score in the initial performance index.
- Initial performance distribution by office: Variance of the SAAO's initial performance index in each sub-district agricultural office.

**Service delivery (performance) measures**

Performance of SAAOs is a measure of the number of service deliveries in one month prior (2nd week of December 2017 to 1st week of January 2018) and after the experiment (2nd week of January 2018 to 1st week of February 2018). The performance of SAAOs is measured by the number of farmers who adopted the suggested specific extension services. The experiment took place in the middle of the Rabi season, when SAAOs provide six main agricultural extension services: (i) compost ground (sites) preparation; (ii) FYM grounds (sites) preparation; (iii) vermicompost grounds (sites) preparation; (iv) ideal seedbeds preparation for rice cultivation. Outcome variables are the numbers of farmers who adopted these practices with the consultation of SAAOs.

Some services are more easily delivered than others; therefore, each extension service was standardized by mean and standard deviation, and an overall performance measure was constructed by taking an average of the standardized values of each service. This is the Total Performance Index (TPI), which was calculated for the initial and the post-treatment periods. In this study, TPI and Index of Service Delivery are used as synonyms.

**Compost:**

In Bangladesh, farmers make compost by mixing cow dung with crop residue, water hyacinth, dry leaves, vegetables and fruit peels, and weeds (Agriculture Learning, 2018). The decomposition process takes six to nine weeks, and compost can be stored for three to six months. During land preparation, compost is applied to enhance the soil. The measurement of service delivery on compost use is the number of farmers SAAOs motivated to prepare compost in the last month.

**Farmyard Manure (FYM):**

Farmyard manure refers to the decomposed mixture of animal manure, urine, bedding material, fodder residue, and other organic materials such as crops residue and waste (FAO, 2012). It has high organic content, which increases water holding capacity and improves friable soil structures. The application of partially decomposed manure can increase pests. The measurement of service delivery on FYM is the number of farmers SAAOs motivated to prepare FYM in the last month.

**Vermicompost:**

Vermicompost is produced using earthworms for composting organic residues and is a widely used organic fertilizer (Agriculture Learning, 2018). The duration of the decomposition process is shorter, and the loss of nutrients during the process is smaller than that of traditional compost. The measurement of service delivery on vermicompost is the number of farmers SAAOs motivated to prepare vermicompost in the last month.

**Ideal Seedbeds:**

There are several standards for seedbeds to be considered ideal in Bangladesh. The width of the seedbed should be 1.0–3.5 feet, but the length can vary. There must be a 25–30 cm drainage between

seedbeds. In every square meter, 80–100 grams of seeds must be sowed evenly (AIS, 2015). Frequent weeding should be conducted. The measurement of service delivery on ideal seedbeds is the percentage of the total land used as an ideal seedbed in the current season (Rabi Season) (post-treatment period) and in the previous Kharip-2 season (mid-July to mid-November 2018) for the baseline. Construction and management of seedbeds are only at the beginning of each cropping season.

## Appendix C: Variables for Analyses Using Restricted Sample

For data analysis, we used the following variables:

a. Married: 1=married, 0 otherwise.

b. Religion (Islam): 1=Muslim

c. Raised in an urban area: 1=raised in the district and capital area up to secondary education.

d. Good grades: This variable takes 1 if one obtained good grades (60%–70% marks) in the secondary school certificate exam.

e. Quota Privilege: This variable takes 1 if the applicant has quota privilege for getting a BCS job, and 0 otherwise.

f. Big-Five Personality Index: This is an equally-weighted average of the z-score for each Big-Five Personality inventory module. For the Neuroticism module, the reverse score is a negative trait. The instruments items are given in Table C.1.

g. PSM Index: To construct the PSM index, 12 of the 40 statements from Perry's 1996 scale of Public service motivation (Perry, 1996) were elicited, and an equally-weighted average of the z-scores of each module of the PSM was created. For some questions, reverse scores were used, as indicated in the instrument items for the PSM interview in Table C.2.

h. Patience: To measure patience, four hypothetical questions were asked. *Q1:* If you buy a shirt and win a prize, you can receive prize money of 2,000 BDT instantly or 2,500 BDT after one month. Would you wait for one month? Yes/No. *Q2:* If Q1=No, the respondent is offered 3,000 BDT after one month and asked, Would you wait for one month? Yes/No. By using the response to Q2, "least patient" is assigned to respondents who did not agree to wait for two months. For details, see Alam and Kijima (2021).

i. Most-risk averse**:** To measure risk taking behavior, respondents were asked three lottery questions: (1) (A) 2,000 BDT with certainty or (B) 50% chance of winning 4,000 and 50% chance of zero. (2) (A) 2,000 BDT with certainty or (B) 50% chance of winning 8,000 and 50% chance

of zero. (3) (A) 2,000 BDT with certainty or (B) 50% chance of winning 10,000 and 50% chance of zero. Respondents that did not take the risk in lottery (3) are identified as the most risk averse. For details, see Alam and Kijima (2021).

j. Altruism: This is defined as the level of unselfishness of respondents regarding poor families. The respondent is asked a hypothetical question: If 10 tokens are given to you (1 token = 100 BDT), how many tokens do you want to give to poor families and how many do you want to keep for yourself? Respondents who agreed to give more tokens to poor families are considered more altruistic. For details, see Alam and Kijima (2021).

k. Reside in block area: Equals 1 if the SAAO resides in their jurisdictional village, 0 otherwise.

## Appendix C.1

### Instruments items for Big-Five Personality Traits Interview

Here are characteristics that may or may not apply to you. For example, do you agree that you are someone who *likes to spend time with others?* Please choose a number for each statement to indicate the extent to which you agree or disagree with that statement.

1=Disagree Strongly, 2=Disagree, 3=Neither Disagree nor Agree, 4=Agree, 5=Strongly Agree

a. Extraversion
1. I like to interact and talk with people.
2. I am sometime shy and unable to communicate with others easily. (reverse)

b. Agreeableness
3. I like to cooperate with others, although it is difficult.
4. I tend to find fault with others (reverse).

c. Conscientiousness
5. I do any task regarding every detail: not superficial and partial.
6. Anybody can depend on me (in general).

d. Neuroticism
7. I can be tense in any matter.
8. I am emotionally stable, not easily upset (reverse).

e. Openness
9. I like to think deeply or carefully about any task.
10. I prefer work that is routine (reverse).

Source: Adopted from Benet-Martínez and John (1998).

## Appendix C.2

### Instruments items for Public Service Motivation (PSM) Interviews

The questions on 5-point Likert scales elicit answers for each statement below.

1=Disagree Strongly, 2=Disagree, 3=Neither Disagree nor Agree, 4=Agree, 5=Strongly Agree

| | |
|---|---|
| a. | Attraction to Policy Making |
| 1. | I am interested in making public programs and policies that are beneficial for the country. |
| 2. | I like to share my views on public policies with others. |
| b. | Commitment to the Public Interest |
| 3. | An official's obligation to the public should always come before loyalty to superiors. |
| 4. | I would prefer seeing public officials do what is best for the whole community even if it harms my interests. |
| c. | Social Justice |
| 5. | I am not afraid to go to bat for the rights of others, even if it means I will be ridiculed. |
| 6. | I do not believe that government can do much to make society fairer (reverse). |
| d. | Civic Duty |
| 7. | I believe everyone has a moral commitment to civic affairs, no matter how busy they are. |
| 8. | I have an obligation to look after those less well off. |
| e. | Compassion |
| 9. | I have little compassion for people in need who are unwilling to take the first step to help themselves (reverse). |
| 10. | It is difficult for me to contain my feelings when I see people in distress. |
| f. | Self-Sacrifice |
| 11. | I believe in putting duty before self. |
| 12. | Making a difference in society means more to me than personal achievements. |

Source: Adopted from Perry (1996).