



Business training plus for female entrepreneurship? Short and medium-term experimental evidence from Peru



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ABSTRACT

With millions of women around the developing world thrown into self-employment but with low productivity, increasing the profitability of their businesses is highly relevant for poverty reduction and gender equity. This study evaluates the impacts of a BDS program serving female microentrepreneurs in Lima using an experimental design, that included two treatment groups: One received only general training (GT), albeit more time-intensive than previous studies, and delivered by experts, while the other received in addition technical assistance (TA). Results show the existence of room for efficiency gains and growth, as all treated showed increased sales revenues and self-reported adoption of recommended business practices. Those that received only GT showed positive but not significant effects early on, but the two treatment groups showed indistinguishable growth, above 15%, two years after the end of the treatment. Low take up of the training may suggest some space to improve recruitment and delivery of treatments.

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1. Introduction

Can we make a microentrepreneur out of a small trader/producer? This question is increasingly important as it becomes more evident that microfinance alone is not enough to consolidate the growth of microbusinesses and take microentrepreneurs out of poverty (Banerjee et al., 2010; Karlan and Zinman, 2010). Microentrepreneurs may be neoclassical, but the financial constraint may not always be the most relevant, with lack of managerial capital likely to be relevant for many to make their business grow (Bruhn et al., 2010), as many start a business after being expelled from many formal jobs, or for perceiving they would be excluded from such job opportunities (Perry et al., 2007). Indeed, de Mel et al. (2009), with the help of a randomized experiment in Sri Lanka, find that many microentrepreneurs earn negative returns to capital, especially women. Furthermore, they find that the group of poor, high-ability, female microentrepreneurs that could benefit from expanded access to credit is rather small. The gender equity connotation of the distribution of entrepreneurial traits is also a major concern as most of the progress in the participation of females in the labor market has occurred through self-employment, and also because female-run microenterprises tend to be smaller, less productive and less profitable, at least in Latin America (Banco Mundial, 2010).

The question is whether we can improve the likelihood of business success by teaching entrepreneurial skills. In principle, more managerial capital may imply increased marginal productivity of labor or physical capital, but it can also improve the quality and quantity of such inputs (Bruhn et al., 2010). However, the goal of helping microentrepreneurs become successful may be complicated if business success is not guaranteed by the mere replication of recognized “best business practices”, but rather depends on the microentrepreneur’s intuition to identify business opportunities and the timing and perseverance with which she implements her business plan. Although there are many programs around the world implementing business-training modules for microentrepreneurs, they are very heterogeneous in time intensity, content and target groups, and we still know little about their true impact (McKenzie and Woodruff, 2014).¹ Self-selection into these programs has been another factor complicating these studies in the past. Recently, Karlan and Valdivia (2011) and Bruhn and Zia (2011) have presented experimental evidence related to business training programs that focus on transferring to microentrepreneurs business practices that are recognized as leading to success in survival and growth. The first one corresponded to a business training applied to female microfinance

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¹ Freedom from Hunger (FFH) and the International Labor Organization (ILO) are worldwide leaders in the design and implementation of such training programs. Other important agencies are Promujer in Latin America and BRAC in Bangladesh (see Dunford, 2002).

clients in Peru while the second one focused on young entrepreneurs in Bosnia and Herzegovina. Both studies are not encouraging about this type of business training. They both find that the training led to many adjustments in business practices consistent with the messages of the training, but weak or no effects on business performance.

Other recent studies have explored the impacts of complementing business training with capital transfers. Giné and Mansuri (2014) find that business training does indeed lead to increased business knowledge and better business practices, but not on business sales or profits, and only for male clients in rural Pakistan, a result similar to the one reported by Berge et al. (2012), for microfinance clients in Tanzania. Women do improve business knowledge but show no adjustments in their business practices and profitability. Giné and Mansuri argue that social norms that restrict women's labor supply and their participation in family business decisions may explain the differentiated outcome by gender. Both studies included a complementary capital transfer, but they do not find any business effects, which can be interpreted as evidence that the beneficiaries were not credit constrained. de Mel, McKenzie and Woodruff (2014), on the other hand, do find that the cash grant makes a difference, although only in the short run as the increased profitability vanished in the second year after the treatment. Despite lack of business effects of the loan lottery, Giné and Mansuri find the intervention to be profitable to the lender as they increased the number of larger loans issued to the beneficiaries without an increase in default rates or officer's workload, a result consistent with the one reported in Karlan and Valdivia (2011), although in that case benefits to the lender came not from larger loans, but from reduced default and increased retention.

These results could be interpreted as evidence that the lack of management skills is not the main constraint faced by microentrepreneurs, but an alternative interpretation is that the lack of effects is evidence that this kind of business training cannot transfer the management skills required to make the targeted microentrepreneurs successful. On one hand, previously analyzed training may not be deep enough or delivered by individuals with enough expertise. On the other hand, besides learning about general best business practices, microentrepreneurs may need some more specific advice about what are the key problems of their businesses or where to start to define the line of a new business, something that is closer to what is called technical assistance. Indeed, improving the management capital available to microbusinesses can be done through technical assistance, that is, through a detailed diagnosis of the strengths and weaknesses of the microbusiness, the identification of required changes/improvements, and the support in the implementation of such changes/improvements.

This study aims to contribute to this debate about whether lack of managerial capital is the main constraint for microbusiness growth in developing countries, and whether transmitting general best practices can be enough to guide our female microentrepreneurs to adjust their practices and innovate for business growth, or it is necessary to complement such training with a more personalized approach in the form of technical assistance. I report here the results of a randomized control trial associated to a business development services (BDS) program applied to female microentrepreneurs in four districts of Metropolitan Lima, Peru. The study design first identified a sample of eligible female microentrepreneurs, and then randomly assigned them to two treatment groups and a control group. Both treatment groups received a general business training (GT) module that was delivered over a 3-month period with three three-hour sessions a week. For one of the treatment groups, the training was complemented with an offer of technical assistance (TA), also over a three-month period, and combining the consultant's visits to the beneficiaries' businesses with group sessions to discuss common problems and alternative business strategies. We analyzed short-term and medium-term effects with the help of two follow up surveys, the first one about 7–10 months after the end of the treatment and the second one about 12–15 months later.

To my knowledge, there is no previous study that analyzes the importance of complementing business training with TA to improve business performance in developing countries with an experimental design. Bruhn et al. (2010) do report positive short run and long run results of an intervention that subsidizes management consultancy services for SMEs in Puebla, Mexico. They find consultancy services to improve productivity 1–4 months after the end of the intervention (12–16 months from the beginning) and increases employment and payroll up to three years after the end of the intervention. The processes most affected by the intervention were those related to formal accounts and marketing efforts, although the authors hypothesize that heterogeneity across firms might explain the lack of other significant effects of individual business practices. That study, however, differs from the one reported here on the nature of treatment and the beneficiaries, as their intervention did not include a training component and it is not exclusively targeted to microfirms but includes small and medium firms as beneficiaries.

Although the statistical power of our analysis was affected by low take up and retention of either treatment, the trends reported here are still rather clear. Our main findings, based on intention-to-treat (ITT) estimates, first indicate that all those that were offered either treatment experimented increased business sales by more than 15% (0.11 SD) in normal and bad months, about two years after the end of the training. Such sales effects were initially present only for the fully treated, and remained stable by the second follow up survey. The GT-only treated group, on the other hand, showed a positive sales effect early on, around 10%, but was not statistically significant. By the second follow up, this point estimate rose to the levels similar to those shown by the fully treated, and became statistically significant, especially the larger firms at baseline. The sales revenue effects came along with the adoption of some of the business practices recommended during the training, especially in the case of the fully treated, but also for the larger firms that were GT-only treated. Overall, we interpret these results as evidence that management capital is a binding constraint for business growth for our sample of microfirms in Lima and that efficiency gains can be achieved by providing these female entrepreneurs with the right support to their managerial capital, which includes long, intensive training delivered by specialized professionals. The other important lesson is that we need to be patient with these complex interventions, to allow them the time they need for its full impacts to materialize.

This article is organized in seven sections including this introduction. Section 2 describes the two interventions and discusses the expected effects. Section 3 explains the experimental design and its implementation, and briefly describes the statistical methods used to establish causal effects of the training on a wide variety of outcomes. Section 4 uses the baseline survey to describe the sample of the study in terms of key variables such as socio-economic characteristics of the women and their businesses, access to credit, previous experience on business training, use of family time, among others. We also explore other characteristics of the microentrepreneurs such as their attitudes towards risk, leadership abilities and disposition to work in groups. Next, Section 5 presents the level of compliance associated to the intention to treat, based on the women's participation in the training activities. Section 6 presents the results on key business practices and results and Section 7 closes with a discussion of results and policy implications.

2. The intervention and the expected effects

The intervention under study was supported by the World Bank and UNIFEM as part of a joint effort to promote the economic empowerment of women in developing countries. In the Peruvian case, we worked with a consortium formed by three organizations with vast experience on the provision of business training for adults for the development of the training materials and the

implementation of the training.² In previous studies that targeted female microentrepreneurs, such as Karlan and Valdivia (2011) or Giné and Mansuri (2014), materials were also developed by, or based on the work by, experienced institutions such as Freedom from Hunger, but the delivery was actually implemented by credit officials with little experience as trainers/facilitators of adults. The intervention was organized in two components: a general training component (GT) and a technical assistance component (TA). The first component included 36 three-hour group sessions delivered three times a week, that is, this training is much more intense than the 46-hour training analyzed in Giné and Mansuri (2014) and de Mel et al. (2014), or the 15-hour training in Karlan and Valdivia (2011). This length and intensity was necessary to allow an adequate coverage of different relevant topics, but its benefits could be limited by a reduced effective exposure to the training as it collides with beneficiaries' time constraints.

The content of the general training component consisted of the identification and explanation of best practices associated to successful microentrepreneurs, and was organized in three modules: personal development, business development and management and productivity improvements. The first module focused on the strengthening of women's self-esteem, social skills and tools for life planning. The second module focused on tools to plan new businesses, or process innovations in the current ones, as well as marketing and sales strategies, and costing. The third module provided tools to improve treatment of clients, safety and hygiene of production processes as well as production workshops on food processing industries, tailoring and dressmaking, and cosmetology.

The TA component also included the same three modules of the first component, but the support was more specific, based on the characteristics of the women's businesses and their needs. It combined individual sessions/visits with group sessions among similar businesses over a three-month period. In the personal development module, not only individual counseling was included to deal with personal issues, but also self-help groups were encouraged and supported. In addition, a short module on digital literacy was included in the group sessions. In the second module, individual and group sessions helped examine the strengths and weaknesses of the women's businesses, and discuss adjustments/innovations. Also, the formation of investment groups among firms in the same lines of work was encouraged and supported, so that they could coordinate certain common business activities.

The main goal of the BDS program is to transfer entrepreneurial skills. The training aims to improve basic business practices such as keeping records of sales and withdrawals, how to treat clients, where to sell, the use of special discounts, credit sales, and the goods and services produced. Some of these improvements may require more credit for the business, and should lead to increased productivity, sales, workers, and could eventually provide incentives to join the formal sector. However, if the entrepreneurial "spirit" is more about personality than skills, teaching an individual to engage in activities similar to those used by successful microentrepreneurs may not be enough for low-educated microentrepreneurs to properly identify their businesses' weaknesses and implement fixes that can eventually lead to improved business outcomes. An extra push from an expert's specific technical advice or the support and social pressure from peers in the same association of microentrepreneurs may help female entrepreneurs act on flaws or implement innovations. Still, such effort may not be enough to guarantee sustainability of the changes or the ultimate desired outcomes if a market for technical assistance for microbusinesses does not exist or has sizable informational asymmetries.

3. Experimental design and estimation methods

In this section I describe the randomized control trial implemented and the statistical methods used to establish the causal effects of the training intervention.

3.1. The randomized control trial

We evaluate the impacts of this business training plus intervention using a randomized control trial in which eligible female microentrepreneurs were randomly assigned to control and treatment groups. Eligibility was defined based on women having a family business, a titled plot, and expressing interest in participating in the training program. Eligible women were recruited in four of the largest districts of Lima (Comas, Independencia, Villa El Salvador and San Juan de Miraflores) by the training institutions with help from local government officials. Graph A.1 in the appendix maps the districts within Lima Metro. Recruitment strategies started using local radio and newspaper ads and brochures to be later complemented with visits to the women's businesses. Besides local markets, recruiters visited areas with large concentration of small firms, based on information from officials of the corresponding municipalities, to check for eligibility. Eligible businesswomen signed a commitment sheet but were informed during recruitment that it was not going to be possible for the training to be delivered to all eligible women in this pilot stage, and that initial beneficiaries were going to be selected randomly, and only half of them were going to receive the complete package.³

The project started in the northern cone of Lima, districts of Comas and Independencia. However, once we noticed that compliance was very low, the project decided to expand adding two districts in the southern cone: Villa El Salvador y San Juan de Miraflores. Thus, recruitment was implemented in two rounds. The first round took place in February of 2009 in the northern cone, while the second round took place in September of the same year in the southern cone. We recruited and surveyed at baseline a total of 1979 eligible women from 34 zones, which were randomly distributed in the three groups⁴: 711 women were assigned to treatment 1 (T1), 703 to treatment 2 and 565 were assigned to the controls group.⁵

Women in the T1 group were selected to receive only the general training component while those in the T2 group were selected to receive both components: the general training component first, followed by the technical assistance (TA) component. However, we did not disclose which beneficiary women belonged to which treatment group until about 2 weeks before the end of the first component, to avoid the risk that beneficiaries in the T1 group lose a positive attitude during training, out of disappointment, and/or facilitators engage in a compensating effort in favor of the T1 group. Thus, we are able to evaluate the sufficiency of the GT component and the marginal contribution of the TA component. We were not able to include a TA only treatment group that would have allowed us to evaluate whether the GT component is necessary to generate the effects of the full treatment (GT + TA).⁶

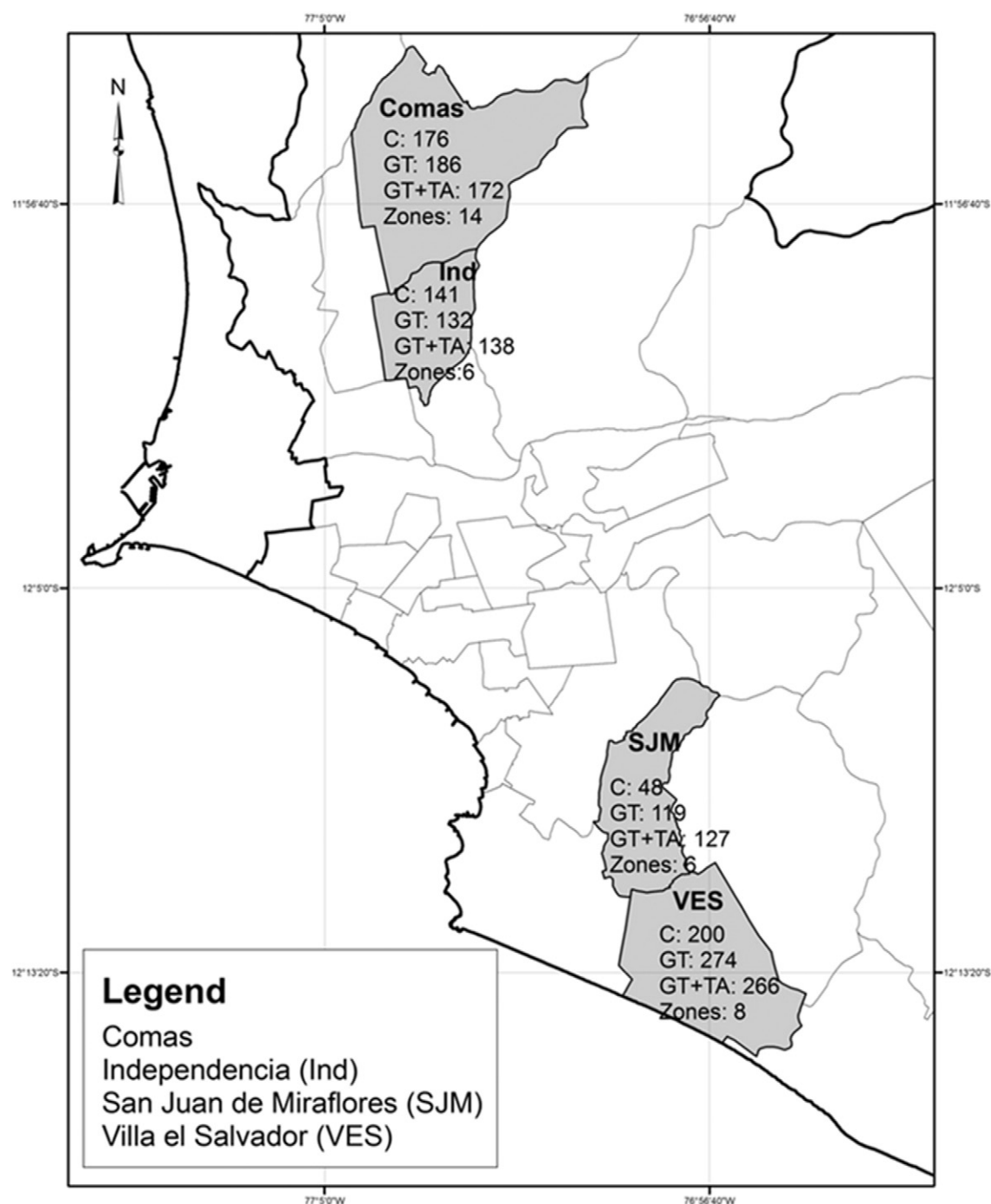
³ The commitment sheet also included basic information that was used to stratify randomization.

⁴ We consider the following stratification variables for the randomization: age and schooling of the woman, if she had a titled plot, if she received business training previously, if she runs the business and age of the business, and the zone (34) in which her business is located. We run 100 repetitions of the randomization and chose the first one that showed no statistically significant t-statistic when comparing groups across the stratification variables against, which it happened to be the second one.

⁵ Graph A.1 in the appendix shows the distribution of each of these treatment groups across the four districts, as well as the number of zones in each district.

⁶ A budgetary constraint was one of the reasons raised for such decision, as the cost of the impact evaluation became more expensive with respect to the intervention itself. Such approach, however, ignores the externalities of the learning about what works best to promote female entrepreneurship in developing countries.

² The three organizations are the following: Centro de Servicios para la Capacitación Laboral y el Desarrollo (CAPLAB), Centro Latinoamericano de Trabajo Social (CELATS), and Instituto de Promoción del Desarrollo Solidario (INPET). CAPLAB was the coordinator, and was in charge of the business development and management module. CELATS was in charge of the personal development module while INPET run the productivity improvements module.



Graph A.1. Map of the districts in the sample. Notes: (C) Women not invited to any training. (GT) Women invited only to training classes. (GT + TA) Women invited to full treatment (training and technical assistance).

We applied a baseline survey to all eligible women (1979), right after recruitment and before randomization results were announced to the consortium. For both rounds, the process was organized over one month with a team of 14 experienced surveyors. The questionnaire included questions about socio-demographic characteristics of the eligible women and her family, economic activities by all family members, characteristics of the eligible women's businesses as well as business practices and performance. We also asked the women about their business knowledge, attitudes and perceptions as well as their involvement in key business and family decisions.

Randomization was partially announced, not distinguishing between T1 and T2, right after the end of the baseline survey. Then, the consortium proceeded to contact those women selected into treatment

(1414) and invited them to start training sessions. 692 (49%) of the invited women declined participating in the training despite having expressed interest and availability at recruitment. The 722 that started the training were organized in 24 groups of 30 members each for the first training component. For the delivery of the training, those from the first recruitment round were divided in two cohorts. For the first cohort, the intervention started in March 2009, and lasted until October including the TA component, while for the second cohort the intervention went from June to December. For the second round of recruitments in the southern cone, training went from October 2009 to March 2010.

Monitoring of the intervention and the experimental design included periodic reports of attendance by selected beneficiaries, progress in the curricula by the different groups, as well as discussions with

facilitators about what they perceive to be key changes generated by the intervention. The first follow up survey went from March to November of 2010, about 7–10 months after the end of the general training component. For those in the T2 group, the intervention continued with the TA component for three more months, by helping female micro-entrepreneurs identify problems with their businesses and implement innovations. Small businesses may see ultimate results (sales, profits, workers) materialize this fast, but it may still occur that this time is too short for some of them. The second follow up survey went from October to December of 2011, giving the first cohort 27–30 months since the end of the training component. Instead of organizing a large team of surveyors for a one-month period for each round of interventions, as for the baseline survey, we worked for the first follow up survey with a smaller team of just 5 surveyors working continuously over 9 months, in such a way that all cohorts had the same time between the beginning of the intervention and the follow-up survey. For the second follow up survey, we went back to a team of 17 surveyors over a 3-month period, although the last month was mostly dedicated to re-visit those initially not found. We were able to re-interview a total of 1624 women in the first follow up and 1600 in the second one. Thus, attrition rates were quite similar (18% and 19%, respectively), and differences by treatment group were only significant in the first follow up.⁷ Data processing followed a double-entry system to minimize the incidence of typing errors.

3.2. Estimation methods

For the estimation of impacts, we use the treatment–control (T–C) differences based on the randomly allocated intention to treat (ITT). The comparison between treatment (T1) and control groups allows the estimation of the ITT effects of traditional business training, allowing us to test whether the transmission of general best practices associated to successful microentrepreneurs is enough to generate adjustments in the businesses practices followed by our entitled beneficiaries and ultimately increase sales and profits. In turn, comparing the two treatment groups allows for the estimation of the marginal contribution of the technical assistance component, allowing us to test whether such more personalized approach is necessary or cost efficient to help entitled women's beneficiaries improve their businesses and escape from poverty. Formally, the preferred specification is the ANCOVA estimator for the ITT effects, which we obtain through the following regression⁸:

$$Y_{ijt} = \alpha + \beta_1 T1_{ij} + \beta_2 T2_{ij} + \beta_3 Y_{ij0} + \beta_4 X_{ij0} + \delta_j + \varepsilon_{ij} \quad (1)$$

where Y_{ijt} denotes an outcome variable for a woman i in zone j at time t (follow up), $T1_{ij}$ is a dummy variable that takes the value one if the eligible woman was selected to receive only the general training, and $T2_{ij}$ is also a dummy variable that takes the value one if the eligible woman was selected to receive both components of the training. Y_{ij0} denotes the value of the outcome variable at baseline, X_{ij0} is the vector of stratifiers used in the randomization,⁹ δ_j is the zone fixed effects and ε_{ij} is the error term. Thus, β_1 is the effect of basic training, while $(\beta_2 - \beta_1)$ would represent the marginal contribution of the TA component. The error term is assumed to be uncorrelated across geographical zones but not within them.¹⁰

We evaluate the impact of this intervention upon a large number of indicators related to business practices and business results.¹¹ However, testing multiple outcomes using Eq. (1) independently increases the probability of rejecting a true null hypothesis for at least one outcome

above the significance level used for each test (Duflo et al., 2007). We need to adjust the estimated p-values if we want to test whether business training has an impact on the family of outcomes associated to business practices/knowledge, business results or institutional outcomes. A summary measure that captures such idea is the mean standardized treatment effect. Following Kling et al. (2007), we implement that by defining a summary measure Y^* as the unweighted average of all standardized outcomes of a family. That is, we get $Y^* = \sum_k Y_k^*/k$, where $Y_k^* = (Y_k - \mu_k)/\sigma_k$. Y_k denotes the outcome variables within each family and were re-defined in some cases so that a larger value is always better for the business or household. Standardization is done using mean and variance for the control group at baseline. Thus, the mean and standard deviation of β in Eq. (1) for Y^* allow us to test whether treatment had an overall positive effect on the corresponding family of outcomes.

We also use the summary measure Y^* to test whether the training generates heterogeneous treatment effects for each family of outcomes along key individual characteristics. We use the following model:

$$Y_{ij1} = \alpha + \delta X_{ij0} + \beta_1 T1_{ij} + \gamma_1 T1 \cdot X_{ij0} + \beta_2 T2_{ij} + \gamma_2 T2 \cdot X_{ij0} + \beta_3 Y_{ij0} + \delta_j + \varepsilon_{ij} \quad (2)$$

where X_0 is a binary variable that denotes the characteristic of interest prior to the intervention. In this case, β_1 is the estimator of the treatment effect for those individuals in T1 that have characteristic $X = 0$ and $(\beta_1 + \gamma_1)$ measures the impact for those individuals that have characteristic $X = 1$.

4. The sample

A total of 2400 women filled out the commitment sheets during the two rounds of recruitment, 1200 in each cone. However, we were able to interview only 1979 (83%) of them at baseline, as the rest were not found or refused the interview.¹² In Appendix B, we present key characteristics of the sample of eligible women, their families, and their businesses. First, those tables show that the sample is fairly well balanced at baseline, in the sense that almost none of the analyzed variables show significant differences between the treatment and control groups. In terms of socio-demographic characteristics, the eligible woman for this project is 43 years old, has 10 years of schooling, has a partner under marriage or a common-law arrangement, and lives in a household with 4–5 members on a titled dwelling (see Appendix Table B.1). However, 30% of them live without a partner, and about the same proportion play the role of household head.

With respect to her business activities, the families of the eligible woman have an average of 1.2 businesses, but the woman herself runs only one of them (see Appendix Table B.1). 68% of the businesses run by the program's beneficiaries are dedicated to retail, and half of them sell fresh food or groceries. Moreover, within manufacturing businesses, we include food processing which mainly refers to small restaurants. In terms of the size of the businesses, they are very small, selling on average 510 soles a week, which represent approximately US\$ 200, although one out of four businesses sell less than US\$ 40 a week.¹³ One out of two of the women had a credit transaction in the 12 months prior to the baseline survey, mainly for their businesses (see Appendix Table B.2). Consumption credit is low, and mostly in households that already had a business loan. On the other hand, only 16% of the eligible women had received business training before. Thus, it is not surprising that they report very high interest in training at baseline, even when the enumerators asked about a hypothetical costly training, at US\$ 4 per

⁷ See the last two lines in Table 1.

⁸ The results section also presents the diff-in-diff estimates with fixed effects, for some aggregate indexes, as a robustness check.

⁹ See footnote 6 for the full list of stratifiers. Also, see Bruhn and McKenzie (2009) for a discussion of the need to control for the stratifiers in the estimation of treatment effects.

¹⁰ The sample is distributed in 34 zones in the four districts, 2 cones of Lima.

¹¹ Table A.1 presents the definition used to construct all variables used in the analysis.

¹² Randomization was done upon the eligible women that were reached for the baseline survey.

¹³ At the exchange rate prevalent by March 2013.

Table 1
Attrition, treatment take up and retention for GT, by treatment group.

	Control	GT	GT + TA	p-Value		
	(1)	(2)	(3)	(3) – (2)	(2) – (1)	(3) – (1)
Take up		0.491	0.531	0.097		
Retention (attendance)						
Less than 50% of classes		0.576	0.579	0.957		
50%–75% of classes		0.146	0.145	0.972		
More than 75% of classes		0.278	0.276	0.969		
Attrition						
Follow up 1	0.206	0.162	0.172	0.594	0.030	0.156
Follow up 2	0.198	0.198	0.183	0.487	0.995	0.460
# of obs.	565	711	703			

Notes: (GT) Women invited only to training classes. (GT + TA) Women invited to full treatment (training and technical assistance).

session. However, as we see in the following section, compliance was low and dropout rate was high throughout the training.

The participation of family members in the women's business is high. 26% of the other adults still report working in the business, while 15% of the children in the family report working in the business, especially girls above 14 years old. In general, Appendix Table B.3 shows that the eligible population reproduces traditional gender patterns in time use. On average, the eligible woman reports dedicating 75 h of her time to productive activities.¹⁴ They dedicate 48 h a week to work on her business but another 22 are dedicated to household chores. Adult males, on the other hand, work 34 h a week on jobs outside the household, 12 h in a family business, but only dedicate 5 h a week to household chores. In Appendix Table B.4, we report some key personal characteristics of our sample of eligible women such as risk prone and impatience as well as self-reported attitudes that are usually positively associated with entrepreneurial success: drive, persistence, innovativeness and independence.¹⁵ None show to be statistically different between treatment and control groups at baseline.

5. Implementation: the low compliance problem

In the previous section, we already indicated that we lost 17% of those originally recruited as they were not found or refused the interview at baseline. Thus, as indicated in Section 3, we randomly allocated 1979 female microentrepreneurs across treatment and control groups, and 1414 women were invited to join the program. However, only 722 (51%) accepted and started the training (see Table 1). This figure would seem low considering that recruitment included an explicit signed declaration of interest by the entrepreneur, although McKenzie and Woodruff (2014) show that such low take up is not rare in this kind of training interventions, even for such samples.¹⁶

Furthermore, attendance records to the general training sessions show that dropout was also high, which is not surprising considering the length and intensity of the training. Only 42% of those that started the training completed at least 20 sessions (50%) while only 28% reached at least 30 sessions (75%).¹⁷ The take up and retention rates for this GT component were similar across treatment groups, which is not surprising since the beneficiaries of the GT + TA (T2) treatment were not disclosed until the week before the end of the GT. Only those women in T2 that started the general training (373) were invited to that second component regardless of their attendance record to the

training sessions. Only 173 (46%) female entrepreneurs attended at least one of the group sessions of the second component, but the dropout rate was much lower, as 95% of those that started the group sessions attended half of the programmed sessions for the TA module and 53% (92 microentrepreneurs) reached 75% of the sessions.

In what follows of this section, we use a multivariate model to identify the observable characteristics featured by those that accepted to start the training and continue it, in search of adjustments in recruitment, the curricula, which could help improve take up and retention for these programs.

Which women fulfill their commitment to attend the training and which ones dropped during the course of the training? Table 2 shows that those eligible women selected to treatment that accepted to start the training tended to be relatively older, expressed the highest interest in the training at baseline and had to move to a different zone to receive the training. Education does not seem to be a significant determinant of take-up, although the ones with secondary education are indeed more likely to stick with the training longer: they are 13 percentage points more likely to attend at least 50% of the general training sessions.¹⁸ Something similar occurs with the childbearing situation, suggesting the importance of the time constraint to explain the high dropout rate. Take-up of the general training does not seem to be reduced when the woman has a child younger than five years old. However, it does reduce (9 percentage points) the likelihood that she stays until the end. Also, the fact that training meetings took place in a zone different from the one where the woman resides did increase dropout in 7 percentage points. These latter results are consistent with the hypothesis that a time constraint plays an important role in explaining the low retention showed in this training program. Finally, self-reported personal characteristics and the importance of the business for family income do not seem to matter for either enrollment or retention.

Table 2 also analyzes the determinants of take up and retention for the TA component. For that component, we see that level of interest in training and individual attitudes matter. Those who expressed more interest in training at baseline tended to accept the offer to receive specific advice. Also, those identified as risk prone and driven individuals were more likely to continue with the group meetings organized by the advisor/facilitator. On the other hand, those that were identified as impatient, independent and persistent tended to drop the program before the end of the intervention.

This multivariate analysis provides only suggestive evidence of the factors that may be behind low take-up and high dropout rate, but they should be considered more seriously in future studies of the impacts of business training. First, it significantly reduces the statistical power of the studies that analyze the impacts of business training, as discussed extensively in McKenzie and Woodruff (2014). Second, from a policy perspective, it raises the relevance of

¹⁴ The complement of these activities would be leisure and rest.

¹⁵ See Costa and McRae (1992) and Caliendo et al. (2011) for a discussion of the connection between some personality characteristics that are associated to the likelihood to become self-employed and to be successful at it.

¹⁶ Average take up rate in the sample of studies they analyzed, was 65%, above the one found here. However, they also cite a number of cases in which the studies did not finish precisely for the complications associated to low take up.

¹⁷ We need to keep in mind, however, that exposure to 50% of the training implied more than 50 h, which is longer than many of the previous programs analyzed in the literature.

¹⁸ Notice that the regressions on attendance are run over the sample of beneficiaries from T1 and T2 that started the corresponding component.

Table 2
Compliance and retention by treatment component.

	Training component			TA component	
	Started	Attendance GT sessions		Started	Attendance group sessions
		50% or more	75% or more		75% or more
	(1)	(2)	(3)	(4)	(5)
Age					
35 to 50 years old	0.132*** (0.044)	0.192*** (0.049)	0.121*** (0.044)	0.178*** (0.037)	−0.182 (0.154)
More than 50 years old	0.145*** (0.051)	0.202*** (0.051)	0.148*** (0.056)	0.224*** (0.048)	−0.435** (0.178)
Household head	0.032 (0.030)	0.015 (0.044)	0.014 (0.036)	0.081*** (0.030)	−0.045 (0.095)
Education					
Secondary	−0.005 (0.049)	0.031 (0.049)	0.055 (0.037)	−0.001 (0.036)	0.043 (0.131)
Higher education	0.056 (0.045)	0.131** (0.052)	0.074 (0.053)	0.038 (0.042)	−0.060 (0.175)
Number of children					
5 years old or younger	−0.027 (0.028)	−0.059 (0.036)	−0.089** (0.039)	−0.001 (0.041)	−0.017 (0.112)
Between 5 and 15 years old	0.002 (0.017)	0.015 (0.027)	0.017 (0.027)	0.004 (0.021)	0.087 (0.077)
Business size (by weekly sales)					
Medium (S/.101 to S/.500)	−0.046 (0.040)	−0.037 (0.048)	−0.033 (0.045)	−0.044 (0.037)	−0.095 (0.123)
Large (over S/.500)	−0.006 (0.056)	−0.058 (0.052)	−0.052 (0.047)	−0.065 (0.047)	0.055 (0.144)
Very interested in training	0.084** (0.034)	0.051 (0.037)	0.081* (0.036)	0.054* (0.036)	−0.006 (0.102)
Attitudes (self-reported)					
Risk prone	0.010 (0.031)	0.033 (0.042)	0.044 (0.036)	0.062** (0.031)	0.194** (0.092)
Impatient	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	0.001 (0.001)	−0.003* (0.002)
Independent (dislikes orders)	−0.030 (0.029)	0.011 (0.037)	−0.010 (0.040)	0.021 (0.028)	−0.367*** (0.107)
Persistent	−0.047 (0.051)	−0.036 (0.074)	−0.058 (0.077)	0.053 (0.078)	−0.534*** (0.095)
Innovative	−0.013 (0.062)	−0.015 (0.087)	0.000 (0.062)	−0.045 (0.083)	−0.014 (0.185)
Driven	−0.006 (0.083)	0.161** (0.071)	0.048 (0.093)	0.061 (0.088)	0.495*** (0.068)
Business dependence					
Medium	−0.020 (0.034)	−0.015 (0.039)	−0.006 (0.034)	−0.073* (0.039)	−0.022 (0.109)
High	−0.046 (0.060)	0.033 (0.041)	0.017 (0.041)	−0.059 (0.037)	0.091 (0.122)
Distance to meeting places					
Different zone	0.124*** (0.033)	−0.062* (0.035)	−0.073** (0.035)	0.060 (0.040)	−0.335*** (0.111)
# observations	1414	725	725	701	172

Notes: (2) and (3) include only women who started general training; (5) includes only women who started technical assistance. All regressions include district and business activity fixed effects. Also, the errors are clustered at the level of each of the 34 zones. Marginal effects reported. Standard errors clustered by zone.

* Significant at 10%.

** Significant at 5%.

*** Significant at 1%.

questions about the recruitment mechanisms required, the importance of day-care facilities or a more efficient use of time during the sessions to help improve retention, which in turn may lead to larger average effects for this type of interventions, or helping reach those in highest need. Still, further research is needed to learn about who to recruit and how to improve the effective exposure to treatment.

6. Estimated impacts

We present here our short-run (7–10 months after end of treatment) and long-run (19–25 months) estimates of the intention-to-treat effects (ITT) of the BDS program on key measures of business results (Table 3) and practices (Tables 4 and 7). Table 3 reports effects

on self-reported sales and productivity measures, but not on self-reported profits, a measure that has been common in many previous studies. We did not ask for this measure because of the difficulties to measure it with the kind of surveys we use here. Indeed, McKenzie and Woodruff (2014) report that such difficulties have made many recent studies stop collecting profit data, or collecting it but not using it in the analysis due to excessive noise. A related argument is that training tends to emphasize on registering revenues and costs, so that increased profits may result from better accounting rather than increased profitability, and such bias tend to be higher for profits than for sales or revenues.

Columns (2)–(3) and (6)–(7) in Table 3 presents the ANCOVA estimates of the ITT effects for each treatment groups when using the regression in expression (1) with the first and second follow

Table 3
Intention to treat (ITT) effects – business results.

	FU1					FU2				
	# of obs.	Control	GT	GT + TA	p-Value	# of obs.	Control	GT	GT + TA	p-Value
		(1)	(2)	(3)	(3) – (2)		(5)	(6)	(7)	(7) – (6)
Monthly sales (log)										
Last week	1547	5.275	0.087 (0.087)	0.186*** (0.065)	0.209	1487	5.067	0.115 (0.102)	0.139 (0.110)	0.799
Excellent month	1544	7.200	0.058 (0.092)	0.168** (0.071)	0.176	1429	6.755	0.175 (0.122)	0.177 (0.118)	0.987
Normal month	1536	6.801	0.101 (0.069)	0.203*** (0.059)	0.187	1474	6.525	0.156* (0.086)	0.191* (0.098)	0.604
Bad month	1535	6.167	0.106 (0.087)	0.190*** (0.069)	0.285	1468	5.800	0.201** (0.081)	0.172** (0.083)	0.714
Capital (log)	1623	5.97	0.052 (0.154)	0.042 (0.198)	0.958	1595	5.873	0.194 (0.252)	0.337 (0.257)	0.538
Employment (not including owner/manager)										
Number of total workers	1623	0.556	–0.089 (0.069)	–0.095 (0.070)	0.812	1595	0.514	–0.020 (0.090)	–0.049 (0.081)	0.670
Number of non-family workers	1623	0.229	–0.068 (0.055)	–0.063 (0.053)	0.903	1595	0.237	–0.052 (0.087)	–0.079 (0.075)	0.587
Productivity residual										
Last week	1547	0.054	0.075* (0.044)	0.081 (0.054)	0.907	1487	–0.063	0.020 (0.057)	0.014 (0.059)	0.863
Normal month	1536	0.084	0.095** (0.043)	0.122* (0.061)	0.656	1474	–0.095	0.045 (0.074)	0.057 (0.070)	0.827

Notes: (FU1) First follow-up. (FU2) Second follow-up. (GT) Women invited only to training classes. (GT + TA) Women invited to full treatment (training and technical assistance). Regressions in columns (2), (3), (6) and (7) control for clusterization variables, the value of the dependent variable at baseline, and include zone's fixed effects. Standard errors are clustered at zones (34).

* Significant at 10%.

** Significant at 5%.

*** Significant at 1%.

Table 4
Intention to Treat (ITT) effects – business practices and associativity.

	FU1					FU2				
	# of obs.	Control	GT	GT + TA	p-Value	# of obs.	Control	GT	GT + TA	p-Value
		(1)	(2)	(3)	(3) – (2)		(5)	(6)	(7)	(7) – (6)
<i>Business practices</i>										
Tax formality	1624	0.132	–0.008 (0.017)	0.005 (0.021)	0.524	1595	0.16	–0.002 (0.018)	–0.020 (0.014)	0.397
Financing strategies business vs household										
Paid fixed salary to herself	1623	0.056	0.018 (0.015)	0.019 (0.014)	0.988	1595	0.093	0.033 (0.021)	0.037* (0.020)	0.837
Taking money/products of the business	1624	0.776	–0.030 (0.023)	–0.019 (0.026)	0.649	1595	0.681	–0.036 (0.032)	–0.032 (0.031)	0.844
Keeping records of business activities										
Sales	1623	0.238	0.019 (0.026)	0.044* (0.025)	0.303	1595	0.211	–0.009 (0.028)	0.025 (0.020)	0.271
Withdrawals	1623	0.168	0.020 (0.021)	0.024 (0.028)	0.846	1595	0.126	0.009 (0.022)	0.034* (0.019)	0.273
Salaries	1623	0.063	–0.022** (0.009)	–0.005 (0.011)	0.020	1595	0.035	–0.001 (0.012)	0.005 (0.008)	0.595
Innovations in business activities										
Started new business last year	1624	0.121	0.014 (0.024)	–0.006 (0.022)	0.288	1595	0.078	0.053*** (0.018)	0.013 (0.024)	0.058
Stop any business operation – last two years	1624	0.157	0.045* (0.025)	0.021 (0.018)	0.197	1595	0.2	0.055** (0.022)	0.021 (0.029)	0.080
Identify problems with business – last year	1623	0.630	–0.013 (0.025)	–0.036 (0.031)	0.510	1595	0.568	0.015 (0.033)	0.024 (0.032)	0.817
Planned innovations in her business – last year	1623	0.753	–0.008 (0.024)	0.026 (0.026)	0.133	1595	0.721	0.019 (0.030)	0.048 (0.028)	0.261
Executed innovations in her business – last year	1623	0.693	0.006 (0.026)	0.038 (0.024)	0.228	1595	0.576	0.029 (0.029)	0.043 (0.037)	0.651
<i>Participation in business related associations</i>										
Is a member?	1624	0.105	0.033** (0.015)	0.075*** (0.024)	0.034	1595	0.042	0.012 (0.015)	0.030* (0.017)	0.286
# of associations	1624	0.112	0.037* (0.017)	0.083*** (0.029)	0.055	1595	0.042	0.012 (0.015)	0.034* (0.017)	0.216

Notes: See notes to Table 3.

* Significant at 10%.

** Significant at 5%.

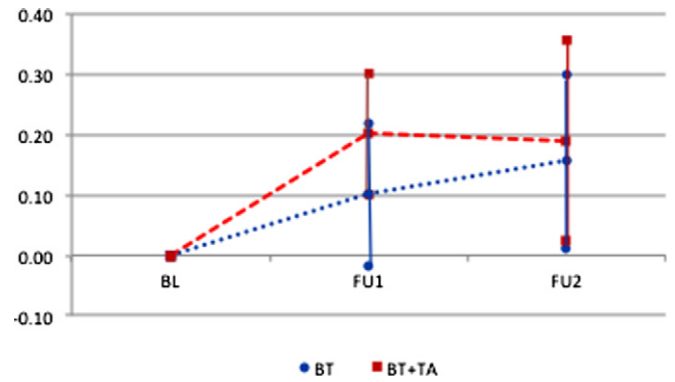
*** Significant at 1%.

ups, respectively.¹⁹ In terms of business sales, we find positive and significant differences in favor of those female microentrepreneurs that received treatment, about two years after the end of the treatment, with the exception of sales in good months. In the case of sales in a normal month, for instance, we find large average effects for both treatment groups; those GT-only treated sold 16% more than the control group under the preferred specification. Those fully treated were able to increase their sales in 19%, but the differentiated effect by treatment group is strongly rejected.

However, we do observe differences by treatment group in the short-run. By the first follow up survey (7–10 months after the end of the treatment), sales increases are only statistically significant for those for whom the treatment included GT + TA. In a normal month, those treated with GT + TA were already selling 20% more than their control counterparts. The women that received only GT treatment also increased their average sales by 10%, but the variance is so high that they are not statistically different from the control group. Such high variance also explains that the GT + TA treatment effect is not statistically different from that of the GT treatment group, although the p-value is much smaller than with the second follow up. Fig. 1 shows graphically the evolution over time of the average effect for sales in a normal month, and the corresponding 90% confidence intervals.

We also find positive effects on the residual-based productivity measure, for both treatment groups, but they vanish by the second follow-up. In the case of the productivity index based on sales in a normal month, the GT + TA group increased their productivity in 0.12 SD 7–10 months after the end of treatment. In turn, the GT group increased productivity by 0.09 SD, but the difference was not statistically significant. By the second follow up, the corresponding point estimates dropped in half, and failed to be statistically significant. On the other hand, we find no significant capital or employment effects for any of the treatment groups in any of the measurement points. Interestingly, the estimated average employment effects are negative, although highly variable. In contrast, we find positive capital stock effects, but also not statistically significant.

The next question is whether sales increases can be associated to changes in business practices closely connected to the messages provided with the training delivered. Table 4 reports the effects on self-reported variables such as the formality of the business, management of household and business accounts, registry of key business movements and planning or execution of major changes/innovations in the entrepreneurial activity of women in treated and control groups. We find only a few statistically significant adjustments in business practices, and they differ by type of treatment received. In the short-run, GT + TA treated women were 4.4 percentage points more likely to keep records of their sales, and 7.5 percentage points more likely to participate in business-related associations. This latter finding is very relevant considering that the value of associating with business peers and how to make them work was one of the most important messages in the TA component of the BDS intervention, although it is important to notice that increased associativity is also observed among those GT trained, albeit at a lower scale. We also find that GT treated women were more likely to close their old business lines (4.5 percentage points), but the opening of new ones was not statistically significant. In turn, those that received GT + TA were more prone to plan and implement innovations in their current business (about 3.8 percentage points), although this latter effect fails to be statistically significant.²⁰ Appendix Table C.1 shows that treated women planned and implemented more innovations into their businesses by the first follow up. Those training-only reported to be more inclined towards seasonal adjustments in



Note: Points joined by the lines are the estimated average effects. Vertical segments indicate the 90% confidence interval

Fig. 1. Log sales effects over time – normal month. Note: Points joined by the lines are the estimated average effects. Vertical segments indicate the 90% confidence interval.

products/services while those fully treated tended to focus more on improving customer service. But the two treatment groups also show some common adjustments, specifically, an increased product/service diversification, more sales campaigns and increased ad expenditures.

With the second follow up, we observe other relevant changes. Those GT treated that had not already shown to be more prone to close some business operations, were more likely to start new business lines a year later. On the other hand, those GT + TA treated became more likely to pay themselves a fixed salary (3.7 pp), instead of taking money from the business depending on business capacity or household needs, and to register cash or in kind withdrawals (3.4 pp). The implementation of innovations effect is even larger on average than earlier, and for the two treatment groups, but it is now far from statistically significant.²¹ The associativity effects, on the other hand, are much smaller on average a year later, and only significant for the GT + TA group.

We next look at the aggregate measures of business productivity, sales and associativity.²² Two reasons are behind this analysis. On the one hand, analyzing too many individual variables increases the likelihood of finding a false impact (Duflo et al., 2007). On the other hand, the intervention may generate different adjustments in heterogeneous firms, so that one particular recommended business practice may be adopted only by a few, but all firms adopt some of the recommended business practices, which can be captured by the standardized index. In Tables 5 and 6, we also take advantage of the reduction in the number of variables under analysis to explore the presence of heterogeneous impacts, across education and entrepreneurial traits of the woman and business size. For each aggregate index, we also report the p-values associated to the null hypotheses that effects by treatment group are no different.

As in the individual measures shown in Table 3, the business productivity index shows a positive average treatment effect for both treatment groups (0.07 SD and 0.1 SD), with no statistically significant difference between the two by the first follow up, but such effects vanish a year later. However, the distributional analysis does show that some groups were able to sustain the effects over time. Indeed, the effects within the GT + TA group clearly accrues among the more educated and those with initial high entrepreneurial traits, and to an extent, the larger firms, suggesting that the intervention tends to benefit

¹⁹ Columns (1) and (5) present the average value of the outcome variable for the control group at the corresponding survey.

²⁰ The corresponding p-value is 0.13.

²¹ No specific innovation is found to be statistically significant by the second follow up, except increased ad expenditures.

²² See methodological discussion in Section 3 for a description of the aggregation method.

Table 5
ITT effects — aggregate standardized indexes for business results by sub-groups.

	Business productivity							Business sales						
	FU1				FU2			FU1				FU2		
	# of obs.	GT	GT + TA	p-Value	GT	GT + TA	p-Value	# of obs.	GT	GT + TA	p-Value	GT	GT + TA	p-Value
		(1)	(2)	(2) – (1)	(3)	(4)	(4) – (3)		(5)	(6)	(6) – (5)	(7)	(8)	(8) – (7)
Full sample	1512	0.075 (0.044)	0.100* (0.057)	0.650	0.030 (0.063)	0.041 (0.065)	0.794	1481	0.049 (0.056)	0.126** (0.047)	0.161	0.109 (0.069)	0.110 (0.067)	0.985
Schooling														
Up to secondary education	1154	0.078 (0.057)	0.051 (0.059)	0.627	–0.012 (0.060)	–0.004 (0.064)	0.844	1130	0.082 (0.058)	0.114* (0.057)	0.519	0.112 (0.088)	0.129* (0.071)	0.816
Higher education	358	0.066 (0.077)	0.273** (0.113)	0.111	0.184* (0.108)	0.207* (0.117)	0.801	351	–0.048 (0.128)	0.175* (0.088)	0.065	0.095 (0.114)	0.041 (0.108)	0.632
p-Value diff		0.912	0.060		0.021	0.033			0.355	0.583		0.917	0.427	
Business size (sales)														
Below median	756	0.094* (0.054)	0.137 (0.089)	0.593	0.03 (0.062)	–0.02 (0.076)	0.405	740	0.101 (0.084)	0.158* (0.090)	0.442	0.01 (0.082)	0.029 (0.087)	0.811
Above median	756	0.059 (0.056)	0.076 (0.068)	0.793	0.035 (0.091)	0.113 (0.088)	0.154	741	–0.002 (0.082)	0.104* (0.051)	0.118	0.202** (0.097)	0.197* (0.104)	0.950
p-Value diff		0.576	0.592		0.954	0.193			0.398	0.627		0.108	0.225	
Entrepreneurial attitude index														
Low	550	0.107 (0.069)	0.062 (0.098)	0.659	–0.003 (0.076)	–0.07 (0.083)	0.270	536	0.149** (0.065)	0.185** (0.075)	0.582	0.115 (0.141)	0.206 (0.144)	0.411
Medium	575	0.037 (0.072)	0.076 (0.065)	0.527	0.041 (0.087)	0.063 (0.073)	0.709	564	–0.006 (0.094)	0.077 (0.100)	0.323	0.157 (0.112)	0.063 (0.101)	0.187
High	387	0.083 (0.098)	0.193* (0.104)	0.413	0.082 (0.095)	0.207* (0.111)	0.269	381	–0.020 (0.133)	0.115 (0.107)	0.294	–0.010 (0.178)	0.018 (0.148)	0.840
p-Value diff (Medium – Low)		0.500	0.894		0.616	0.119			0.197	0.456		0.828	0.44	
p-Value diff (High – Low)		0.828	0.397		0.454	0.027			0.166	0.529		0.609	0.389	
p-Value diff (High – Medium)		0.724	0.272		0.739	0.199			0.936	0.814		0.454	0.806	

Notes: See notes to Table 3.

* Significant at 10%.

** Significant at 5%.

more those originally better off.²³ It is also interesting to see that the more educated GT group shows an effect similar to their fully treated counterparts about two years after the treatment, after showing positive but not significant effects by the first follow up.²⁴

The index on business sales shows a pattern similar to the one observed for the individual variables in Table 3, although the null hypothesis fails to be rejected by the second follow up. We observe an early positive effect, but only statistically significant for those GT + TA treated (0.13 SD). As before, however, we cannot reject the null hypothesis that this effect is not larger than the one observed on the GT group (0.05 SD). The sales effects are equal for both treatment groups by the second follow up (0.11 SD), although again, we fail to reject the null hypothesis with respect to the control group.²⁵ When looking at the heterogeneity of the sales effects, we find no clear pattern early on. By the second follow up, though, we find sales effects mostly for the larger firms, which results from the effects in smaller firms flourishing early and vanishing with time, while those for the larger firms taking extra time but reaching even higher effects (around 0.2 SD).

The aggregate standardized index for business practices (Table 6) also shows persistent and statistically significant positive average effects of the training, but only among those that received full treatment (0.05 SD). We do see an increase in the average effect on

those GT treated by the second follow up, but is still too variable to become statistically different from the control group. The fact that the effect measured by this standardized index is so clearly statistically significant for the fully treated while very few individual business practices show that significance supports the notion that this BDS intervention generated different adjustments for different firms, a result that is consistent with the findings reported by Bruhn et al. (2012). Also, these effects appear rather homogeneous by education, entrepreneurial traits and business size in the short run, but they clearly accrue among larger firms by the second follow up, becoming statistically significant for the two treatment groups. With respect to the associativity index, both treatment groups increase their participation at the beginning, especially those with the GT + TA treatment (0.075 SD), but the effect decreases in more than half a year later, remaining significant only for those fully treated. In sum, for the most part, the GT + TA intervention did move microentrepreneurs into some adjustments of their business practices that led to sizable productivity gains. A similar pattern is found for those with larger firms in the GT group.

Finally, in Table 7, we analyze whether the training led to an increased use of business credit, either from formal or informal sources. We find an increase in the use of credit, as measured by loan size, from informal sources by those that received full treatment (GT + TA), and negative for the GT-only group. The effect on the loan sizes from formal sources is also positive but not statistically significant. We do see the same pattern when looking at the number of loans. Those fully treated increased the number of loans from *Juntas*, Peruvian informal credit and saving associations, while both treatment groups increase their number of loans from banks. Also, both treatment groups report an increased use of collateral to access credit, although the proportion is still very small (below 10%).

²³ We use an entrepreneurial traits index, built by aggregating on self-reported attitudes towards independence, innovations, persistence and drive, in a way analogous to the way aggregation was done for the business results and practices indexes. See Appendix A for the precise definition of the entrepreneurial traits index.

²⁴ Notice, however, that education being a significant predictor of higher exposure, these differences may be driven by that higher exposure as opposed to be driven by a differentiated effect conditional on attendance.

²⁵ The corresponding p-values are below 0.12.

Table 6

ITT effects – aggregate standardized indexes for business practices by sub-groups.

	Business practices							Associativity						
	FU1			FU2			# of obs.	FU1			FU2			# of obs.
	# of obs.	GT	GT + TA	p-Value	GT	GT + TA	p-Value	# of obs.	GT	GT + TA	p-Value	GT	GT + TA	p-Value
	(1)	(2)	(2) – (1)	(3)	(4)	(4) – (3)		(5)	(6)	(6) – (5)	(7)	(8)	(8) – (7)	
Full sample	1623	0.010 (0.015)	0.050*** (0.015)	0.012	0.029 (0.022)	0.052*** (0.019)	0.350	1623	0.033** (0.015)	0.075*** (0.024)	0.034	0.012 (0.015)	0.030* (0.017)	0.286
Schooling														
Up to secondary education	1242	–0.005 (0.019)	0.033 (0.020)	0.011	0.035 (0.024)	0.052** (0.021)	0.517	1242	0.035* (0.017)	0.065*** (0.023)	0.151	0.020 (0.016)	0.031 (0.019)	0.538
Higher education	381	0.062 (0.058)	0.111** (0.046)	0.355	0.008 (0.060)	0.054 (0.037)	0.467	381	0.029 (0.026)	0.112** (0.055)	0.118	–0.017 (0.024)	0.025 (0.028)	0.125
p-Value diff		0.324	0.171		0.684	0.958			0.856	0.39		0.106	0.849	
Business size (sales)														
Below median	806	0.004 (0.033)	0.036 (0.029)	0.238	–0.012 (0.033)	0.024 (0.027)	0.233	806	–0.004 (0.020)	0.052* (0.026)	0.034	0.005 (0.012)	0.043* (0.022)	0.060
Above median	817	0.018 (0.021)	0.075** (0.030)	0.006	0.070** (0.026)	0.085** (0.031)	0.702	817	0.069*** (0.022)	0.100*** (0.032)	0.323	0.021 (0.024)	0.022 (0.024)	0.964
p-Value diff		0.775	0.447		0.049	0.177			0.02	0.152		0.533	0.526	
Entrepreneurial attitude index														
Low	588	0.034 (0.039)	0.049 (0.036)	0.739	0.003 (0.040)	0.089* (0.044)	0.010	588	0.027 (0.026)	0.056 (0.050)	0.442	0.016 (0.019)	0.044 (0.028)	0.337
Medium	618	0.007 (0.043)	0.039 (0.043)	0.158	0.071** (0.029)	0.042 (0.033)	0.403	618	0.059** (0.027)	0.084*** (0.029)	0.458	0.011 (0.024)	0.009 (0.017)	0.939
High	417	–0.024 (0.046)	0.065 (0.046)	0.023	–0.024 (0.076)	0.006 (0.065)	0.525	417	0.004 (0.030)	0.088** (0.040)	0.014	0.008 (0.021)	0.060 (0.031)	0.141
p-Value diff (Medium – Low)		0.702	0.869		0.179	0.442			0.427	0.657		0.843	0.25	
p-Value diff (High – Low)		0.382	0.823		0.768	0.333			0.564	0.596		0.747	0.582	
p-Value diff (High – Medium)		0.670	0.732		0.270	0.658			0.211	0.932		0.917	0.129	

Notes: See notes to Table 3.

* Significant at 10%.

** Significant at 5%.

*** Significant at 1%.

6.1. Robustness checks

The results reported in Tables 3–6 were ITT estimates obtained using an ANCOVA specification based on the sample that was found at each follow-up survey. In this sub-section, we look at the robustness of our findings when looking at the double-difference estimates and worst-case scenarios for the implications of attrition. Table D.1 compares the average treatment effects reported in Tables 5 and 6, based on expression (1), with those that result from calculating the double-difference while controlling for individual fixed effects. We see the treatment effects are rather similar. We find the treatment effects on sales and practices to be of similar magnitude, although the DD estimates are somewhat less precise. Sales increases for the GT + TA treatment group are estimated at 0.14 SD by the first follow up, very similar to the 0.13 SD found with our preferred specification. The two effects stopped being statistically significant at standard levels of confidence by the second follow up, but the p-values for the DD estimates still remain below 0.14 for the fully treated, although it rises to 0.25 for those that received training only. In the case of business practices, the DD estimate is 0.08 SD by the second follow up, also very similar to the 0.05 SD obtained with our preferred specification. We do find meaningful differences in the productivity and associativity indexes. In the case of the productivity index, the pattern over time is rather similar, that is, that the effect is stronger initially but decrease substantially by the second follow up. Finally, the DD associativity effect is not statistically significant, even early on, when the ANCOVA estimate appears strong.

We declared before that the attrition rate was 18%, and slightly higher for the control group. Given this relatively high non-response rate, we analyze next the implications of different plausible assumptions about the non-respondents upon our estimated ITT effects, in the lines of the non-parametric approaches followed in Horowitz and Manski (2000) and Lee

(2002). In Appendix Table D.2, we report the lower and upper bound estimates for the mean standardized treatment effects for all treated by the second follow up, under the same scenarios used in Karlan and Valdivia (2011). Column 5 reproduces the mean standardized treatment effects in Table 5 and 6. Columns 1 and 9 present the lower and upper bounds obtained under the worst-case scenario. For the lower (upper) bound, we impute the minimum (maximum) value of each variable in the observed treatment distribution to the non-responders in the treatment group, and the maximum (minimum) value of the observed control distribution to the non-responders in the control group.

The second scenario (columns 2 and 8) adjusts the worst-case scenario by considering the behavior observed at baseline for those attrited by the follow up. For dichotomous variables, the lower (upper) bound assumes non-reversal for the non-responders in the control group. If variables are continuous or categorical, it imputes the median growth rate of the bottom (top) growth quintile of each variable in the observed treatment distribution to the non-responders in the treatment group, and the median growth rate of the top (bottom) growth quintile of the observed control distribution to the non-responders in the control group.

The third scenario (columns 3 and 7) follows Kling et al. (2007) and imputes to the lower (upper) bound the mean minus (plus) 0.25 standard deviations of the observed treatment distribution to the non-respondents in the treatment group, the mean plus (minus) 0.25 standard deviations of the observed control distribution to non-responders in the control group. The fourth scenario (columns 4 and 6) repeats the third scenario but with a 0.1 standard deviations.

Given the 18% attrition rate, it is not surprising to find very large differences between the lower and upper bounds of the worst-case scenario. In the case of the index for the family of business sales, the mean standardized treatment effect for those GT treated can be either largely negative (a reduction of 0.9 SD) or largely positive (an increase of

Table 7
ITT effects – credit activity by women's business.

	FU1					FU2				
	# of obs.	Control	GT	GT + TA	p-Value	# of obs.	Control	GT	GT + TA	p-Value
		(1)	(2)	(3)	(3) – (2)		(5)	(6)	(7)	(7) – (6)
# of loans										
Requested loans – all sources	1623	0.538	0.105*	0.100	0.958	1580	0.545	–0.016	0.087	0.116
			(0.060)	(0.067)				(0.047)	(0.086)	
Approved loans – all sources	1623	0.538	0.104*	0.099	0.958	1580	0.534	–0.007	0.096	0.117
			(0.061)	(0.067)				(0.044)	(0.085)	
From regulated institutions	1624	0.269	–0.017	–0.058**	0.155	1595	0.235	0.071**	0.050*	0.365
			(0.026)	(0.025)				(0.029)	(0.029)	
Banks	1624	0.193	–0.006	–0.043*	0.220	1595	0.208	0.057**	0.042*	0.413
			(0.022)	(0.021)				(0.022)	(0.023)	
Other	1624	0.076	–0.011	–0.014	0.849	1595	0.027	0.012	0.010	0.825
			(0.015)	(0.015)				(0.015)	(0.011)	
From informal sources	1624	0.200	0.051**	0.070***	0.496	1595	0.160	–0.007	0.058**	0.021
			(0.025)	(0.025)				(0.021)	(0.029)	
Peruvian ROSCAs (Juntas)	1624	0.078	0.053***	0.076***	0.202	1595	0.027	0.004	0.042**	0.011
			(0.015)	(0.021)				(0.009)	(0.018)	
Relatives/friends	1624	0.103	–0.014	–0.010	0.857	1595	0.104	0.004	–0.008	0.553
			(0.020)	(0.016)				(0.018)	(0.018)	
MFI	1624	0.011	0.011*	0.005	0.152	1595	0.020	–0.013	0.010	0.001
			(0.006)	(0.006)				(0.008)	(0.010)	
Other	1624	0.072	–0.010	–0.007	0.879	1595	0.082	–0.008	–0.002	0.728
			(0.017)	(0.016)				(0.025)	(0.022)	
With some colateral	1623	0.137	0.011	0.001	0.648	1595	0.122	0.026	0.075**	0.105
			(0.022)	(0.026)				(0.027)	(0.029)	
Property title as colateral	1623	0.070	0.000	–0.011	0.510	1595	0.058	0.039**	0.045**	0.783
			(0.016)	(0.020)				(0.018)	(0.019)	
Total business debt – any source										
Loan size (nuevos soles)	1623	1658.4	–67.5	–362.8	0.234	1595	1890.4	–14.5	607.2	0.120
			(306.0)	(258.0)				(458.1)	(545.3)	
From regulated institutions	1623	1347.0	–93.1	–270.4	0.404	1595	1679.8	58.1	423.7	0.349
			(294.5)	(260.9)				(433.7)	(524.5)	
From informal sources	1623	311.4	15.0	–54.3	0.141	1595	210.6	–103.9**	208.5*	0.016
			(95.0)	(92.8)				(44.6)	(107.2)	
Default events	1624	0.022	0.004	–0.004	0.285	1595	0.058	0.008	0.001	0.605
			(0.009)	(0.007)				(0.013)	(0.012)	

Notes: See notes to Table 3.

* Significant at 10%.

** Significant at 5%.

*** Significant at 1%.

1.05 SD). The next three scenarios reduce the range gradually, with the last one (± 0.1 SD) implying a definite positive range for the mean standardized treatment effect for the business sales and associativity indexes, although even in that case the lower bound estimate is not statistically different from zero. Still, with our level of non-response and size effect, if the treatment effect for the non-response varies by more than 0.1 standard deviations from the observed, then the results are no longer statistically different than zero.

6.2. Cost-effectiveness and the rationale for low take up and retention

Our estimates indicate that those GT-treated increased their sales in 16% in sales during a normal month while those fully treated (GT + TA) saw an increase of 19%, although they are not statistically different from each other. In that sense, we can conclude that the extra costs associated to the TA component would not be cost-effective if we assume that the persistence of the effects is similar for both treatment groups. The question is whether the training alone is cost-effective, as the average sales effect amounts to US\$ 112 a month. The training component of the intervention was budgeted at US\$ 341 per beneficiary.²⁶ That is,

²⁶ The consortium presented a total budget of US \$ 392,921 to provide the basic training component to at least 660 beneficiaries, and the TA component to at least 330 of them. Thus, the full intervention was budgeted at US \$ 674 per beneficiary, distributed roughly evenly between the GT and TA components. Recruitment, coordination, monitoring and administrative costs were distributed evenly considering that each component (GT and TA) lasted three months. Field supervision and logistics were distributed based on the number of beneficiaries of each component.

the intervention can be paid with only 3 months of the extra sales, so that effects need not be that permanent for the training component to be cost-effective. Is this return enough to justify the investment by our microentrepreneurs? The answer depends on the profit rate but also the uncertainty the microentrepreneur perceives about the returns to the business training they can find in the market, which is likely affected by adverse selection and moral hazard that tends to characterize the market for the provision of these services (see Bruhn et al., 2012).

Although the intervention had no monetary cost for the beneficiary, recall that the intervention was very time intensive, as the training component implied 3 sessions a week of 3 h each, over 3 months, and that the take up rate was slightly above 50%. Furthermore, only 42% of those that started the training attended at least half of the training sessions. It may be that those that did not participate much in the training were those that predicted correctly that such intervention was not going to help them much. However, others may have declined or dropped once they accounted for the opportunity cost of their time. Even if such return were positive on average, women may still not be able to sustain the commitment over the whole course due to family or business emergencies, and then catching up becomes too costly. Indeed, our analysis in Section 5 indicated that travel time to attend classes and childbearing demands were predictors of lower retention in the program. In that sense, adjustments to the training component of the intervention to make it more efficient in the time demanded from beneficiaries could increase participation of female microentrepreneurs that would in fact benefit greatly from it, thus increasing its cost effectiveness.

7. Summary and discussion

We report here the results of an experimental impact evaluation of a BDS intervention aimed at female microentrepreneurs in Lima, Peru, that expressed interest in receiving business training. This study is thus related to key research and policy questions. For one, is there room for efficiency gains for female microentrepreneurs that are often thrown into self-employment due to the rigidities of formal jobs? Second, can we transfer entrepreneurial capital to these female microentrepreneurs so that they can improve their likelihood to grow by adopting proven business practices? Third, is teaching general business practices enough, or does specific business advice is required to help these businesses grow? We explore these questions by using a RCT to evaluate the impacts of two additive interventions applied to female microentrepreneurs: one that offers only general training (GT), and a second one that adds specific advice tailored to the needs of each business (TA).

Although the statistical power of our analysis was affected by low take up and retention of either treatment, the trends reported here are still rather clear. Our findings first indicate that all those that were offered either treatment experimented increased business sales by more than 15% (0.11 SD) in normal and bad months about two years after the end of the training. Such sales effects were not initially present for the GT-only treated group, but the two groups showed indistinguishable growth by the second follow up, especially the larger firms at baseline. That is, offering technical assistance to complement this long and specialized general training did not make a difference in the long run. On the other hand, the stagnated performance by the fully treated after the first follow up may indicate the intervention generated only a one-shot effect. If that is the case, we need further research to learn whether it is the result of the limits of the intervention to permanently improve the entrepreneurial traits of the beneficiaries, or rather an indication of limits to growth for these microentrepreneurs in these markets.

The sales revenue effects come along with the adoption of some of the business practices recommended during the training, especially in the case of the fully treated, but also for the larger firms that were GT-only treated. The fully treated increased their planning and execution of innovations within the business, although the specific innovations they implemented did not differ from those implemented by the GT-only treated, basically product diversification and regular sales campaigns. The GT-only group, however, did differentiate in being more inclined towards closing some business lines early on while also opening new ones in the medium term. However, many other specific business practices were not widely adopted, including those related to tax formalization, keeping records and separating home finances from that of the women's business. We interpret this finding first as an indication that the adoption of specific practices was highly heterogeneous but the adoption of at least some of them was high, a result consistent with the finding by Bruhn et al. (2012). Overall, we interpret these results as evidence that management capital is a binding constraint for business growth for our sample of microfirms in Lima and that efficiency gains can be achieved by providing these female entrepreneurs with the right support to their managerial capital. The fact that the two treatment groups applied the same specific adjustments/innovations may lead us away from understanding the advisor's contribution as mainly helping with the right diagnosis of business needs and solutions for this type of microentrepreneurs.

One key policy and research lesson that comes from our results is that we need to be patient and give this kind of interventions the time they need for their full impacts to materialize. The picture we get with the second follow up, about two years after the end of the training component, is different than the one we got with the first follow up, which was made only 7–10 months after the end of the training. The second follow up allowed us to observe a more robust effect for those that were offered only the general training component that we discuss in

this article, and without it, we might have erroneously concluded that even this intensive training was not effective in generating business growth at the level of these Peruvian microfirms. It is only until very recently that studies are paying more attention to the dynamics of the effects of business training plus interventions. de Mel et al. (2014), for instance, applied four follow up surveys that spanned over two years after the training in their study in Sri Lanka. They found no effects for training alone while the full treatment seemed to help speed up the convergence to the steady state but not a significant change in the firms' trajectory. This latter result is somewhat equivalent to our result for the marginal contribution of the technical assistance component, although the treatment effects we report here do not vanish with time.

Our positive effect of training is very relevant for policy considering the higher cost and lower scalability of the technical assistance component, but is indeed in contrast with the Sri Lanka study as well as other previous studies that reported weak or no effects of business training for similar samples (Giné and Mansuri, 2014; Karlan and Valdivia, 2011). This difference may be explained by the fact that this intervention was much more time-intensive than previous efforts, and delivered by highly experienced professionals. If so, the policy lesson is that we need highly intensive training, delivered by experts for it to be effective, at least for microentrepreneurs like the ones included in this study. However, the low take up and retention observed suggests otherwise. If dropouts did so because they judged the training to be rather irrelevant after a while, then we may not be able to improve its cost-effectiveness by increasing effective exposure. However, our analysis of the retention patterns suggested that time was an important constraint for high or full exposure to the training by these busy microentrepreneurs, so it may be advisable to explore ways to make this intervention more time-efficient. At 116 h of training, more than twice the length of the previous most intensive trainings, we cannot discard that there would be some room to reduce the length or the number of sessions without affecting the effectiveness of the messages, although that may require careful piloting. Another avenue may be to facilitate beneficiaries to recover the sessions they are forced to miss at some point during the training.²⁷ On the other hand, if the key factor behind the positive effects of this intervention is the level of expertise of the trainers/facilitators, scaling up may be constrained by the availability of such quality staff.

Role of the funding source

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²⁷ In in-depth interviews, beneficiaries reported they had some business or family emergencies that made them miss a few sessions, and that it was complicated to catch up with the training if they miss too many, which led to an eventual involuntary dropout.

Appendix A

Table A.1

Description of variables used in the analysis.

Variable	Description
Business results	
Sales	
Last week sales (log)	Logarithm of main business' sales in the week prior to the survey.
Excellent month sales (log)	Logarithm of main business' sales in an excellent month of the last 12 months
Normal month sales (log)	Logarithm of main business' sales in a normal month of the last 12 months.
Bad month sales (log)	Logarithm of main business' sales in a bad month of the last 12 months.
Business sales index	Standardized index based on four measures of business sales.
Capital (log)	Logarithm of the value of main business' assets (nuevos soles)
Employment	
Number of total workers	Number of workers in the main business (not including the business women)
Number of non-family workers	Number of workers in the main business that are not household members
Productivity residual	
Last week	Productivity residual calculated from the estimation of last week sales as a function of capital (value of business assets) and labor (total number of workers, including eligible women)
Normal month	Productivity residual calculated from the estimation of normal month sales as a function of capital (value of business assets) and labor (total number of workers, including eligible women).
Productivity index	Standardized index based on both productivity measures
Business practices	
Tax formality	Binary variable equal to one if the main business is registered at the tax agency and has a tax ID number
Financing strategies business vs household	
Paid fixed salary to herself	Binary variable equal to one if eligible woman receives a fixed salary from the business
Taking money/products from the business	Binary variable equal to one if eligible woman takes money or products from the business
Keeping records	
Business sales	Binary variable equal to one if eligible woman records sales in a registry or notebook
Withdrawals	Binary variable equal to one if eligible woman records her withdrawals (money or products) in a registry or notebook
Worker's salaries	Binary variable equal to one if eligible woman records payments to non-family workers in a registry or notebook
Business practices	
Changes/innovations in business activities	
Started new business last year	Binary variable equal to one if eligible woman started a new business in the 12 months prior to the survey
Stop any business operation — last two years	Binary variable equal to one if the eligible woman closed a business in the last two years
Identified problems with business	Binary variable equal to one if eligible woman identified problems with her business in the last year
Planned innovations in her business	Binary variable equal to one if eligible woman planned innovations to her business in the last year
Executed innovations in her business	Binary variable equal to one if eligible woman executed innovations in her business in the last year
Business practices index	Standardized index based on the adoption of all business practices mentioned above.
Participation in business related associations	
Is a member?	Binary variable equal to one if eligible woman reports being a member of a producers' association savings group or investment group (SPI)
# of associations	# of such organizations
Business credits	
Number of loans	
# of requested loans — all sources	# of requested loans from informal and formal sources
# of approved loans — all sources	# of approved loans from informal and formal sources
From regulated institutions	# of approved loans from regulated institutions during the last year
From bank	# of approved loans from a bank during the last year
Other	# of approved loans from Cajas/EDPYME during the last year
From informal source	# of approved loans from informal sources during last year
Peruvian ROSCA (Junta)	# of approved loans from a "Junta" (Peruvian ROSCA) during last year
Relative/friend	# of approved loans from a relative or friend during last year
MFI	# of approved loans from a non-regulated NGO during last year
Other	# of approved loans from other informal sources during last year
With some collateral	# of approved loans in which eligible woman gave a collateral for the business loan
With property title as a collateral	# of approved loans in which eligible woman gave her property title as a collateral for the business loan
Business credits	
Indebtedness — any source	
Loan size (nuevos soles)	total loan amounts in the 12 months prior to the survey, any source,
From regulated institutions	total loan amounts in the 12 months prior to the survey, from regulated institutions
From informal sources	total loan amounts in the 12 months prior to the survey, from relative/friend/MFI/Junta, etc.
Default	Binary variable equal to one if eligible woman reported having failed to make a loan payment during last year
Risk proneness and time discounting	
Risk prone	Binary variable equal to one if eligible woman chose any of the hypothetical lotteries to the sure gift (expected value of offered lotteries went from 2 to 5 times the amount of the sure gift)
Impatient (discount)	Amount (soles) of the discount the eligible woman is willing to accept to receive a hypothetical 100 soles prize today rather than 30 days from now
Entrepreneurial attitudes	
Independent (dislikes orders)	Binary variable equal to one if eligible woman self-reports that she dislikes taking orders from others
Innovative	Binary variable equal to one if eligible woman self-reports that she is always coming up with new ideas/solutions to problems
Persistent	Binary variable equal to one if eligible woman self-reports as persisting until her plans/goals are fulfilled
Driven	Binary variable equal to one if eligible woman self-reports that she is always searching for ways to improve
Entrepreneurial attitudes index	Standardized index based on four attitudes reported above

Table A.1 (continued)

Variable	Description
Background on business training	
Previous experience	Binary variable equal to one if eligible woman reported having ever participated before in any business training program
Interest in free training	Discrete variable taking values from 1 to 5 according to woman's interest in training if it were free (1 = None, 5 = Very)
Interest in costly training (10 soles per session)	Discrete variable taking values from 1 to 5 according to woman's interest in training if it cost 10 soles per session (1 = None, 5 = Very)
Very interest in training	Binary variable equal to one if woman states 'very interest in training' if it cost 10 soles per session
Distance to meeting places (different zone)	Binary variable equal to one if woman lives in a zone different to the location of the general training or the technical assistance group sessions.

Table B.1

Key characteristics of beneficiary and her main business.

	Control	GT	GT + TA	p-Value		
	(1)	(2)	(3)	(2) – (1)	(3) – (1)	(3) – (2)
Age (years old)	42.9 (0.822)	42.8 (0.603)	43.4 (0.634)	0.883	0.440	0.279
Schooling (years)	10.2 (0.195)	10.3 (0.212)	9.9 (0.143)	0.927	0.107	0.100
Marital status						
Single	0.180 (0.014)	0.197 (0.018)	0.184 (0.017)	0.375	0.837	0.614
Married/cohabiting	0.614 (0.018)	0.634 (0.024)	0.631 (0.025)	0.431	0.525	0.932
Divorced/widowed	0.206 (0.017)	0.169 (0.015)	0.185 (0.017)	0.072	0.367	0.491
Role at home						
Head	0.322 (0.024)	0.284 (0.023)	0.316 (0.024)	0.217	0.791	0.246
Head's partner	0.504 (0.026)	0.544 (0.024)	0.534 (0.027)	0.243	0.106	0.765
Number of household members	4.795 (0.097)	4.769 (0.051)	4.744 (0.065)	0.825	0.624	0.736
Partner living at home	0.681 (0.017)	0.724 (0.018)	0.699 (0.019)	0.080	0.367	0.387
Family businesses						
# of family businesses	1.222 (0.039)	1.232 (0.031)	1.192 (0.025)	0.824	0.454	0.121
# of family businesses run by beneficiary	0.995 (0.016)	1.008 (0.016)	1.013 (0.018)	0.513	0.248	0.809
Business line of work						
Retail						
Food	0.320 (0.034)	0.354 (0.029)	0.360 (0.026)	0.338	0.294	0.837
Non-food	0.335 (0.034)	0.319 (0.030)	0.345 (0.019)	0.687	0.788	0.283
Production/processes						
Food	0.117 (0.013)	0.113 (0.016)	0.125 (0.013)	0.764	0.617	0.555
Manufacturing	0.073 (0.014)	0.058 (0.009)	0.047 (0.009)	0.276	0.083	0.340
Services	0.060 (0.006)	0.073 (0.007)	0.063 (0.012)	0.214	0.867	0.304
# of observations	565	711	703			

Notes: Standard errors in parenthesis. (GT) Women invited only to training classes. (GT + TA) Women invited to full treatment (training and technical assistance).

Table B.2

Business size, access to credit and background on business training.

	Control	GT	GT + TA	p-Value		
	(1)	(2)	(3)	(2) – (1)	(3) – (1)	(3) – (2)
Business size						
# of workers						
Total workers (including business woman)	2.111 (0.083)	1.944 (0.070)	1.851 (0.092)	0.119	0.039	0.434
Non-family workers	0.224 (0.029)	0.177 (0.056)	0.205 (0.069)	0.467	0.770	0.784

(continued on next page)

Table B.2 (continued)

	Control	GT	GT + TA	p-Value		
	(1)	(2)	(3)	(2) – (1)	(3) – (1)	(3) – (2)
Sales						
Weekly sales	538.30 (45.631)	522.66 (59.817)	475.51 (40.228)	0.828	0.198	0.556
Up to S/. 100 (per week)	0.259 (0.024)	0.234 (0.027)	0.252 (0.024)	0.334	0.735	0.451
From S/.101 to S/.500 (per week)	0.481 (0.018)	0.540 (0.022)	0.526 (0.016)	0.013	0.030	0.505
Over S/.500 (per week)	0.259 (0.019)	0.226 (0.022)	0.222 (0.021)	0.239	0.091	0.899
Credit access (any source, any reason)						
Last year	0.495 (0.028)	0.536 (0.018)	0.510 (0.022)	0.146	0.636	0.382
Business credit (any source)	0.420 (0.026)	0.451 (0.016)	0.4359 (0.017)	0.254	0.574	0.475
Formal	0.288 (0.027)	0.307 (0.017)	0.295 (0.017)	0.531	0.818	0.562
Informal	0.173 (0.023)	0.193 (0.013)	0.201 (0.017)	0.346	0.143	0.635
Home credit (any source)	0.158 (0.019)	0.157 (0.023)	0.153 (0.020)	0.968	0.832	0.889
Background on business training						
Previous experience	0.174 (0.020)	0.150 (0.014)	0.167 (0.015)	0.344	0.715	0.439
Interest in training (general)	4.840 (0.024)	4.814 (0.021)	4.826 (0.026)	0.432	0.723	0.685
Free training	4.866 (0.022)	4.851 (0.018)	4.858 (0.021)	0.554	0.793	0.764
10 soles per session	4.292 (0.046)	4.187 (0.073)	4.248 (0.049)	0.191	0.483	0.258
# of observations	565	711	703			

Notes: See notes in Table B.1.

Table B.3

Family participation in beneficiary's main business.

				Children				
		Other adults		7–13 years		14–17 years		Total
	Beneficiary	Male	Female	Male	Female	Male	Female	
<hr/>								
Hours per week								
Work family business	48.3 (27.42)	11.7 (24.99)	10.7 (22.19)	1.6 (7.01)	2.3 (8.96)	4.9 (13.53)	6.1 (14.36)	85.5
Jobs outside home	4.0 (13.66)	33.6 (29.95)	17.1 (25.29)	0.3 (3.54)	0.2 (2.80)	2.1 (9.65)	1.4 (8.84)	58.7
Household chores	22.2 (13.20)	5.3 (8.16)	16.5 (15.27)	5.6 (6.60)	6.7 (7.25)	8.1 (13.55)	7.9 (10.79)	72.4
Studies	0.5 (3.89)	3.0 (9.90)	5.0 (12.32)	20.9 (17.56)	21.1 (16.60)	18.5 (17.81)	18.2 (17.86)	87.2
All activities	75.1	53.6	49.3	28.3	30.3	33.7	33.5	303.9
% by activity								
Work family business	0.61 (0.28)	0.19 (0.36)	0.17 (0.30)	0.05 (0.18)	0.06 (0.17)	0.11 (0.25)	0.12 (0.24)	
Jobs outside home	0.05 (0.18)	0.58 (0.45)	0.30 (0.40)	0.02 (0.13)	0.02 (0.11)	0.05 (0.20)	0.03 (0.15)	
Household chores	0.33 (0.23)	0.16 (0.28)	0.42 (0.38)	0.33 (0.38)	0.34 (0.36)	0.35 (0.35)	0.44 (0.36)	
Studies	0.01 (0.15)	0.08 (0.24)	0.11 (0.26)	0.60 (0.41)	0.60 (0.39)	0.49 (0.40)	0.41 (0.38)	
All activities	1.01	1.00	1.00	1.00	1.00	1.00	1.00	
# Observations	1963	2663	1430	526	504	361	369	7816

Notes: See notes in Table B.1.

Table B.4
Attitudes (self-reported).

	Control	GT	GT + TA	(2) – (1)	(3) – (1)	(3) – (2)
	(1)	(2)	(3)			
Risk proneness and time discounting						
Risk prone	0.381 (0.036)	0.346 (0.022)	0.356 (0.026)	–0.035	–0.025	0.010
Impatience (discount)	16.970 (1.356)	18.326 (1.329)	18.160 (1.334)	1.357	1.190	–0.167
Entrepreneurial attitude						
Independent (dislikes orders)	0.327 (0.030)	0.366 (0.023)	0.342 (0.022)	0.038	0.014	–0.024
Innovative	0.897 (0.015)	0.909 (0.016)	0.922 (0.012)	0.012	0.025*	0.013
Persistent	0.906 (0.015)	0.914 (0.011)	0.922 (0.008)	0.009	0.016	0.007
Driven	0.948 (0.010)	0.952 (0.009)	0.964 (0.008)	0.004	0.016**	0.012
Aggregate standardized index	0.001 (0.057)	0.033 (0.053)	0.037 (0.040)	0.032	0.037	0.005
Low level (%)	0.375 (0.037)	0.352 (0.031)	0.330 (0.029)	–0.024	–0.045*	–0.021
Medium level (%)	0.461 (0.028)	0.463 (0.027)	0.506 (0.024)	0.002	0.045*	0.043
High level (%)	0.164 (0.020)	0.186 (0.021)	0.164 (0.018)	0.022	0.000	–0.022
# Observations	565	711	703			

Notes: See notes to Table B.1.

* Significant at 10%.

** Significant at 5%.

Table C.1

Intention to treat (ITT) effects – planned and executed innovations in last year.

	FU1					FU2				
	# of obs.	Control	GT	GT + TA	p-Value	# of obs.	Control	GT	GT + TA	p-Value
		(1)	(2)	(3)	(3) – (2)		(5)	(6)	(7)	(7) – (6)
Planned innovations in her business										
Diversify products or services	1623	0.504	0.063** (0.031)	0.077** (0.037)	0.660	1595	0.510	–0.006 (0.036)	0.027 (0.029)	0.311
Upgrade store presentation	1623	0.48	–0.018 (0.027)	0.029 (0.030)	0.049	1595	0.421	0.029 (0.028)	0.050** (0.019)	0.313
Increase product stock	1623	0.52	–0.003 (0.027)	0.004 (0.029)	0.817	1595	0.534	–0.009 (0.026)	0.015 (0.025)	0.446
Promotional sales campaigns	1623	0.159	0.066*** (0.021)	0.063*** (0.021)	0.888	1595	0.315	–0.036 (0.024)	–0.003 (0.027)	0.088
Seasonal adjustments in products	1623	0.206	0.031 (0.023)	0.030 (0.028)	0.963	1595	0.330	–0.014 (0.033)	–0.016 (0.033)	0.904
Improve strategies for input purchases	1623	0.141	0.034 (0.024)	0.025 (0.025)	0.721	1595	0.262	–0.035 (0.034)	–0.015 (0.029)	0.401
New sales mechanisms	1623	0.238	0.050 (0.033)	0.049 (0.029)	0.978	1595	0.244	–0.010 (0.030)	0.011 (0.033)	0.380
Improve customer service	1623	0.572	0.019 (0.025)	0.044** (0.020)	0.372	1595	0.534	0.022 (0.029)	0.022 (0.033)	0.992
Increase ad expenditures	1623	0.226	0.052* (0.030)	0.086*** (0.031)	0.141	1595	0.220	–0.003 (0.025)	0.063** (0.023)	0.003
Renew machinery/equipment	1623	0.224	0.015 (0.029)	0.050 (0.035)	0.188	1595	0.200	–0.029 (0.021)	–0.008 (0.020)	0.267

(continued on next page)

Table C.1 (continued)

	FU1					FU2				
	# of obs.	Control	GT	GT + TA	p-Value	# of obs.	Control	GT	GT + TA	p-Value
		(1)	(2)	(3)	(3) – (2)		(5)	(6)	(7)	(7) – (6)
Executed innovations in her business										
Diversify products or services	1623	0.265	0.076*** (0.024)	0.059** (0.028)	0.511	1595	0.259	0.009 (0.028)	–0.003 (0.025)	0.688
Upgrade store presentation	1623	0.159	0.001 (0.018)	0.006 (0.020)	0.818	1595	0.180	0.018 (0.024)	0.004 (0.030)	0.572
Increase product stock	1623	0.287	0.020 (0.022)	0.025 (0.030)	0.844	1595	0.297	0.013 (0.028)	–0.010 (0.027)	0.350
Promotional campaigns	1623	0.081	0.054** (0.022)	0.050** (0.019)	0.839	1595	0.171	–0.042* (0.023)	–0.008 (0.027)	0.043
Seasonal adjustments in products	1623	0.099	0.027* (0.014)	0.008 (0.012)	0.079	1595	0.188	–0.026 (0.025)	–0.016 (0.027)	0.501
Improve strategies for input purchases	1623	0.045	0.022 (0.013)	0.010 (0.015)	0.281	1595	0.135	–0.027 (0.026)	–0.019 (0.021)	0.709
New selling mechanisms	1623	0.049	0.009 (0.013)	–0.002 (0.011)	0.298	1595	0.071	–0.002 (0.014)	0.004 (0.021)	0.721
Improve customer service	1623	0.567	0.016 (0.026)	0.036* (0.020)	0.497	1595	0.468	0.008 (0.030)	0.010 (0.032)	0.920
Increase ad expenditures	1623	0.043	0.002 (0.014)	–0.002 (0.013)	0.660	1595	0.100	–0.028** (0.013)	0.024* (0.014)	0.001
Renew machinery/equipment	1623	0.031	0.007 (0.008)	0.012 (0.012)	0.673	1595	0.075	–0.031*** (0.010)	–0.010 (0.018)	0.237

See notes to Table 3.

* Significant at 10%.

** Significant at 5%.

*** Significant at 1%.

Table D.1

Robustness check of mean standardized ITT effects – double difference vs T–C at FU.

	# of obs.	Double diff. FU				Treatments–control (T–C)			
		Treated	GT	GT + TA	p-Value	Treated	GT	GT + TA	p-Value
		(1)	(2)	(3)	(3) – (2)	(4)	(5)	(6)	(6) – (5)
Productivity residual									
Follow up 1	3030	0.110 (0.075)	0.015 (0.085)	0.205** (0.093)	0.054	0.085* (0.043)	0.075 (0.044)	0.100* (0.057)	0.650
Follow up 2	2941	0.052 (0.126)	0.009 (0.125)	0.093 (0.136)	0.253	0.036 (0.060)	0.030 (0.063)	0.041 (0.065)	0.794
Business sales									
Follow up 1	2821	0.069 (0.070)	–0.005 (0.089)	0.144* (0.077)	0.115	0.089* (0.044)	0.049 (0.056)	0.126** (0.047)	0.161
Follow up 2	2688	0.168 (0.113)	0.155 (0.127)	0.180 (0.118)	0.798	0.103 (0.063)	0.109 (0.069)	0.110 (0.067)	0.985
Business practices									
Follow up 1	3141	0.038 (0.029)	0.012 (0.033)	0.064* (0.032)	0.100	0.031** (0.013)	0.010 (0.015)	0.050*** (0.015)	0.012
Follow up 2	3073	0.065* (0.038)	0.049 (0.046)	0.081* (0.040)	0.457	0.039** (0.017)	0.029 (0.022)	0.052*** (0.019)	0.350
Business associativity									
Follow up 1	3141	0.009 (0.034)	–0.010 (0.030)	0.027 (0.043)	0.243	0.054*** (0.017)	0.033** (0.015)	0.075*** (0.024)	0.034
Follow up 2	3073	–0.001 (0.032)	–0.014 (0.039)	0.012 (0.031)	0.352	0.021 (0.014)	0.012 (0.015)	0.030* (0.017)	0.286

Notes: (FU) Follow-up. Double difference estimates include individual fixed effects and controls such as business activity, business size, age and schooling of the eligible female. The T–C estimates are estimated as in Table 6. All standard errors are clustered at zone (34 zones).

* Significant at 10%.

** Significant at 5%.

*** Significant at 1%.

Table D.2

Mean standardized ITT effects under varying missing data assumptions (follow up 2).

Missing data scenarios		Productivity residual		Business Sales		Business practices		Business Associativity	
		GT	GT + TA	GT	GT + TA	GT	GT + TA	GT	GT + TA
# of observations		1975	1975	1975	1975	1975	1975	1975	1975
Lower bounds	(1)	−0.934*** (0.079)	−0.880*** (0.085)	−0.905*** (0.072)	−0.845*** (0.067)	−0.561*** (0.045)	−0.528*** (0.042)	−0.189*** (0.017)	−0.172*** (0.016)
	(2)	−0.559*** (0.062)	−0.562*** (0.083)	−0.327*** (0.048)	−0.341*** (0.062)	−0.366*** (0.035)	−0.337*** (0.039)	−0.182*** (0.018)	−0.162*** (0.014)
	(3)	−0.117* (0.065)	−0.094 (0.066)	−0.055 (0.041)	−0.029 (0.047)	−0.071*** (0.020)	−0.052*** (0.018)	−0.008 (0.012)	0.006 (0.014)
	(4)	−0.030 (0.065)	−0.011 (0.066)	0.035 (0.041)	0.059 (0.046)	−0.008 (0.018)	0.010 (0.017)	0.005 (0.012)	0.019 (0.014)
Average treatment effect	(5)	0.030 (0.063)	0.041 (0.065)	0.109 (0.069)	0.110 (0.067)	0.029 (0.022)	0.052*** (0.019)	0.012 (0.015)	0.030* (0.017)
Upper bounds	(6)	0.086 (0.067)	0.099 (0.065)	0.156*** (0.043)	0.175*** (0.045)	0.077*** (0.018)	0.092*** (0.017)	0.022* (0.013)	0.035** (0.015)
	(7)	0.172** (0.069)	0.182*** (0.065)	0.247*** (0.045)	0.263*** (0.046)	0.141*** (0.019)	0.153*** (0.017)	0.035** (0.013)	0.048*** (0.015)
	(8)	0.561*** (0.084)	0.543*** (0.072)	0.466*** (0.070)	0.465*** (0.069)	0.403*** (0.044)	0.401*** (0.042)	0.198*** (0.026)	0.203*** (0.024)
	(9)	0.964*** (0.103)	0.934*** (0.075)	1.054*** (0.082)	1.044*** (0.062)	0.609*** (0.050)	0.602*** (0.042)	0.204*** (0.025)	0.208*** (0.024)

(1) Imputes minimum value of each variable in the non-attrited treatment distribution to attrited in the treatment group, maximum value of non-attrited control distribution to attrited in the control group.

(2) Same as (1) except it assumes non-reversal for attrited in the treatment group.

(3) Imputes mean minus 0.25 SD of the non-attrited treatment distribution to attrited in the treatment group, mean plus 0.25 SD of the non-attrited control distribution to attrited in the control group.

(4) Imputes mean minus 0.10 SD of the non-attrited treatment distribution to attrited in the treatment group, mean plus 0.10 SD of the non-attrited control distribution to attrited in the control group.

(5) Mean standardized treatment effect on the non-attrited (see Table 5 and 6).

(6) Imputes mean plus 0.10 SD of the non-attrited treatment distribution to attrited in the treatment group, mean minus 0.10 SD of the non-attrited control distribution to attrited in the control group.

(7) Imputes mean plus 0.25 SD of the non-attrited treatment distribution to attrited in the treatment group, mean minus 0.25 SD of the non-attrited control distribution to attrited in the control group.

(8) Same as (9) except it assumes non-reversal for attrited in the control group.

(9) Imputes maximum value of each variable in the non-attrited treatment distribution to attrited in the treatment group, minimum value of non-attrited control distribution to attrited in the control group.

Appendix B. Supplementary data

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.jdeveco.2014.10.005>.

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