Mission and the Bottom Line: Performance Incentives in a Multigoal Organization

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Abstract

The impact of performance pay in institutions with multiple goals depends on complementarities in the cost of effort and in production, especially when only a subset of goals can be measured. To assess their importance, workers of a mission-oriented nonprofit were randomly assigned to one of two bonus schemes, incentivizing either the performance of a microcredit program or the client social empowerment. We find that the credit bonus improved credit-related outcomes but it undermined the social outcome. In contrast, the social bonus advanced both outcomes, but only for employees working alone. These results suggest that production complementarities are important.

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1 Introduction

Economic theory has long suggested that monetary incentives can motivate agents to fulfill the goals of their principals.[1] In their seminal article, Holmstrom and Milgrom (1991), however, argue that incentives can produce poor results in settings where workers perform multiple tasks, some outcomes of interest are more poorly measured and job designs make it impossible to separate tasks across workers.

Multitasking is pervasive, not only in the nonprofit and public sectors, but also in many private sector organizations (Dixit, 2002; Besley and Ghatak, forthcoming). One context in which multitasking has been extensively studied is that of teacher incentives on student performance. Neal (2011) reviews the evidence and finds mixed results. One concern in this context is that rewarding a goal that can be directly measured, such as student performance on tests, may undermine other goals such as curiosity, critical thinking and civic values that are not easily measured. In this case, no incentives may be preferable to incentives only on measurable goals.

It is well understood in the literature that if tasks are competing in agent effort, then incentivizing a subset of outcomes can adversely affect performance in other outcomes. What is less understood, is the impact of incentives in multitasking contexts where complementarities in production may also exist.[2] While several of the studies reviewed in Neal (2011) acknowledge the importance of production spillovers or complementarities, none provide evidence of their empirical relevance. The possibility of production complementarities is of particular interest in organizations that espouse a mission. As Besley and Ghatak (forthcoming) point out, such organizations are now common in both the for-profit sector, as social enterprises or public-private partnerships, as well as in the public sector and nonprofits. Mission-oriented organizations typically have multiple goals, some of which are harder to measure than others, with associated tasks that are costly to split across workers (Dewatripont et al., 2000; Dixit, 2002; Besley and Ghatak, 2017). For these organizations, actions taken to fulfill the mission could have positive or negative impacts on its bottom line (Besley and Ghatak, 2017) due to complementarities in production and not just in the cost of effort. For this reason, when only a set of outcomes can be measured and thus incentivized, understanding the nature of complementarities is crucial to assess whether incentives are at all desirable.

In addition, if workers are also motivated to achieve certain prosocial goals, as is often the case in mission-oriented organizations, the impact of financial incentives may also directly affect their intrinsic motivation (Gneezy and Rustichini, 2000; Bénabou and Tirole, 2006).[3]

Empirical studies which have looked at performance incentives in multitask settings, usually in the context of service delivery, have all used a single bonus scheme that rewards performance based on either one institutional goal (Duflo et al., 2012; Ashraf et al., 2014), or multiple goals (Olken et al., 2014; Berg et al., forthcoming).

[1] See Gibbons (1998) and Prendergast (1999) for a general overview of worker incentives used in organizations.

[2] Production complementarities exist when effort in tasks associated with a set of outcomes positively or negatively affect the "production" of other outcomes.

[3] See Frey and Jegen (2001) and Gneezy et al. (2011) for an overview of the intrinsic motivation literature.

In this paper, we directly assess the role of both cost and production complementarities in a mission-oriented organization by using a different bonus scheme for each of the two sets of goals of the organization. One of the bonuses rewards the worker on outcomes that impact the organization's bottom line and are more easily observed. The other rewards the worker on outcomes that are closely aligned with the organization's mission but are typically more difficult to observe. To compare the performance of both bonuses, a special effort was made to measure accurately the outcomes related to the mission. This design allows, to our knowledge, the first direct examination of the role of both cost and production complementarities in a multitask setting.

We first develop a stylized model of worker effort and then provide experimental evidence of cost and production complementarities from a randomized trial. In the model, workers choose effort over two tasks, each affecting a set of outcomes associated with one of the organization's two goals. The two tasks are allowed to be complements, substitutes, or neither in disutility cost and in production. We also extend the model to incorporate the role of intrinsic motivation.

The partner nonprofit is a prominent development organization in Pakistan called the National Rural Support Program (NRSP). NRSP has two operational goals: building and strengthening organizations of the poor and supporting poor households directly through small (micro) loans intended for investment in income generating activities. All NRSP field staff (Field Assistants or FAs) support both operational goals in their day to day interactions with poor communities working alone or in teams.[4]

In our experiment, all active FAs were assigned to one of two bonus schemes or to a control group. The "social bonus" rewarded effort on tasks related to social empowerment, such as working with communities to create and strengthen organizations of the poor, while the "credit bonus" incentivized the health of the microcredit portfolio, which required bringing in new community members for micro loans and ensuring the timely repayment of loans.

Our results show that staff effort on social-related tasks did not harm (and in some instances, improved) the performance of the institution's credit program but an incentivized focus on credit related tasks undermined the institution's empowerment mission. In particular, the credit bonus improved NRSP's microcredit program but only for outcomes directly incentivized by the bonus. At the same time, it worsened the quality of community organizations (COs). In contrast, the social bonus increased CO formation and improved client empowerment, and did so without worsening microcredit outcomes. In fact, among FAs working individually, the social bonus was as effective as the credit bonus at improving credit outcomes.

This asymmetric impact of the credit bonus on social outcomes and of the social bonus on credit outcomes can only be explained by production complementarities, where the set of tasks associated with the social outcomes help in the production of the set of credit outcomes while tasks associated with credit outcomes

[4]Prior to the experiment, NRSP had been rapidly expanding the microcredit program, raising concerns about possible negative effects on the quality of the community level institutions. At the same time, most FAs were being moved from main branches to smaller satellite offices located in/near villages (labeled 'village branches') in an effort to improve their proximity to clients. While working directly from the main branches, FAs had been offered a fixed salary. NRSP was also concerned that the transfer of FAs to village branches could weaken the monitoring ability of supervisory staff and was therefore interested in testing the introduction of pay for performance incentives for FAs.

harm the production of social outcomes. Put differently, while complementarities in the disutility cost alone could explain why the credit bonus worsened social-related outcomes, they cannot explain why at the same time the bonus that incentivized social outcomes improved the health of the credit portfolio. Production complementarities are thus empirically relevant.

In addition, we find a significant decline in intrinsic motivation among all FAs offered the social bonus. We show that this decline in intrinsic motivation, which may raise the cost of social effort, can also generate an asymmetric impact of the two bonus schemes, but it cannot explain our findings.

For FAs working in teams, the social bonus had a negative impact on both credit and empowerment outcomes. This is accompanied by an overall decline in teamwork. In contrast, the credit bonus had no impact on intrinsic motivation or the odds of working in teams.

These results contribute to several strands of the literature. Evaluations of microcredit programs have typically found small or negligible impacts on empowerment or other social-related outcomes (Banerjee et al. 2015c, among others).[5] Our results offer a plausible explanation for this finding since incentive structures that only reward the performance of microcredit, similar to the incentives provided by many of the institutions reviewed in Banerjee et al. (2015a), may undermine social-related goals. To be sure, the introduction of incentive structures that focus on repayment or that rely on CO membership fees may be a response to the pressure that microfinance institutions face to become financially self-sustainable (Greaney et al., 2016), but under these schemes social empowerment may languish.

More broadly, anti-poverty programs increasingly provide a holistic set of private and public services based on the idea that combinations of interventions can address the multidimensional problems of development more effectively (Mansuri and Rao, 2013; Banerjee et al., 2015b). Our results suggest that a careful assessment of complementarities in the cost of effort and in production is likely to be important for understanding the success or failure of such programs, because they typically include interventions with difficult to measure outcomes.

Our results also relate to the broader literature on the role of performance pay in organizations (Lazear, 2000; Paarsch and Shearer, 2000; Shearer, 2004). Studies that contemporaneously vary worker incentive structure within a single firm are rare (Bandiera et al. 2007, 2013 and Friebel et al. 2017 are notable exceptions). We contribute to this literature by studying incentive design in mission-oriented organizations with staff that not only have multiple tasks, but may also be intrinsically motivated (Besley and Ghatak, 2005; Osterloh and Frey, 2000; Bowles and Polanina-Reyes, 2012) and sometimes work in teams (Bandiera et al., 2010, 2013).

In such settings, incentives have been shown to affect worker performance by changing, in some instances, the number and the quality of job applicants (Bó et al., 2013; Ashraf et al., 2014; Deserranno, 2016) and by inducing greater effort among mission-motivated workers (Ashraf et al., 2014), albeit to a much smaller degree compared with their peers whose preferences are not aligned with the mission (Carpenter and Gong,

[5]Relatedly, several studies have found that incentives focused on credit-related tasks can change the composition of the borrower pool, favoring richer and more credit worthy individuals (McKim and Hughart, 2005; Aubert et al., 2009).

2016).[6] Ashraf et al. (2014) find that both financial and non-financial rewards given to boost performance in a social cause such as selling condoms to prevent HIV/AIDS were effective, especially among socially motivated agents. In Berg et al. (forthcoming), agents were hired to spread information about a public health insurance program. They find that in the absence of incentive pay, social distance prevents the flow of information while incentive pay is particularly effective in overcoming social distance. In contrast to these papers, we find that in our context financial incentives crowd out intrinsic motivation and undermine the willingness of motivated employees to work in teams.

The rest of the paper proceeds as follows. Section 2 describes NRSP's organizational goals and its overall mission, and outlines the experimental design. Section 3 presents the model of worker effort choice in an organization with multiple goals. Section 4 discusses the data, Section 5 describes the empirical strategy, and Section 6 reports the results of the experiment and discusses how the empirical findings match with the predictions of the model. Section 7 concludes.

2 Context and Experiment

NRSP's mission is to reduce poverty by empowering communities through social mobilization and investing in their livelihoods through microcredit.[7] The process of social mobilization involves engaging with community members at the village-level to form COs and empowering its members to work collectively on local development issues. Each CO is typically comprised of 15 members, who live close to each other in the same village.[8] Once the CO is formed, its members typically meet once a month and are encouraged to save. During these meetings, CO members deliberate on village development needs and identify priorities for development projects. NRSP also provides small grant support for local infrastructure projects to COs that meet regularly and save. It also links CO members to a range of government services, and funds skill training sessions. This process supports the community's immediate development needs, while building cohesion and capacity for collective decision making.

Microfinance is provided in the form of individual loans, usually with a single or monthly installments and a maturity of six to 12 months. While CO membership is a prerequisite to access these loans, and about two-thirds of CO members are active borrowers, all loans are individual loans with no joint liability at the CO level.[9]

[6] Lavy (2002, 2009), Muralidharan and Sundararaman (2011), and Duflo et al. (2012), among others, have examined the effects of financial and non-financial incentives on public teachers; Bó et al. (2013) and Rasul and Rogger (2016) on government bureaucrats; Khan et al. (2015) on tax inspectors; Olken et al. (2014) on community groups; Ashraf et al. (2014) and Deserranno (2016) on development workers; Mullen et al. (2010) on health care workers; Baicker and Jacobson (2007) and Banerjee et al. (2014) on policing. For review of the literature, see Neal (2011) and Finan et al. (2017).

[7] NRSP is a development organization operating in Pakistan since 1991. Its activities have covered more than 2.5 million households, with 550,000 current clients in all four provinces, making it the largest rural support program in the country in terms of outreach, staff and development activities.

[8] Depending on the local norms, CO members may be of the same or mixed gender.

[9] CO members are eligible to receive new loans even if some members from the CO have overdue amounts. Each borrower is however required to find two guarantors, who can be members of the same CO. NRSP uses these guarantors and other CO members to exert pressure on the defaulting borrower to repay. The loans can be used for the purchase of agricultural inputs, livestock, and investments in household enterprises. A new borrower starts with a maximum loan size of PKR 10,000, which

NRSP's dual focus on social mobilization and microcredit is operationalized on the ground by Field Assistants (FAs), who are its frontline staff. FAs engage directly with local communities and CO members on a daily basis; and implement all on-the-ground activities related to NRSP's two goals. In particular, FAs deliver both credit- and social-related services to COs that fall under their purview.

As facilitators of social empowerment, FAs form and manage COs. They attend every CO meeting, build leadership within COs, ensure COs are inclusive in their decision-making process, and encourage collective action on local development. In addition, FAs ensure that COs maintain adequate hand-written records of meetings, attendance and savings, and gather requests from CO members for skill training.

FAs responsibilities related to the microcredit program involve screening loan applications from CO members and assessing their creditworthiness, typically by visiting the applicant's home and relaying this information to their supervisors. FAs are also charged with ensuring timely loan repayment, which may require visits to the home of delinquent borrowers.

Such credit-related activities are typically more retail-oriented than social-related activities. Effort exerted on credit-related activities therefore tends to map more directly and predictably to credit outcomes. In contrast, social-related activities rely more heavily on the discretionary actions of CO members. Social outcomes like savings and attendance are less costly for CO members to renege on compared to defaulting on their loans. Moreover, social outcomes are also difficult to quantify. While data on loan disbursements and repayments are available from the Management Information System (MIS) used by NRSP, CO-level records of the timing of CO meetings, attendance of members, and savings were not entered into the MIS.[10] All of this makes it more challenging to map effort on social-related activities to the sought after outcomes of CO quality. In the baseline survey, for instance, 56.8 percent of FAs report that social mobilization outcomes are difficult to change, while only 18.9 percent of them find microcredit outcomes like expanding disbursement and ensuring good repayment difficult.[11]

In addition, effort to enforce repayment, whether during meetings or visits to a borrower's home, can lead to stressful relations between FAs and community members and could undermine social cohesion. In contrast, many social-related activities can strengthen CO cohesion and enhance social capital among CO members, which in turn tends to also encourage better repayment (Karlan, 2005). In the baseline survey, for example, more than 90 percent of FAs say that social-related tasks such as regular and on-time CO meetings improve the creditworthiness of CO members.

FAs regularly work overtime hours either individually or in teams of two or three individuals.[12] FAs who work in teams co-manage a group of COs by dividing the monthly workload among them. Each team member is responsible for attending the meetings of the COs assigned to him or her that month and for

can increase in intervals of up to PKR 5,000 with each successful loan cycle. CO members are encouraged to save but the accumulated savings is kept in the CO and not used to determine the loan size.

[10]For the purpose of this study, data on social outcomes was compiled from CO hand-written records by each FA and was subject to a random audit by the Credit Officer (CrO).

[11]The difference in the share of FAs who find social versus microcredit outcomes difficult to change is statistically significant at the 1 percent level.

[12]In the baseline survey, the self-reported average daily overtime among study-sample FAs is 2 hours.

collecting the repayments from CO members due that month. A CO that is collectively managed by an FA team, therefore, will be managed by different FAs over time. Because both credit and social activities require deep community and client knowledge, it is too costly to allow for specialization. Every FA, therefore, whether working alone or in a team will perform all tasks. Teamwork among FAs is encouraged by NRSP to ensure continuity in case an FA falls sick, leaves NRSP, or is promoted; and it provides NRSP with a useful way to train new and inexperienced FAs, by partnering them with relatively more experienced FAs. A detailed description of team formation is provided in Section 4 and in Appendix C.

NRSP's dual mission is also reflected in its branch management structure. In each branch or Field Unit (FU), a Social Organizer (SO) oversees the social mobilization aspects of the program while a Credit Officer (CrO) is in charge of the microcredit program. FAs report to the SO for social mobilization and to the CrO for all microcredit related issues. Both the SO and CrO in all FUs are paid a flat wage that does not depend on the performance of FAs.

Before the study, FAs were based in FUs under the direct supervision of both the CrO and the SO and earned a fixed salary. By the time of the study, however, NRSP had transferred 85 percent FAs from FUs to newly created village branches in order to move FAs closer to the clients. FAs continued to work alone or in teams, but this decentralization meant that direct supervision by the managers was no longer possible. Due to this shift, NRSP management was concerned that a fixed salary might no longer be optimal and was willing to explore other ways of remunerating field staff. At the same time, NRSP was scaling up its microcredit program thanks to its partnership with the Pakistan Poverty Alleviation Fund (PPAF). The health of the microcredit program was crucial for NRSP's growth and survival, as it was funded through loans from PPAF that needed to be repaid. Due to this bottomline concern, NRSP was considering rewarding FAs with a bonus based on credit-related outcomes. However, NRSP management was also concerned that such a bonus could have a negative impact on the quality of its COs and the social mobilization agenda. The field experiment is designed to assess the empirical relevance of this potential tension between credit and social outcomes (see also Siwale and Ritchie, 2012).

2.1 Bonus intervention

The study was conducted in all 35 FUs located in 15 districts across Sindh, Punjab, and Khyber Pakhtunkhwa provinces, where NRSP was active in March 2005. We thus use all of the active NRSP frontline staff at the time, which provided us with a sample of 162 FAs. FAs were randomly divided into three groups (two treatment groups, and one control group). To ensure that all FAs under a given CrO-SO management team were provided with the same bonus scheme, the randomization was done at the FU level.[13] Appendix Table A.2 reports the list of FUs in the study and their bonus assignments. Section 5.1 discusses how bonuses were assigned to different FUs to address concerns about statistical power and inference and presents different statistical tests to mitigate these concerns.

[13]FAs that were already working from a village branch were also assigned to the treatment of the relevant FU.

FAs in the treatment group received one of two bonus schemes. The credit bonus incentivized performance on disbursement and loan recovery. The social bonus incentivized performance on observable correlates of CO quality: new CO formation, regular CO meeting, and savings by CO members.

The bonus scheme was designed to be easily understood, fair, and transparent. Each bonus had two triggers. The first trigger determined whether an FA was eligible to receive a bonus while the second trigger determined the bonus amount once the first trigger was achieved. Monthly targets on these trigger outcomes were set based on past performance and were meant to be achievable but were set at a higher level than current performance. Put differently, an FA working with the same intensity as before should not receive a bonus. The intervention only provided monetary incentives to FAs for achieving these targets and it did not affect their career progression or any other aspect of the program.[14] Appendix Table A.1 describes the triggers and provides more details about the bonus scheme.

Treatment FAs that had met their monthly target received the incentive as a bonus pay added to their base monthly salary.[15] For FAs working in teams, the bonus was paid based on whether the joint performance of the team exceeded the target. The monthly base salary of an FA was about PKR 3,000 (USD 50.54) at the time of the study.[16] The largest bonus an FA could earn in any month was PKR 600 (20 percent of the base salary). FAs in control FUs continued to earn the (flat) base salary.

The bonus scheme was announced in March 2005. Treatment FAs became eligible to receive the bonus starting on April 2005. The bonus intervention lasted for 15 months, and ended in June 2006. To discourage any intertemporal substitution of worker effort, FAs in treatment FUs were not informed in advance about whether and when the bonus would end. FAs in control FUs were never told about the intervention, and none of the control FAs interviewed in June 2006 reported having any knowledge of the bonus. Detailed timeline of the study is presented in Appendix Figure A.2.

3 Theory

In this section we develop a model that highlights how cost and production complementarities affect the impact of rewarding any given outcome on the other unrewarded outcomes.

Consider an employee of an organization with two main tasks that produce outcomes y_1 and y_2. The employee needs to decide how much effort to allocate to each task. Let e_1 be the effort that the employee devotes to task 1, and e_2 be the employee effort on task 2. Effort on both tasks (e_1, e_2) carry a disutility cost to the employee. For simplicity, we assume that the employee is risk neutral, and so the employee's utility function is described by

$$W - C(e_1, e_2)$$

[14] While FAs could be promoted to Senior FA and earn a slightly higher salary, only one of the 162 study FAs had a Master's degree, the required schooling level for a promotion to SO or CrO.

[15] During the intervention, slightly more than 25 percent of treatment FAs qualified for a bonus each month. In any given month, two-fifths of FAs offered the credit bonus and one-fifth of FAs offered the social bonus qualified for it. Appendix Figure A.1 presents the monthly frequency and the amount of bonus payments made during the study period.

[16] The exchange rate in March 2005 was USD 1 = PKR 59.36.

where W is the employee's salary. $C(\cdot)$ is a convex function in both arguments e_1 and e_2, and denotes the disutility cost of effort.

Employee effort generates outcome y_i, associated with task $i = 1, 2$, according to the following production technologies

$$y_1 = \theta_1 e_1 + \gamma_1 e_2 + \epsilon_1 \quad \text{and} \quad y_2 = \gamma_2 e_1 + \theta_2 e_2 + \epsilon_2,$$

where (ϵ_1, ϵ_2) is a pair of observational noises. The technology scalars θ_1 and θ_2 capture how effort on a specific task affects the outcome directly associated with that task. In other words, θ_i represents the effect of effort on task i on outcome $y_i, i = 1, 2$. Hence, θ_1 and θ_2 are assumed to be positive. In contrast, the technology scalars γ_1 and γ_2 capture the "production spillover" effect of effort on task j on outcome y_i, $i \neq j$. In general, γ_1 and γ_2 can be positive, negative or zero. The sign of γ_1 (γ_2) determines whether effort on task 2 (1) increases, decreases, or has no effect on outcome y_1 (y_2). If $\gamma_1 > 0$, the two tasks are complements in producing y_1, in that effort on task 2 increases y_1. Conversely, if $\gamma_1 < 0$, then the two tasks are substitutes in producing y_1, in that effort on task 2 decreases y_1. Finally, if $\gamma_1 = 0$, then task 2 does not contribute to the production of y_1.[17] Also, we assume that $\theta_i > |\gamma_i|, i = 1, 2$.

We now introduce a goal specific bonus scheme. An employee offered a bonus b_1 on outcome y_1 (b_2 on outcome y_2) earns an amount $b_1 y_1$ ($b_2 y_2$) in addition to the base salary w.[18] An employee offered a bonus b_1 chooses e_1 and e_2 to maximize

$$\begin{aligned} \max_{e_1, e_2} \quad & b_1(\theta_1 e_1 + \gamma_1 e_2) + w - C(e_1, e_2) \\ & \text{s.t.} \quad e_1 \geq 0, \quad e_2 \geq 0. \end{aligned}$$

The first order conditions (incentive constraints) yield

$$b_1\theta_1 = C_1'(e_1, e_2) \quad \text{and} \quad b_1\gamma_1 \leq C_2'(e_1, e_2) \quad (= \text{if } e_2 > 0), \tag{1}$$

where $C_i'(e_1, e_2) = \frac{\partial C(e_1, e_2)}{\partial e_i} \geq 0$, $i = 1, 2$. Likewise, when the employee is offered a bonus b_2, the first order conditions are

$$b_2\gamma_2 \leq C_1'(e_1, e_2) \quad (= \text{if } e_1 > 0) \quad \text{and} \quad b_2\theta_2 = C_2'(e_1, e_2). \tag{2}$$

Assuming an interior solution ($e_i > 0$, $i = 1, 2$) and differentiating (1) and (2) above with respect to $b_i, i = 1, 2$ we obtain

$$\begin{aligned} \theta_1 &= C_{11}'' \tfrac{\partial e_1}{\partial b_1} + C_{12}'' \tfrac{\partial e_2}{\partial b_1} \quad \text{and} \quad \gamma_1 = C_{21}'' \tfrac{\partial e_1}{\partial b_1} + C_{22}'' \tfrac{\partial e_2}{\partial b_1} \\ \gamma_2 &= C_{11}'' \tfrac{\partial e_1}{\partial b_2} + C_{12}'' \tfrac{\partial e_2}{\partial b_2} \quad \text{and} \quad \theta_2 = C_{21}'' \tfrac{\partial e_1}{\partial b_2} + C_{22}'' \tfrac{\partial e_2}{\partial b_2} \end{aligned}$$

[17] Berg et al. (forthcoming) and Besley and Ghatak (forthcoming) assume no production complementarities and thus $\gamma_i = 0, i = 1, 2$.

[18] The assumption of risk neutrality guarantees that linear incentive schemes are optimal.

where the term $C''_{ij} = \frac{\partial^2 C}{\partial c_i \partial c_j}, i, j = 1, 2$ is an element of the Hessian of the disutility cost function $C(e_1, e_2)$. The Hessian matrix is symmetric by definition, i.e. $C''_{12} = C''_{21}$.[19] This implies that if an increase in e_1 makes e_2 costlier in disutility terms, then e_2 must make e_1 costlier as well.

From the expressions above and simplifying, we obtain

$$\begin{aligned} \frac{\partial e_1}{\partial b_1} &= \frac{C''_{22}}{D}\theta_1 - \frac{C''_{12}}{D}\gamma_1 \\ \frac{\partial e_2}{\partial b_1} &= -\frac{C''_{12}}{D}\theta_1 + \frac{C''_{11}}{D}\gamma_1 \\ \frac{\partial e_1}{\partial b_2} &= \frac{C''_{22}}{D}\gamma_2 - \frac{C''_{12}}{D}\theta_2 \\ \frac{\partial e_2}{\partial b_2} &= -\frac{C''_{12}}{D}\gamma_2 + \frac{C''_{11}}{D}\theta_2 \end{aligned} \tag{3}$$

where $D = C''_{11}C''_{22} - C''^2_{12} > 0$ is the determinant of the Hessian of the disutility cost function $C(e_1, e_2)$.

The expressions in (3) show how effort in each task responds to the bonus, and this depends on the sign of the technology scalars $\gamma_i, i = 1, 2$, and on the cross-partial of the disutility cost function C''_{12}.

In addition, differentiating the production technologies with respect to $b_i, i = 1, 2$ we obtain

$$\begin{aligned} \frac{\partial y_1}{\partial b_i} &= \theta_1 \frac{\partial e_1}{\partial b_i} + \gamma_1 \frac{\partial e_2}{\partial b_i} \\ \frac{\partial y_2}{\partial b_i} &= \gamma_2 \frac{\partial e_1}{\partial b_i} + \theta_2 \frac{\partial e_2}{\partial b_i} \end{aligned} \tag{4}$$

The expressions in (4) allows us to examine how bonus $b_i, i = 1, 2$ will impact outcomes y_1 and y_2. First, a bonus on task i will always improve outcome y_i. That is, $\frac{\partial y_i}{\partial b_i} > 0, i = 1, 2$. This can be verified by substituting in for $\frac{\partial e_i}{\partial b_i} > 0$ and $\frac{\partial e_i}{\partial b_j}$ $(i, j = 1, 2)$, and simplifying terms. Second, the impact of bonus b_i on outcome y_j, $i \neq j$, will depend on the nature of cost and production complementarities, that is, on the signs of C''_{12} and technology scalars γ_1 and γ_2. We now examine this impact for different values of technology and cost parameters.

Case 1: $\gamma_1 > 0$ **and** $\gamma_2 > 0$

The incentive constraints in (1) and (2) suggest that $e_1 > 0$ and $e_2 > 0$ irrespective of the bonus offered. The impact of either bonus on the other outcome is found by substituting the expressions for $\frac{\partial e_i}{\partial b_j}, i, j = 1, 2$ from (3) in (4) and simplifying. We obtain

$$\frac{\partial y_2}{\partial b_1} = \frac{\partial y_1}{\partial b_2} = \theta_1\gamma_2\frac{C''_{22}}{D} - (\theta_1\theta_2 + \gamma_1\gamma_2)\frac{C''_{12}}{D} + \theta_2\gamma_1\frac{C''_{11}}{D} \tag{5}$$

The impact of b_1 on y_2 is the same as the impact of b_2 on y_1. When tasks are substitutes in the disutility cost of effort, that is, $C''_{12} > 0$, such that an increase in e_1 makes e_2 costlier in disutility terms (and vice versa), this impact cannot be signed. The first and last terms are positive while the second term is negative. Intuitively, there are two opposing forces. On the one hand, effort in a particular task increases the disutility

[19] Berg et al. (forthcoming) and Besley and Ghatak (forthcoming) parametrize the cost function as $C(e_1, e_2) = \frac{1}{2}c_1e_1^2 + \frac{1}{2}c_2e_2^2 + \delta e_1e_2$. As a result, $C''_{12} = C''_{21} = \delta$.

cost of effort in the other task because $C''_{12} > 0$. Hence, effort on the unrewarded task may decline as the individual increases effort on the rewarded task, thus reducing production of the unrewarded outcome. On the other hand, the production complementarities ($\gamma_i > 0$, $i = 1, 2$) suggest that effort in the rewarded task increases production of the unrewarded outcome. The net effect is therefore ambiguous.

Alternatively, when tasks are complements in the disutility cost of effort, that is, $C''_{12} \leq 0$, then the impact is positive as the second term of the expression in (5) is now non-negative. In this case, effort in a particular task decreases the disutility cost of effort on the other task, so effort in the unrewarded task will increase with an increase in effort in the rewarded task.

Case 2: $\gamma_1 > 0$ **and** $\gamma_2 \leq 0$

The incentive constraints in (1) suggest that $e_1 > 0$ and $e_2 > 0$ when a bonus on task 1 is offered. Therefore, the impact of b_1 on y_2 is given by the expression in (5), and it is ambiguous.[20] In contrast, when the bonus b_2 is offered, the incentive constraints in (2) suggest that $e_1 = 0$ and $e_2 > 0$. In this case, the impact of b_2 on y_1 is given by

$$\frac{\partial y_1}{\partial b_2} = \gamma_1 \left(\theta_2 \frac{C''_{11}}{D} - \gamma_2 \frac{C''_{12}}{D} \right) > 0, \tag{6}$$

and it is positive because the expression in parenthesis is positive and $\gamma_1 > 0$. Intuitively, the bonus b_2 has no direct impact on the effort on task 1 (that is, $e_1 = 0$), yet y_1 will increase because of the production complementarity (scalar $\gamma_1 > 0$).

Case 3: $\gamma_1 \leq 0$ **and** $\gamma_2 > 0$

This case is the opposite of Case 2. The incentive constraints in (1) suggest that $e_1 > 0$ and $e_2 = 0$, so the impact of b_1 on y_2 is then given by

$$\frac{\partial y_2}{\partial b_1} = \gamma_2 \left(\theta_1 \frac{C''_{11}}{D} - \gamma_1 \frac{C''_{12}}{D} \right) > 0, \tag{7}$$

which is positive because the expression in parenthesis is positive and $\gamma_2 > 0$. Intuitively, the bonus b_1 has no direct impact on the effort on task 2 (that is, $e_2 = 0$), and as a result, y_2 will increase because tasks are complements in the production of y_2 (scalar $\gamma_2 > 0$).

The incentive constraints in (2) suggest that $e_1 > 0$ and $e_2 > 0$ when the bonus b_2 is offered. The impact of b_2 on y_1 is therefore given by the expression in (5), and it is ambiguous because the last term is non-positive but the second term depends on the sign of C''_{12}.

[20] Given the assumptions, it is always the case that $\theta_1\theta_2 + \gamma_1\gamma_2 > 0$, but the second term of the expression in (5) can be positive or negative depending on the sign of C''_{12}.

Case 4: $\gamma_1 \leq 0$ **and** $\gamma_2 \leq 0$

When bonus b_1 is offered, the incentive constraints in (1) suggest that $e_1 > 0$ and $e_2 = 0$, while the constraints in (2) suggest that $e_1 = 0$ and $e_2 > 0$ when bonus b_2 is offered.

In this case, the impact of b_1 and b_2 is non-positive and given by the expressions in (7) and (6), respectively. If there are no production complementarities ($\gamma_1 = 0$, $\gamma_2 = 0$), then the bonus on a given outcome has no impact on the other outcome. If the two tasks are substitutes in the production of each outcome ($\gamma_1 < 0$, $\gamma_2 < 0$), then the bonus will increase effort on the rewarded task thus decreasing the unrewarded outcome.

3.1 Discussion

Table 2 provides the predictions for the effect of bonuses b_1 and b_2 on outcomes y_1 and y_2 in each of the above four cases, separately for $C''_{12} \leq 0$ (Panel A) and $C''_{12} > 0$ (Panel B). In Section 6 we compare these predictions with the actual impacts of the bonuses introduced in the field experiment. A positive (negative) sign indicates that the impact of the bonus on the outcome is positive (negative). A question mark indicates that the impact cannot be signed.

Several important patterns emerge in Table 2. First, the impact of bonus b_i on y_i is always positive. Second, production complementarities are needed to explain asymmetric impacts of the bonuses on the unrewarded outcome. In particular, only when the technology scalars γ_1 and γ_2 have different signs (Cases 2 and 3) can the impact of b_1 on y_2 have the opposite sign from that of b_2 on y_1. In contrast, when they have the same sign as in Cases 1 and 4, the impact of b_1 on y_2 has the same sign as the impact of b_2 on y_1.

Case 4.2 is of particular importance because it assumes no production complementarities ($\gamma_1 = 0, \gamma_2 = 0$). In this case, effort on the incentivized task, say e_1 does not crowd out effort in the non-incentivized task because it is already a corner solution ($e_2 = 0$). However, if workers were intrinsically motivated to perform task 2 but only when not directly incentivized ($b_2 = 0$), then crowding out of effort could occur if tasks were substitutes in the disutility cost of effort ($C''_{12} > 0$).

We examine this case in more detail. As in Besley and Ghatak (forthcoming), we assume that the employee derives utility m per unit of y_2 produced, and for simplicity, we further assume that the cost of disutility takes the quadratic form.

An intrinsically motivated employee that is not offered any bonus solves the following problem

$$\begin{aligned} \max_{e_1,e_2} \quad & m\theta_2 e_2 + w - \frac{1}{2}c_1 e_1^2 - \frac{1}{2}c_2 e_2^2 - \delta e_1 e_2. \\ \text{s.t.} \quad & e_1 \geq 0, \quad e_2 \geq 0. \end{aligned}$$

The first order conditions (incentive constraints) yield

$$e_1 = 0 \quad \text{and} \quad m\theta_2 = c_2 e_2. \tag{8}$$

The first order conditions for the problem of an intrinsically motivated employee offered bonus b_1 are

$$b_1\theta_1 = c_1e_1 + \delta e_2 \quad \text{and} \quad m\theta_2 = c_2e_2 + \delta e_1. \tag{9}$$

Comparing the first order conditions with respect to e_2 in (8) and (9), it is clear that bonus b_1 increases e_1 and lowers e_2 if $C''_{12} = \delta > 0$, i.e. if tasks were substitutes in the cost of effort.

When offered bonus b_2, the first order conditions are

$$e_1 = 0 \quad \text{and} \quad b_2\theta_2 = c_2e_2 + \delta e_1. \tag{10}$$

The first order conditions in (8) and (10) show that bonus b_2 has no effect on e_1, and it increases e_2 if $b_2\theta_2 > m\theta_2$.

Table 2 reports these predictions in Case 5 of Panel B. The predictions show that intrinsic motivation (with no production complementarities) can result in an asymmetric impact of the bonuses on the unrewarded outcomes. The nature of this asymmetry, however, is different from that in Cases 2 and 3. In particular, only production complementarities in Case 2 (Case 3) can result in a negative (positive) impact of b_1 on y_2 and a positive (negative) impact of b_2 on y_1.

Lastly, consider a bonus that rewards both tasks simultaneously. The employee would choose e_1 and e_2 to maximize

$$\begin{aligned} \max_{e_1,e_2} \quad & b_1(\theta_1e_1 + \gamma_1e_2) + b_2(\theta_2e_2 + \gamma_2e_1) + w - C(e_1, e_2) \\ & \text{s.t.} \quad e_1 \geq 0, \quad e_2 \geq 0. \end{aligned}$$

The first order conditions (incentive constraints) yield

$$b_1\theta_1 + b_2\gamma_2 = C'_1(e_1, e_2) \quad \text{and} \quad b_2\theta_2 + b_1\gamma_1 = C'_2(e_1, e_2). \tag{11}$$

The organization, on the other hand, seeks to maximize the total surplus given by the sum of the organization's objective function and the employee's welfare. Letting the scalars $\alpha_i, i = 1, 2$ be the weight that the organization puts on y_i, the problem of the organization is given by

$$\begin{aligned} \max_{e_1,e_2} \quad & \alpha_1(\theta_1e_1 + \gamma_1e_2) + \alpha_2(\theta_2e_2 + \gamma_2e_1) - C(e_1, e_2) \\ & \text{subject to the incentive constraints in (11)} \end{aligned}$$

This problem is similar to the one solved by the employee above, and it is clear that the optimal bonus satisfies $b_i = \alpha_i, i = 1, 2$, that is, the institution will reward an outcome inasmuch as it is valued. The optimal bonus therefore depends on neither production nor cost complementarities since the employee will internalize them when choosing the optimal level of effort. As a result, the only way to assess whether complementarities in production and disutility cost exist, is by offering a different bonus for each outcome.

4 Data

Data used in the empirical analysis come from multiple sources. Survey data were collected between January and February 2005, prior to the announcement of the bonus, and in June 2006, the last month of the intervention. These surveys asked each FA about his or her demographic and household characteristics, current employment conditions and work history, along with his or her level of motivation for working with NRSP.

These two rounds of survey data are supplemented with administrative data from NRSP, including the monthly employee records with the employment status of each FA, salary and bonus information, and the name of FU or village branch where the FA worked. NRSP also provided us with a monthly record of COs managed (or co-managed) by each FA from June 2004 to June 2006. This FA-CO panel helps us construct the monthly portfolio of COs for each FA during the 10 months before and the 15 months of the bonus intervention.

FA's performance was tracked using two administrative datasets. Data on loan disbursements and recovery are obtained from NRSP's Management Information Systems (MIS) database. The MIS digitally records all loans taken and repaid by all borrowing CO members by installment. A total of 5,364 unique COs appear in the MIS database during the 25 months that overlap with the FA-CO panel. Of them, 4,404 COs (82.1 percent) were managed by the 162 FAs who were working for NRSP at the time of the study.[21] Out of the 4,404 COs managed by the study-sample FAs, 4,008 COs show loan activity at least once during these 25 months, and have 5.81 active borrowers each month with repayment or disbursement in 14 out of the 25 months, on average.

Information on social mobilization efforts is obtained from the Monthly Progress Reports (MPRs) submitted each month by each FA for the COs managed or co-managed by him or her. This report includes information on meeting attendance, member savings, and loans approved and denied during the meeting. The MPRs data are available for the 15 months when the bonus was implemented. These data were verified by a supervisor through random visits to a subset of scheduled CO meetings.[22] We use the verified MPRs data for our analysis on the social outcomes.

We aggregate the CO level credit and social outcomes at the FA-month level using information from the FA-CO panel. We calculate the performance of an FA before and after the bonus, by taking the average across the 9 months prior to the bonus announcement and the 15 months during the bonus period, respectively. Data from March 2005 (the month when the bonus was announced but not yet implemented) is dropped from the analysis.

[21] The rest of the COs were managed and formed by FAs hired after the bonus intervention began in March 2004. In our analysis, we focus on the FAs who were already working with NRSP prior to the bonus intervention because any differential selection of new hires on their characteristics/quality across the different experimental arms could confound the results. While financial incentives have also been shown to affect performance through differential selection into working in an organization (Bó et al., 2013; Deserranno, 2016), the main focus of this paper is to understand the incentive effects on performance due to task complementarities.

[22] The random visits were carried out by the Credit Officer (CrO). All FAs working from the same FU report to the same CrO.

In addition, CO members from a subset of COs managed by our study-sample FAs were interviewed in November 2006 (5 months after the end of our study) as part of a baseline survey for another study (see Giné and Mansuri (2017)). It covered 11 FUs, and interviewed 1691 CO members from 214 COs managed by 57 (out of 162) study-sample FAs. The survey asked CO members about any changes since around the time the bonuses were introduced in their COs' activities—such as discussions of non-credit related social issues during CO meetings, member's ability to speak freely and actively participate in CO decisions, willingness to seek advice from CO leaders outside of CO meetings, and collective action taken by CO members to jointly purchase agricultural inputs or sell the harvest. We use these data to construct subjective quality measures of a CO as reported by its members.

Lastly, we interviewed supervisors in June 2006 (last month of the bonus). The survey asked supervisors about the performance of all FAs working under them on various credit and social outcomes in the previous month. They also reported their subjective evaluation of each FA since the study began. We use the data from the supervisor survey to construct measures of supervisory effort, and of their assessment of FA performance.

4.1 Baseline characteristics and balance tests

Columns 1, 2, and 3 of Table 1 report means of FA characteristics measured at baseline in the control, credit bonus, and social bonus groups, respectively. Columns 4, 5, and 6 report the p-value from the t-test of the difference in means between control FAs and credit bonus FAs (Cr-FAs); control FAs and social bonus FAs (Soc-FAs); and Cr-FAs and Soc-FAs, respectively. Across all the reported variables, we cannot reject that means are equal for any pairwise comparison at conventional levels of statistical significance. As indicated by the p-value of F-test at the bottom of Columns 4, 5, and 6, we again cannot reject that all covariates are not jointly different from zero in a regression where the dependent variable takes the value one if the FA is in the control group using the sample of FAs in the control and credit bonus groups in Column 4 and FAs in the control and social bonus groups in Column 5. In Column 6, the dependent variable takes value 1 if the FA is offered a credit bonus using the sample of FAs offered a bonus.

FAs in our study are on average 28 years old, roughly one-fourth are female, and slightly more than half of them have at least a high school degree (equivalent to 12 years of education). The average duration of employment with NRSP is 26 months, and NRSP was the first job for roughly two-fifths of FAs.

FAs manage on average 14 COs every month. Their average monthly portfolio consists of 104.1 active loans (new and ongoing), with roughly PKR 100,000 (USD 1,685) disbursed each month. The mean recovery rate on installments due at the end of each month is around 98 percent, while only 70 percent of such installments is recovered fully by the 20th of that month.

Slightly more than half of the FAs prefer a hypothetical bonus to be paid on credit outcomes as opposed to social outcomes. During the baseline interview, each FA was asked to rank what they liked most about working in NRSP. Roughly half of the FAs reported that the ability to help people is what they liked most.

One-fifth of them had also done volunteer work before joining NRSP.

Out of 162 FAs in the study, 132 FAs were successfully interviewed in the follow-up survey. This attrition rate is almost identical and not statistically different across the three groups (see bottom of Table 1), suggesting that attrition bias is not a concern when examining impacts of bonus on outcomes measured in the follow-up survey. In addition, CO meetings held by 31 FAs were never visited by a supervisor. These 31 FAs do not appear in the verified MPRS data, restricting our sample to 131 FAs when examining social outcomes. The selection into this restricted sample is again not statistically different across control FAs, Cr-FAs, and Soc-FAs (see bottom of Table 1). Similarly, 73 FAs for whom we have subjective assessments from supervisors are not differentially selected across the two bonus and control groups.

Appendix Tables D.1, D.2, and D.3 present means of baseline variables in the control and the two bonus groups, and their differences for the verified MPRS, follow-up, and supervisor evaluation restricted samples, respectively. None of the differences in means (out of 66 differences) in Appendix Table D.2 are statistically significant at the 10 percent conventional level. In Appendix Tables D.1 and D.3, two and three differences are statistically significant at the 10 percent level respectively. In all samples, the F-tests at the bottom of Columns 4-6 cannot reject the hypothesis that all variables are jointly insignificant in explaining assignment to an experimental arm.

4.2 Partnership

Roughly two-fifths of FAs co-manage their entire CO portfolio with other FAs at baseline, while slightly less than one-fourth manage all their COs on their own. Appendix Figure C.1 plots the distribution of FAs based on the share of their CO portfolio that are co-managed with other FAs during the 9 months prior to the bonus announcement. The median level of co-management is 73 percent, and we classify FAs who co-manage more than this median value during the pre-bonus months as "partnered" FAs in the analysis.[23]

Columns 1 and 2 of Appendix Table C.1 report the means of FAs' baseline characteristics for non-partnered and partnered FAs respectively; Column 3 reports the p-values from the F-tests of the difference in means between the two groups. We find no statistically significant difference in any reported characteristics including education and work experience between partnered and non-partnered FAs. The p-value of the F-test (reported at the bottom of Column 3) cannot reject the equality of means across the two groups. Column 4 presents the correlation between the FA's and his/her partner's characteristics. NRSP management tend to form teams between FAs of the same gender and the same level of education (correlation coefficients are 0.834 and 0.309 respectively). In Table 1, we do not find statistically significant difference in the propensity to work in a team prior to bonus nor in the pre-bonus share of co-managed COs between FAs in the different experimental arms. Appendix C contains a more detailed discussion on partnership.

[23]In the baseline, almost 90 percent of partnered FAs (71 out of 81 partnered FAs) co-manage their COs with one other FA, while the rest co-manage with two other FAs. We also find that FA teams are stable throughout the study period, unless one of the team members quits NRSP.

5 Empirical Strategy

Because the bonus assignment is random, we can estimate the causal impact of introducing the bonus scheme by estimating OLS with the following specification:

$$Y_{i,1} = \beta_C TC_i + \beta_S TS_i + \psi Y_{i,0} + \eta_r + \epsilon, \tag{12}$$

where $Y_{i,1}$ is the post-treatment outcome of interest for FA i, TC_i (TS_i) is an indicator variable that takes the value of one if FA i was offered the credit (social) bonus, and zero otherwise, $Y_{i,0}$ is the pre-treatment outcome for FA i, η_r is a region dummy (one for each of the four NRSP's administrative regions) and ϵ is a mean-zero error term. The coefficients of interest in the regression are β_C and β_S, which estimate the average treatment effects of the credit and social bonus on FA outcomes $Y_{i,1}$, respectively.

We also examine the impact of bonus separately by partnership status of FAs at baseline using the following specification:

$$Y_{i,1} = \beta_C\ TC_i + \beta_S TS_i + \delta_C P_i * TC_i + \delta_S P_i * TS_i + \pi P_i + \psi Y_{i,0} + \eta_r + \epsilon, \tag{13}$$

where P_i is an indicator variable that takes the value of one if FA i was partnered with another FA prior to the bonus announcement. We use baseline partnership rather than actual partnership status during the study to avoid selection into partnership due to treatment, since the bonus could have led to the creation or destruction of FA teams.

The coefficients δ_C and δ_S on the interaction terms $P_i * TC_i$ and $P_i * TS_i$ respectively, capture the differential impact of the bonus on FAs that work in a team, relative to those that work alone. The coefficients β_C and β_S estimate the impact of credit and social bonus, respectively, on FAs that work alone, while the sum of the coefficients $\beta_C+\delta_C$ and $\beta_S+\delta_S$ estimate their impact on partnered FAs.

5.1 Unit of randomization

Treatment was assigned at the FU level because under NRSP's management structure, all FAs working in an FU report to the same supervisor (CrO for microcredit program and SO for social mobilization program). This design thus helps minimize the potential spillovers across different experimental arms. Despite covering all NRSP FUs at the time of the study, the sample comprises 35 FUs and 162 FAs. This relatively small sample could affect the statistical power of the study, and could raise concerns about the use of conventional statistical tests that rely on asymptotic approximations. We now discuss both issues in turn, and the steps taken to address them.

5.1.1 Statistical power

We address concerns of statistical power in several ways. First, we use NRSP's administrative data (from its Monitoring and Information System – MIS), which should help minimize measurement error. Second, we collect monthly data on performance and calculate FA's averages over the entire 15-month bonus period. This way, the FA's performance outcomes used in the empirical strategy do not contain outliers since monthly idiosyncratic shocks are likely averaged out. Third, we designed the bonus scheme to ensure that treated FAs had adequate incentives to respond: (i) the bonus amount was determined every month based on monthly performance for 15 consecutive months; (ii) the bonus amount was paid immediately at the end of the month together with monthly base salary; and (iii) the bonus amount could be as high as 20 percent of the base salary. Finally, more FUs were assigned to the social bonus (and control) compared to FUs assigned to the credit bonus to help detect an effect of the social bonus, which is likely to be weaker relative to the credit bonus because social outcomes are less reflective of FA effort, and consequently, more difficult to achieve.

5.1.2 Statistical inference

We take the concern of a small sample size seriously and conduct all statistical inference using two different ways of computing p-values that independently provide asymptotic refinement over the conventional methods of inference. As it turns out, the p-values generated by the two methods are very similar in magnitude for almost all statistical tests conducted in Section 6.

The first method uses the t-asymptotic wild cluster bootstrap procedure described in Cameron et al. (2008). Unlike standard bootstrap methods that compute the Wald statistic W from the bootstrap estimated standard error, the t-asymptotic procedure directly bootstraps W, and uses the resulting distribution of Ws to form inference on the observed Wald statistics. This bootstrap procedure provides an asymptotic refinement over standard methods of inference for OLS with clustered data. Moreover, the t-bootstrap, compared to other bootstrap procedures, provides a more accurate cluster-robust inference when the number of clusters is small (Cameron et al., 2008).

The second method uses a permutation test based on randomization inference that does not rely on asymptotic approximations, and therefore its properties are independent of sample size. Following Young (2017), among others, we randomly assign treatments at the FU level and calculate the exact p-value under the null hypothesis that treatment in every treated unit has no effect. In this respect, this randomization statistical inference procedure differs from all other statistical procedures including the t-bootstrap method discussed above, in that it is not testing whether the average treatment effect is zero, but rather whether the treatment effect is zero for all participants. Given that each FU in our study received a specific treatment, we can test this sharp null and avoid any dependence on the asymptotic assumptions that tend to produce inaccurate finite sample statistical inference in other tests.

As the next section shows, the data strategy and statistical inference adopted deliver statistically significant results on the key outcomes and a precise match from the theoretical predictions to the experimental

results.

6 Results

6.1 Impact of bonus on NRSP's twin goals

6.1.1 Credit outcomes

Table 3 examines the effects of the credit and social bonus on FA performance related to microcredit outcomes. Columns 1 and 2 present the impact on the two outcomes that were directly incentivized: number of active loans and repayment by the 20th of the month. The number of active loans increased by 31.6, and the repayment improved by 7.6 percentage points for FAs offered the credit bonus (Cr-FAs) compared to control FAs. Both estimates are statistically significant at the 10 percent level, as reported by the two sets of p-values —from t-bootstrap and from randomization inference procedures— displayed below each coefficient in Table 3. The size of these impacts is large, amounting to a 23 percent increase in active loans and a 11 percent improvement in repayment from the mean performance of control FAs. The impact of the social bonus on the number of active loans is also positive (11 percent improvement over the control mean), but it is not statistically significant at conventional levels. On the other hand, the social bonus had no effect on repayment by the 20th of the month. The effect of the credit and social bonuses on this repayment outcome is statistically different at the 5 percent level.

Appendix Table E.1, Panel A estimates the impacts of the bonuses on other credit outcomes not directly incentivized: number of new loans, disbursement amount, and repayment by end of the month. In contrast to the impacts on the two trigger variables, Cr-FAs showed no improvements on any of these non-incentivized credit outcomes. In fact, the improved repayment rate at the 20th of the month made little difference to the repayment rates by the end of the month, partly because the end of the month repayment rates were already above 96 percent among control FAs. Consequently, by the end of the month, the repayment rates of Cr-FAs were also not statistically significantly better from that of Soc-FAs. For all the non-incentivized credit outcomes, the difference in performance between Cr-FAs and Soc-FAs is negligible in size, and not statistically significant at conventional levels.

Since these five credit outcomes may be correlated, we follow Kling et al. (2007) to account for the problem of multiple hypothesis testing and construct a summary index that aggregates information over multiple outcomes. The credit index in Table 3, Column 3 is calculated by taking an equally weighted average across all five standardized microcredit outcomes.[24] The impact of credit bonus on this index is positive and large, suggesting that Cr-FAs performed 0.383 standard deviations higher (on the credit index) than control FAs. This estimate is statistically significant at the 10 percent level. Moreover, this impact is

[24]First, we standardize each distribution of the five credit outcomes based on the mean and the standard deviation of the control group, and take an equally weighted average across the five standardized credit outcomes. We then standardize this mean outcome based on the mean and the standard deviation of the control group.

largely due to improvements in the two specific outcomes that were directly incentivized by the credit bonus, rather than a general increase in performance in all credit-related tasks. The impact of the social bonus on the credit index is also positive (0.104 standard deviations improvement over the control). However, it is not statistically significant at conventional levels.

6.1.2 Social outcomes

Table 4 estimates the impact of the bonuses on the objective measures used by NRSP to evaluate the quality of COs and social empowerment. Columns 1-3 of Table 4 report the impacts on the three measures directly incentivized and used as triggers for the social bonus, while the impacts on other social measures not directly incentivized are reported in Appendix Table E.1 (Panel B).

We find that Soc-FAs formed 0.275 more new COs per month than control FAs (Column 1). The estimate is statistically significant at the 10 percent level, and amounts to a 70.8 percent increase in CO formation compared to the mean of 0.388 in the control group. It is however almost identical to and also not significantly different from Cr-FAs, who also increased CO formation by 0.260 compared to control FAs. This is not entirely unexpected since CO membership is a prerequisite for applying for microcredit loans, and one way FAs expand their loan portfolio is by bringing in new borrowers through new CO formation.

While Cr-FAs and Soc-FAs increased new CO formation relative to control FAs, the impact of the credit bonus on the rest of CO quality outcomes in Columns 2 and 3 in Table 4 (and in Panel B in Appendix Table E.1) is negative and large in magnitude among Cr-FAs. Cr-FAs decrease the share of savers among CO members by 12.7 percentage points and worsen attendance by 10.5 percentage points relative to control FAs. The estimates are statistically different from zero at the 10 percent level, and amount to 18.2 and 13.5 percent decline in savings and attendance relative to the mean of controls, respectively. This suggests a large negative effect of the credit bonus on social-related activities.

In contrast, relative to control FAs we find no change in these measures of CO quality among Soc-FAs. The impacts of social bonus on the share of savers among CO members and their attendance in CO meetings, which make up the remaining triggers for the social bonus, are small (-0.029 and -0.027 respectively) and not statistically different from zero at conventional levels.[25] But they are statistically different from those of Cr-FAs (t-bootstrap p-values are 0.106 and 0.024, respectively).[26] On savings and attendance outcomes, Soc-FAs outperformed Cr-FAs by 9.7 and 7.8 percentage points, respectively.

We construct a CO quality index similar to the credit index, by taking an equally weighted average of all six standardized measures of CO quality.[27] The effect of social bonus on the CO quality index in Column 4 is close to zero (-0.008 standard deviations) and not statistically different from zero. For Cr-FAs, however, this index is large and negative (-0.596 standard deviations), and statistically significantly different from

[25] We note that attendance levels among control FAs are high at 78 percent and as a result, Soc-FAs would have qualified for a positive bonus amount conditional on meeting their first trigger targets without any change in attendance.

[26] Randomized inference p-values are 0.124 and 0.105, respectively.

[27] While calculating the CO quality index, the sign of one of the outcomes, i.e. "Dead COs," is reversed so that for all the outcomes, positive values represent an increase in social empowerment.

zero at the 5 percent level. Cr-FAs also performed worse on the CO quality index as compared to Soc-FAs by 0.588 standard deviations (this difference is statistically significant at the 5 percent level).

Table 5 examines the effects of the bonuses on subjective measures of CO quality constructed from a survey of CO members. These client-level data provide us with complementary measures of CO quality and more detailed information on the CO and its members' activities that are directly related to community mobilization and social empowerment. Client data were only collected for a subset of COs in 11 of the 35 FUs as part of the baseline for another study. Clients in each of the two treatment and control groups have characteristics that are not significantly different across the experimental arms (see Appendix Table D.4).

In Columns 2 and 3 of Table 5, we find that clients of Soc-FAs are more likely to engage in buying and selling agricultural inputs and outputs collectively with others in their village and that they are more likely to turn to their CO leaders for help or advice. The estimated impacts on these two outcomes are large (50.0 and 68.6 percent respectively compared to the control means), and they are statistically significant at the 10 percent level. Additionally, members of COs managed by Soc-FAs are more likely to discuss non-credit related social issues during CO meetings. While this effect is not statistically significant at conventional levels, the point estimate however is large in magnitude (86.9 percent compared to the mean in the control group). In contrast, the estimates of the credit bonus in Columns 1-3 are close to zero and not statistically significant.

The effect of the social bonus on the empowerment index, constructed by taking an equally weighted mean of the three outcomes in Columns 1-3 of Table 5, is positive by 11.6 percentage points and suggests a 69.9 percent improvement compared to the control mean. It is also statistically significant at the 10 percent level. In comparison, the effect of credit bonus on this index is about half in magnitude (6.2 percentage points) and not statistically significantly different from zero. The difference in impact between the social and credit bonus (of 5.2 percentage points) is significant at conventional levels, but only based on the t-bootstrap p-value (t-bootstrap p-value is 0.138).

Overall, these results suggest that while the credit bonus improved the NRSP's microcredit program, albeit only for outcomes directly incentivized, it also worsened the quality of COs thus undermining NRSP's goal of empowering communities through social mobilization. In comparison, the social bonus increased CO formation without worsening the objective measures of CO quality and without adversely affecting microcredit outcomes. It also improved subjective measures of CO quality and client empowerment: COs managed by Soc-FAs are more cohesive and more likely to work collectively on economic and social activities.

Lastly, Appendix Figure E.1 plots the bonus effects on FA outcomes (credit and social indices) month-by-month for the 15-month bonus period. In contrast to Jayaraman et al. (2016) that find a large productivity response immediately following a change in the incentive contract followed by a decline four months after the change, the plots in Appendix Figure E.1 suggest that monthly effects of the bonus were fairly consistent across the 15 months and similar in size.

6.2 Production and cost complementarities

We now compare the results from the randomized experiment with the theoretical predictions derived in Section 3. The model predictions presented in Table 2 show that the bonus impact on the incentivized goal is always positive for all 10 different cases of cost and production complementarities. Our empirical findings validate this: credit bonus improved the microcredit program, and social bonus improved the subjective measures of social empowerment.

On the other hand, the theoretical predictions on the effect of a bonus on the other goal (i.e. the effect of the credit bonus on social outcomes, and of the social bonus on credit outcomes) are sometimes different from zero and not always symmetric; and they vary by the model assumptions about the nature of cost and production complementarities.

In our experiment, we find a negative impact of the credit bonus on social outcomes (see Column 7, Table 4) and the non-negative impact of the social bonus on credit outcomes.[28] This is consistent with only two out of 10 cases (Case 2 in both panels), where task 1 refers to credit-related activities and task 2 refers to social-related activities.

The two cases that match our empirical results have one striking similarity. Case 2 in both panels are identical in their assumptions about the nature of production complementarities, i.e. $\gamma_1 > 0$ and $\gamma_2 \leq 0$. These values of γ_1 and γ_2 imply that a healthy credit portfolio is more easily achieved when FAs work hard on organizing new COs or ensuring that existing COs are cohesive; and that enforcing repayment discipline may discourage borrowers, perhaps those in arrears, from attending CO meetings thus undermining the social goal.[29] In the model, these production spillovers from efforts e_2 and e_1 on outcomes y_1 and y_2 respectively, are independent of the effort complementarities in the disutility cost.

While our results do not help identify whether effort levels on credit and social tasks are compliments or substitutes in the disutility cost of effort, they suggest that production complementarities exist. In particular, the results are not consistent with Case 4.2 that assumes no production complementarities ($\gamma_1 = 0$, $\gamma_2 = 0$). The results are also not consistent with Case 1 of Panel B, which assumes that the production spillovers are positive while the two tasks are substitutes in the disutility cost ($C''_{12} > 0$). In this case, the negative effect on non-incentivized outcomes can come about if the bonus triggers a large enough reallocation of agents' effort away from the unrewarded tasks to the rewarded tasks. Evaluations of teacher incentive schemes, for example, underscore this idea as performance bonuses can be harmful when they induce teachers to replace effective instruction with significant accounts of teaching to the test (Neal, 2011).

Our findings provide an alternate explanation for a negative impact of a bonus on the non-incentivized

[28] In Section 6.4 we find that among non-partnered FAs, the effect of social bonus on the credit index is positive and large, and it is statistically significant at the 10 percent level (Column 1, Table 7). Non-partnered Soc-FAs performed 0.515 standard deviations higher on the credit index compared to control FAs, and this improvement in performance is almost identical to that of non-partnered Cr-FAs, who also performed 0.414 standard deviations higher on the credit index than control FAs. Both impacts are statistically significant at conventional levels using both t-bootstrap and randomization inference procedures.

[29] In Case 2 of Panel B, in which the two tasks are assumed to be substitutes in FA's disutility cost of effort ($C''_{12} > 0$), the credit bonus is predicted to affect social goal negatively i.e. $\frac{\partial y_2}{\partial b_1} < 0$ (and the social bonus positively impact credit goal) as long as the term $\gamma_1 > 0$ is not too large.

outcome. In the context of microfinance, incentivizing frontline staff on repayment may undermine the social empowerment of clients because effort on repayment activities may directly harm social-related outcomes, even if the staff does not shift effort away from social-related activities. This is consistent with the null effects of microfinance programs on empowerment indicators in Banerjee et al. (2015a). More generally, our findings suggest that both cost as well as production complementarities are relevant in designing an effective incentive scheme.

6.3 Alternative channels

We explore next whether alternative mechanisms besides production and cost complementarities can explain our results. For this purpose, we look at (1) differences in intrinsic motivation between credit and social related tasks; (2) differences in the noisiness of measurement between credit and social outcomes; and (3) differential response by supervisors to credit and social bonus.

6.3.1 Intrinsic motivation

Intrinsic motivation associated with the social mission of an organization often plays an important role in determining the level effort by its workers (see for example Besley and Ghatak, 2005). In a multigoal organization, intrinsic motivation of workers can be associated with tasks related to a subset of its goals that are perceived by workers as being *prosocial*. For example, Berg et al. (forthcoming) find that introducing a monetary bonus scheme leads agents to improve effort on *non-social* tasks, while not affecting their intrinsic motivation and their effort related to *social* tasks. In our case, the credit and social bonuses could differentially affect the intrinsic motivation of FAs, and this depends on whether FAs view credit and social tasks differently in terms of their prosocial value.

We test this by estimating the impact of the two bonus on the intrinsic motivation of FAs in Table 6. In the follow-up survey, FAs were asked questions related to their intrinsic motivation. We use these self-reported measures to construct a motivation index, where the larger value on the index implies a higher intrinsic motivation.[30] Based on this index (Column 1), the social bonus decreased intrinsic motivation by 17.2 percentage points (statistically significant at the 10 percent level). In contrast, the impact of the credit bonus is close to zero at -0.070 and not statistically significant. More importantly, the impacts of the two bonuses on the motivation index are statistically different from each other (the t-bootstrap and randomization inference p-values are 0.085 and 0.104, respectively).

These results provide evidence that incentivizing effort on the social-related tasks undermined FAs' intrinsic motivation, suggesting that FAs view their effort on building and strengthening COs as being more

[30] The surveys include three questions related to intrinsic motivation. First, FAs were asked to list the things that they liked most about working with NRSP. We construct a dummy variable that equals one if the FA chose the ability to help people as what they like most about NRSP. Second, FAs were asked whether they identified with NRSP's mission. Lastly, they were asked whether they found their work with NRSP satisfying and important. We construct a motivation index by taking an equally weighted mean of the three dummy variables. Appendix Table E.1, Panel C presents the estimated impacts of the bonus on these three measures separately.

in line with the social mission of NRSP. The theoretical predictions in Case 5 of Table 2, which incorporates intrinsic motivation into the model, indicate however that our results cannot be explained by a decline in intrinsic motivation alone. If FAs were intrinsically motivated to perform social tasks (task 2), then a bonus on social outcomes (b_2) would not change effort in the credit tasks (task 1) because it is already at a corner ($e_1 = 0$). This contradicts the empirical finding of positive effects of the social bonus on credit outcomes among non-partnered Soc-FAs discussed later in Section 6.4. Intrinsic motivation for social tasks alone is however consistent with a bonus on credit outcomes (b_1) worsening the performance on social outcomes as Cr-FAs devote less effort than control FAs to social activities.[31]

6.3.2 Poor measurement

Because workers typically perform several tasks, Holmstrom and Milgrom (1991) argue that if these tasks are measured with different degrees of accuracy, workers may devote more effort to those easily measured to the detriment of others harder to measure. Moreover, if incentivized tasks are hard to measure, the bonus may not be effective in eliciting effort (Baker, 1992; Besley and Ghatak, forthcoming). In our study, social outcomes like CO quality are likely to be measured less accurately or to be less reflective of FA effort, compared to credit outcomes. The relative noisiness of social outcomes imply that the effects of social bonus on both goals are likely to be muted, while the credit bonus will improve credit outcomes and worsen social outcomes if $C''_{12} > 0$. Under this assumption, the impact of the social bonus on the credit outcome cannot be positive, but in the subsample of FAs who were working alone, we find that the effect of the social bonus on credit outcomes is positive and significant. Therefore, poor measurement (in combination with intrinsic motivation) alone cannot explain the results.

6.3.3 Management effort

Lastly, we examine whether the two incentive schemes had an impact on supervisory effort and management quality. Managers could, for example, increase supervision towards the non-incentivized task for fears that FAs would focus attention on the incentivized task. Our measure of supervisor effort is the absolute difference between the actual performance of FAs during the month of the survey and that reported by the supervisor on two credit outcomes (number of active loans and repayment) and one social outcome (savings) in the supervisor survey.[32] Appendix Table E.2 reports the results. On both credit and social outcomes, the estimated effects of credit and social bonuses are close to zero and not statistically significantly different from zero at conventional levels. Put differently, the introduction of either bonus does not influence the supervisors' ability to correctly report their FA's performance on both incentivized and non-incentivized outcomes.

[31] Because the two tasks are substitutes ($C''_{12} \geq 0$), higher effort in the credit tasks means lower effort in the social tasks.

[32] Out of 162 study-sample FAs, we have supervisor cross-reports for 98 FAs (and for 55 FAs out of 132 FAs who also show up in the verified MPRs sample). We do not find evidence for a differential selection of FAs into the two restricted samples by treatment assignment.

6.4 Impact of bonus by partnership

Given that NRSP relies on teamwork among FAs and that the impacts of the bonuses may differ depending on whether FAs work alone or in teams, we now examine the differential effects of the bonuses by FA partnership status in the baseline. Table 7, Columns 1 and 2 present the differential impacts on the credit and CO quality indices, respectively.[33]

In Column 1 of Table 7, non-partnered Cr-FAs performed 0.414 standard deviations higher than non-partnered control FAs on the credit index (statistically significant at the 10 percent level). The improvement of credit-related outcomes when credit bonus is offered is perhaps unsurprising and predicted by the model in Section 3. In Column 2, Cr-FAs performed 0.696 standard deviations worse on the CO quality index than control FAs, and this difference is statistically significant at the 1 percent level.

Non-partnered Soc-FAs also performed 0.515 standard deviations higher on the credit index compared to control FAs (Column 1 of Table 7). The estimate is large and statistically significant at the 10 percent level. In Column 2, non-partnered Soc-FAs perform 0.236 standard deviations higher than control FAs on the CO quality index. While this estimate is not statistically significant at conventional levels, the results are consistent with a positive impact of the social bonus on both the credit and social goals.

More importantly, while the difference in the credit index between non-partnered Soc-FAs and Cr-FAs is negligible (in fact, 0.101 standard deviation higher for Soc-FAs) and not statistically significant at any conventional levels, non-partnered Soc-FAs outperformed Cr-FAs on the CO quality index, and this difference is statistically significant at the 1 percent level. These effects on non-partnered FAs provide clear evidence for the asymmetric effects of the credit and social bonus on the non-incentivized goal, i.e. the social bonus improves credit outcomes, while the credit bonus harms the social goal.

Partnership, however, dampens the effect of the bonus. The coefficient on the interaction term $P\text{x}TC$ is negative for the credit index and positive for CO quality index, and therefore, the effects of the credit bonus on partnered Cr-FAs on both indices are smaller in size compared to its effects on non-partnered Cr-FAs (and no longer statistically significant). Partnership has even larger negative effects on Soc-FAs. Partnered Soc-FAs performed 0.269 standard deviations lower in the credit index and 0.182 standard deviations lower in the CO quality index compared to partnered control FAs (not statistically significant at conventional levels). The coefficient on the interaction term $P\text{x}TS$ on both indices is large and negative (-0.784 and -0.446). This interaction term in Column 1 is statistically significant at the 5 percent level.

The negative effect of partnership on the performance of Soc-FAs is accompanied by a decline in their propensity to work in teams after the social bonus was introduced. Partnership status of FA can change during the intervention either because FA requests to co-manage a smaller share of COs, work alone or because the supervisors decides to break-up a team or not form new ones.[34] Column 2 of Table 6 reports a decline of 12.4 percentage points in the share of partnered Soc-FAs at the end of the study compared

[33] The differential effects on the full sets of credit and social outcomes are presented in Appendix Tables E.3 and E.4.

[34] We consider an FA as partnered at the end of the study if the share of COs that are co-managed with other FAs during the treatment months exceeds the pre-treatment median value of co-sharing (73 percent of COs).

to control FAs. This negative impact of the social bonus on the likelihood of partnership is statistically significant at the 5 percent level, and implies roughly a 20 percent decline in the share of Soc-FAs working in teams relative to the mean in the control group. This effect is also statistically different from Cr-FAs at the 10 percent level. The credit bonus had no impact on the propensity of Cr-FAs to work in teams.

These results provide evidence of heterogeneous treatment effects by partnership, and a decline in teamwork mainly among workers who were offered the social bonus. These effects could be explained by free riding among partnered FAs. First, in line with the findings of previous studies on group incentives such as Imberman and Lovenheim (2015), the impact of both bonuses on partnered FAs are relatively more muted, which suggests that the effort of each FA working in a team is likely unobservable to other team members. Moreover, social outcomes are less reflective of FA effort, and therefore, partnered FAs who were offered the social bonus could have experienced a higher degree of free riding relative to partnered Cr-FAs. And more importantly, consistent with studies of motivated agents (Gneezy and Rustichini, 2000), our results also suggest an important link between teamwork and intrinsic motivation, i.e. the negative effects of social bonus on performance as well as teamwork is accompanied by a decline in intrinsic motivation of workers who were offered the social bonus (Table 6, Column 1). Taken together, these results highlight the role of intrinsic motivation for workers in mission-oriented organizations that work in teams, and that such considerations are important when designing incentives.

6.5 Performance assessment by supervisors

At the end of the study, supervisors of all study FAs were asked to evaluate each FA currently working under them on three specific dimensions: (1) the likelihood of being promoted to Senior FA; (2) perceived improvements in loan disbursement rates since the introduction of the bonus scheme; and (3) perceived improvements in savings by CO members. We use these measures to construct a supervisor assessment score by taking an equally weighted average of the three outcomes. Column 1 in Table 8 presents the average treatment effects of the bonus on the assessment score; and Column 2 presents the results by baseline partnership status.[35]

In Column 1 supervisors of Soc-FAs increased their assessment by 13.7 percentage points compared to supervisors of control FAs. While the estimate is not statistically different from zero, the magnitude of the effect implies a 46.3 percent increase over the control mean. In comparison, supervisors of Cr-FAs increased their assessment score, on average, by only 5 percentage points compared to the assessment of control FAs, and this effect is also not statistically significant at conventional levels.

Column 2 reports the supervisor's assessment of Column 1 by partnership status. Supervisors increased their assessment of non-partnered Soc-FAs by 37.7 percentage points compared to the assessment of control non-partnered FAs. The estimate is statistically significant at the 10 percent level. This assessment of non-

[35]The average treatment effects on the individual components of the assessment score are presented in Appendix Table E.1, Panel D; and by partnership in Appendix Table E.5.

partnered Soc-FAs is 50.1 percentage points higher than that of partnered Soc-FAs in the same FU, and the difference is also statistically significant (p-values from two inference methods are 0.026 and 0.060). Partnered and non-partnered Cr-FAs, on the other hand, scored 5.7 percentage points lower and 17.3 percentage points higher than their counterparts in control FUs, respectively. None of these estimates for Cr-FAs are statistically significantly different from zero, and from each other at conventional levels.

These results are consistent and strengthen our previous findings. Table 7 reported that the social bonus improved performance in both credit- and social-related activities of non-partnered FAs, while partnered Soc-FAs performed significantly worse. The assessment of Soc-FAs by their supervisors also reflects these results. On the other hand, the impacts of the credit bonus on the supervisor assessment of Cr-FAs, who improved their performance on microcredit but worsened their social outcomes, are mixed, and do not very different in magnitude nor statistical power from that of FAs in control FUs.

7 Conclusion

In this paper, we provide evidence of the impact of performance incentives in the context of a mission-oriented organization where workers, who are also intrinsically motivated to fulfill the mission, need to multitask to both achieve its mission and protect its bottom line. This context is becoming increasingly common in the for-profit private sector, as social enterprises and public-private partnerships grow, in addition to its relevance for the public sector and for nonprofits. It is characterized by asymmetries in measurability across outcomes related to the mission and those related to the bottom line.

We show that both cost and production complementarities are important for understanding the impact of worker incentives. To do this we make a special effort to collect data on otherwise poorly observed social outcomes and randomly vary the incentive scheme offered to last mile workers. The bonus is paid on either the sustainability of the microcredit portfolio (i.e. the organization's bottom line), which predictably, is well measured, or on a set of social outcomes related to the empowerment of poor communities which are well aligned with the institution's core mission but would typically be poorly measured.

We find that the credit bonus unsurprisingly improved the performance of the microcredit program but worsened social outcomes. In contrast, at least among staff working alone, the social bonus improved social outcomes and was as effective as the credit bonus at improving credit outcomes. These results cannot obtain with cost complementarities alone and suggest that production complementarities are important.

Further, the social bonus undermined the intrinsic motivation of employees and worsened teamwork. Taken together, these results suggest that in mission-oriented organizations, it may be best to use a fixed wage contract rather than to incentivize only the outcomes that can be easily measured or to try to measure those that are difficult to observe.

In fact, shortly after the study concluded the organization we worked with stopped collecting the data needed to pay the social bonus and reverted to the previous practice of paying all FAs a flat wage.

Our results also suggest that anti-poverty programs which are increasingly multifaceted and are often delivered through a community driven approach, need to think carefully not just about the design of the interventions they support, but also the mechanisms through which the services they provide are delivered. Incentives to last mile staff on the performance of some program goals could well undermine other central but less well observed goals.

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Table 1: Summary statistics and balance tests

	No bonus *(C)* (1)	Credit bonus *(TC)* (2)	Social bonus *(TS)* (3)	P-value *C=TC* (4)	*C=TS* (5)	*TC=TS* (6)
Demographic characteristics						
Age	27.39	27.53	28.03	*0.932*	*0.628*	*0.734*
Female	0.266	0.250	0.129	*0.880*	*0.118*	*0.140*
Married	0.375	0.361	0.435	*0.890*	*0.572*	*0.532*
Household head	0.125	0.167	0.177	*0.588*	*0.572*	*0.932*
Completed high school	0.562	0.500	0.565	*0.566*	*0.928*	*0.556*
Household consumption *(PKR)*	6531	5875	6874	*0.426*	*0.572*	*0.192*
Housing quality index	0.167	-0.094	0.265	*0.162*	*0.618*	*0.140*
Employment characteristics						
Employed with NRSP *(months)*	26.92	25.97	26.40	*0.672*	*0.882*	*0.932*
NRSP first job	0.547	0.667	0.597	*0.138*	*0.450*	*0.478*
Works from a village branch	0.781	0.889	0.903	*0.428*	*0.362*	*0.870*
Number of COs managed	12.29	16.59	14.62	*0.362*	*0.292*	*0.686*
Share of COs co-managed	0.569	0.496	0.603	*0.594*	*0.834*	*0.490*
Partnered FA[a]	0.500	0.389	0.565	*0.478*	*0.744*	*0.258*
Preferences and motivation						
Wants to work for next two years	0.906	0.889	0.903	*0.792*	*0.982*	*0.790*
Overtime work *(hrs/day)*	1.940	1.748	2.223	*0.632*	*0.396*	*0.180*
Prefers credit bonus	0.594	0.528	0.565	*0.618*	*0.766*	*0.792*
Thinks social-related tasks help credit goal	0.906	0.944	0.952	*0.402*	*0.326*	*0.884*
Did volunteer work before NRSP	0.250	0.194	0.290	*0.672*	*0.690*	*0.480*
Best about NRSP is ability to help others	0.484	0.528	0.565	*0.618*	*0.386*	*0.766*
Monthly performance						
Number of active loans	85.4	114.5	117.3	*0.296*	*0.162*	*0.858*
New disbursement *(PKR)*	75453	120385	106063	*0.210*	*0.112*	*0.752*
Repayment on dues at 20th of month	0.732	0.725	0.674	*0.926*	*0.358*	*0.488*
Repayment on dues at end of month	0.984	0.968	0.992	*0.746*	*0.458*	*0.518*
Number of field units (FUs)	11	9	15	-	-	-
Number of field assistants (FAs)	64	36	62	-	-	-
Number of credit organizations (COs)	1411	1217	1776	-	-	-
FA attrition in follow-up survey	0.156	0.194	0.210	*0.704*	*0.600*	*0.934*
FA selection into verified MPRs[b]	0.719	0.944	0.823	*0.288*	*0.608*	*0.244*
FA selection into client survey	0.484	0.389	0.194	*0.840*	*0.490*	*0.414*
FA selection into supervisor evaluation	0.422	0.583	0.403	*0.520*	*0.898*	*0.316*
P-value for joint test of significance	-	-	-	*0.985*	*0.997*	*0.989*

Notes: The p-values (in F-tests in Columns 4-6) are calculated using the wild cluster t-bootstrap at the field unit level. [a] *Partnered FA* is defined as a dummy variable which equals one if an FA is co-managing more than 73 percent of her/his CO portfolio (median value of co-sharing) with other FAs during the 9 months prior to the bonus announcement. [b] *Verified MPRs* sample includes FAs whose CO meetings were visited by the CrO at least once during the bonus period.

Table 2: Impact of bonus on outcomes

			Bonus on y_1		Bonus on y_2	
			$\frac{\partial y_1}{\partial b_1}$	$\frac{\partial y_2}{\partial b_1}$	$\frac{\partial y_1}{\partial b_2}$	$\frac{\partial y_2}{\partial b_2}$
Panel A:	$C''_{12} \leq 0$					
	Case 1:	$\gamma_1 > 0$ and $\gamma_2 > 0$	+	+	+	+
	Case 2:	$\gamma_1 > 0$ and $\gamma_2 \leq 0$	+	?	+	+
	Case 3:	$\gamma_1 \leq 0$ and $\gamma_2 > 0$	+	+	?	+
	Case 4.1:	$\gamma_1 < 0$ and $\gamma_2 < 0$	+	-	-	+
	Case 4.2:	$\gamma_1 = 0$ and $\gamma_2 = 0$	+	0	0	+
Panel B:	$C''_{12} > 0$					
	Case 1:	$\gamma_1 > 0$ and $\gamma_2 > 0$	+	$?^a$	$?^a$	+
	Case 2:	$\gamma_1 > 0$ and $\gamma_2 \leq 0$	+	?	+	+
	Case 3:	$\gamma_1 \leq 0$ and $\gamma_2 > 0$	+	+	?	+
	Case 4.1:	$\gamma_1 < 0$ and $\gamma_2 < 0$	+	-	-	+
	Case 4.2:	$\gamma_1 = 0$ and $\gamma_2 = 0$	+	0	0	+
	Case 5:	$\gamma_1 = \gamma_2 = 0$ and $m > 0$	+	-	0	+

Notes: A positive (negative) sign indicates that the impact of the bonus on the outcome is positive (negative). A question mark (?) indicates that the impact cannot be signed. ^{a}indicates that while the impact of the bonus on the outcome cannot be signed, the expressions are the same and thus have the same sign ($\frac{\partial y_2}{\partial b_1} = \frac{\partial y_1}{\partial b_2}$).

Table 3: Impact of bonus on microcredit outcomes

	Bonus triggers		
	Number of active loans	Repayment on dues at 20th of month	Credit index
	(1)	(2)	(3)
Credit bonus (TC)	31.56*	0.076*	0.383*
(wild cluster t-bootstrap p-value)	*(0.014)*	*(0.084)*	*(0.092)*
[randomization inference p-value]	*[0.082]*	*[0.074]*	*[0.088]*
Social bonus (TS)	15.68	-0.001	0.104
(wild cluster t-bootstrap p-value)	*(0.310)*	*(1.000)*	*(0.598)*
[randomization inference p-value]	*[0.292]*	*[0.982]*	*[0.631]*
P-value of F-test: TC = TS			
(wild cluster t-bootstrap p-value)	*(0.308)*	*(0.044)*	*(0.118)*
[randomization inference p-value]	*[0.330]*	*[0.033]*	*[0.135]*
Observations	162	162	162
Mean dep. var., control	135.70	0.712	0.000

Notes: All specifications control for region dummies and the pre-treatment value of the dependent variable. ***Number of active loans*** is the monthly average number of active loans (new and on-going) managed by the FA. ***Repayment on dues at 20th of the month*** is the monthly average share of installment dues paid in full by the 20th. ***Credit index*** is calculated by taking an equally weighted mean across the standard distributions of the five microcredit outcomes: Number of active loans, Repayment on dues at 20th of the month, New loans, New disbursement, and Repayment on dues at end of month. Each distribution is standardized based on the mean and the standard deviation of the control group; higher value on the credit index implies better performance on microcredit. P-values are reported below the coefficients and are calculated using the wild cluster t-bootstrap and the cluster randomization inference at the field unit level; *** denotes 1%, ** denotes 5%, * denotes 10% significance based on the larger of the two (t-bootstrap and randomization inference) p-values.

Table 4: Impact of bonus on CO quality

	Bonus triggers			
	New COs	Savers per member	Attendance	CO quality index
	(1)	(2)	(3)	(4)
Credit bonus (TC)	0.260	-0.127*	-0.105*	-0.596**
(wild cluster t-bootstrap p-value)	*(0.190)*	*(0.048)*	*(0.062)*	*(0.034)*
[randomization inference p-value]	*[0.149]*	*[0.072]*	*[0.046]*	*[0.030]*
Social bonus (TS)	0.275*	-0.029	-0.027	-0.008
(wild cluster t-bootstrap p-value)	*(0.044)*	*(0.454)*	*(0.636)*	*(1.000)*
[randomization inference p-value]	*[0.083]*	*[0.659]*	*[0.628]*	*[0.968]*
P-value of F-test: TC = TS				
(wild cluster t-bootstrap p-value)	*(0.978)*	*(0.106)*	*(0.024)*	*(0.030)*
[randomization inference p-value]	*[0.936]*	*[0.124]*	*[0.105]*	*[0.020]*
Observations	131	131	131	131
Mean dep. var., control	0.388	0.688	0.777	0.000

Notes: All specifications control for region dummies. ***New COs*** is the monthly average number of new COs formed by the FA. ***Savers per member*** is the monthly average share of CO members who saved during CO meetings conducted by the FA. ***Attendance*** is the monthly average share of CO members present at the CO meetings conducted by the FA. ***CO quality index*** is calculated by taking an equally weighted mean across the standard distributions of the six CO-quality outcomes: New COs, Savers per member, Attendance, Dead COs, Multiple meetings, and Loan rejection rate. Each distribution is standardized based on the mean and the standard deviation of the control group; higher value on the social index implies better performance on social mobilization. P-values are reported below the coefficients and are calculated using the wild cluster t-bootstrap and the cluster randomization inference at the field unit level; *** denotes 1%, ** denotes 5%, * denotes 10% significance based on the larger of the two (t-bootstrap and randomization inference) p-values.

Table 5: Impact of bonus on social empowerment (client-level)

	Discussions on social issues (1)	Collective action (2)	CO leader advice (3)	Empowerment index (4)
Credit bonus (TC)	0.086	0.011	0.088	0.062
(wild cluster t-bootstrap p-value)	*(0.494)*	*(0.830)*	*(0.186)*	*(0.208)*
[randomization inference p-value]	*[0.618]*	*[0.897]*	*[0.406]*	*[0.347]*
Social bonus (TS)	0.146	0.070*	0.131**	0.116*
(wild cluster t-bootstrap p-value)	*(0.510)*	*(0.000)*	*(0.000)*	*(0.046)*
[randomization inference p-value]	*[0.255]*	*[0.094]*	*[0.049]*	*[0.083]*
P-value of F-test: TC = TS				
(wild cluster t-bootstrap p-value)	*(0.604)*	*(0.488)*	*(0.566)*	*(0.138)*
[randomization inference p-value]	*[0.661]*	*[0.433]*	*[0.733]*	*[0.345]*
Observations	1691	1691	1691	1691
Mean dep. var., control	0.168	0.140	0.191	0.166

Notes: The sample includes CO members from a subset of COs managed by the study-sample FAs, who were interviewed in November 2006 (5 months after the end of the study). All specifications control for region dummies. ***Discussions on social issues*** is a dummy variable which equals one if a CO member reported that his/her CO discussed noncredit-related social issues like public goods and service provisions more frequently since July 2005 (3 months into the bonus period). ***Collective action*** is a dummy variable which equals one if a CO member reported that he/she collectively bought and sold agricultural input and output with others in the village more frequently since July 2005. ***CO leader advice*** is a dummy variable if a CO member reported that he/she sought advice from CO leaders more frequently since July 2005. ***Empowerment index*** is calculated by taking an equally weighted mean across the three subjective CO quality dummy variables in Columns 1-3. Higher value on the empowerment index implies higher CO quality. P-values are reported below the coefficients and are calculated using the wild cluster t-bootstrap and the cluster randomization inference at the field unit level; *** denotes 1%, ** denotes 5%, * denotes 10% significance based on the larger of the two (t-bootstrap and randomization inference) p-values.

Table 6: Impact of bonus on motivation and teamwork

	Motivation index (1)	Works with a partner (2)
Credit bonus (TC)	-0.070	0.023
(wild cluster t-bootstrap p-value)	*(0.332)*	*(0.744)*
[randomization inference p-value]	*[0.315]*	*[0.780]*
Social bonus (TS)	-0.172*	-0.124**
(wild cluster t-bootstrap p-value)	*(0.078)*	*(0.002)*
[randomization inference p-value]	*[0.037]*	*[0.027]*
P-value of F-test: TC = TS		
(wild cluster t-bootstrap p-value)	*(0.085)*	*(0.062)*
[randomization inference p-value]	*[0.104]*	*[0.096]*
Observations	132	162
Mean dep. var., control	0.449	0.672

Notes: All specifications control for region dummies and the pre-treatment value of the dependent variable. ***Motivation index*** is calculated by taking an equally weighted mean across the three intrinsic motivation dummy variables: Best about NRSP: ability to help, Identify with NRSP mission, and Finds work important. The effects on the individual components of the motivation index is presented in Appendix Table E.1. Higher value on the motivation index implies higher intrinsic motivation. ***Works with a partner*** is a dummy variable which equals one if an FA co-manages more than 73 percent (pre-treatment median value) of his/her post-treatment CO portfolio with other FAs. P-values are reported below the coefficients and are calculated using the wild cluster t-bootstrap and the cluster randomization inference at the field unit level; *** denotes 1%, ** denotes 5%, * denotes 10% significance based on the larger of the two (t-bootstrap and randomization inference) p-values.

Table 7: Differential impact of bonus by partnership

	Credit index (1)	CO quality index (2)
Credit bonus (TC)	0.414*	-0.696***
(wild cluster t-bootstrap p-value)	*(0.070)*	*(0.004)*
[randomization inference p-value]	*[0.085]*	*[0.010]*
Social bonus (TS)	0.515*	0.236
(wild cluster t-bootstrap p-value)	*(0.062)*	*(0.400)*
[randomization inference p-value]	*[0.072]*	*[0.421]*
Partnered FA x TC	-0.061	0.255
(wild cluster t-bootstrap p-value)	*(0.798)*	*(0.628)*
[randomization inference p-value]	*[0.828]*	*[0.650]*
Partnered FA x TS	-0.784**	-0.446
(wild cluster t-bootstrap p-value)	*(0.020)*	*(0.264)*
[randomization inference p-value]	*[0.036]*	*[0.317]*
Partnered FA (P)	-0.102	-0.264
(t-wild cluster t-bootstrap p-value)	*(0.580)*	*(0.374)*
[randomization inference p-value]	*[0.916]*	*[0.531]*
P-value of F-test (t-boot.) [rand. inf.]:		
TC + P x TC	*(0.210) [0.212]*	*(0.370) [0.336]*
TS + P x TS	*(0.284) [0.318]*	*(0.454) [0.437]*
TC = TS	*(0.686) [0.704]*	*(0.002) [0.001]*
TC+PxTC = TS+PxTS	*(0.016) [0.037]*	*(0.596) [0.625]*
Observations	162	131
Mean dep. var., control	0.000	0.000

Notes: All specifications control for region dummies and the pre-treatment value of the dependent variable (except Column 2). ***Partnered FA*** is a dummy variable which equals one if an FA co-manages more than 73 percent of her/his pre-treatment CO portfolio (median value of co-sharing) with other FAs. ***Credit index*** is calculated by taking an equally weighted mean across the standard distributions of the five microcredit outcomes: Number of active loans, Repayment on dues at 20th of the month, New loans, New disbursement, and Repayment on dues at end of month. Higher value on the credit index implies better performance on microcredit. ***CO quality index*** is calculated by taking an equally weighted mean across the standard distributions of the six social outcomes: New COs, Savers per member, Attendance, Dead COs, Multiple meetings, and Loan rejection rate. Higher value on the social index implies better performance on social mobilization. P-values are reported below the coefficients and are calculated using the wild cluster t-bootstrap and the cluster randomization inference at the field unit level; *** denotes 1%, ** denotes 5%, * denotes 10% significance based on the larger of the two (t-bootstrap and randomization inference) p-values.

Table 8: Impact of bonus on supervisor evaluation

	Assessment score (1)	Assessment score (2)
Credit bonus (TC)	0.050	0.173
(wild cluster t-bootstrap p-value)	*(0.692)*	*(0.316)*
[randomization inference p-value]	*[0.791]*	*[0.443]*
Social bonus (TS)	0.137	0.377*
(wild cluster t-bootstrap p-value)	*(0.314)*	*(0.054)*
[randomization inference p-value]	*[0.406]*	*[0.094]*
Partnered FA x TC	-	-0.230
(wild cluster t-bootstrap p-value)		*(0.400)*
[randomization inference p-value]		*[0.506]*
Partnered FA x TS	-	-0.501*
(wild cluster t-bootstrap p-value)		*(0.026)*
[randomization inference p-value]		*[0.060]*
Partnered FA (P)	-	0.169
(t-wild cluster t-bootstrap p-value)		*(0.368)*
[randomization inference p-value]		*[0.401]*
P-value of F-test (t-boot.) [rand. inf.]:		
TC + P x TC	-	*(0.822) [0.855]*
TS + P x TS	-	*(0.586) [0.582]*
TC = TS	*(0.378) [0.533]*	*(0.244) [0.395]*
TC+PxTC = TS+PxTS	-	*(0.662) [0.774]*
Observations	73	73
Mean dep. var., control	0.296	0.296

Notes: All specifications control for region dummies. ***Partnered FA*** is a dummy variable which equals one if an FA co-manages more than 73 percent of his/her pre-treatment CO portfolio (median value of co-sharing) with other FAs. ***Assessment score*** is calculated by taking an equally weighted mean across the three assessment dummy variables that are constructed from the supervisor's evaluation of the FA at the end of the study. The three evaluation criteria include: Likelihood of promotion, Improvement in loan disbursement, and Improvement in CO savings. Higher value on the assessment score implies favorable supervisor evaluation. P-values are reported below the coefficients and are calculated using the wild cluster t-bootstrap and the cluster randomization inference at the field unit level; *** denotes 1%, ** denotes 5%, * denotes 10% significance based on the larger of the two (t-bootstrap and randomization inference) p-values.

A Appendix: Study Design and Bonus Incentive Scheme

Table A.1: Description of the credit and social bonus incentives

Panel A: *Credit bonus*

The first trigger is based on disbursement, measured by the number of active loans managed by the FA in any month. The second trigger is based on whether the repayment on the installment was made in full by the 20^{th} of the month due. The disbursement trigger can be satisfied at two target levels: High (A) or Low (B). If the FA meets at least target B for disbursement, he qualifies for a bonus based on his recovery rate at the 20^{th} in that month.

If FA qualifies on target A, the size of the bonus is:
- 20% of base monthly salary if repayment is 100%
- 16% of base monthly salary if repayment is 99%
- 12% of base monthly salary if repayment is 98%
- 8% of base monthly salary if repayment is 97%
- 4% of base monthly salary if repayment is 96%
- 0 bonus if repayment is 95% or below

If FA qualifies on target B, the size of the bonus is:
- 15% of base monthly salary if repayment is 100%
- 12% of base monthly salary if repayment is 99%
- 9% of base monthly salary if repayment is 98%
- 6% of base monthly salary if repayment is 97%
- 3% of base monthly salary if repayment is 96%
- 0 bonus if repayment is 95% or below

The bonus cannot ever be negative.

Panel B: *Social bonus*

The first trigger is based on two outcomes: the number of new COs formed and the number of savers at CO meetings. High (A) and Low (B) target levels are set for both outcomes, and an FA needs to reach at least target B for both outcomes to satisfy the first trigger. The second trigger is based on the attendance of CO members at CO meetings. If an FA meets at least target B, he qualifies for a bonus based on member attendance at CO meetings.

If the FA qualifies on target A, the size of the bonus is:
- 20% of base salary if average attendance is 85% or more (more than 60% in harvest months)
- 16% of base salary if average attendance is 80% to 84%(between 56% and 60% in harvest months)
- 12% of base salary if average attendance is 75% to 79% (between 50% and 55% in harvest months)
- 8% of base salary if average attendance is 70% to 74% (between 46% and 50% in harvest months)
- 4% of base salary if average attendance is 65% to 69% (between 40% and 45% in harvest months)
- 0 bonus if attendance is below 65% (0 bonus if attendance is below 40%)

If the FA qualifies on target B, the size of the bonus is determined as follows:
- 15% of base salary if average attendance is 85% or more (more than 60% in harvest months)
- 12% of base salary if average attendance is 80% to 84% (between 56% and 60% in harvest months)
- 9% of base salary if average attendance is 75% to 79% (between 50% and 55% in harvest months)
- 6% of base salary if average attendance is 70% to 74% (between 46% and 50% in harvest months)
- 3% of base salary if average attendance is 65% to 69% (between 40% and 45% in harvest months)
- 0 bonus if attendance is below 65% (0 bonus if attendance is below 40%)

The bonus cannot ever be negative.

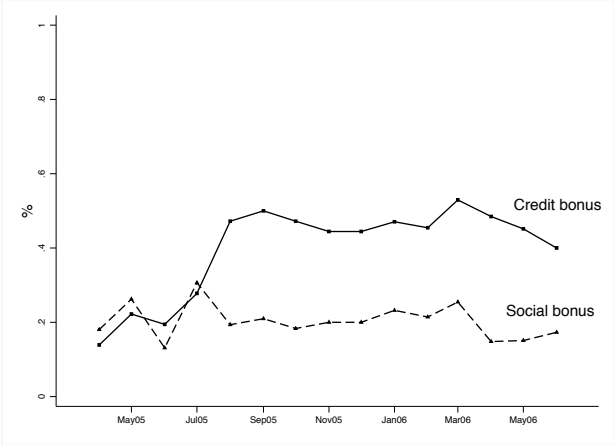
Notes: The bonus incentives were announced to the FAs in the treatment FUs in Mach 2005. The monthly bonuses were paid for 15 months during the study period, and terminated in June 2006. The average base monthly salary for an FA was PKR 3,000 (USD 50.54).

Table A.2: List of FUs and bonus assignments

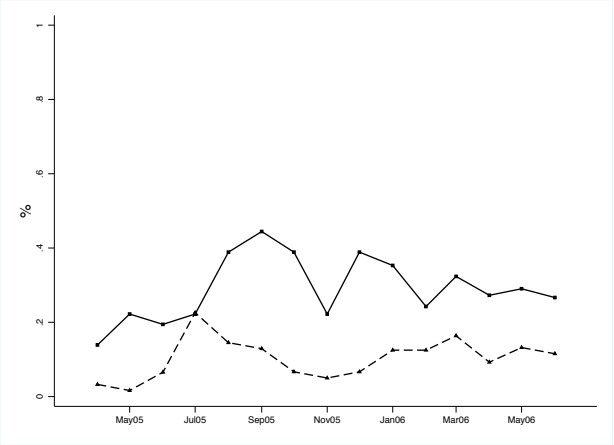
	Region	District	Field Unit
Panel A: *No bonus*			
(control group)	Hyderabad	Badin	Matli
	Hyderabad	Badin	Talhar
	Hyderabad	Hyderabad	Hala
	Hyderabad	Mir Pur Khas	Digri
	Hyderabad	Mir Pur Khas	Ghulam Muhammad
	Hyderabad	Thatta	Mirpur Sakro
	Malakand	Malakand	Dargai
	Mianwali	Bhakkar	Bhakkar
	Mianwali	Mianwali	Mianwali (Swans)
	Rawalpindi	Attock	Hasanabdal
	Rawalpindi	Gujar Khan	Gujar Khan
Panel B: *Credit bonus*			
	Hyderabad	Badin	Badin II (Golarchi)
	Hyderabad	Hyderabad	Matiari
	Hyderabad	Mir Pur Khas	Hyderabad
	Malakand	Malakand	Thana
	Malakand	Mardan	Katlang
	Mianwali	Khusab	Quaidabad
	Rawalpindi	Attock	Attock
	Rawalpindi	Jand	Jand
	Rawalpindi	Jand	Pindi Gheb
Panel C: *Social bonus*			
	Hyderabad	Badin	Tando Bago
	Hyderabad	Hyderabad	Tando Allah Yar
	Hyderabad	Hyderabad	Tando M. Khan
	Hyderabad	Thatta	Mirpur Bathoro
	Hyderabad	Thatta	Sajawal
	Malakand	Malakand	Hero Shah
	Malakand	Malakand	Kabal
	Malakand	Mardan	Hatian
	Malakand	Mardan	Takhat Bhai
	Mianwali	Bhakkar	Dulle Wala
	Mianwali	Bhakkar	Mankera
	Mianwali	Khusab	Jauharabad
	Rawalpindi	Attock	Fateh Jang
	Rawalpindi	Gujar Khan	Doltala
	Rawalpindi	Pind Dadan	Pind Dadan Khan

Notes: The study was conducted in 35 Field Units (FUs) of NRSP located in 15 districts and four regions of Pakistan, where NRSP was active in March 2005. The two treatment and control assignments were randomly allocated across these 35 FUs. All FAs working in an FU received the same type of bonus (or control group).

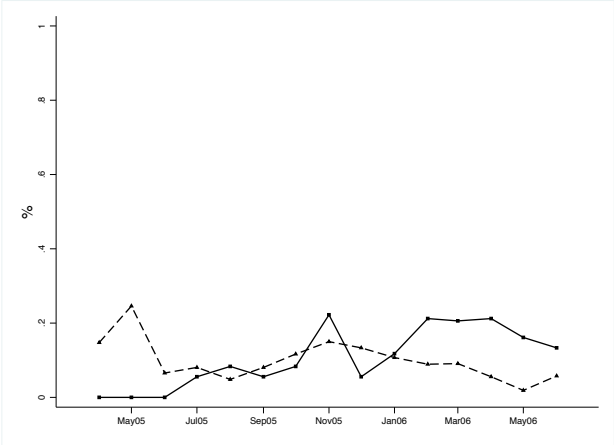
Figure A.1: Monthly payments of credit and social bonus



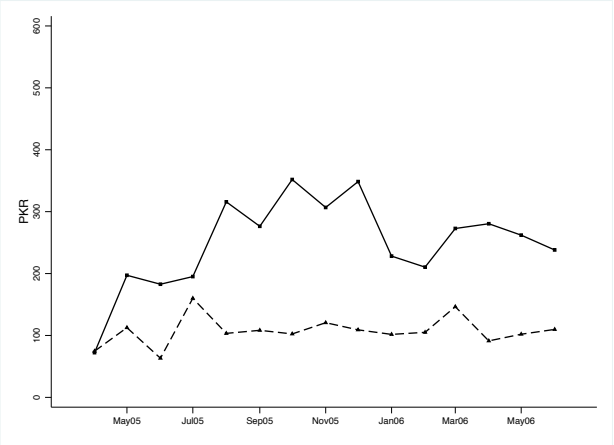
(a) Qualified for a bonus



(b) Target A



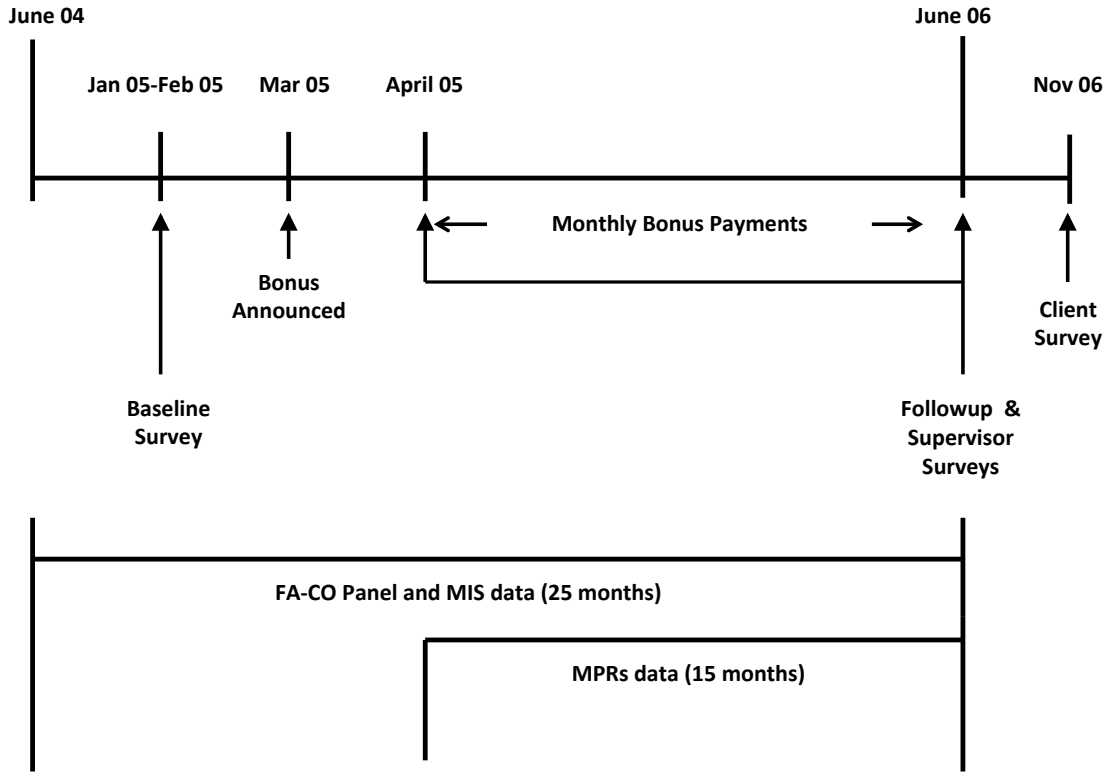
(c) Target B



(d) Bonus amount

Notes: During the 15-months bonus period, 26.7 percent of treated FAs qualified for a bonus each month; and 62.9 percent of those qualified on target A. The average bonus amount was PRK 570.30 for target A and PKR 416.70 for target B. Comparing across the two types of bonus, two-fifths of Cr-FAs qualified for a bonus, while only one-fifth of Soc-FAs qualified for a bonus in any given month. Soc-FAs received PKR 124.30 less on monthly bonus payment compared to Cr-FAs, who on average earned PKR 249.30 in bonus each month. Soc-FAs therefore earned 50 percent less in bonus relative to Cr-FAs.

Figure A.2: Timeline of the study



B Appendix: Selection into Supervisor Visits

Data on CO-quality outcomes are based on the Monthly Progress Report (MPRs) filed by each FA for all COs visited that month. Prior to this study, COs kept hand-written records of the timing of CO meetings, attendance of members, and savings collected, but this data was not entered into NRSP's MIS records. For the purpose of this study, data on such social outcomes was compiled from paper records by each FA into MPRs. MPRs data are available for 15 months when the bonus was implemented. These data were verified by a supervisor i.e. a Credit Officer (CrO) through random visits to a subset of scheduled CO meetings. We restrict the analysis to MPRs data verified by supervisors.

According to the FA-CO panel, 4,380 unique COs were managed by FAs in our study sample during the bonus period. Out of them, 1,807 COs (41.26%) were visited by a CrO at least once in 15 months, and 6 months out of 15 on average. We take all the COs that show up in the FA-CO panel for each month (during the bonus period), and estimate the rate of CrO visits across the two treatment and the control groups using the following specification:

$$CrO_{c,t} \;=\; \alpha \;+\; \beta_r + \;\omega_t \;+ \gamma\, TC_c \;+\; \lambda\, TS_c \;+\; \epsilon \tag{14}$$

where $CrO_{c,t}$ is an indicator variable that takes the value of one if a CO c was visited by a CrO in month t. β_r and ω_t are region and month dummies, respectively. The coefficients γ and λ estimate the propensity of CrO visits to CO meetings that are managed by credit and social bonus FAs, respectively (compared to CO meetings managed by control FAs).

Appendix Table B.1, Column 1 presents the estimated results and reports the p-values calculated using the wild cluster t-bootstrap and the cluster randomization inference at the FU level. We conduct statistical inference based on the larger of the two p-values. Among control FAs, 10.5 percent of CO meetings was visited by a CrO. The estimated coefficients γ and λ are both close to zero, 0.039 and 0.000 respectively, and not statistically different from zero and from each other at conventional levels.

While we do not find evidence of a differential rate of CrO visits, we also test for any potential selection of COs visited by the supervisor on CO characteristics. For this purpose, we calculate CO's disbursement and repayment outcomes for each month (during the bonus period) using information from the MIS data, and then estimate the following specification:

$$Y_{c,t} \;= \alpha \;+\; \beta_r + \;\omega_t \;+\; \zeta\; CrO_{c,t} \;+ \gamma\, TC_c \;+\; \lambda\, TS_c \;+\; \phi\; CrO_{c,t} * TC_c + \;\psi\; CrO_{c,t} * TS_c + \epsilon \tag{15}$$

where $Y_{c,t}$ is the characteristics of a CO c in month t. The coefficients ϕ and ψ on the interaction terms $CrO_{c,t} * TC_c$ and $CrO_{c,t} * TS_c$ represent the difference in CO characteristics for those that were visited by a CrO compared with those that were not, among COs managed by credit and social bonus FAs, respectively (relative to the same difference among COs managed by control FAs).

Appendix Table B.1, Columns 2-6 report the results on five different CO characteristics: the number of active loans, number of new loans, disbursement, and recovery rates at the 20th and at the end of the month. The estimated coefficient ϕ is close to zero (if anything, negative) and not statistically significantly different from zero at conventional levels for all five outcomes. The estimated coefficient ψ is also negative in sign for these five outcomes, although not statistically significantly different from zero at conventional levels. The two coefficients are also not statistically significantly different from each other at the conventional levels for all five outcomes.

Column 7 presents the results on the CO characteristics index, which is calculated by taking an equally weighted average across the standard distributions of the five measures. The results in Column 7 also suggest no differential selection of CrO visits to CO meetings that are managed by credit and social bonus FAs (compared to control FAs). Both coefficients are not statistically significantly different from zero and from each other at the conventional levels. The negative signs on both coefficients ϕ and ψ suggest a plausibly negative selection (if anything), which would underestimate our main results on social outcomes in Table 4.

Table B.1: Selection on frequency and the quality of CO meetings visited by a CrO

	CrO visit	Number of active loans	New loans	New disburs-ement	Repayment on dues at 20th of mth	Repayment on dues at end of mth	CO characteristics index
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Credit bonus (TC)	0.039	0.335	0.005	-400.5	0.041	0.013	0.084
(t-boot. p-value)	*(0.420)*	*(0.746)*	*(0.976)*	*(0.784)*	*(0.210)*	*(0.276)*	*(0.466)*
[rand. inf. p-value]	*[0.411]*	*[0.734]*	*[0.968]*	*[0.813]*	*[0.267]*	*[0.382]*	*[0.545]*
Social bonus (TS)	0.000	0.087	0.013	-448.5	-0.002	0.008	0.016
(t-boot. p-value)	*(1.000)*	*(0.900)*	*(0.974)*	*(0.764)*	*(0.950)*	*(0.604)*	*(0.884)*
[rand. inf. p-value]	*[0.979]*	*[0.923]*	*[0.920]*	*[0.819]*	*[0.936]*	*[0.621]*	*[0.907]*
CrO visit (CrO)	-	3.625	0.417	4997	0.006	0.015	0.400
(t-boot. p-value)		*(0.000)*	*(0.000)*	*(0.000)*	*(0.892)*	*(0.350)*	*(0.000)*
[rand. inf. p-value]		*[0.406]*	*[0.432]*	*[0.514]*	*[0.843]*	*[0.274]*	*[0.458]*
CrO x TC	-	-0.288	-0.018	-448.3	-0.011	-0.015	-0.071
(t-boot. p-value)		*(0.778)*	*(0.932)*	*(0.848)*	*(0.770)*	*(0.346)*	*(0.516)*
[rand. inf. p-value]		*[0.789]*	*[0.909]*	*[0.842]*	*[0.773]*	*[0.330]*	*[0.571]*
CrO x TS	-	-1.158	-0.179	-1656	-0.015	-0.014	-0.172
(t-boot. p-value)		*(0.092)*	*(0.194)*	*(0.378)*	*(0.742)*	*(0.400)*	*(0.192)*
[rand. inf. p-value]		*[0.140]*	*[0.224]*	*[0.424]*	*[0.738]*	*[0.416]*	*[0.168]*
P-value of F-test:							
TC = TS							
(t-boot. p-value)	*(0.388)*	-	-	-	-	-	-
[rand. inf. p-value]	*[0.433]*	-	-	-	-	-	-
CrO x TC = CrO x TS							
(t-boot. p-value)	-	*(0.260)*	*(0.138)*	*(0.404)*	*(0.814)*	*(0.952)*	*(0.288)*
[rand. inf. p-value]	-	*[0.303]*	*[0.189]*	*[0.439]*	*[0.894]*	*[0.944]*	*[0.302]*
Observations	53,127	53,127	53,127	53,127	53,127	53,127	53,127
No. of COs	4,380	4,380	4,380	4,380	4,380	4,380	4,380
Mean dep. var., control	0.105	5.998	0.558	7022	0.832	0.966	0.000

Notes: The above regressions control for region and month dummies. ***CO characteristics index*** is calculated by taking an equally weighted mean across the standard distributions of the five CO characteristics in Columns 2-6. P-values are reported below the coefficients and are calculated using the wild cluster t-bootstrap and the cluster randomization inference at the FU level; *** denotes 1%, ** denotes 5%, * denotes 10% significance based on the larger of the two (t-bootstrap and randomization inference) p-values.

C Appendix: Partnership

FAs may co-manage part of their CO portfolio jointly with other FAs. Partnership among FAs is encouraged by NRSP to ensure that services are delivered without interruption when an FA falls sick, leaves NRSP, or gets promoted. Partnership also provides NRSP a useful way to train inexperienced FAs while they are on the job, by partnering them with relatively more experienced FAs. In addition, it allows NRSP to keep check on corruption and fraudulent activities by FAs through peer monitoring.

Appendix Figure C.1 depicts the distribution of FAs based on the percentage of their CO-portfolio that was co-managed with other FAs during the nine months before the bonus was announced. The median pre-treatment level of co-management is 73 percent. We use the median to identify FAs as either partnered or non-partnered in the main analysis. Our results are however robust to using alternate cut-offs for defining partnership. Almost two-fifths of FAs co-manage their entire CO-portfolio with other FAs, while slightly less than one-fourth manage all their COs independently.

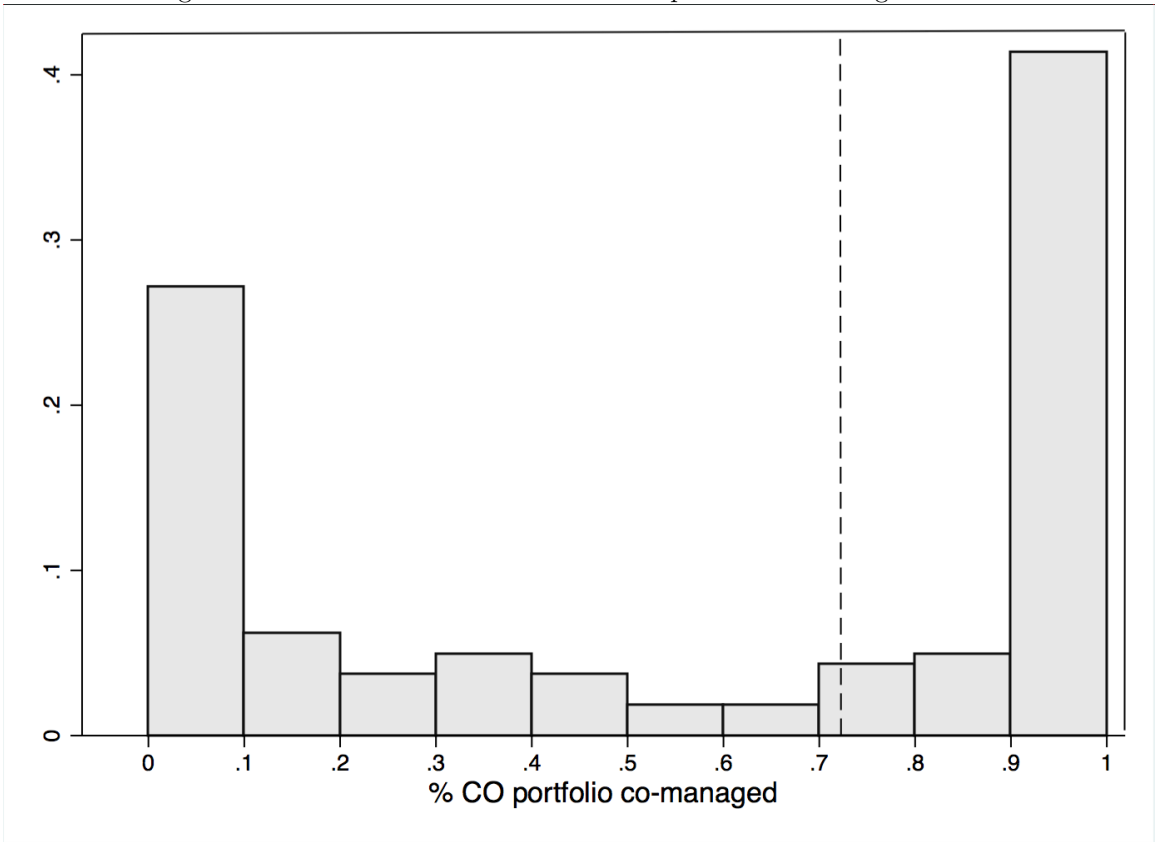
Columns 1 and 2 of Appendix Table C.1 present the mean of FA characteristics, preferences, and motivation separately for partnered and non-partnered FAs respectively; column 3 reports the p-values from the F-test of the difference in means between partnered and non-partnered FAs. For all variables including age, gender, and education, partnered FAs do not look any different from non-partnered FAs. Partnered FAs are slightly more experienced than non-partnered FAs (based on number of months of working at NRSP), though the difference is not statistically significant at the conventional level. As indicated by the F-test statistics at the bottom of Column 3, we can not reject equality of means across the full set of variables between partnered and non-partnered FAs.

Non-partnered FAs on average co-manage 17 percent of their CO-portfolio with other FAs, while the average co-management rate is 96 percent among partnered FAs. The average number FAs in a partnership team (excluding the FA) is 1.243.

Appendix Table C.1, Column 4 reports the correlation between FA's and the partner's characteristics (mean characteristics in case of two partners or more) among 81 partnered FAs. FA's gender is highly correlated with his partner's gender (correlation of 0.834), suggesting that most partnership-teams are formed between FAs of the same gender. More interestingly, partners are also positively sorted on their education. The correlation between FA's and his partner's education is 0.309. It is statistically significant at the 10 percent level. Partnered FAs are also positively sorted on experience (based on number of months working at NRSP) and preference for a type of bonus. The correlations are 0.162 and 0.209, but they are not statistically significant at the conventional level. The correlation between FA's and the partner's motivation is close to zero (corr=0.097), and it is also not statistically significantly different from zero.

Overall, we find no difference on FA characteristics between partnered and non-partnered FAs. In the paper, we take the pre-treatment selection into partnership and partnership formation as given.

Figure C.1: Distribution of the share of CO-portfolio co-managed with other FAs



Notes: The figure depicts the distribution of the share of FA's CO-portfolio in the 9 months before the bonus was announced (June 2004 - March 2005) that was co-managed with other FAs. The dotted line in the graph shows the median value of co-management (73 percent of FA's CO-portfolio). FAs with their share greater than the median value is categorized as "partnered" FA in the analysis. 71 out of 81 partnered FAs co-manage their COs with one other FA, while the rest (10 partnered FAs) co-manage with two other FAs. FA partnership-teams are stable throughout the study period (unless one of the partners quit NRSP).

Table C.1: Characteristics of partnered and non-partnered FAs

	Non-Partnered *(NP)*	Partnered *(P)*	P-value $NP = P$	Corr w/ partner's characteristics[a]
	(1)	(2)	(3)	(4)
Age	28.47	26.86	*0.244*	-0.122
Female	0.173	0.247	*0.240*	0.834***
Married	0.407	0.383	*0.770*	0.224
Household head	0.173	0.136	*0.584*	0.010
Completed high school	0.531	0.568	*0.650*	0.309*
Household consumption *(Rs.)*	6431	6602	*0.730*	0.147
Housing quality index	0.083	0.211	*0.462*	-0.244
Employed with NRSP *(months)*	27.17	25.85	*0.556*	0.162
NRSP first job	0.605	0.580	*0.756*	-0.022
Wants to work for next two years	0.889	0.914	*0.724*	-0.028
Prefers credit bonus	0.630	0.506	*0.084*	0.209
Thinks social helps credit	0.938	0.926	*0.790*	0.253
Did volunteer work before NRSP	0.296	0.210	*0.380*	0.028
Best about NRSP: ability to help	0.580	0.469	*0.226*	0.097
Number of field units (FUs)	32	23	-	-
Number of field assistants (FAs)	81	81	-	-
Share of COs co-managed	0.166	0.957	*0.000*	-
Number of partners	-	1.123	-	-
F-test statistics	-	-	0.696	-
P-value	-	-	*0.776*	-

Notes: The p-values (in F-tests in Column 3) are calculated using the wild cluster t-bootstrap at the field unit level. FAs are categorized as partnered or non-partnered based on whether an FA is co-managing more than 73 percent of his/her CO portfolio (median value of co-sharing) with other FAs during the 9 months prior to the bonus announcement. [a]For partnered FAs with more than one partners, we take the mean value of characteristics across multiple partners. Starred value indicates a statistically significant correlation between FA's and his partner's characteristics.

D Appendix: Balance Tests on Restricted Samples

Table D.1: Summary statistics and balance tests (restricted sample, verified MPRs)

	No bonus *(C)* (1)	Credit bonus *(TC)* (2)	Social bonus *(TS)* (3)	P-value *C=TC* (4)	*C=TS* (5)	*TC=TS* (6)
Demographic characteristics						
Age	28.04	27.85	27.82	*0.888*	*0.942*	*0.982*
Female	0.239	0.206	0.098	*0.668*	*0.052*	*0.152*
Married	0.370	0.382	0.431	*0.940*	*0.652*	*0.746*
Household head	0.174	0.176	0.176	*0.964*	*0.930*	*1.000*
Completed high school	0.587	0.500	0.569	*0.494*	*0.812*	*0.558*
Household consumption *(Rs.)*	7038	5927	6651	*0.280*	*0.654*	*0.402*
Housing quality index	0.095	-0.077	0.349	*0.402*	*0.260*	*0.100*
Employment characteristics						
Employed with NRSP *(months)*	26.17	26.15	25.51	*0.980*	*0.704*	*0.826*
NRSP first job	0.521	0.676	0.569	*0.096*	*0.496*	*0.282*
Work from a village branch	0.848	0.882	0.961	*0.820*	*0.394*	*0.384*
Number of COs managed	12.98	17.47	17.08	*0.372*	*0.182*	*0.892*
Share of COs co-managed	0.571	0.513	0.626	*0.732*	*0.822*	*0.524*
Partnered FA[a]	0.522	0.412	0.588	*0.530*	*0.772*	*0.288*
Preferences and motivation						
Wants to work for next two years	0.891	0.882	0.902	*0.906*	*0.900*	*0.810*
Prefers credit bonus	0.565	0.500	0.549	*0.600*	*0.882*	*0.702*
Thinks social-related task helps credit goal	0.957	0.941	0.941	*0.738*	*0.802*	*0.948*
Did volunteer work before NRSP	0.326	0.206	0.333	*0.308*	*0.946*	*0.346*
Best about NRSP is ability to help others	0.413	0.529	0.608	*0.432*	*0.180*	*0.480*
Monthly performance						
Number of active loans	99.35	121.0	135.4	*0.454*	*0.134*	*0.560*
New disbursement *(Rs.)*	82967	126715	120751	*0.232*	*0.012*	*0.816*
Repayment on dues at 20th of month	0.722	0.719	0.655	*0.956*	*0.292*	*0.478*
Repayment on dues at end of month	0.986	0.966	0.993	*0.626*	*0.526*	*0.458*
Number of field units (FUs)	10	9	14	-	-	-
Number of field assistants (FAs)	46	34	51	-	-	-
Number of credit organizations (COs)	764	792	1150	-	-	-
P-value for joint test of significance	-	-	-	*0.983*	*0.986*	*0.988*

Notes: The sample includes 131 out of 162 FAs whose CO meetings were visited by the supervisor at least once during the 15-month bonus period. The p-values (in F-tests in Columns 4-6) are calculated using the wild cluster t-bootstrap at the field unit level.
[a] *Partnered FA* is defined as a dummy variable which equals one if an FA is co-managing more than 73 percent of his/her CO portfolio (median value of co-sharing) with other FAs during the 9 months prior to the bonus announcement.

Table D.2: Summary statistics and balance tests (restricted sample, follow-up)

	No bonus *(C)* (1)	Credit bonus *(TC)* (2)	Social bonus *(TS)* (3)	P-value *C=TC* (4)	*C=TS* (5)	*TC=TS* (6)
Demographic characteristics						
Age	27.09	27.24	28.63	*0.922*	*0.310*	*0.494*
Female	0.315	0.310	0.143	*1.000*	*0.116*	*0.180*
Married	0.352	0.345	0.449	*0.992*	*0.352*	*0.440*
Household head	0.130	0.138	0.224	*0.896*	*0.358*	*0.380*
Completed high school	0.593	0.517	0.531	*0.550*	*0.556*	*0.888*
Household consumption *(Rs.)*	6486	6250	6769	*0.836*	*0.602*	*0.544*
Housing quality index	0.121	-0.047	0.300	*0.430*	*0.352*	*0.144*
Employment characteristics						
Employed with NRSP *(months)*	27.33	25.83	28.12	*0.586*	*0.862*	*0.618*
NRSP first job	0.574	0.655	0.592	*0.344*	*0.826*	*0.426*
Works from a village branch	0.796	0.862	0.898	*0.654*	*0.472*	*0.708*
Number of COs managed	12.70	17.66	15.35	*0.330*	*0.344*	*0.650*
Share of COs co-managed	0.588	0.523	0.582	*0.624*	*1.000*	*0.672*
Partnered FA[a]	0.519	0.414	0.551	*0.570*	*0.854*	*0.424*
Preferences and motivation						
Wants to work for next two years	0.889	0.862	0.918	*0.678*	*0.662*	*0.318*
Prefers credit bonus	0.630	0.483	0.551	*0.326*	*0.554*	*0.680*
Thinks social-related task helps credit goal	0.926	0.931	0.959	*0.918*	*0.448*	*0.588*
Did volunteer work before NRSP	0.241	0.207	0.327	*0.826*	*0.446*	*0.466*
Best about NRSP is ability to help others	0.519	0.448	0.531	*0.474*	*0.968*	*0.536*
Monthly performance						
Number of active loans	87.90	116.0	119.3	*0.304*	*0.250*	*0.870*
New disbursement *(Rs.)*	76542	126319	106750	*0.116*	*0.166*	*0.578*
Repayment on dues at 20th of month	0.723	0.761	0.680	*0.614*	*0.450*	*0.304*
Repayment on dues at end of month	0.983	0.997	0.991	*0.270*	*0.454*	*0.242*
Number of field units (FUs)	11	7	15	-	-	-
Number of field assistants (FAs)	54	29	49	-	-	-
P-value for joint test of significance	-	-	-	*0.972*	*0.996*	*0.964*

Notes: The sample includes 132 out of 162 FAs who were interviewed in the follow-up survey in June 2006. The p-values (in F-tests in Columns 4-6) are calculated using the wild cluster bootstrap at the field unit level. [a] *Partnered FA* is defined as a dummy variable which equals one if an FA is co-managing more than 73 percent of his/her CO portfolio (median value of co-sharing) with other FAs during the 9 months prior to the bonus announcement.

Table D.3: Summary statistics and balance tests (restricted sample, supervisor eval.)

	No bonus *(C)* (1)	Credit bonus *(TC)* (2)	Social bonus *(TS)* (3)	P-value *C=TC* (4)	*C=TS* (5)	*TC=TS* (6)
Demographic characteristics						
Age	27.11	28.43	28.12	*0.716*	*0.636*	*0.938*
Female	0.185	0.238	0.0800	*0.632*	*0.364*	*0.252*
Married	0.333	0.381	0.440	*0.836*	*0.626*	*0.826*
Household head	0.111	0.190	0.280	*0.524*	*0.084*	*0.502*
Completed high school	0.741	0.476	0.440	*0.198*	*0.078*	*0.818*
Household consumption *(Rs.)*	6157	6238	5888	*0.894*	*0.768*	*0.680*
Housing quality index	0.091	0.011	0.546	*0.630*	*0.162*	*0.104*
Employment characteristics						
Employed with NRSP *(months)*	27.07	25.81	25.80	*0.744*	*0.744*	*0.996*
NRSP first job	0.519	0.667	0.600	*0.236*	*0.388*	*0.514*
Works from a village branch	0.926	0.810	0.960	*0.366*	*0.732*	*0.180*
Number of COs managed	11.29	20.24	15.75	*0.132*	*0.316*	*0.370*
Share of COs co-managed	0.591	0.555	0.526	*0.886*	*0.716*	*0.778*
Partnered FA[a]	0.519	0.429	0.480	*0.712*	*0.800*	*0.776*
Preferences and motivation						
Wants to work for next two years	0.852	0.857	0.920	*1.000*	*0.592*	*0.544*
Prefers credit bonus	0.556	0.524	0.480	*0.846*	*0.592*	*0.764*
Thinks social-related task helps credit goal	0.963	0.952	0.920	*0.848*	*0.466*	*0.616*
Did volunteer work before NRSP	0.333	0.286	0.200	*0.720*	*0.264*	*0.572*
Best about NRSP is ability to help others	0.444	0.476	0.520	*0.838*	*0.654*	*0.722*
Monthly performance						
Number of active loans	100.8	133.9	128.5	*0.378*	*0.502*	*0.928*
New disbursement *(Rs.)*	82217	135684	105090	*0.090*	*0.374*	*0.460*
Repayment on dues at 20th of month	0.691	0.701	0.690	*0.924*	*1.000*	*0.926*
Repayment on dues at end of month	0.993	0.948	0.992	*0.480*	*0.910*	*0.458*
Number of field units (FUs)	6	6	13	-	-	-
Number of field assistants (FAs)	27	21	25	-	-	-
P-value for joint test of significance	-	-	-	*0.969*	*0.917*	*1.000*

Notes: The sample includes 73 out of 162 FAs for whom we have their supervisors' evaluation of their performance from the supervisor survey conducted in June 2006. The p-values (in F-tests in Columns 4-6) are calculated using the wild cluster t-bootstrap at the field unit level. [a] *Partnered FA* is defined as a dummy variable which equals one if an FA is co-managing more than 73 percent of his/her CO portfolio (median value of co-sharing) with other FAs during the 9 months prior to the bonus announcement.

Table D.4: Summary statistics and balance tests (client sample)

	No bonus *(C)* (1)	Credit bonus *(TC)* (2)	Social bonus *(TS)* (3)	P-value *C=TC* (4)	*C=TS* (5)	*TC=TS* (6)
Age	34.33	41.14	36.56	*0.268*	*0.108*	*0.324*
Female	0.120	0.184	0.226	*0.140*	*0.398*	*0.744*
Household head	0.474	0.575	0.506	*0.208*	*0.304*	*0.276*
Years of education	6.150	5.544	6.483	*0.516*	*0.518*	*0.572*
Household size	9.294	7.774	8.309	*0.168*	*0.180*	*0.548*
Number of children	3.084	2.405	2.758	*0.456*	*0.526*	*0.614*
Number of CO members (clients)	758	548	385	-	-	-
Number of field units (FUs)	3	4	4	-	-	-
Number of field assistants (FAs)	31	14	12	-	-	-
Number of credit organizations (COs)	83	71	59	-	-	-
P-value for joint test of significance	-	-	-	*0.369*	*0.553*	*0.796*

Notes: The sample includes 1691 clients of FAs (i.e. CO members) who were interviewed in Nov 2006 (5 months after the end of the study). The p-values (in F-tests in Columns 4-6) are calculated using the wild cluster bootstrap at the field unit level.

E Appendix: Additional Tables and Figures

Table E.1: Impact of bonus on individual components of indices

	Mean dep. var. (control)	Credit bonus (TC)			Social bonus (TS)			P-value (TC = TS)	
		Coeff.	P-value		Coeff.	P-value			
			(t-boot.)	*[rand. inf.]*		*(t-boot.)*	*[rand. inf.]*	*(t-boot.)*	*[rand. inf.]*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: *Components of credit index*									
Number of active loans	135.7	31.56*	*(0.014)*	*[0.082]*	15.68	*(0.310)*	*[0.292]*	*(0.308)*	*[0.330]*
Repayment at the 20th of month	0.712	0.076*	*(0.084)*	*[0.074]*	-0.001	*(1.000)*	*[0.982]*	*(0.044)*	*[0.033]*
New loans	12.33	1.359	*(0.456)*	*[0.557]*	1.683	*(0.440)*	*[0.396]*	*(0.802)*	*[0.888]*
New disbursement	154178	6837	*(0.806)*	*[0.836]*	12483	*(0.624)*	*[0.658]*	*(0.752)*	*[0.838]*
Repayment on dues at end of month	0.965	0.007	*(0.604)*	*[0.656]*	-0.008	*(0.602)*	*[0.584]*	*(0.228)*	*[0.286]*
Panel B: *Components of CO quality index*									
New COs	0.388	0.260	*(0.190)*	*[0.149]*	0.275*	*(0.044)*	*[0.083]*	*(0.978)*	*[0.936]*
Savers per member	0.688	-0.127*	*(0.048)*	*[0.072]*	-0.029	*(0.454)*	*[0.659]*	*(0.106)*	*[0.124]*
Attendance	0.777	-0.105*	*(0.062)*	*[0.046]*	-0.027	*(0.636)*	*[0.628]*	*(0.024)*	*[0.105]*
Dead COs	2.231	1.040	*(0.130)*	*[0.104]*	0.188	*(0.574)*	*[0.752]*	*(0.172)*	*[0.146]*
Multiple meetings	0.422	-0.194	*(0.074)*	*[0.139]*	-0.041	*(0.738)*	*[0.714]*	*(0.158)*	*[0.215]*
Loan rejection rate	0.138	-0.079	*(0.212)*	*[0.191]*	-0.047	*(0.372)*	*[0.388]*	*(0.420)*	*[0.574]*
Panel C: *Components of motivation index*									
Best about NRSP: ability to help	0.500	-0.141	*(0.222)*	*[0.218]*	-0.234**	*(0.022)*	*[0.024]*	*(0.390)*	*[0.424]*
Identify with NRSP mission	0.426	-0.068	*(0.498)*	*[0.456]*	-0.152	*(0.226)*	*[0.188]*	*(0.238)*	*[0.284]*
Finds work important	0.370	0.005	*(0.978)*	*[0.959]*	-0.136	*(0.156)*	*[0.159]*	*(0.198)*	*[0.201]*
Panel D: *Components of assessment score*									
Likelihood of promotion	0.222	-0.016	*(0.958)*	*[0.901]*	0.127	*(0.286)*	*[0.368]*	*(0.236)*	*[0.330]*
Improvement in loan disbursement	0.444	0.060	*(0.752)*	*[0.811]*	-0.040	*(0.900)*	*[0.829]*	*(0.642)*	*[0.688]*
Improvement in CO savings	0.222	0.105	*(0.670)*	*[0.670]*	0.322	*(0.124)*	*[0.223]*	*(0.220)*	*[0.341]*

Notes: All specifications control for region dummies and the pre-treatment value of the dependent variable (when available). ***New COs*** is the monthly average number of active loans (new and on-going) managed by the FA. ***Repayment on dues at 20th of the month*** is the monthly average share of installment dues paid in full by the 20th. ***New loans*** is the monthly average number of new loans issued by the FA. ***New disbursement*** is the monthly average amount of new loans issued by the FA in Rupees. ***Repayment on dues at end of month*** is the monthly average share of installment dues that were paid in full by end of the month. ***New COs*** is the monthly average number of new COs formed by the FA. ***Savers per member*** is the monthly average share of CO members who saved during CO meetings conducted by the FA. ***Attendance*** is the monthly average share of CO members present at the CO meetings conducted by the FA. ***Dead COs*** is the monthly average number of COs managed by the FA without any active borrowers for the entire bonus period. ***Multiple meetings*** is the monthly average share of COs managed by the FA that had more than one monthly meetings. ***Loan rejection rate*** is the monthly average share of social appraisals rejected by the FA. ***Likelihood of promotion*** is a dummy variable which equals one if a supervisor thinks that an FA is likely to get a promotion in the next 2 years. ***Improvement in loan disbursement*** is a dummy variable which equals one if a supervisor reports that an FA has improved performance in credit disbursement rate, compared to a year ago. ***Improvement in CO savings*** is a dummy variable which equals one if a supervisor reports that an FA has improved performance in ensuring COs save regularly, compared to a year ago. P-values are reported below the coefficients and are calculated using the t-asymptotic wild cluster bootstrap at the field unit level; *** denotes 1%, ** denotes 5%, * denotes 10% significance based on the larger of the two (t-bootstrap and randomization inference) p-values.

Table E.2: Impact of bonus on supervisory effort

	|Difference| between actual and supervisor-reported FA performance on:		
	Recovery rate	Number of active loans	Attendance
	(1)	(2)	(3)
Credit bonus (TC)	-0.022	-2.31	0.044
(wild cluster t-bootstrap p-value)	*(0.524)*	*(0.954)*	*(0.112)*
[randomization inference p-value]	*[0.572]*	*[0.930]*	*[0.288]*
Social bonus (TS)	-0.010	-31.25	0.038
(wild cluster t-bootstrap p-value)	*(0.804)*	*(0.260)*	*(0.612)*
[randomization inference p-value]	*[0.784]*	*[0.308]*	*[0.734]*
p-value of F-test: TC = TS			
(wild cluster t-bootstrap p-value)	*(0.684)*	*(0.234)*	*(0.972)*
[randomization inference p-value]	*[0.747]*	*[0.329]*	*[0.960]*
Observations	98	98	52
Mean dep. var., control	0.060	99.94	0.186

Notes: The sample includes 98 FAs and (52 FAs from verified MPRs sample) whose supervisors were interviewed in June 2006. During the interview, the supervisors were asked about each of their FA's performance in the previous month (i.e. May 2006) on two credit outcomes (number of active loans and repayment rates) and one social outcome (attendance of CO members in CO meetings). The dependent variables are constructed by taking the absolute difference between the supervisor's reported performance and the actual performance on an FA in May 2006. All specifications control for region dummies. P-values are reported below the coefficients and are calculated using the wild cluster t-bootstrap at the FU level and the randomization inference at the FU level; *** denotes 1%, ** denotes 5%, * denotes 10% significance based on the larger of the two (t-bootstrap and randomization inference) p-values.

Table E.3: Differential impact of bonus on microcredit outcomes, by partnership

	Bonus triggers				
	Number of active loans	Repayment on dues at 20th of month	New loans	New disbursement	Repayment on dues at end of month
	(1)	(2)	(3)	(4)	(5)
Credit bonus (TC)	19.23	0.107**	0.380	-1518	0.021
(t-bootstrap p-value)	*(0.306)*	*(0.024)*	*(0.836)*	*(0.956)*	*(0.300)*
[rand. inf. p-value]	*[0.323]*	*[0.013]*	*[0.838]*	*[0.965]*	*[0.360]*
Social bonus (TS)	37.07	0.041	4.841*	45517	0.016
(t-bootstrap p-value)	*(0.132)*	*(0.254)*	*(0.062)*	*(0.226)*	*(0.434)*
[rand. inf. p-value]	*[0.164]*	*[0.263]*	*[0.086]*	*[0.254]*	*[0.538]*
Partnered FA x TC	30.98	-0.067	2.662	21797	-0.026
(t-bootstrap p-value)	*(0.328)*	*(0.086)*	*(0.276)*	*(0.470)*	*(0.352)*
[rand. inf. p-value]	*[0.321]*	*[0.140]*	*[0.326]*	*[0.533]*	*[0.395]*
Partnered FA x TS	-38.51	-0.080**	-5.735	-60276	-0.045
(t-bootstrap p-value)	*(0.210)*	*(0.018)*	*(0.104)*	*(0.204)*	*(0.136)*
[rand. inf. p-value]	*[0.217]*	*[0.046]*	*[0.101]*	*[0.196]*	*[0.075]*
Partnered FA (P)	-26.54	0.036*	-3.330	-41393	0.032
(t-bootstrap p-value)	*(0.204)*	*(0.044)*	*(0.178)*	*(0.236)*	*(0.232)*
[rand. inf. p-value]	*[0.498]*	*[0.066]*	*[0.572]*	*[0.642]*	*[0.084]*
P-value of F-test:					
TC + P x TC *(t-boot.)*	*(0.010)*	*(0.466)*	*(0.132)*	*(0.434)*	*(0.790)*
TC + P x TC *[rand. inf.]*	*[0.005]*	*[0.479]*	*[0.113]*	*[0.443]*	*[0.783]*
TS + P x TS *(t-boot.)*	*(1.000)*	*(0.312)*	*(0.806)*	*(0.780)*	*(0.130)*
TS + P x TS *[rand. inf.]*	*[0.947]*	*[0.344]*	*[0.710]*	*[0.671]*	*[0.041]*
TC = TS *(t-boot.)*	*(0.536)*	*(0.114)*	*(0.112)*	*(0.160)*	*(0.686)*
TC = TS *[rand. inf.]*	*[0.525]*	*[0.181]*	*[0.109]*	*[0.206]*	*[0.746]*
TC+PxTC=TS+PxTS *(t-boot.)*	*(0.000)*	*(0.146)*	*(0.000)*	*(0.056)*	*(0.328)*
TC+PxTC=TS+PxTS *[rand. inf.]*	*[0.002]*	*[0.227]*	*[0.034]*	*[0.159]*	*[0.185]*
Observations	162	162	162	162	162
Mean dep. var., control	135.70	0.712	12.33	154178	0.965

Notes: Notes: All specifications control for region dummies and the pre-treatment value of the dependent variable. ***Partnered FA*** is a dummy variable which equals one if an FA co-manages more than 73 percent of his/her pre-treatment CO portfolio (median value of co-sharing) with other FAs. ***New COs*** is the monthly average number of active loans (new and on-going) managed by the FA. ***Repayment on dues at 20th of the month*** is the monthly average share of installment dues paid in full by the 20th. ***New loans*** is the monthly average number of new loans issued by the FA. ***New disbursement*** is the monthly average amount of new loans issued by the FA in Rupees. ***Repayment on dues at end of month*** is the monthly average share of installment dues that were paid in full by end of the month. P-values are reported below the coefficients and are calculated using the wild cluster t-bootstrap and cluster randomization inference at the field unit level; *** denotes 1%, ** denotes 5%, * denotes 10% significance based on the larger of the two (t-bootstrap and randomization inference) p-values.

Table E.4: Differential impact of bonus on CO quality, by partnership

	Bonus triggers					
	New COs	Savers per member	Atten-dance	Dead COs	Multiple meetings	Loan rejection rate
	(1)	(2)	(3)	(4)	(5)	(6)
Credit bonus (TC)	0.092	-0.121**	-0.084**	1.578	-0.178	-0.055
(t-bootstrap p-value)	*(0.472)*	*(0.032)*	*(0.020)*	*(0.168)*	*(0.246)*	*(0.418)*
[rand. inf. p-value]	*[0.470]*	*[0.032]*	*[0.033]*	*[0.171]*	*[0.230]*	*[0.441]*
Social bonus (TS)	0.490**	-0.057	0.007	0.046	-0.021	-0.032
(t-bootstrap p-value)	*(0.032)*	*(0.320)*	*(0.836)*	*(0.988)*	*(0.944)*	*(0.734)*
[rand. inf. p-value]	*[0.040]*	*[0.312]*	*[0.876]*	*[0.955]*	*[0.903]*	*[0.676]*
Partnered FA x TC	0.415	-0.029	-0.048	-1.377	-0.034	-0.056
(t-bootstrap p-value)	*(0.174)*	*(0.786)*	*(0.548)*	*(0.234)*	*(0.836)*	*(0.398)*
[rand. inf. p-value]	*[0.123]*	*[0.805]*	*[0.645]*	*[0.248]*	*[0.854]*	*[0.346]*
Partnered FA x TS	-0.390	0.049	-0.062	0.219	-0.035	-0.029
(t-bootstrap p-value)	*(0.124)*	*(0.652)*	*(0.438)*	*(0.766)*	*(0.824)*	*(0..614)*
[rand. inf. p-value]	*[0.093]*	*[0.636]*	*[0.506]*	*[0.807]*	*[0.828]*	*[0.629]*
Partnered FA (P)	-0.239	-0.077	-0.037	-0.715	0.010	0.003
(t-bootstrap p-value)	*(0.212)*	*(0.414)*	*(0.596)*	*(0.352)*	*(0.892)*	*(0.970)*
[rand. inf. p-value]	*[0.499]*	*[0.495]*	*[0.802]*	*[0.726]*	*[0.867]*	*[0.929]*
P-value of F-test:						
TC + P x TC *(t-boot.)*	*(0.144)*	*(0.168)*	*(0.122)*	*(0.624)*	*(0.096)*	*(0.122)*
TC + P x TC *[rand. inf.]*	*[0.059]*	*[0.209]*	*[0.134]*	*[0.617]*	*[0.119]*	*[0.130]*
TS + P x TS *(t-boot.)*	*(0.412)*	*(0.906)*	*(0.486)*	*(0.392)*	*(0.634)*	*(0.238)*
TS + P x TS *[rand. inf.]*	*[0.291]*	*[0.900]*	*[0.510]*	*[0.423]*	*[0.599]*	*[0.160]*
TC = TS *(t-boot.)*	*(0.062)*	*(0.272)*	*(0.010)*	*(0.094)*	*(0.348)*	*(0.664)*
TC = TS *[rand. inf.]*	*[0.060]*	*[0.405]*	*[0.050]*	*[0.107]*	*[0.364]*	*[0.762]*
TC+PxTC=TS+PxTS *(t-boot.)*	*(0.282)*	*(0.180)*	*(0.106)*	*(0.750)*	*(0.248)*	*(0.124)*
TC+PxTC=TS+PxTS *[rand. inf.]*	*[0.100]*	*[0.209]*	*[0.252]*	*[0.830]*	*[0.337]*	*[0.160]*
Observations	131	131	131	131	131	131
Mean dep. var., control	0.388	0.688	0.777	2.231	0.422	0.138

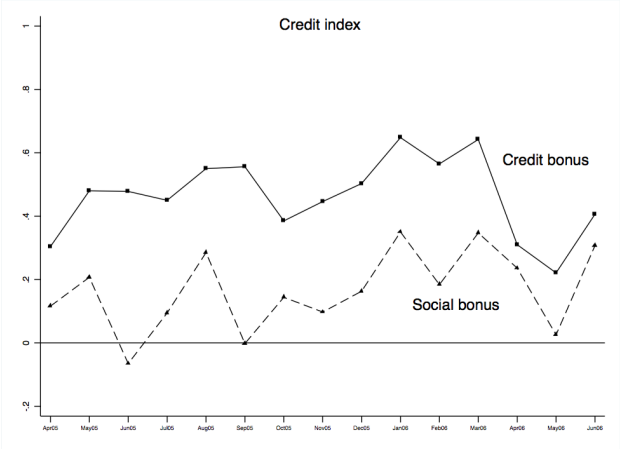
Notes: All specifications control for region dummies. ***Partnered FA***is a dummy variable which equals one if an FA co-manages more than 73 percent of his/her pre-treatment CO portfolio (median value of co-sharing) with other FAs. ***New COs*** is the monthly average number of new COs formed by the FA. ***Savers per member*** is the monthly average share of CO members who saved during CO meetings conducted by the FA. ***Attendance*** is the monthly average share of CO members present at the CO meetings conducted by the FA. ***Dead COs*** is the monthly average number of COs managed by the FA without any active borrowers for the entire bonus period. ***Multiple meetings*** is the monthly average share of COs managed by the FA that had more than one monthly meetings. ***Loan rejection rate*** is the monthly average share of social appraisals rejected by the FA. P-values are reported below the coefficients and are calculated using the wild cluster t-bootstrap and cluster randomization inference at the field unit level; *** denotes 1%, ** denotes 5%, * denotes 10% significance based on the larger of the two (t-bootstrap and randomization inference) p-values.

Table E.5: Impact of bonus on supervisor evaluation, by partnership

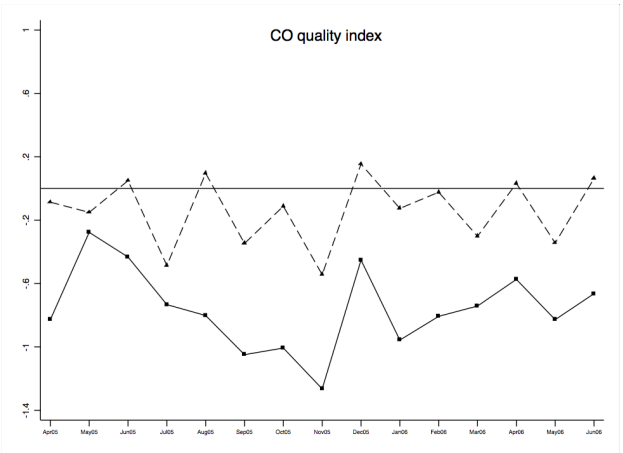
	Likelihood of promotion (1)	Improvement in loan disbursement (2)	Improvement in CO savings (3)
Credit bonus (TC)	0.070	0.091	0.288
(t-bootstrap p-value)	*(0.706)*	*(0.646)*	*(0.208)*
[rand. inf. p-value]	*[0.742]*	*[0.542]*	*[0.294]*
Social bonus (TS)	0.373	0.180	0.503*
(t-bootstrap p-value)	*(0.124)*	*(0.332)*	*(0.016)*
[rand. inf. p-value]	*[0.148]*	*[0.268]*	*[0.054]*
Partnered FA x TC	-0.134	-0.004	-0.397
(t-bootstrap p-value)	*(0.658)*	*(0.934)*	*(0.316)*
[rand. inf. p-value]	*[0.716]*	*[0.717]*	*[0.394]*
Partnered FA x TS	-0.522	-0.476	-0.358
(t-bootstrap p-value)	*(0.044)*	*(0.166)*	*(0.238)*
[rand. inf. p-value]	*[0.121]*	*[0.052]*	*[0.279]*
Partnered FA (P)	0.070	-0.047	0.317
(t-bootstrap p-value)	*(0.660)*	*(0.836)*	*(0.330)*
[rand. inf. p-value]	*[0.813]*	*[0.576]*	*[0.199]*
P-value of F-test:			
TC + P x TC *(t-boot.)*	*(0.804)*	*(0.806)*	*-(0.724)*
TC + P x TC *[rand. inf.]*	*[0.766]*	*[0.995]*	*[0.815]*
TS + P x TS *(t-boot.)*	*(0.394)*	*(0.400)*	*(0.628)*
TS + P x TS *[rand. inf.]*	*[0.422]*	*[0.144]*	*[0.729]*
TC = TS *(t-boot.)*	*(0.166)*	*(0.712)*	*(0.296)*
TC = TS *[rand. inf.]*	*[0.242]*	*[0.754]*	*[0.430]*
TC+PxTC=TS+PxTS *(t-boot.)*	*(0.540)*	*(0.234)*	*(0.418)*
TC+PxTC=TS+PxTS *[rand. inf.]*	*[0.715]*	*[0.307]*	*[0.555]*
Observations	73	73	73
Mean dep. var., control	0.222	0.444	0.222

Notes: All specifications control for region dummies. ***Partnered FA*** is a dummy variable which equals one if an FA co-manages more than 73 percent of his/her pre-treatment CO portfolio (median value of co-sharing) with other FAs. ***Promotion*** is a dummy variable which equals one if a supervisor thinks that an FA is likely to get a promotion in the next 2 years. ***Loan disbursement*** is a dummy variable which equals one if a supervisor reports that an FA has improved performance in credit disbursement rate, compared to a year ago. ***CO savings*** is a dummy variable which equals one if a supervisor reports that an FA has improved performance in ensuring COs save regularly, compared to a year ago. P-values are reported below the coefficients and are calculated using the wild cluster t-bootstrap and cluster randomization inference at the field unit level; *** denotes 1%, ** denotes 5%, * denotes 10% significance based on the larger of the two (t-bootstrap and randomization inference) p-values.

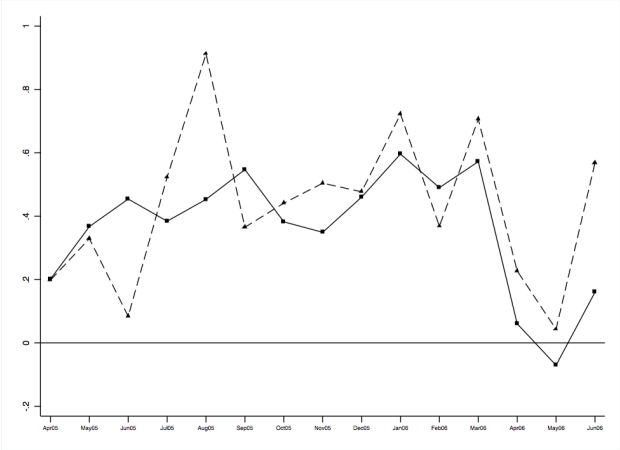
Figure E.1: Impact of credit and social bonus by month



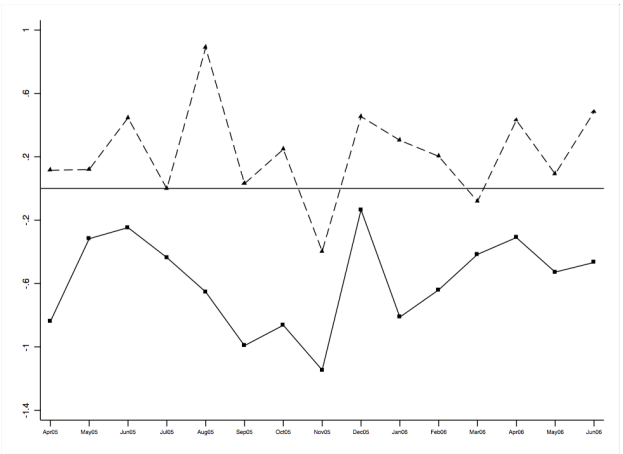
(a) Credit index: All FAs



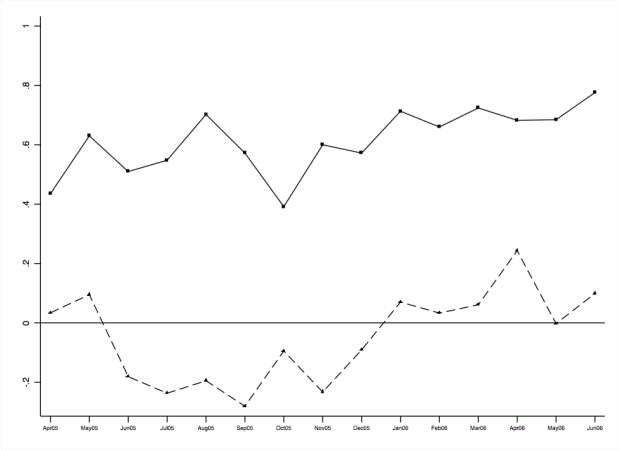
(b) CO quality index: All FAs



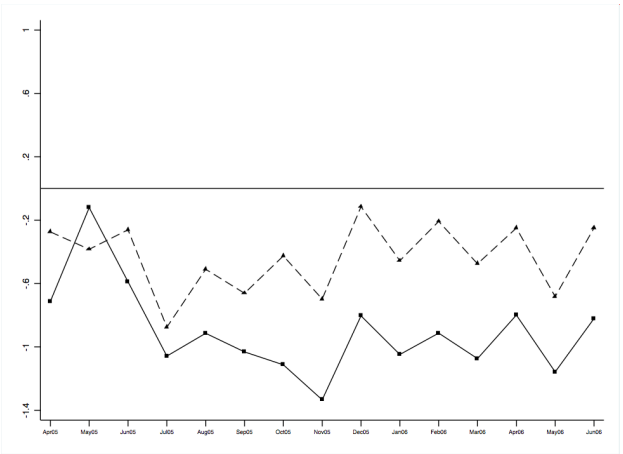
(c) Credit index: Non-partnered FAs



(d) CO quality index: Non-partnered FAs



(e) Credit index: Partnered FAs



(f) CO quality index: Partnered FAs

*Notes:*The graphs above plot the estimated impact of credit bonus (solid line) and social bonus (dash line) on credit and CO quality indices by month, for the 15-months bonus period. ATEs of credit and social bonus are estimated by using FA-month level data and by running an OLS regression with the following specification: $Y_{it} = \alpha + \beta_r + \theta_t + \Sigma_{j=11}^{25}\gamma_j TC_{ij} + \Sigma_{j=11}^{25}\sigma_j TS_{ij} + \epsilon$. γ_ts and $\sigma_t s$ for $11 \leq t \leq 25$ are plotted in (a) and (b) for the credit index and social indices (dependent variables) respectively. The effects on the subgroups by partnership are estimated by running an OLS regression with the following specification: $Y_{it} = \alpha + \beta_r + \theta_t + P_i + \Sigma_{j=11}^{25}\gamma_j TC_{ij} + \Sigma_{j=11}^{25}\sigma_j TS_{ij} + \Sigma_{j=11}^{25}\delta_j P_i TC_{ij} + \Sigma_{j=11}^{25}\omega_j P_i TS_{ij} + \epsilon$. γ_ts and σ_ts, which represent the effects on the non-partnered FAs, are presented in (c) and (d); the effects on the partnered FAs given by $\gamma_t + \delta_t$ and $\sigma_t + \omega_t$ are plotted in (e) and (f), for the dependent variables credit and CO quality indices respectively.