# Social Networks and Business Practices: Evidence from a Randomized Experiment with Microentrepreneurs[*]

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### Abstract

We introduce a representative sample of small Ghanaian entrepreneurs to randomly-selected peers. We do this through a team experiment that favors the creation of new social links among entrepreneurs. Participants are divided into three treatment groups: pure controls, who only participate to the ex ante and ex post surveys; treated subjects, who are invited to participate to the link formation treatment; and placebo subjects, who are invited to the same activity as the treated subjects but perform this activity individually. We also seed a randomly selected subsample of the population of control and placebo subjects with ideas about business practices. We find that the experiment has a significant positive effect on several aspects of firm performance. Further, we find evidence of diffusion of business practices among treated entrepreneurs who were on the same team. For business performance, however, we find that treated firms who were on the same team are on average more different *ex post* than firms that were not on the same team. These results question several common narratives about networks and firm performance in developing economies.

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# 1  Introduction

Since Melitz (2003), it is now increasingly accepted that the productivity of an economy ultimately depends on the distribution of productivity levels of the units that compose it. Improving aggregate productivity requires upgrading the productivity of existing firms or improving the mix of low and high productivity firms. In developing economies, microenterprises constitute a large proportion of these low productivity firms. The question then is how can their productivity be improved.

The recent literature has relied on a series of experiments to explore which methods are capable of improving the productivity of individual small firms. Examples include capital grants (De Mel, McKenzie, and Woodruff, 2008; Fafchamps, McKenzie, Quinn, and Woodruff, 2013), training (Bruhn, Karlan, and Schoar, 2013; Fafchamps and Woodruff, 2013), labor subsidies (De Mel, McKenzie, and Woodruff, 2010), or combinations of interventions (Berge, Bjorvatn, and Tungodden, 2011). While this literature has tentatively identified interventions that have a stronger impact on individual firms, it is doubtful that these interventions can be scaled up to the level of entire economies because of their cost (see Bruhn, Karlan, and Schoar (2013) or Bloom, Eifert, Mahajan, McKenzie, and Roberts (2013) for recent examples of successful entreprise support interventions that are too costly to scale up). To be cost effective, any intervention to improve the aggregate productivity of small enterprises must rely on the diffusion of new ideas and practices among small entrepreneurs.[1]

In policy circles interested in private sector development, it is widely accepted that the diffusion of ideas and practices is essential for aggregate economic performance: to become more productive firms must innovate in the technology they use but also in the products they buy and sell and in the way they organize themselves internally (e.g., labor management, delegation) and externally (e.g., supplier credit, hiring practices). There is less agreement on how ideas

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[1] Ideas and practices can also diffuse across firms through workers (e.g., Muendler, Rauch, and Tocoian (2012)). Since the firms we study do not, as a rule, employ wage workers, we ignore this possible diffusion channel here.

and practices diffuse among firms, and particularly on the role that social networks play in the diffusion of business practices.

We present the results of an experiment designed to test the diffusion of business ideas and practices between microenterprises through social contact between entrepreneurs. Our purpose is to empirically identify the diffusion of business practices through social networks among small entrepreneurs. To do this convincingly, we need an empirical context in which social links are not self-selected but assigned at random. The reason is that people with similar views or interests are more likely to adopt similar practices but also more likely to be linked because of homophily (e.g., Moffitt (2001)).

To circumvent this problem, we introduce a representative sample of small entrepreneurs to randomly-selected peers. Early inspiration for this approach comes from the work of Sacerdote (2001) who uses a natural experiment — the random assignment of roommates and dormmates at Darmouth College — to study social network effects on GPA and social groupings. Similar strategies were used by Lyle (2007, 2009) and Shue (2012). Synthetic network randomisation was pioneered by Centola (2010, 2011). The nature of the social interaction enabled by Centola's experiment remains quite limited, however – i.e., automatic messages.[2] To improve on this design, we follow Fafchamps and Quinn (2012) and organize a team activity that favors the creation of new social links among entrepreneurs. Participants are divided into three treatment groups: pure controls, who only participate to the ex ante and ex post surveys; treated subjects, who are invited to participate to the link formation treatment; and placebo subjects, who are invited to the same activity as the treated subjects but perform this activity individually. We also seed a randomly selected subsample of the population of control and placebo subjects with ideas about business practices. This is achieved through the distibution of factsheets based on the results from a comparative enterprise survey in Africa and Asia. All participants are surveyed one year before and one year after the experiment, so as to give

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[2] Duflo, Dupas, and Kremer (2011) randomly assigned students to groups – i.e., sections in Kenyan schools – to study spill-over effects on student achievement.

enough time for the intervention to have an effect.

We find a fairly high level of compliance with treatment: most invited subjects participate either as treated or placebo subjects, and there is balance across them. We find little evidence of selective attrition between invited participants and pure controls. The social network treatment works in the sense that treated subjects are more likely to remember participants in their team, and significantly more likely to speak to them after the experiment has ended, including about business matters. Factsheets have little additional effect on social links.

From Intent-To-Treat and LATE regressions, we find that the social network treatment has a significant effect on some firm outcomes, notably (i) whether others are employed to work in the business, (ii) the value of firm inventories, (iii) the combined value of firm inventories and cash holding, (iv) total firm capital, and (v) firm profits. We find almost no such significant effect for placebo participants (although we cannot always reject that the effect of being invited to the experiment is the same for placebo and treated subjects). The factsheets have little noticeable impact on subsequent firm performance, which may not be a surprise given the low intensity of this treatment.

To test for evidence of diffusion along social networks, we estimate dyadic regressions comparing business practices and performance across linked and unlinked firms. If productivity enhancing ideas diffuse across firms along social networks, we expect to observe that treated entrepreneurs who were part of the same team have more similar business practices than those who part of different teams. The anticipated effect of diffusion on individual firm performance is, however, less clear *a priori*. One possibility is that social links permit the transmission of information about new practices that benefit all firms, in which case we expect linked firms to have more similar performance improvements than unliked firms. It is also conceivable that the information that is being transmitted only benefits certain firms. This could be because the information exchange game resembles a 'treasure hunt' (Möbius, Phan, and Szeidl, 2010): two

players who share information about the possible location of a single treasure increase their joint likelihood finding it, even though at most one of them can find it. Transposed to the world of business, this could be because firms compete for the same market (Aghion, Bechtold, Cassar, and Herz, 2013).

We test these hypotheses and find evidence of diffusion of business practices among treated entrepreneurs who were on the same team. For business performance, however, we find that treated firms who were on the same team are on average more different *ex post* than firms that were not on the same team.

The paper is organized a follows. The experimental design is presented in Section 2. The sampling strategy and the implementation of the experiment are described in Section 3. Data descriptives are presented in Section 4. Average treatment effects are estimated in Section 5 while results on diffusion from dyadic regressions are detailed in Section 6.

# 2 Experimental design

Our experimental design is close in spirit to that of Sacerdote's natural setting and to that of Fafchamps and Quinn (2012): to encourage the formation of social links, we invite entrepreneurs to undertake, with three randomly assigned peers, a financially incentivized joint activity. The success of this activity requires the collaboration of the four members of the team. Participants take turn leading their team. Because we expect the formation of social links to require repeated interaction, the activity is conducted over a period of 16 days and requires daily interaction. We test whether the experiment is effective in creating social links, that is, whether being assigned to the same team affects subsequent social contact. We also conduct a 'placebo' treatment which is in every way identical to the team treatment except that participants complete the activity individually.

The activity that participants are invited to engage in is closely inspired from the level-$k$ strategic thinking experiment of Costa-Gomes and Crawford (2006). In this experiment, each team $i$ (or each subject, for participants playing individually) is asked to choose a number $d_i$ contained between two bounds $\underline{b}_i$ and $\overline{b}_i$. The opposing team is asked to similarly choose a number $d_j$ contained between two other bounds $\underline{b}_j$ and $\overline{b}_j$. Team $i$ receives a payoff that is highest if $d_i$ is closest to $d_j \times p_i$. Similarly, team $j$ receives a payoff that decreases rapidly in the distance between $d_j$ and $d_i \times p_j$.[3]

Costa-Gomes and Crawford (2006) show that many subjects play a best response to random play by the other team. They call this 'level-1 thinking'. In the above notation, it means setting $d_i = \left( \underline{b}_j + \frac{\overline{b}_j - \underline{b}_j}{2} \right) p_i$. Random play is denoted 'level-0 thinking'. Level-2 thinking is when subjects play a best response to level-1 play, *etc.* Each team (or individual player) is given all six pieces of information – $\underline{b}_i$ and $\overline{b}_i$, $\underline{b}_j$ and $\overline{b}_j$, $p_i$ and $p_j$. The game is designed to require strategic thinking, that is, a deliberate mental effort to anticipate the action of the opposite player and calculate a best response to it. This game is chosen because its complexity creates conditions that should encourage team members to debate the appropriate decision.[4]

In practice, our level-$k$ experiment is implemented over the phone. At the beginning of each of the 16 consecutive days covered by the experiment, participants are sent SMS messages with the six pieces of information listed above. For subjects playing individually, they receive all six in a single message. For subjects playing in a team, each of the four members of the team receives one piece of information as follows: $\underline{b}_i$ and $\overline{b}_i$; $\underline{b}_j$ and $\overline{b}_j$; $p_i$; and $p_j$. Team members therefore need to pool the information in order to make an informed choice.[5] Each team or individual participant has to return their choice in an SMS before a set time on the same day.

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[3] As in Costa-Gomes and Crawford (2006), guesses that fall outside the acceptable bounds are automatically brought to the closest bound for the purpose of calculating payoffs.

[4] The main differences between our experiment and Costa-Gomes and Crawford (2006) are that (1) we optimized the values of $\underline{b}_i$ and $\overline{b}_i$, $\underline{b}_j$ and $\overline{b}_j$, $p_i$ and $p_j$ so as to discriminate more efficiently between different player archetypes; and (2) the game was played over the phone by entrepreneurs, instead of university students in a computer laboratory.

[5] The order of play is further randomized, so that team $i$ on day $t$ is playing game $s$ against team $j$, while on that same day team $j$ is playing game $n \neq s$. This was done to eliminate the possibility of collusion across teams.

For teams, one players is designed, at random, to be the player habilitated to return a decision. Other members are nevertheless incentivized to return their own choice as well. Final payoffs are calculated by selecting one play at random. In addition to a turn-up fee and final payoff, participants are given an airtime lumpsum to cover the cost of SMS and phone calls associated with the experiment.

We combine random network assignment with random 'seeding' of information. At the end of the interaction period, participants are handed one of three randomly selected 'factsheets' presented in appendix. Two of the factsheets provide very simple summaries of academic findings on small firm performance. One focuses on labor management, the other on enterprise finance. The third factsheet is a 'placebo' factsheet that contains no business-relevant information but encourages participants to wear a seatbelt. These factsheets are provided in the appendix. A quarter of the participants receive no factsheet. At no point are participants told that the purpose the experiment is to study social networks or the diffusion of business practices.

We focus here on the effect of the experiment on subsequent entrepreneur performance. Choices made during the experiment itself are the object of separate analysis.

# 3    Sampling strategy and implementation

The population invited to participate to the experiment is composed of male and female Ghanaian microentrepreneurs living in Accra. In 2008, a sample of around 900 microentrepreneurs was drawn at random from the population of Accra and the neighboring town of Tema. Individuals employing wage workers at baseline were excluded from the sampling frame. So were taxi and truck drivers, leaving microentrepreneurs involved in manufacturing, trade, and services. These microentrepreneurs were surveyed six times at three month intervals prior to our experiment — see Fafchamps, McKenzie, Quinn, and Woodruff (2012, 2013) for details. Over the six rounds there was some attrition, in line with the rates of firm exit common in

the microentreprise sector. The experiment took place in the summer of 2011, one year after the round 6 survey. All entrepreneurs – participants and non-participants – were resurveyed in the March 2012, approximately one year after the experiment and two years after the round 6 survey.

Participants to the experiment were drawn from entrepreneurs who (i) answered round 6 of the panel survey and (ii) are located in Accra. We focus on round 6 entrepreneurs because these are the ones we can locate more easily. We drop Tema to simplify the logistics of the experiment. These leaves a sampling population of 551 entrepreneurs. Of these, 455 were invited to take part to the experiment. Not all responded or could be located. Of those who were invited, 298 accepted to take part. Two third of these, or 202, were randomly assigned to the team treatment. The rest, 96, were assigned to the individual treatment.

Participants were first invited to a half-day training session during which the game was explained and all participants were shown examples of the game. The focus of the training was on the rules of the game, and the calculation of payoffs. Participants were not presented with heuristics leading them to play according to level-1 or level-2 thinking, *etc*. The purpose of this was to ensure that the strategic complexity of the game remains intact, hence encouraging subjects to interact with each other. After the training session participants were quizzed on their understanding of the rules of the game. They were also given instructions on how to play the game using SMS messages.

Participants to the training session were then randomly divided between treated and placebo, and treated participants were randomly assigned to different teams of four individuals. To minimize the logistically complexity of the experiment, randomization into teams was performed in each session separately, thereby precluding *ex ante* stratification.

# 4 The data

Table 1 shows descriptive statistics from our pre-experiment survey for those invited and those not invited to participate.[6] Note that all currency values in this paper refer to real Ghana cedis; given the normalisation used, one real Ghana cedi was worth about 40 US cents at the time of the 2012 follow-up survey. Table 1 shows that balance was broadly achieved; of the 14 variables tested, two show significant differences between those invited and those not (in the number of hours worked by others in the business, and in whether the respondent had a bank account).

**< Table 1 here. >**

Table 2 shows the balance between those accepting and those declining the invitation. The table shows that respondents accepting the invitation were very similar to those declining, except that they had significantly higher education (on average, one additional year). (Of course, balance on this table is not necessary for the validity of the experiment, because we do not rely on acceptance of the invitation being random or quasi-random — but this is informative for describing the experiment participants.)

**< Table 2 here. >**

Table 3 shows the balance between those assigned to the group treatment and those assigned to the individual treatment. There are significant differences on four variables: (i) gender, (ii) education, (iii) hours worked in the business by others, and (iv) whether the respondent has a bank account.

**< Table 3 here. >**

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[6] As explained earlier, this survey was round 6 of an earlier microenterprise panel survey, used by Fafchamps, McKenzie, Quinn, and Woodruff (2012, 2013). In this paper, we term this survey the 'baseline', in that we use it as a baseline for the networks experiment.

# 5 Treatment effects

## 5.1 Identification strategy for treatment effects

Denote $y_{it}$ as the outcome for firm $i$ in period $t$ (where $t = 0$ refers to data collected in February 2010, and $t = 1$ to data collected in March 2012). Denote $z_i^g$ and $z_i^h$ respectively as dummy variables for whether respondent $i$ was invited to participate in the group experiment and the individual experiment.[7]

Denote $x_i^g$ and $x_i^h$ respectively as dummy variables for whether respondent $i$ actually participated in the group and individual experiments. We use a difference-in-difference estimation identification strategy:

$$y_{it} = \beta_0 + \beta_1^g \cdot z_i^g \cdot t + \beta_1^h \cdot z_i^h \cdot t + \beta_2^g \cdot z_i^g + \beta_2^h \cdot z_i^h + \beta_3 \cdot t + \varepsilon_{it}, \tag{1}$$

where $\beta_1^g$ and $\beta_1^h$ respectively represent the Intent To Treat ('ITT') of the group experiment and the individual experiment.[8]

We estimate the Local Average Treatment Effect ('LATE') of participation in the group and individual experiments by estimating the following first stages:

$$x_i^h = \gamma_0 + \gamma_1^g \cdot z_i^g + \gamma_1^h \cdot z_i^h + \mu_i^h \tag{2}$$

$$x_i^g = \delta_0 + \delta_1^g \cdot z_i^g + \delta_1^h \cdot z_i^h + \phi_i^h. \tag{3}$$

We then form the predicted values, $\hat{x}_i^h$ and $\hat{x}_i^g$, and use $\hat{x}_i^h$, $\hat{x}_i^g$, $\hat{x}_i^h \cdot t$ and $\hat{x}_i^g \cdot t$ to instrument

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[7] In practice, we did not separately invite respondents to participate in the group experiment and the individual experiment. Instead, we issued each chosen respondent a general invitation to participate in the experiment; respondents who agreed were then randomly assigned either to the group treatment or to the individual treatment. We therefore use a synthetic randomization method, in which those respondents who declined our invitation to participate are assigned *ex post* to either $z_i^g = 1$ or $z_i^h = 1$, such that the proportion of respondents declining is equal across synthetic assignments.

[8] We begin, in each set of regressions, by restricting $\beta_1^g = \beta_1^h$; this estimates the ITT for being invited to participate, whether or not that participation was in the group or the individual experiment.

together for $z_i^g \cdot t$, $z_i^h \cdot t$, $z_i^g$ and $z_i^h$ (see Wooldridge (2010)).

Several important outcomes — in particular, outcomes concerning innovation — were observed only in the follow-up questionnaire. For these outcomes, we use the following simple difference estimator (with an analogous IV procedure):

$$y_{i1} = \beta_0 + \beta_1^g \cdot z_i^g + \beta_1^h \cdot z_i^h + \xi_{it}. \tag{4}$$

In each case, we cluster errors by team (where, for clustering purposes, each respondent in the individual experiment is assigned to his or her own one-person 'team').

## 5.2   Results

We consider three measures of firm inputs: (i) the number of hours worked by the respondent in the firm in the previous week, (ii) a dummy variable for whether others work in the firm, and (iii) the total expenses for the firm over the previous month. Results are reported respectively in Tables 4, 5 and 6. We find no effect on hours worked or expenses. We find a significant positive effect of the experiment on whether others are employed to work in the business: those invited to participate in the experiment are almost 12 percentage points more likely to hire others (significant at the 10% level). This effect is wholly explained by the effect of participation in the group treatment (for which we estimate an ITT of almost 15 percentage points and a LATE of about 20 percentage points, both significant at the 5% level).[9]

**< Table 4 here. >**

**< Table 5 here. >**

**< Table 6 here. >**

We use three measures of firm assets: (i) the value of firm inventories, (ii) the combined value of firm inventories and the firm cash holding, and (iii) total firm capital (defined here as the sum

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[9] A formal test for whether individual and group effects are the same almost rejects the null hypothesis of equality: $p = 0.158$ for the ITT and $p = 0.112$ for the LATE.

of firm inventories and firm assets, excluding land and buildings). We report results in Tables 7, 8 and 9 respectively. We find a large effect of the group treatment on all three measures. We find no effect of the individual treatment on any measure.[10]

**< Table 7 here. >**

**< Table 8 here. >**

**< Table 9 here. >**

We have two variables showing firm outcomes: (i) sales last month and (ii) profit last month. Estimates are reported in Tables 10 and 11. We find no significant effect on sales, but we find large and significant effects on profits of both the individual and group treatments.

**< Table 10 here. >**

**< Table 11 here. >**

We consider two measures of savings behavior: (i) whether the respondent has a bank account, and (ii) whether the respondent uses a susu collector. We find no significant effect on either outcome. (See the appendix for regression tables.)

Finally, we run a series of tests on various measures of firm innovation. Specifically, we consider (i) whether the firm introduced new design or packaging, (ii) whether the firm introduced a new channel for selling its products, (iii) whether the firm introduced a new method for pricing, (iv) whether the firm introduced a new way of advertising or promotion, (v) whether the firm changed or introduced new business processes, (vi) whether the firm changed the organization of its work, (vii) whether the firm introduced new quality control standards for suppliers or subcontractors, and (viii) whether the firm introduced new products. Measures (i) to (vii) were asked about the preceding year, and the final measure was asked about the preceding two

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[10] The difference between group treatment and individual treatment is significant in the case of the combined value of firm inventories and cash; in the case of the other two measures, the $p$-value is between 0.1 and 0.2.

years. Each of these questions was asked only at the follow-up.

We test each of these outcomes separately; we also use the method of Anderson (2008) to create a weighted index of innovation, which we then test as a distinct outcome variable. We find positive and significant effects of the experiment on whether the firm introduced new products in the previous two years, and whether the firm introduced new quality control standards in the previous year; in each case, the estimated ITT is about 10 percentage points. We also find a positive and significant effect on the index of innovation, of about 0.1 standard deviations. In each of these cases, it is only the individual treatment that is separately significant — but we comfortably pass hypothesis tests that individual and group effects are equal. These results are reported in Tables 12, 13 and 14. We find no effect testing each of the other innovation measures separately; these results are not reported, but are available on request.

**< Table 12 here. >**

**< Table 13 here. >**

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In sum, we find large and significant effects of our experiment on several important measures of firm performance and firm innovation; these results appear primarily to be driven by the group treatment. This motivates a deeper analysis of the group treatment, in which we use dyadic regression to test outcomes at the level of the firm-to-firm dyad.

# 6   Network effects of the group experiment

## 6.1   Identification strategy for network effects

We use dyadic regression to estimate effects of entrepreneurs being assigned to the same team. These dyadic regressions take two forms: directed and undirected.

We use directed dyadic regressions where the outcome records participant $i$'s response about participant $j$. As part of the follow-up survey, each participant in the experiment was asked questions about nine other participants in the experiment. For participants in the group experiment, these nine other participants included all of the other members of participant $i$'s team.[11] In this paper, we focus specifically on two questions: "*Were you on the same team as this person?*", and "*Have you spoken to this person since the game ended?*". Denote $y_{ij}$ as recording $i$'s answer to such a question about $j$, and denote $s_{ij}$ as a dummy for whether $i$ and $j$ were actually on the same team. Then we estimate the following dyadic regression:

$$y_{ij} = \beta_0 + \beta_1 \cdot s_{ij} + \varepsilon_{ij}. \tag{5}$$

We then test for heterogeneous network effects by interacting $s_{ij}$ with other covariates (specifically, dummy variables recording factsheet assignment and gender).

We use undirected dyadic regressions to test whether entrepreneurs were prompted to adopt similar business practices — and have similar outcomes — to those of their fellow team members. Denote $y_{it}$ as an outcome for firm $i$ at time $t$ (for example, firm profit). Following Fafchamps and Söderbom (forthcoming), we use $|y_{it} - y_{jt}|$ as a measure of firm similarity. We therefore test for experimental effects on firm similarity using a difference-in-difference estimator:

$$|y_{it} - y_{jt}| = \beta_0 + \beta_1 \cdot s_{ij} \cdot t + \beta_2 \cdot s_{ij} + \beta_3 \cdot t + \varepsilon_{ijt}. \tag{6}$$

For measures of innovation — observed only in the follow-up survey — we use an analogous difference estimator:

$$|y_{i1} - y_{j1}| = \beta_0 + \beta_1 \cdot s_{ij} + \varepsilon_{ij1}. \tag{7}$$

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[11] Other participants $j$ were randomly drawn, balanced so that each participant was the object of an (approximately) equal number of questions.

Under both specifications, we will estimate $\beta_1 < 0$ if participating on the same team causes firms to have similar outcomes; if outcomes are driven to be more dispersed, we will estimate $\beta_1 > 0$.

For both directed and undirected dyadic regressions, we use the two-way clustering of Cameron, Gelbach, and Miller (2011).[12]

## 6.2   Results

We begin by using directed dyadic regressions to measure the direct effect of being on the same team. In Table 15, we measure the effect of being on the same team on (i) whether $i$ (correctly) remembered that (s)he was on the same team as $j$, (ii) whether $i$ reports having spoken to $j$ since the competition, and (iii) whether $i$ reports having discussed savings, labor or innovation with $j$. We find highly significant effects on all measures. Almost nobody wrongly claims to have been on a team with someone who was not a teammate, and about half of team members correctly remember another named team member. Shared team membership shifts the probability of a subsequent conversation from approximately zero to about 16%. We find small effects (approximately 2%) for each measure of topics discussed. These results are reassuring for showing that our experiment created meaningful connections between entrepreneurs.[13]

**< Table 15 here. >**

Table 16 shows the effects of the factsheets. We estimate that a respondent who received the labor factsheet is about nine percentage points more likely to be remembered by a former teammate; this is marginally significant. We estimate that participants are about five percentage points less likely to have spoken with a former teammate who received the placebo factsheet;

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[12] This is a good approximation to the dyadic clustering of Fafchamps and Gubert (2007), because the network adjacency matrix is sparse.

[13] In the appendix, we report a separate set of regressions in which we include (i) a dummy variable for $i$ and $j$ having shared the same training session, and (ii) that same dummy plus a set of dummies for $i$'s training session and a set of dummies for $j$'s training session. We show that this barely shifts the results. This is a useful robustness check for showing that our results are not somehow driven by assortative matching into training sessions.

this, too, is marginally significant. In sum, we find some factsheet effects, but these are not particularly striking, nor highly significant.

**< Table 16 here. >**

Table 17 shows the effect of gender. It is often suggested that female owners of microenterprises are inherently more sociable than their male counterparts: more likely to network, more likely to behave cooperatively, more likely to refer other female entrepreneurs for opportunities, and so on. However, recent experimental evidence by Beaman, Keleher, and Magruder (2013) has cast some doubt on this conclusion, suggesting that highly skilled women may be disadvantaged in the labor market because other women refer less qualified candidates for jobs. Of course, gender is not the focus of this present paper. Nonetheless, it is interesting to note that our results, like those of Beaman, Keleher, and Magruder (2013), challenge the simplistic narrative: in our sample, men were more likely to remember having been on a team than were women.

**< Table 17 here. >**

We now move to test whether our random group assignment caused adoption of similar business practices. Table 18 shows results from estimating equation 7 across our eight separate measures of innovation, plus our weighted innovation index. Taken separately, we find strongly significant negative effects for two innovations: the introduction of new designs/packaging, and changing or introducing new business practices.[14] The weighted index of innovation also shows a significant negative effect. Together, we interpret these results as indicating that the experience of participating on a team together caused a positive correlation in adoption of new business practices.[15]

**< Table 18 here. >**

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[14] In this draft of the paper, we report $p$-values from individual hypothesis tests. In a future revision, we intend to complement these results by using a Westfall-Young Stepdown Bootstrap to calculate the Family-Wise Error Rate.
[15] Recall that, in equations 6 and 7, a negative coefficient implies a positive correlation in outcomes.

We extend these results by estimating equation 6, using our earlier measures of firm outcomes; the estimations are reported in Table 19. Given the negative coefficients in Table 18 — and, indeed, much of the accepted wisdom on firm networks — one might expect to estimate that participating on a team together caused a positive correlation in business outcomes. However, we obtain the opposite result. For three measures — cash and inventories, capital stock, and sales — we estimate that participating on a team together generates a large and significant *negative* correlation between firm outcomes (*i.e.* significant positive coefficients); we also estimate positive coefficients that are almost significant for expenses and inventories. That is, we find that, if two firms were randomly paired to participate in a team, the experience caused them to have *less similar* cash and inventories, capital and sales than they otherwise would have had.

**< Table 19 here. >**

# 7 Robustness to attrition

We plan to run an extensive set of robustness checks in a future version of the paper. At this stage, we report our main robustness check: on whether the experiment differentially affected attrition rates. Table 20 shows no significant effect of the experiment on attrition. We conclude that it does not appear that our results are driven by attrition.

**< Table 20 here. >**

# 8 Conclusion

We have presented the results from an original field experiment designed to test whether experimentally induced social links can improve firm performance and diffuse business practices. We find that they can: firms that were invited to a link formation activity have significantly higher performance, on average, than untreated firms, and firms on the same randomly assigned experimental team have more similar business practices one year after the experiment.

Social links do not, however, raise firm performance equally for newly linked entrepreneurs: some gain more than others, so much so that the performances of linked treated entrepreneurs are more different than those of unlinked ones.

What do these findings suggest regarding the role of social networks in the diffusion of business practices and the improvement of the aggregate productivity level of small enterprises? The evidence presented here suggest that diffusion of practices can indeed be facilitated by forming social links between entrepreneurs. Entrepreneurs should not be expected to benefit equally from the newly formed links. Instead of facilitating convergence in performance, creating social links between firms results in diverging performance. Perhaps we should not be surprised by these findings. The anecdotes frequently used to claim that social networks facilitate diffusion often focus on success stories and ignore the rest — for example, we normally hear about the Mark Zuckerbergs of the world, but less about the friends with whom he shared his initial ideas for Facebook (except, in this case, for the movie). Yet the larger the successes are, the more divergence there must be between the successful and the friends they left behind. This does not imply that exchange of information and ideas was unimportant, only that not everyone benefits equally. This observation in turn raises the question of who is most likely to benefit, a research question for which more experimental evidence is needed. It is also unclear, from the evidence presented here, whether the success of a few is sufficient to raise the aggregate performance of the microenterprise sector. These and other issues remain to be explored, and will be the focus of future work.

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**Tables**

*Marcel Fafchamps and Simon Quinn*

Table 1: **Balance between those invited and those not invited**

| | INVITED | | | NOT INVITED | | | Mean equality (*p*) |
|---|---|---|---|---|---|---|---|
| | N | Mean | Std.Dev | N | Mean | Std.Dev | |
| Dummy: Male | 456 | 0.428 | 0.495 | 95 | 0.411 | 0.495 | **0.759** |
| Years of education | 454 | 8.786 | 3.689 | 94 | 8.819 | 3.935 | **0.938** |
| Hours: Respondent | 440 | 56.234 | 25.196 | 92 | 55.065 | 23.884 | **0.683** |
| Dummy: Others work in the business | 440 | 0.343 | 0.475 | 92 | 0.370 | 0.485 | **0.630** |
| Hours: All others (total) | 438 | 16.550 | 34.962 | 91 | 26.330 | 62.049 | **0.038**** |
| Real sales last month | 440 | 600.373 | 1538.129 | 92 | 641.659 | 921.860 | **0.804** |
| Real expenses last month | 439 | 487.103 | 1446.754 | 91 | 536.299 | 1039.019 | **0.758** |
| Real inventories | 456 | 329.357 | 921.241 | 95 | 377.985 | 992.757 | **0.644** |
| Real total cash | 456 | 655.263 | 2426.691 | 95 | 632.029 | 1076.552 | **0.927** |
| Real profit last month | 440 | 122.664 | 212.857 | 92 | 148.048 | 231.983 | **0.306** |
| Real total capital | 404 | 374.851 | 978.885 | 84 | 428.316 | 1046.021 | **0.653** |
| Introduced new products | 440 | 0.073 | 0.260 | 92 | 0.065 | 0.248 | **0.800** |
| Respondent has bank account | 436 | 0.424 | 0.495 | 88 | 0.330 | 0.473 | **0.099*** |
| Respondent uses a susu collector | 440 | 0.461 | 0.499 | 92 | 0.543 | 0.501 | **0.152** |

'*Mean equality* (*p*)' reports the p-value from a two-sample t test with equal variances.
'*Distr. equality* (*p*)' reports the p-value from a two-sample Kolmogorov-Smirnov test (calculated exactly, rather than approximately).
*Confidence: '*': 90%; '**': 95%; '***': 99%.*

Table 2: **Balance between those accepting and those declining the invitation**

| | ACCEPTED INVITATION | | | DECLINED INVITATION | | | Mean equality ($p$) |
|---|---|---|---|---|---|---|---|
| | N | Mean | Std.Dev | N | Mean | Std.Dev | |
| Dummy: Male | 298 | 0.443 | 0.498 | 158 | 0.399 | 0.491 | **0.365** |
| Years of education | 298 | 9.188 | 3.486 | 156 | 8.019 | 3.947 | **0.001***** |
| Hours: Respondent | 293 | 56.491 | 26.013 | 147 | 55.721 | 23.562 | **0.763** |
| Dummy: Others work in the business | 293 | 0.352 | 0.478 | 147 | 0.327 | 0.471 | **0.603** |
| Hours: All others (total) | 291 | 17.557 | 37.997 | 147 | 14.558 | 28.015 | **0.397** |
| Real sales last month | 293 | 563.968 | 1449.810 | 147 | 672.935 | 1703.487 | **0.484** |
| Real expenses last month | 292 | 431.918 | 1195.804 | 147 | 596.724 | 1846.891 | **0.260** |
| Real inventories | 298 | 376.531 | 1081.279 | 158 | 240.383 | 485.430 | **0.133** |
| Real total cash | 298 | 790.697 | 2964.146 | 158 | 399.825 | 587.296 | **0.102** |
| Real profit last month | 293 | 125.013 | 225.062 | 147 | 117.983 | 186.804 | **0.744** |
| Real total capital | 265 | 427.981 | 1148.498 | 139 | 273.559 | 509.032 | **0.132** |
| Introduced new products | 293 | 0.065 | 0.247 | 147 | 0.088 | 0.285 | **0.370** |
| Respondent has bank account | 288 | 0.448 | 0.498 | 148 | 0.378 | 0.487 | **0.165** |
| Respondent uses a susu collector | 293 | 0.440 | 0.497 | 147 | 0.503 | 0.502 | **0.211** |

*'**Mean equality** ($p$)' reports the p-value from a two-sample t test with equal variances.*
*'**Distr. equality** ($p$)' reports the p-value from a two-sample Kolmogorov-Smirnov test (calculated exactly, rather than approximately).*
*Confidence: '\*': 90%; '\*\*': 95%; '\*\*\*': 99%.*

Table 3: **Balance between group treatment and individual treatment**

| | GROUP TREATMENT | | | INDIVIDUAL TREATMENT | | | Mean equality (*p*) |
|---|---|---|---|---|---|---|---|
| | N | Mean | Std.Dev | N | Mean | Std.Dev | |
| Dummy: Male | 202 | 0.490 | 0.501 | 96 | 0.344 | 0.477 | **0.017**\*\* |
| Years of education | 202 | 9.470 | 3.473 | 96 | 8.594 | 3.457 | **0.042**\*\* |
| Hours: Respondent | 200 | 55.960 | 25.153 | 93 | 57.634 | 27.880 | **0.609** |
| Dummy: Others work in the business | 200 | 0.335 | 0.473 | 93 | 0.387 | 0.490 | **0.386** |
| Hours: All others (total) | 198 | 14.556 | 32.080 | 93 | 23.946 | 47.820 | **0.049**\*\* |
| Real sales last month | 200 | 576.626 | 1507.751 | 93 | 536.748 | 1324.021 | **0.827** |
| Real expenses last month | 199 | 477.040 | 1414.188 | 93 | 335.365 | 452.726 | **0.346** |
| Real inventories | 202 | 415.865 | 1185.757 | 96 | 293.764 | 818.612 | **0.363** |
| Real total cash | 202 | 711.769 | 1810.913 | 96 | 956.775 | 4526.442 | **0.506** |
| Real profit last month | 200 | 128.909 | 258.953 | 93 | 116.635 | 124.969 | **0.665** |
| Real total capital | 181 | 464.115 | 1244.000 | 84 | 350.121 | 911.285 | **0.453** |
| Introduced new products | 200 | 0.080 | 0.272 | 93 | 0.032 | 0.178 | **0.123** |
| Respondent has bank account | 196 | 0.490 | 0.501 | 92 | 0.359 | 0.482 | **0.037**\*\* |
| Respondent uses a susu collector | 200 | 0.420 | 0.495 | 93 | 0.484 | 0.502 | **0.307** |

'**Mean equality** (*p*)' reports the p-value from a two-sample t test with equal variances.
'**Distr. equality** (*p*)' reports the p-value from a two-sample Kolmogorov-Smirnov test (calculated exactly, rather than approximately).
Confidence: '*': 90%; '\*\*': 95%; '\*\*\*': 99%.

Table 4: **Experimental results: Hours worked**

|  | (1) ITT | (2) ITT | (3) LATE | (4) ITT | (5) LATE |
|---|---|---|---|---|---|
| **Dummy: Invited × post** | -0.336 (-0.115) |  |  |  |  |
| **Dummy: Individual treatment × post** |  | -2.689 (-0.720) | -3.444 (-0.723) |  |  |
| **Dummy: Group treatment × post** |  | 0.714 (0.235) | 1.030 (0.242) |  |  |
| **Dummy: Capital factsheet × post** |  |  |  | 3.821 (1.061) | 4.897 (1.042) |
| **Dummy: Labor factsheet × post** |  |  |  | -5.024 (-1.427) | -6.980 (-1.441) |
| **Dummy: Placebo factsheet × post** |  |  |  | -2.497 (-0.755) | -3.504 (-0.755) |
| Dummy: Invited | 1.368 (0.472) |  |  |  |  |
| Dummy: Individual treatment |  | 1.997 (0.554) | 2.552 (0.557) |  |  |
| Dummy: Group treatment |  | 1.090 (0.365) | 1.524 (0.367) |  |  |
| Dummy: Capital factsheet |  |  |  | -6.096 (-1.942)* | -7.899 (-1.926)* |
| Dummy: Labor factsheet |  |  |  | 2.988 (0.955) | 4.124 (0.966) |
| Dummy: Placebo factsheet |  |  |  | 2.802 (0.939) | 3.931 (0.941) |
| Dummy: Post | 2.278 (0.918) | 2.278 (0.917) | 2.278 (0.922) | 2.817 (1.543) | 2.817 (1.553) |
| Constant | 42.094 (2.551)** | 42.094 (2.548)** | 42.094 (2.560)** | 39.999 (3.380)*** | 39.999 (3.400)*** |
| Obs. | 910 | 910 | 910 | 910 | 910 |
| $H_0$: Same treatment effect ($p$-value) |  | 0.288 | 0.288 | 0.125 | 0.120 |

Parentheses show $t$ statistics. Errors are clustered by team (where each individual player forms his/her own team).
Significance: * $\Leftrightarrow p < 0.1$, ** $\Leftrightarrow p < 0.05$, *** $\Leftrightarrow p < 0.01$.

Table 5: **Experimental results: Others work in the business**

|  | (1) ITT | (2) ITT | (3) LATE | (4) ITT | (5) LATE |
|---|---|---|---|---|---|
| **Dummy: Invited × post** | 0.118 (1.905)* | | | | |
| **Dummy: Individual treatment × post** | | 0.056 (0.700) | 0.072 (0.706) | | |
| **Dummy: Group treatment × post** | | 0.146 (2.304)** | 0.205 (2.328)** | | |
| **Dummy: Capital factsheet × post** | | | | 0.082 (1.171) | 0.105 (1.163) |
| **Dummy: Labor factsheet × post** | | | | 0.046 (0.636) | 0.063 (0.638) |
| **Dummy: Placebo factsheet × post** | | | | 0.092 (1.372) | 0.129 (1.359) |
| Dummy: Invited | -0.046 (-0.792) | | | | |
| Dummy: Individual treatment | | 0.008 (0.107) | 0.010 (0.108) | | |
| Dummy: Group treatment | | -0.069 (-1.171) | -0.097 (-1.172) | | |
| Dummy: Capital factsheet | | | | -0.102 (-1.739)* | -0.132 (-1.739)* |
| Dummy: Labor factsheet | | | | -0.039 (-0.626) | -0.053 (-0.631) |
| Dummy: Placebo factsheet | | | | -0.108 (-1.879)* | -0.152 (-1.875)* |
| Dummy: Post | -0.059 (-1.046) | -0.059 (-1.045) | -0.059 (-1.050) | -0.007 (-0.168) | -0.007 (-0.169) |
| Constant | 0.747 (2.015)** | 0.747 (2.013)** | 0.747 (2.022)** | 0.448 (1.651) | 0.448 (1.661)* |
| Obs. | 912 | 912 | 912 | 912 | 912 |
| $H_0$: Same treatment effect ($p$-value) | | 0.158 | 0.112 | 0.821 | 0.829 |

Parentheses show $t$ statistics. Errors are clustered by team (where each individual player forms his/her own team).
Significance: * $\Leftrightarrow p < 0.1$, ** $\Leftrightarrow p < 0.05$, *** $\Leftrightarrow p < 0.01$.

Table 6: **Experimental results: Expenses last month**

|  | (1)<br>ITT | (2)<br>ITT | (3)<br>LATE | (4)<br>ITT | (5)<br>LATE |
|---|---|---|---|---|---|
| **Dummy: Invited × post** | -96.085<br>(-0.420) | | | | |
| **Dummy: Individual treatment × post** | | -77.972<br>(-0.330) | -103.692<br>(-0.341) | | |
| **Dummy: Group treatment × post** | | -103.824<br>(-0.444) | -147.038<br>(-0.448) | | |
| **Dummy: Capital factsheet × post** | | | | 45.649<br>(0.253) | 56.244<br>(0.236) |
| **Dummy: Labor factsheet × post** | | | | -83.848<br>(-0.521) | -119.521<br>(-0.535) |
| **Dummy: Placebo factsheet × post** | | | | -190.023<br>(-1.071) | -266.876<br>(-1.071) |
| Dummy: Invited | -53.524<br>(-0.563) | | | | |
| Dummy: Individual treatment | | -136.635<br>(-1.561) | -174.589<br>(-1.567) | | |
| Dummy: Group treatment | | -16.621<br>(-0.152) | -23.270<br>(-0.152) | | |
| Dummy: Capital factsheet | | | | -123.034<br>(-1.321) | -159.424<br>(-1.310) |
| Dummy: Labor factsheet | | | | -108.223<br>(-1.070) | -149.378<br>(-1.072) |
| Dummy: Placebo factsheet | | | | 45.271<br>(0.242) | 63.791<br>(0.243) |
| Dummy: Post | 189.012<br>(0.853) | 189.012<br>(0.852) | 189.012<br>(0.856) | 157.083<br>(1.087) | 157.083<br>(1.093) |
| Constant | -669.907<br>(-0.497) | -669.907<br>(-0.497) | -669.907<br>(-0.499) | -483.430<br>(-0.530) | -483.430<br>(-0.533) |
| Obs. | 915 | 915 | 915 | 915 | 915 |
| $H_0$: Same treatment effect ($p$-value) | | 0.816 | 0.773 | 0.288 | 0.285 |

Parentheses show $t$ statistics. Errors are clustered by team (where each individual player forms his/her own team).
Significance: $^* \Leftrightarrow p < 0.1$, $^{**} \Leftrightarrow p < 0.05$, $^{***} \Leftrightarrow p < 0.01$.

Table 7: **Experimental results: Inventories**

| | (1) ITT | (2) ITT | (3) LATE | (4) ITT | (5) LATE |
|---|---|---|---|---|---|
| **Dummy: Invited × post** | 290.255 (1.865)* | | | | |
| **Dummy: Individual treatment × post** | | 122.542 (0.939) | 158.201 (0.940) | | |
| **Dummy: Group treatment × post** | | 365.049 (1.909)* | 516.178 (1.919)* | | |
| **Dummy: Capital factsheet × post** | | | | 490.976 (1.251) | 654.635 (1.259) |
| **Dummy: Labor factsheet × post** | | | | 54.906 (0.302) | 76.154 (0.301) |
| **Dummy: Placebo factsheet × post** | | | | 42.011 (0.233) | 58.831 (0.234) |
| Dummy: Invited | -32.416 (-0.258) | | | | |
| Dummy: Individual treatment | | -109.652 (-0.819) | -141.486 (-0.822) | | |
| Dummy: Group treatment | | 2.692 (0.020) | 3.800 (0.020) | | |
| Dummy: Capital factsheet | | | | -120.484 (-1.049) | -160.646 (-1.048) |
| Dummy: Labor factsheet | | | | -64.282 (-0.482) | -89.281 (-0.484) |
| Dummy: Placebo factsheet | | | | -18.452 (-0.141) | -25.779 (-0.142) |
| Dummy: Post | -59.928 (-0.541) | -59.928 (-0.540) | -59.928 (-0.543) | 56.964 (0.392) | 56.964 (0.395) |
| Constant | 744.759 (0.980) | 744.759 (0.979) | 744.759 (0.983) | 59.072 (0.064) | 59.072 (0.064) |
| Obs. | 929 | 929 | 929 | 929 | 929 |
| $H_0$: Same treatment effect ($p$-value) | | 0.161 | 0.135 | 0.504 | 0.503 |

Parentheses show $t$ statistics. Errors are clustered by team (where each individual player forms his/her own team).
Significance: * ⇔ $p < 0.1$, ** ⇔ $p < 0.05$, *** ⇔ $p < 0.01$.

Table 8: **Experimental results: Cash and inventories holding**

| | (1) ITT | (2) ITT | (3) LATE | (4) ITT | (5) LATE |
|---|---|---|---|---|---|
| **Dummy: Invited × post** | 528.757 (2.282)** | | | | |
| **Dummy: Individual treatment × post** | | -34.239 (-0.089) | -43.179 (-0.088) | | |
| **Dummy: Group treatment × post** | | 782.086 (2.971)*** | 1105.877 (2.971)*** | | |
| **Dummy: Capital factsheet × post** | | | | 959.528 (1.771)* | 1279.370 (1.787)* |
| **Dummy: Labor factsheet × post** | | | | -288.011 (-0.606) | -399.389 (-0.610) |
| **Dummy: Placebo factsheet × post** | | | | 559.846 (1.263) | 785.218 (1.263) |
| Dummy: Invited | 66.958 (0.367) | | | | |
| Dummy: Individual treatment | | 191.135 (0.490) | 246.626 (0.493) | | |
| Dummy: Group treatment | | 10.513 (0.066) | 14.842 (0.066) | | |
| Dummy: Capital factsheet | | | | -221.063 (-1.290) | -294.751 (-1.285) |
| Dummy: Labor factsheet | | | | 344.303 (0.734) | 478.199 (0.740) |
| Dummy: Placebo factsheet | | | | -40.135 (-0.222) | -56.071 (-0.224) |
| Dummy: Post | -43.477 (-0.350) | -43.477 (-0.349) | -43.477 (-0.351) | 141.175 (0.812) | 141.175 (0.817) |
| Constant | 906.926 (1.084) | 906.926 (1.083) | 906.926 (1.088) | -165.974 (-0.147) | -165.974 (-0.148) |
| Obs. | 929 | 929 | 929 | 929 | 929 |
| $H_0$: Same treatment effect ($p$-value) | | 0.062* | 0.046** | 0.136 | 0.136 |

Parentheses show $t$ statistics. Errors are clustered by team (where each individual player forms his/her own team). Significance: * $\Leftrightarrow p < 0.1$, ** $\Leftrightarrow p < 0.05$, *** $\Leftrightarrow p < 0.01$.

Table 9: **Experimental results: Capital stock**

| | (1)<br>ITT | (2)<br>ITT | (3)<br>LATE | (4)<br>ITT | (5)<br>LATE |
|---|---|---|---|---|---|
| **Dummy: Invited × post** | 388.595<br>(2.285)** | | | | |
| **Dummy: Individual treatment × post** | | 209.381<br>(1.309) | 269.767<br>(1.314) | | |
| **Dummy: Group treatment × post** | | 469.895<br>(2.315)** | 664.453<br>(2.317)** | | |
| **Dummy: Capital factsheet × post** | | | | 639.026<br>(1.618) | 847.569<br>(1.622) |
| **Dummy: Labor factsheet × post** | | | | 145.443<br>(0.693) | 203.994<br>(0.696) |
| **Dummy: Placebo factsheet × post** | | | | 137.209<br>(0.681) | 192.883<br>(0.685) |
| Dummy: Invited | -38.509<br>(-0.273) | | | | |
| Dummy: Individual treatment | | -107.225<br>(-0.703) | -137.300<br>(-0.705) | | |
| Dummy: Group treatment | | -8.571<br>(-0.058) | -12.151<br>(-0.058) | | |
| Dummy: Capital factsheet | | | | -122.505<br>(-0.954) | -158.874<br>(-0.954) |
| Dummy: Labor factsheet | | | | -59.900<br>(-0.399) | -84.234<br>(-0.401) |
| Dummy: Placebo factsheet | | | | -39.092<br>(-0.276) | -55.225<br>(-0.278) |
| Dummy: Post | 39.243<br>(0.309) | 39.243<br>(0.308) | 39.243<br>(0.310) | 168.566<br>(1.093) | 168.566<br>(1.099) |
| Constant | 198.183<br>(0.228) | 198.183<br>(0.227) | 198.183<br>(0.228) | -564.118<br>(-0.568) | -564.118<br>(-0.571) |
| Obs. | 822 | 822 | 822 | 822 | 822 |
| $H_0$: Same treatment effect ($p$-value) | | 0.167 | 0.128 | 0.436 | 0.448 |

Parentheses show $t$ statistics. Errors are clustered by team (where each individual player forms his/her own team).
Significance: * $\Leftrightarrow p < 0.1$, ** $\Leftrightarrow p < 0.05$, *** $\Leftrightarrow p < 0.01$.

Table 10: **Experimental results: Sales last month**

| | (1) ITT | (2) ITT | (3) LATE | (4) ITT | (5) LATE |
|---|---|---|---|---|---|
| **Dummy: Invited $\times$ post** | -212.833 (-0.526) | | | | |
| **Dummy: Individual treatment $\times$ post** | | -411.140 (-0.980) | -538.046 (-0.997) | | |
| **Dummy: Group treatment $\times$ post** | | -126.191 (-0.308) | -175.924 (-0.310) | | |
| **Dummy: Capital factsheet $\times$ post** | | | | 12.490 (0.040) | -0.441 (-0.001) |
| **Dummy: Labor factsheet $\times$ post** | | | | -350.445 (-1.343) | -464.320 (-1.341) |
| **Dummy: Placebo factsheet $\times$ post** | | | | -182.658 (-0.746) | -255.031 (-0.754) |
| Dummy: Invited | -136.099 (-1.087) | | | | |
| Dummy: Individual treatment | | -160.390 (-1.052) | -204.943 (-1.055) | | |
| Dummy: Group treatment | | -125.355 (-0.914) | -175.228 (-0.912) | | |
| Dummy: Capital factsheet | | | | -191.034 (-1.909)* | -247.537 (-1.879)* |
| Dummy: Labor factsheet | | | | -17.559 (-0.112) | -24.237 (-0.113) |
| Dummy: Placebo factsheet | | | | 95.045 (0.448) | 133.347 (0.451) |
| Dummy: Post | 425.942 (1.074) | 425.942 (1.073) | 425.942 (1.078) | 359.455 (1.679)* | 359.455 (1.690)* |
| Constant | -1875.259 (-0.787) | -1875.259 (-0.786) | -1875.259 (-0.790) | -1565.933 (-1.203) | -1565.933 (-1.211) |
| Obs. | 813 | 813 | 813 | 813 | 813 |
| $H_0$: Same treatment effect ($p$-value) | | 0.099* | 0.116 | 0.392 | 0.443 |

Parentheses show $t$ statistics. Errors are clustered by team (where each individual player forms his/her own team).
Significance: $^* \Leftrightarrow p < 0.1$, $^{**} \Leftrightarrow p < 0.05$, $^{***} \Leftrightarrow p < 0.01$.

Table 11: **Experimental results: Profit**

| | (1) ITT | (2) ITT | (3) LATE | (4) ITT | (5) LATE |
|---|---|---|---|---|---|
| **Dummy: Invited × post** | 78.351 (2.654)*** | | | | |
| **Dummy: Individual treatment × post** | | 97.315 (2.129)** | 124.516 (2.138)** | | |
| **Dummy: Group treatment × post** | | 69.932 (2.450)** | 97.323 (2.436)** | | |
| **Dummy: Capital factsheet × post** | | | | 49.477 (1.741)* | 64.065 (1.746)* |
| **Dummy: Labor factsheet × post** | | | | 27.262 (0.976) | 37.211 (0.972) |
| **Dummy: Placebo factsheet × post** | | | | 96.948 (1.758)* | 135.335 (1.770)* |
| Dummy: Invited | -28.052 (-1.018) | | | | |
| Dummy: Individual treatment | | -34.901 (-1.255) | -44.596 (-1.261) | | |
| Dummy: Group treatment | | -25.022 (-0.849) | -34.977 (-0.851) | | |
| Dummy: Capital factsheet | | | | -21.620 (-1.145) | -28.014 (-1.149) |
| Dummy: Labor factsheet | | | | -7.306 (-0.323) | -10.084 (-0.325) |
| Dummy: Placebo factsheet | | | | 8.942 (0.237) | 12.545 (0.239) |
| Dummy: Post | -32.219 (-1.226) | -32.219 (-1.225) | -32.219 (-1.231) | -2.506 (-0.166) | -2.506 (-0.167) |
| Constant | 341.546 (1.908)* | 341.546 (1.906)* | 341.546 (1.915)* | 144.204 (1.414) | 144.204 (1.422) |
| Obs. | 866 | 866 | 866 | 866 | 866 |
| $H_0$: Same treatment effect ($p$-value) | | 0.490 | 0.597 | 0.442 | 0.441 |

Parentheses show $t$ statistics. Errors are clustered by team (where each individual player forms his/her own team).
Significance: * $\Leftrightarrow p < 0.1$, ** $\Leftrightarrow p < 0.05$, *** $\Leftrightarrow p < 0.01$.

Table 12: **Experimental results: Firm introduced new products in the past two years (difference estimates)**

|  | (1) ITT | (2) ITT | (3) LATE | (4) ITT | (5) LATE |
|---|---|---|---|---|---|
| **Dummy: Invited × post** | 0.070 (1.683)* |  |  |  |  |
| **Dummy: Individual treatment × post** |  | 0.109 (2.013)** | 0.141 (2.034)** |  |  |
| **Dummy: Group treatment × post** |  | 0.053 (1.230) | 0.074 (1.231) |  |  |
| **Dummy: Capital factsheet × post** |  |  |  | 0.103 (2.067)** | 0.136 (2.026)** |
| **Dummy: Labor factsheet × post** |  |  |  | 0.090 (1.722)* | 0.126 (1.725)* |
| **Dummy: Placebo factsheet × post** |  |  |  | 0.010 (0.227) | 0.014 (0.228) |
| Constant | 0.123 (3.250)*** | 0.123 (3.247)*** | 0.123 (3.261)*** | 0.139 (5.139)*** | 0.139 (5.167)*** |
| Obs. | 458 | 458 | 458 | 458 | 458 |
| $H_0$: Same treatment effect ($p$-value) |  | 0.213 | 0.267 | 0.217 | 0.237 |

Parentheses show $t$ statistics. Errors are clustered by team (where each individual player forms his/her own team).

Significance: * $\Leftrightarrow p < 0.1$, ** $\Leftrightarrow p < 0.05$, *** $\Leftrightarrow p < 0.01$.

Table 13: **Experimental results: Firm introduced new quality control standards in the past year (difference estimates)**

| | (1) ITT | (2) ITT | (3) LATE | (4) ITT | (5) LATE |
|---|---|---|---|---|---|
| **Dummy: Invited × post** | 0.115 (1.839)* | | | | |
| **Dummy: Individual treatment × post** | | 0.149 (2.027)** | 0.192 (2.000)** | | |
| **Dummy: Group treatment × post** | | 0.099 (1.543) | 0.140 (1.559) | | |
| **Dummy: Capital factsheet × post** | | | | 0.054 (0.891) | 0.071 (0.893) |
| **Dummy: Labor factsheet × post** | | | | 0.037 (0.596) | 0.051 (0.601) |
| **Dummy: Placebo factsheet × post** | | | | 0.018 (0.281) | 0.025 (0.282) |
| Constant | 0.506 (8.764)*** | 0.506 (8.754)*** | 0.506 (8.792)*** | 0.578 (15.313)*** | 0.578 (15.395)*** |
| Obs. | 458 | 458 | 458 | 458 | 458 |
| $H_0$: Same treatment effect ($p$-value) | | 0.367 | 0.484 | 0.876 | 0.889 |

Parentheses show $t$ statistics. Errors are clustered by team (where each individual player forms his/her own team).

Significance: * $\Leftrightarrow p < 0.1$, ** $\Leftrightarrow p < 0.05$, *** $\Leftrightarrow p < 0.01$.

Table 14: **Experimental results: Innovation index (difference estimates)**

| | (1) ITT | (2) ITT | (3) LATE | (4) ITT | (5) LATE |
|---|---|---|---|---|---|
| **Dummy: Invited × post** | 0.127 (1.999)** | | | | |
| **Dummy: Individual treatment × post** | | 0.165 (2.192)** | 0.213 (2.182)** | | |
| **Dummy: Group treatment × post** | | 0.110 (1.634) | 0.156 (1.645)* | | |
| **Dummy: Capital factsheet × post** | | | | 0.113 (1.824)* | 0.151 (1.793)* |
| **Dummy: Labor factsheet × post** | | | | 0.110 (1.702)* | 0.153 (1.690)* |
| **Dummy: Placebo factsheet × post** | | | | 0.042 (0.606) | 0.059 (0.614) |
| Constant | 0.000 (0.000) | 0.000 (0.000) | 0.000 (0.000) | 0.050 (1.195) | 0.050 (1.202) |
| Obs. | 466 | 466 | 466 | 466 | 466 |
| $H_0$: Same treatment effect ($p$-value) | | 0.377 | 0.495 | 0.625 | 0.645 |

Parentheses show $t$ statistics. Errors are clustered by team (where each individual player forms his/her own team).
Significance: $^* \Leftrightarrow p < 0.1$, $^{**} \Leftrightarrow p < 0.05$, $^{***} \Leftrightarrow p < 0.01$.

Table 15: **Dyadic regressions: Effects of being on the same team**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | | | | *i* discussed with *j*… | |
| | *i* remembers *j* | *i* spoke with *j* | …savings | …labor | …innovation |
| **Dummy: Same team** | 0.469 | 0.157 | 0.015 | 0.021 | 0.021 |
| | (17.207)*** | (8.233)*** | (2.557)** | (3.226)*** | (3.324)*** |
| Constant | 0.006 | 0.005 | 0.002 | 0.001 | 0.001 |
| | (2.737)*** | (2.761)*** | (1.750)* | (1.419) | (1.002) |
| Obs. | 2414 | 2414 | 2414 | 2414 | 2414 |

Parentheses show *t* statistics. Errors are clustered by firm *i* and by firm *j*.

Significance: * $\Leftrightarrow p < 0.1$, ** $\Leftrightarrow p < 0.05$, *** $\Leftrightarrow p < 0.01$.

Table 16: **Dyadic regressions: Effects of factsheets**

| | (1)<br>$i$ remembers $j$ | (2)<br>$i$ remembers $j$ | (3)<br>$i$ spoke with $j$ | (4)<br>$i$ spoke with $j$ |
|---|---|---|---|---|
| **Dummy: Same team** | 0.448<br>(10.295)*** | 0.445<br>(10.390)*** | 0.162<br>(5.362)*** | 0.157<br>(5.145)*** |
| **Dummy: Same team and $j$ received capital factsheet** | 0.020<br>(0.381) | 0.028<br>(0.525) | -0.008<br>(-0.206) | -0.002<br>(-0.047) |
| **Dummy: Same team and $j$ received labor factsheet** | 0.089<br>(1.683)* | 0.093<br>(1.814)* | 0.043<br>(1.010) | 0.053<br>(1.236) |
| **Dummy: Same team and $j$ received placebo factsheet** | -0.028<br>(-0.481) | -0.028<br>(-0.484) | -0.056<br>(-1.814)* | -0.054<br>(-1.736)* |
| Dummies: $j$'s factsheet | | ✓ | | ✓ |
| Dummies: $i$'s factsheet | | ✓ | | ✓ |
| Obs. | 2414 | 2414 | 2414 | 2414 |
| $H_0$: Factsheet effects jointly zero ($p$-value) | 0.199 | 0.148 | 0.044** | 0.021* |

Parentheses show $t$ statistics. Errors are clustered by firm $i$ and by firm $j$.

Significance: * $\Leftrightarrow p < 0.1$, ** $\Leftrightarrow p < 0.05$, *** $\Leftrightarrow p < 0.01$.

Table 17: **Dyadic regressions: Effects of gender**

| | (1)<br>*i* remembers *j* | (2)<br>*i* spoke with *j* |
|---|---|---|
| **Dummy: Same team and *i* male and *j* male** | 0.487<br>(10.189)*** | 0.194<br>(5.284)*** |
| **Dummy: Same team and *i* male and *j* female** | 0.589<br>(11.709)*** | 0.186<br>(4.192)*** |
| **Dummy: Same team and *i* female and *j* male** | 0.418<br>(8.882)*** | 0.135<br>(3.371)*** |
| **Dummy: Same team and *i* female and *j* female** | 0.390<br>(9.196)*** | 0.111<br>(3.712)*** |
| Dummy: *i* male and *j* male | 0.006<br>(1.431) | 0.012<br>(2.030)** |
| Dummy: *i* male and *j* female | 0.007<br>(1.751)* | 0.005<br>(1.435) |
| Dummy: *i* female and *j* male | 0.009<br>(2.052)** | 0.004<br>(1.426) |
| Dummy: *i* female and *j* female | 0.005<br>(1.755)* | 0.002<br>(1.003) |
| Obs | 2414 | 2414 |
| $H_0$: Equal gender $\times$ team effects (*p*-value) | 0.018** | 0.306 |

Parentheses show *t* statistics. Errors are clustered by firm *i* and by firm *j*.

Significance: $^* \Leftrightarrow p < 0.1$, $^{**} \Leftrightarrow p < 0.05$, $^{***} \Leftrightarrow p < 0.01$.

Table 18: **Dyadic regressions: Dispersion of innovation (difference estimation)**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **Dummy: Same team × post** | -0.078 (-2.580)*** | -0.023 (-0.846) | 0.036 (1.593) | -0.011 (-0.392) |
| Constant | 0.486 (36.465)*** | 0.429 (22.665)*** | 0.489 (41.302)*** | 0.451 (27.022)*** |
| Obs. | 2214 | 2214 | 2214 | 2214 |

| | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|
| **Dummy: Same team × post** | -0.084 (-2.914)*** | -0.044 (-1.582) | -0.045 (-1.599) | 0.014 (0.569) | -0.046 (-1.764)* |
| Constant | 0.409 (19.571)*** | 0.432 (23.120)*** | 0.469 (32.085)*** | 0.315 (14.440)*** | 0.633 (33.917)*** |
| Obs. | 2214 | 2214 | 2214 | 2214 | 2214 |

Parentheses show $t$ statistics. Errors are clustered by firm $i$ and by firm $j$.

Significance: * $\Leftrightarrow p < 0.1$, ** $\Leftrightarrow p < 0.05$, *** $\Leftrightarrow p < 0.01$.

**Outcome variables:**

1. Firm introduced new design or packaging;
2. Firm introduced a new channel for selling its products;
3. Firm introduced a new method for pricing;
4. Firm introduced a new way of advertising or promotion;
5. Firm changed or introduced new business processes;
6. Firm changed the organization of its work;
7. Firm introduced new quality control standards for suppliers or subcontractors;
8. Firm introduced new products;
9. Weighted average of the earlier innovation measures.

Table 19: **Dyadic regressions: Dispersion of outcomes (difference-in-difference estimation)**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| **Dummy: Same team × post** | 0.242 | 0.021 | 126.625 | 231.073 | 582.663 |
| | (0.116) | (0.500) | (1.499) | (1.606) | (1.954)* |
| Difference in winnings × post | -0.080 | -0.002 | 1.361 | -3.293 | -9.543 |
| | (-0.989) | (-1.382) | (0.418) | (-0.498) | (-0.566) |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ |
| Obs. | 4384 | 4418 | 4427 | 4498 | 4498 |

| | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|
| **Dummy: Same team × post** | 261.919 | 439.237 | -37.040 | -0.025 | 0.009 |
| | (1.729)* | (3.750)*** | (-1.248) | (-0.679) | (0.219) |
| Difference in winnings × post | -2.310 | -3.612 | 0.547 | 0.000 | -0.002 |
| | (-0.345) | (-0.599) | (0.648) | (0.242) | (-2.099)** |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ |
| Obs. | 4071 | 3622 | 4053 | 4341 | 4404 |

Parentheses show $t$ statistics. Errors are clustered by firm $i$ and by firm $j$.

Significance: * $\Leftrightarrow p < 0.1$, ** $\Leftrightarrow p < 0.05$, *** $\Leftrightarrow p < 0.01$.

'Controls' are 'same team', 'post' and 'difference in winnings', and an intercept.

**Outcome variables:**

1. Hours worked by the respondent in the firm;
2. Whether others work in the firm;
3. Total expenses last month;
4. Inventories;
5. Cash and inventories;
6. Capital stock;
7. Sales last month;
8. Profit;
9. Whether the respondent has a bank account;
10. Whether the respondent uses a susu collector.

Table 20: **Experimental results: Attrited between waves 6 and 7**

| | (1) ITT | (2) ITT | (3) LATE | (4) ITT | (5) LATE |
|---|---|---|---|---|---|
| **Dummy: Invited × post** | 0.021 (0.519) | | | | |
| **Dummy: Individual treatment × post** | | 0.047 (0.922) | 0.072 (0.903) | | |
| **Dummy: Group treatment × post** | | 0.009 (0.214) | 0.013 (0.215) | | |
| **Dummy: Capital factsheet × post** | | | | 0.051 (1.234) | 0.078 (1.206) |
| **Dummy: Labor factsheet × post** | | | | 0.010 (0.241) | 0.016 (0.241) |
| **Dummy: Placebo factsheet × post** | | | | -0.006 (-0.135) | -0.009 (-0.136) |
| Constant | 0.137 (3.755)*** | 0.137 (3.752)*** | 0.137 (3.766)*** | 0.142 (5.415)*** | 0.142 (5.440)*** |
| Obs. | 551 | 551 | 551 | 551 | 551 |
| $H_0$: Same treatment effect ($p$-value) | | 0.328 | 0.342 | 0.453 | 0.470 |

Parentheses show $t$ statistics. Errors are clustered by team (where each individual player forms his/her own team).

Significance: * $\Leftrightarrow p < 0.1$, ** $\Leftrightarrow p < 0.05$, *** $\Leftrightarrow p < 0.01$.

**Appendix: Factsheets and further tables (for online publication)**

Figure 1: Factsheet: Placebo

Figure 2: Factsheet: Labor

Figure 3: Factsheet: Capital



**Enterprise Factsheet**

# Did you know...?

**Fact 1: Small entrepreneurs often complain of lack of funding**

Most people with a small business in Asia or Africa say that **lack of funding or lack of credit is the primary obstacle to the growth of their business.**

**Fact 2: Regular savings can allow small businesses to invest and expand**

In Sri Lanka, the owners of some small enterprises were **encouraged to save more**. They subsequently invested more money into their business, increased their stock of products and earned higher profits compared to other business owners who were not encouraged to save.

**Investment in Business Stock**

Without Encouragment for Savings

With Encouragment for Savings

US $    US $ 500    US $ 1000
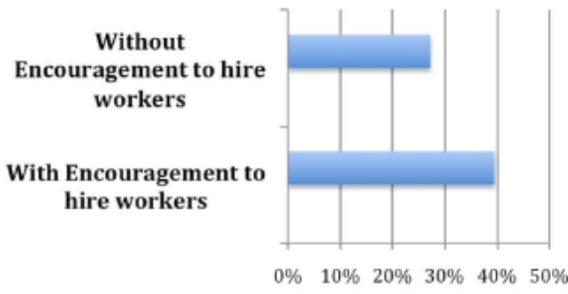
**Suggestions:**

Here are some steps that a business can take to grow:

✓ Save part of the business profit regularly, rather than spending it entirely.

✓ Open a bank account to hold savings

We appreciate your participation in the study and we hope that you find this information useful*

**Marcel Fafchamps**
Professor of Development Economics
University of Oxford

**Paolo Falco**
Post-doctoral researcher
University of Oxford

* Your firm recently took part in a study on African entrepreneurship organized by the Centre for the Study of African Economies at the University of Oxford (UK).

Table 21: **Experimental results: Respondent has a bank account**

| | (1)<br>ITT | (2)<br>ITT | (3)<br>LATE | (4)<br>ITT | (5)<br>LATE |
|---|---|---|---|---|---|
| **Dummy: Invited × post** | -0.016<br>(-0.240) | | | | |
| **Dummy: Individual treatment × post** | | -0.010<br>(-0.123) | -0.012<br>(-0.114) | | |
| **Dummy: Group treatment × post** | | -0.018<br>(-0.270) | -0.025<br>(-0.267) | | |
| **Dummy: Capital factsheet × post** | | | | 0.089<br>(1.248) | 0.117<br>(1.250) |
| **Dummy: Labor factsheet × post** | | | | -0.012<br>(-0.173) | -0.017<br>(-0.176) |
| **Dummy: Placebo factsheet × post** | | | | -0.014<br>(-0.196) | -0.019<br>(-0.190) |
| Dummy: Invited | 0.094<br>(1.564) | | | | |
| Dummy: Individual treatment | | 0.060<br>(0.841) | 0.077<br>(0.841) | | |
| Dummy: Group treatment | | 0.109<br>(1.749)* | 0.153<br>(1.775)* | | |
| Dummy: Capital factsheet | | | | -0.038<br>(-0.582) | -0.050<br>(-0.585) |
| Dummy: Labor factsheet | | | | 0.057<br>(0.915) | 0.079<br>(0.909) |
| Dummy: Placebo factsheet | | | | 0.082<br>(1.345) | 0.114<br>(1.384) |
| Dummy: Post | 0.190<br>(3.138)*** | 0.190<br>(3.135)*** | 0.190<br>(3.150)*** | 0.164<br>(3.968)*** | 0.164<br>(3.992)*** |
| Constant | -0.808<br>(-2.052)** | -0.808<br>(-2.049)** | -0.808<br>(-2.059)** | -0.596<br>(-2.228)** | -0.596<br>(-2.241)** |
| Obs. | 903 | 903 | 903 | 903 | 903 |
| $H_0$: Same treatment effect ($p$-value) | | 0.901 | 0.875 | 0.394 | 0.401 |

Parentheses show $t$ statistics. Errors are clustered by team (where each individual player forms his/her own team).
Significance: * $\Leftrightarrow p < 0.1$, ** $\Leftrightarrow p < 0.05$, *** $\Leftrightarrow p < 0.01$.

Table 22: **Experimental results: Respondent uses a susu collector**

| | (1) ITT | (2) ITT | (3) LATE | (4) ITT | (5) LATE |
|---|---|---|---|---|---|
| **Dummy: Invited × post** | 0.087 (1.141) | | | | |
| **Dummy: Individual treatment × post** | | 0.104 (1.128) | 0.134 (1.133) | | |
| **Dummy: Group treatment × post** | | 0.080 (1.022) | 0.112 (1.021) | | |
| **Dummy: Capital factsheet × post** | | | | 0.053 (0.685) | 0.069 (0.688) |
| **Dummy: Labor factsheet × post** | | | | -0.053 (-0.710) | -0.073 (-0.716) |
| **Dummy: Placebo factsheet × post** | | | | 0.020 (0.258) | 0.028 (0.259) |
| Dummy: Invited | -0.070 (-1.035) | | | | |
| Dummy: Individual treatment | | -0.040 (-0.507) | -0.051 (-0.509) | | |
| Dummy: Group treatment | | -0.083 (-1.201) | -0.116 (-1.214) | | |
| Dummy: Capital factsheet | | | | -0.042 (-0.649) | -0.054 (-0.655) |
| Dummy: Labor factsheet | | | | 0.054 (0.879) | 0.075 (0.885) |
| Dummy: Placebo factsheet | | | | 0.034 (0.519) | 0.048 (0.522) |
| Dummy: Post | -0.057 (-0.759) | -0.057 (-0.759) | -0.057 (-0.762) | 0.012 (0.249) | 0.012 (0.251) |
| Constant | 0.885 (1.798)* | 0.885 (1.796)* | 0.885 (1.804)* | 0.405 (1.293) | 0.405 (1.300) |
| Obs. | 910 | 910 | 910 | 910 | 910 |
| $H_0$: Same treatment effect ($p$-value) | | 0.719 | 0.802 | 0.477 | 0.471 |

Parentheses show $t$ statistics. Errors are clustered by team (where each individual player forms his/her own team). Significance: * $\Leftrightarrow p < 0.1$, ** $\Leftrightarrow p < 0.05$, *** $\Leftrightarrow p < 0.01$.

Table 23: **Dyadic regressions: Effects of being on the same team (controlling for training session)**

|  | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
|  | | *i* remembers *j* | | | *i* spoke with *j* | |
| **Dummy: Same team** | 0.469 | 0.432 | 0.440 | 0.157 | 0.144 | 0.141 |
|  | (17.207)*** | (8.970)*** | (10.391)*** | (8.234)*** | (4.916)*** | (4.683)*** |
| **Dummy: Same training session** | | 0.042 | 0.026 | | 0.014 | 0.013 |
|  | | (1.021) | (0.788) | | (0.538) | (0.492) |
| Constant | 0.006 | 0.005 | | 0.005 | 0.004 | |
|  | (2.737)*** | (2.123)** | | (2.761)*** | (2.676)*** | |
| Dummies: *i*'s training session | | | ✓ | | | ✓ |
| Dummies: *j*'s training session | | | ✓ | | | ✓ |
| Obs. | 2414 | 2414 | 2414 | 2414 | 2414 | 2414 |

Parentheses show *t* statistics. Errors are clustered by firm *i* and by firm *j*.

Significance: * $\Leftrightarrow p < 0.1$, ** $\Leftrightarrow p < 0.05$, *** $\Leftrightarrow p < 0.01$.