Teaching KAIZEN to Small Business Owners: An Experiment in a Metalworking Cluster in Nairobi☆

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☆ We are grateful to Yoshito Kawasaki, David McKenzie, Takeo Hoshi, Alistair Munro, and other participants in the 24th NBER-TCER-CEPR Conference. We would like to thank the entrepreneurs and workers in the Kariobangi Light Industries for their cooperation. We thank Abena Otu, Cecilia Asibey-Bonsu, and Anthony Kiogora for their dedication to the training program discussed in this paper. We are indebted to John Page and Shanta Devarajan for the insightful guidance during their tenure as the Chief Economist of the World Bank Africa Region. Conducted as a part of the joint World Bank-Japan African Enterprise Study, the training program was financially supported by the Policy and Human Resources Development (PHRD) trust fund of Japan at the World Bank.

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1. Introduction

In recent years, managerial capital, or the capability to manage a business, has become increasingly recognized among economists as one of the major determinants of enterprise productivity, growth, and longevity (Bruhn, Karlan, and Schoar, 2010; Syverson, 2011; McKenzie and Woodruff, 2012). Several studies have assessed the impacts of managerial training intervention on business performance, and some of them find that even short-term basic training can improve their management practices (e.g., Karlan and Valdivia, 2011; Drexler et al., 2010; Field et al., 2010; Bjorvatn and Tungodden, 2010).

These experimental training programs taught the basics of management, such as the importance of keeping records, how to make business plans, and the importance of identifying good customers. Such training contents may be suitable for the self-employed or microenterprise owners employing one or two workers, like the subjects of some of the management training experiments (e.g., Karlan and Valdivia, 2011; Berge, et al., 2012; de Mel, McKenzie, and Woodruff, 2012). To more ambitious owners of microenterprises who want to expand their businesses, however, it may be useful to teach some other aspects of management as well.

This paper attempts to assess the impacts of teaching the very basics of KAIZEN, an inexpensive, commonsense approach to management emphasizing the reduction of wasted materials and activities, to owners of small enterprises on their business performance.

This experiment was conducted in a metalworking cluster in Nairobi, Kenya. In this cluster, Sonobe, Akoten, and Otsuka's (2011) observational study found that the enterprises varied considerably in the way they were operated. At some enterprises, more than ten workers worked in an orderly fashion while keeping their workshops neat and tidy. Such enterprises expanded the size of operation within several years, and a few of them moved to more spacious industrial areas. In the same cluster, however, stagnant enterprises abound. They failed to profit even from seemingly lucrative orders for their products or machining services because the mishandling of materials, injuries, machine breakdowns, and other problems occurred with surprising frequency at their workplaces. Based on these observations, we designed our training program featuring the basics of KAIZEN, so that owners of small enterprises could learn how to motivate every worker to participate in workplace housekeeping to improve productivity, safety, and product quality.

Assessing the impacts of teaching KAIZEN is not new. Bloom et al. (2013) report the substantial impacts of teaching lean management practices, which overlap with KAIZEN considerably, at 14 plants of 11 textile firms around Mumbai, India employing 100 to 1000 workers on their business performance. Berihu (2013) reports the strong impacts of teaching KAIZEN on the business performance of the 30 largest manufacturing firms in and near Addis Ababa, Ethiopia. These training programs dispatched a number of management consultants based in the United States and Japan, respectively, to plants of the treated firms and lasted for more than two years. Our study examines whether even a much smaller-scale KAIZEN training program can have favorable impacts on the performance of small enterprises. In our training program, three management consultants from Ghana and Kenya taught 34 business owners in a classroom only 2.5 hours a day for 13 days.

This study of management training differs from the existing ones in a few other respects as well. First, while many existing studies look at the impacts of training on microfinance clients operating in various business sectors, all the enterprises in our sample were located in a geographically small cluster and engaged in metalworking activities. Second, however, our sample enterprises were more heterogeneous in terms of enterprise size and include self-employed persons and small enterprises employing more than 20 workers. The average number of employees was 4.3 before the training program and 5.4 after the program. While training participation was obligatory or recommended by microfinance institutions in some of the preceding training experiments focusing on microfinance clients, it was freely self-selected in our training program.

Our original plan was to select a number of business owners randomly to invite to the training program and let them choose whether to participate in it. Just before getting started, however, this plan was abandoned because post-election violence broke out after the presidential election held in December 27, 2007. The interior of the Kariobangi Light Industries, our study site, was peaceful during the crisis, but the cluster was close to the scene of mayhem. We postponed the program twice, and finally implemented it in April 2008. We also had to skip the initially scheduled enterprise survey. Instead we decided to use the data that we collected in 2006 as the baseline data. We had initially intended to hold training sessions in the evening but instead held them during the daytime for security purpose. Because business owners were busier during the day than at night, we gave up the initial randomization scheme, which would have resulted in very few participants. Thus we invited all the business owners in our baseline sample to participate in the training program.

Our major findings are as follows. First, the free self-selection into the daytime

training sessions led to a low take-up rate of 34 participants out of the 85 invited business owners, while the average take-up rate for the experimental training programs including those for microfinance clients was about 65 percent, according to the excellent review of these studies by McKenzie and Woodruff (2012). Second, the participants tended to be owners of smaller enterprises in terms of sales revenues and those with experience of working at large formal-sector factories and with experience of participating in other training programs. These results suggest that those who had lower opportunity (or time) costs and were aware of the value of learning new knowledge tended to participate in our training program. Third, the combined effects of the training itself and the self-selection on value added and profits are positive and significant even after the unobservable fixed effects of business owners are controlled for, while the combined effects on sales revenues are insignificant. The results remain qualitatively similar when the self-selection effect is mitigated by employing the difference-in-difference propensity-score matching method, even which will not control for potential differences in unobservables correlated with the choice to participate in the training program. By contrast, the participation in other training programs in the past is found to increase sales revenues, not value added or profits. These results suggest that the participants made efforts to reduce wasted materials and activities following the KAIZEN training.

The next section describes our study site and training program. Section 3 presents the empirical results concerning the factors associated with self-selection into participation, participants' attendance, and their test scores. Section 4 presents the empirical results concerning the impacts of the training on business performance and management practices. Section 5 discusses implications for future research and policies.

2. Kariobangi Light Industries and the KAIZEN Training Program

Our study site is near a large slum area in Nairobi and is called the Kariobangi Light Industries. The local government designated this area as a place for artisans' light manufacturing activities in 1989 but did not provide infrastructure (Sonobe, Akoten, and Otsuka, 2011). Its development dates from the early 1980s, when the workers of formal-sector factories lost jobs as a consequence of the implementation of the Structural Adjustment Program and moved to this area. They cleared the bush to construct roads and established garages and workshops. They call themselves Jua Kali in Swahili, meaning informal sector artisans.[1] Many of their businesses are informal, but some are formal and employ as many as twenty workers.

We have studied the development of this cluster since 2004. In 2006, we conducted an enterprise survey to collect data of 127 enterprises on the educational and occupational backgrounds of their owners, production and costs, and marketing in 2000, 2002, and 2005, and on the number of employees in these years and 2006. Using these data, Sonobe, Akoten, and Otsuka (2011) find that more highly educated business owners were more likely to deal with quality-conscious customers, such as international organizations, NGOs, and government bodies, and tended to have higher rates of employment growth than their less educated counterparts. The same data set reveals that profits and enterprise sizes were larger for business owners with higher education.

These results remain unchanged if the effects of different product lines or categories are controlled for. Of the 127 enterprises surveyed, 85 were engaged in metalworking, such as the production of flour mills, scale balances, steel furniture, and bolts and nuts, and

[1] The literal translation of Jua Kali is ‘‘hot sun,’’ and this term refers to informal-sector artisans because they work outside under the hot sun.

the remaining 42 enterprises were engaged in hardware retailing, car repair services, soap making, printing and other miscellaneous activities. Within each category of products, enterprises varied considerably in business performance, even though they were located in the same place.

While the positive association between business owners' education levels and their business performance seems robust, what education represents is unclear. It can be the person's human capital, but it can also be his or her financial wealth and extensive network or social capital. Moreover, the positive association between education and business performance accounts for only a very small part of the variation in business performance across the enterprises producing similar products in the same industrial cluster.

Recent economics literature abounds with empirical findings indicating that management is a major determinant of business performance (e.g., Ichniowski, Shaw, and Prennushi, 1997; Bertrand and Schoar, 2003; Bloom and Van Reenen, 2007), and that management practices can be improved by proper training (e.g., Karlan and Valdivia, 2011; Drexler et al., 2010; Bruhn, Karlan, and Schoar, 2010; Field et al., 2010; Bjorvatn and Tungodden, 2010; Mano et al., 2012; Bloom et al., 2013). Although our 2006 survey did not attempt to measure and record management practices systematically, our observations of the way the enterprises were operated are consistent with these arguments about management in the recent literature.

First, about half the sample enterprises did not keep records of transactions or inventory, like many micro-entrepreneurs in Sri Lanka as described by de Mel, McKenzie, and Woodruff (2009). They were not sure whether they were making profits or losses. Whether to keep records or not may be a matter of habit rather than knowledge. Still, proper training should help participants grasp the importance of keeping records of

transactions and inventory. Drexler et al. (2010) find that a simplified "rule-of-thumb" training in record keeping has favorable impacts on the performance of micro-entrepreneurs.

Second, the majority of the business owners in our sample did not separate their business and household finances. Karlan and Valdivia (2011) find that a training program that taught, among other things, how to separate money between the business and the household increased the business income of microfinance clients. Third, many of the business owners in our sample could not characterize who their good customers were. They had paid little attention to customer needs probably because they were unaware of the basics of marketing. Berge, Bjorvatn, and Tungodden (2012) as well as Karlan and Valdivia (2011) report that learning basic marketing helped microfinance clients expand their businesses. The basics of record keeping and marketing are also core subjects of Start/Improve Your Business (SIYB) and Business Edge management training programs provided in a number of developing countries by ILO and International Finance Corporation (IFC), respectively.

Although not emphasized in the existing studies of management training experiments, there is another problem commonly observed at almost every workplace. It is the problem of motivating workers to pay attention to productivity, quality control, and machinery maintenance. For example, workshops and warehouses littered with broken machines and waste materials prevent workers from working quickly and smoothly, increase the risk of injury, and disappoint visitors who might otherwise offer loans or become customers. As another example, workers waste time in searching for tools because they do not make a point of putting the tools away after they finish using them. Thus, workplace housekeeping is an important factor associated with business performance.

We saw several business owners failing to motivate their workers to keep their workplaces neat and tidy. Similarly, we often heard from business owners that they had to give up their plans to produce higher-quality products by using higher-quality materials or machinery because their rough workers would have spoiled such expensive materials and machinery. These owners believed that they could not motivate workers to pay attention to housekeeping, proper work procedures, or machinery maintenance.

Experts in KAIZEN maintain that KAIZEN helps to motivate workers to pay attention to these aspects of business operation so as to improve productivity and product quality (e.g., Imai, 1997). KAIZEN and lean manufacturing are commonly practiced in East Asia and North America. As mentioned earlier, Berihu (2013) and Bloom et al. (2013) present evidence for the favorable impacts of extensive training programs teaching KAIZEN or lean manufacturing to large firms in developing countries.

Few attempts, however, have been made to assess the impacts of KAIZEN training on small enterprises, even though KAIZEN training has been an important ingredient of a large number of technical aid projects that the Japanese aid agency has implemented in various parts of the world. An exception is a randomized controlled trial of a 15-day training program for small metalworking enterprises in Ghana (Mano et al., 2012). In this program in Ghana, five days (or 12.5 hours) were devoted to lectures on the basics of KAIZEN, and the remaining ten days were used to teach basics of marketing, business planning, and record keeping. The impacts of the program on business performance were assessed to be positive and marginally significant. The present study was initially intended to replicate this randomized controlled trial in Kenya by hiring the same team of instructors consisting of two Ghanaians and one Kenyan. One Ghanaian instructor received KAIZEN training in Japan.

3. Participation, attendance, and understanding

Our original plan was to conduct an enterprise survey just before providing the training program. Not all the invited persons would participate in the program and, thus, we would be able to examine factors associated with self-selection into participation and to assess the intention-to-treat (ITT) effects and the local average treatment effects (LATE) of the training. As mentioned earlier, however, the post-election violence delayed the training program and shortened the period of training from 15 days to 13 days and from 2.5 hours a day to 2 hours a day. The violence also forced us to abandon the enterprise survey and to have the training sessions during the daytime. Consequently, we had to use our 2006 survey data as the baseline data and expected a very low take-up rate. We decided to give up randomization and focus on the largest possible group of relatively homogeneous entrepreneurs within our sample. Thus, we invited all the 85 metalworking entrepreneurs in the sample to the training program. This means that we cannot assess the ITT effect or the LATE of the program.

The timeline for the surveys and the training program is as follows. The baseline survey was conducted in September 2006 and collected data on the operation of the sample enterprises in 2000, 2002, and 2005 as well as the educational and occupational backgrounds of the entrepreneurs. The training program was implemented for 13 weekdays from Wednesday, April 23, 2008 to Friday, May 9, 2008. The follow-up survey was conducted in December 2008 to collect data of the 85 metalworking enterprises on their operation during the post-training period from June to November 2008. In the follow-up survey, we also collected recall data on the pre-training situation in 2006 and 2007 as well.

Table 1 summarizes the background characteristics of the experiment subjects by participation status. In our definition, a business owner is regarded as a participant if he or she attended the training program for more than 7 days. There were 39 business owners who attended the program at least one day, but five of them stopped showing up after the second or third day. The remaining 34 persons recorded high rates of attendance. The training was conducted in a classroom. Although the instructors made short visits to 16 participants' workshops, the main purpose of the visits was to become familiar with the environments of the Kariobangi cluster and the way in which the enterprises operated, not to give suggestions to the participants.

As the first two lines of Table 1 show, the 34 participants and 51 non-participants share about the same ages and years of schooling. On average, they were in their late 30s as of 2005 and had almost 12 years of education.[2] The participants differ significantly from the non-participants in other respects, however. Nearly 80 percent of the participants and 51 percent of the non-participants worked at large factories in the formal sector before they started their businesses in Kariobangi. The difference is statistically significant at the one percent level. From our impression, business owners with this kind of work experience tended to be more knowledgeable about production technologies used in modern factories operated by Indians or Europeans.

While 27 percent of the participants had participated in other training programs in the past, only 6 percent of the non-participants had such a learning opportunity. These training programs were mostly short-term standard business training programs, not

[2] These entrepreneurs are much more highly educated than average workers in Kariobangi, who would have 8 years of education or so even though we did not collect data of workers systematically. According to Fafchamps and Söderbom (2006), the mean of the years of schooling is 8.5 for workers and 11.6 years for supervisors in the manufacturing sector in various countries in sub-Saharan Africa, and the corresponding figures for the manufacturing sector in Morocco are 7.3 and 13.9.

including a KAIZEN element, held by international organizations and NGOs. According to our interview with a successful businessman, participation in a training program almost a decade ago boosted his business so that his metalworking factory moved from Kariobangi to a more spacious and convenient industrial area. The last line of Table 1 shows that the participants had operated their businesses significantly longer than the non-participants. Thus, the participants were more experienced in the operation of own businesses and had more opportunities to see and hear about modern technology and management than the non-participants.

These differences between the participants and non-participants are reflected in the estimated probit model of the self-selection into participation as shown in column (1) of Table 2. The coefficients on age and schooling are insignificant, while the coefficients on the formal-sector experience dummy and the participation in other training dummy are positive and significant. While the coefficient on the years of operation is insignificant in column (1), it is positive and marginally significant in column (2), in which sales revenue in 2005 is added even though it is admittedly endogenous, to control to some extent for the effects of unobservable capability and opportunity costs. The inclusion of sale revenue here is intended to capture the opportunity cost or time cost of the business owner because the business owner would be busier if he or she was operating a larger business. This result is robust as it is not altered if the sales revenue in 2005 is replaced by the sales revenue in other years or by the number of workers or value added.

A possible interpretation of the positive coefficient on the years of operation is that highly experienced business owners tend to have developed a kind of receptivity to welcome any potential opportunity which come around. Another interpretation would be that enterprises operating for longer years are more willing to learn standard management

techniques, preparing for moving to formal industrial areas and expanding their business. As the number of years of operation becomes greater, however, the enterprise becomes larger and the owner becomes busier, which makes it more difficult for him or her to participate in the training program. In column (1), the insignificant coefficient on the years of operation mixes these two effects working in the opposite directions. This is why the significance and magnitude of this coefficient increases slightly with the inclusion of the enterprise size as a proxy of time cost.

Another possible interpretation is that owners of larger enterprises did not find it very useful, or simply did not like, to attend the training program which the instructors clearly stated was about basic management skills, because such owners thought they had already acquired basic management skills of because of their great pride. In any case, the owners of larger enterprise were less likely to participate in the training, and they tended to have longer experience in operating businesses.

The positive coefficients on the formal-sector experience and the training experience suggest that those business owners with these experiences tend to think that training participation are useful for their businesses. These business owners, however, tend to operate larger enterprises than those without formal-sector end training experiences, and the operation of larger enterprises would make the owners busier and less willing to participate in the training program. Thus, the inclusion of the enterprise size in the regression as a control is expected to increase the magnitude of the positive coefficients on these experience variables. Consistent with this expectation, the significance level and magnitude of these coefficients increase if the enterprise size is included as shown in columns (2). To sum, business owners with formal-sector experience, training experience, and longer experience in management and operating relatively small enterprises were more

likely to participate in the training program.

The program consisted of three modules: the first module explained entrepreneurship, business planning, and marketing (3 days); the second module was about basic KAIZEN toward production management and quality management (5 days); and the third module emphasized record keeping and explained how to begin paying value added tax (5 days). The first module was originally planned to last for five days but was shortened to three days. The participants took a short test designed to measure the degree of understanding training contents at the end of each module. We rented a large room of a run-down restaurant in the Kariobangi cluster as the classroom. It had no air conditioner and was surrounded by small workshops emitting the loud sounds of hammering. Still, the three instructors who had extensive experience in adult learning managed to keep the participants from being bored. The attendance rates of the 34 participants were distributed from 77 percent to 100 percent, and the average was 94.9 percent. Their test scores were distributed from 47.0 to 93.3 out of 100 and the average was 69.1.

Table 3 reports the results of regressions linking the attendance rates and test scores to their background characteristics. In the regression equation explaining the attendance rate, the work experience in the formal sector is the only variable that has a significant coefficient except for the intercept.[3] The participants with such an experience skipped some classes probably because they thought they already knew the class content. The insignificant but negative coefficient on the same variable in the test score regressions indicates that these participants did not do well on the short tests. The good performers on the tests were those participants with higher education. This is probably because the

[3] Because 14 participants attended all the training sessions, we also estimated the attendance rate regressions with the Tobit method. The estimation results are essentially the same as the OLS estimates reported in Table 3.

test on record keeping included math questions or because such participants were used to multiple-choice tests.

4. Impacts of the Training Program

Our experiment is not a randomized controlled experiment. It is difficult to assess the average treatment effect of the treated (ATT), the most accepted measure of the treatment effect, because self-selection bias will remain even though we apply difference in differences and propensity matching. Moreover, there may be bias due to some psychological effects that will be discussed shortly. In this section, we attempt to examine the impacts of the training program while keeping these problems in mind.

Table 4 presents the data on the accounting-based indicators of business performance in the upper panel and the data on the adoption of recommended practices in the lower panel. In our enterprise surveys, we used a short and highly focused questionnaire, which was filled out by one of our coauthors or our well-trained enumerator while coaxing answers from business owners in about one hour on average. A possible problem with the accounting-based indicators is that many enterprises did not keep accounts. We estimated the sales revenues, material costs, and other costs by carefully asking such business owner about the number of pieces sold and their prices by product type, material inputs and material prices, payments to subcontractors, and payments to workers. If the same material was used or the same product was produced by two enterprises or more in our sample, we checked the consistency of the material prices or the product prices that they quoted. We believe our estimates are reasonably accurate because we checked that the estimate of gross profit was consistent with the entrepreneur's earnings, investment, living expenses, purchase of durable goods, and so on, and also because we deliberately used

written records, whenever available, taking into account that each entrepreneur might have his or her own unique concept of costs and that his or her calculation might be incorrect. Data were collected in this way by one of our coauthors in the 2006 baseline survey and by the enumerator under his close supervision in the 2008 survey. The two data sets may differ in accuracy, but such difference, if any, will not be sharp for particular types of enterprises buy by and large common to all the enterprises in the sample.

Our 2006 survey produced the estimates of sales revenue, value added, and gross profit (= value added minus labor cost) in 2000, 2002, and 2005, while our 2008 survey produced estimates of these variables in 2006, 2007, and 2008.[4] In general, a heavy dependence on recall data is a source of trouble in empirical studies. In our inference analyses, we attempt three sets of analysis: the first set uses data on business performance in 2005 and 2008, the second set uses those in 2000, 2002, 2005, and 2008, and the third set uses all data years. In the next section, we will report the results of the second and third sets of analyses because the first set is qualitatively very similar to the second set. The upper panel of Table 4 shows the deflated monthly values of these variables.

It is clear from this table that business results were getting worse every year from 2000 to 2007. This is a result of the flood of imports from Asia, which were cheap and had good finishing. Probably market competition was also increasing because producers of similar products were increasing in and around Kariobangi. From 2000 to 2007, the participants had consistently lower averages in these business performance indicators than the non-participants. This is why the results shown in Tables 2 and 3 were not essentially altered if the sales revenue in 2005 on the right-hand side was replaced by the sales

[4] For 2008, we estimated the values in an average month during the period of six months after the training program. In the analysis below, we use the estimated values in an average month in the second half of the year in the other data years as well.

revenue in other years or the other financial variables. Another interesting point is that the ratio of value added to sales revenue and the ratio of gross profit to value added went down from 2000 to 2007 for both the participants and the non-participants. These observations are consistent with the view shared by both the participants and non-participants that the product price relative to material prices were declining and labor costs were soaring.

For the non-participants, the downward trend in profitability continued in 2008. While their sales revenue in 2008 stayed at the same level as in the previous year, their value added and gross profits declined. Although not reported in the table, their average number of employees increased slightly in 2008, which might mean that some of them seriously miscalculated profitability and expanded production. By contrast, the participants increased sales revenues and achieved high profitability, exceeding the past performance. Among the participants, those that attained higher test scores in the training program tend to perform especially better in business.[5] If we take the difference in differences between the participants and the non-participants, the increase in gross profits for the participants was greater than that for the non-participants by (61.0 – 35.2) – (38.0 – 45.0) = 33.2. This relative increase amounts to more than 90 percent of the participants' average gross profit in 2007.

We, however, are concerned about a possible bias due to the Hawthorne effect. The participants might be willing to exaggerate the favorable impacts of the treatment they received. Although we do not think it was easy for them to exaggerate business results in 2008 because we checked the validity of our estimates of business results persistently, it

[5] The test score is correlated with sales revenue, value added, and gross profit, and the pairwise correlation coefficients are 0.10, 0.11, and 0.13, respectively. The *p*-values for these correlation coefficients are 0.14, 0.13, and 0.06, respectively.

might be easy to lead us to underestimate their business results in 2006 and 2007, about which our check was less persistent. During our 2006 survey, we ourselves had no intention to conduct an experiment and, hence, the data collected at that time were not biased. Therefore, to mitigate the possible influence of the Hawthorne effect, difference in differences may be taken between 2005 and 2008. Then, the relative increase in gross profits of the participants is (61.0 – 28.1) – (38.0 – 65.1) = 60.0, which is even larger than the previous measure. Overall, both the participants and the non-participants show similar trends in business results from 2000 to 2007. In 2008 the participants reveal off-trend improvement in business results, while the non-participants continue to follow the previous trend.

It is easy to imagine that the non-participants wanted to demonstrate that they did not miss out on the benefit of a useful training program by exaggerating their performance (the John Henry effect). The non-participants with such an intention would lower our estimates of their business performance in 2007 and 2006 because they would find it more difficult to exaggerate their performance in 2008. In any case, the difference in the estimated business performance between 2008 and 2007 (or 2006) can be biased upward, while the difference in the estimated performance between 2008 and 2005 is less likely to be biased. If both the participants and the non-participants exaggerated their growth performance, however, the difference in differences comparing 2008 and 2007 may or may not be greater than the difference in differences comparing 2008 and 2005, depending on which group exaggerated more greatly.

Note that even if the difference in differences may not be biased in this way, it includes the self-selection effect and cannot be regarded as the impact of the training program itself. The participants would decide to participate in the training because they

anticipated benefiting from it. We think that they could have the correct anticipation about the benefit from the training because they had read the flyer explaining the contents of the training and because they could choose whether to participate in the training after attending a few classes. Actually there were five non-participants who attended one or two sessions, as mentioned earlier. Thus, we expect that the self-selection effect included in the difference in differences is non-negligible.

Thus, the seemingly better business performance of the participants relative to the non-participants may be a result of a self-selection effect, recall bias, and psychological effects as well as the effects of the training program itself. Our data do not clearly indicate that the psychological effects are strong or that the recall bias is serious. As to self-selection, however, we have already seen in Table 3 that the statistical association between some variables and participation is highly significant, and moreover, we expect that some unobservable talents of business owners will be associated both with training participation and business performance after the training program. Thus, the self-selection effect may explain a large part of the relatively good performance of the participants. Note, however, that the self-selection effect cannot be realized without the training program.

We turn to the data on the adoption of three recommended practices shown in the lower panel of Table 4. The first is to keep records of transactions and inventory. The second is to review records to detect abnormalities and to make business plans. The third is to set in order, or to designate locations at which materials are stored or to which tools are returned after being used. During our 2006 survey, we did not formally gather information on these practices but just made casual observations at each sample enterprise. When we conducted our 2008 survey, the data on practices were constructed from the

respondents' answers to the question of when they adopted each of these practices. The collected information on management practices is reasonably consistent with our casual observations during the 2006 survey.

We are concerned about biases in the practice adoption data due to the social desirability bias as well as to the Hawthorne effect. The fact that we asked about these practices would suggest to our respondents that we thought the adoption of these practices was desirable. It seems natural that they were tempted to answer these questions in a manner that would be viewed favorably by us. Like our estimates of business performance in 2008, the data on the adoption of practices as of 2008 are relatively reliable because we directly observed the practices on site by visiting the sample enterprises. However, the adoption rates in the earlier years can be greatly exaggerated. Among the participants, those who achieved higher test scores were likely to adopt the recommended practices.[6]

Table 5 reports the estimated random-effects and the fixed-effects models of the determination of the business results. The random-effects model may be written

$$y_{it} = \beta_0 + \beta_1 P_i \times Year08 + \beta_2 P_i + X_i \gamma + \lambda_t + u_i + \varepsilon_{it},$$

where the dependent variable y_{it} is the outcome (i.e., sales revenue, value added, and gross profit) of enterprise i in year t, P_i is a dummy variable indicating whether or not the owner of enterprise i participated in our training program, $Year08$ is the year dummy for 2008, X_i is a vector of the (time-invariant) characteristics of the owner i, λ_t is the year effect, u_i is un

[6] The pairwise correlation coefficients between the test scores on the one hand and keeping records, analyzing records, and set in order on the other are all higher than 0.30, and the *p*-values are all less than 0.01.

observable individual effect, and ε_{it} is an error term. The training impact is measured by coefficient β_1, the coefficient on the interaction between the participation dummy and the 2008 year dummy.

In the corresponding fixed-effects model, one can estimate β_1 but not β_2 or γ because variables P_i and X_i are time-invariant. Table 5 reports primarily the estimated random-effect model. The fixed-effects estimate of β_1 is presented in the second to the last row. According to the results of the Hausman test, as shown in the last row, the coefficients of the random- and fixed-effects models are not systematically different. Note, however, that both random- and fixed-effects estimation may be inconsistent because the self-selection into participation may relate the participation dummy P_i (and hence the interaction term $P_i \times Year08$ as well) to not only u_i but also the error term ε_{it}. The specification in columns (1), (3), and (5) uses the full set of data and includes five year dummies, while the specification in columns (2), (4), and (6) focuses on years 2000, 2002, 2005, and 2008 to make the estimates more immune from the possible bias due to the psychological effects discussed above.[7]

The first row of Table 5 shows the estimates of β_1. The first two columns indicate that the impact of the training program on sales revenue is positive but insignificant. By contrast, the next four columns indicate that the impacts on value added and gross profit are significant at the five percent level. The estimated impact on gross profit shown in column (6) is about the same as the difference in differences that we calculated above. Both for value added and gross profit, the estimated impacts are smaller if the 2006 and 2007 data are included. This suggests that the non-participants might exaggerate their

[7] Because 19 firms entered the market from 2001 to 2004, the panel is balanced only from 2005, which is well before providing the training program. Although not reported, the estimation results of analyzing balanced panel from 2005 to 2008 is very similar to the results reported in Tables 5 and 6.

growth performance more greatly than the participants.

The coefficients on the participant dummy are negative and highly significant across the columns, indicating that the participants had smaller enterprise sizes than the non-participants.[8] These results are consistent with the estimated probit model of self-selection into participation (Table 2). The coefficients on the schooling variable are insignificant but positive. By contrast, the formal-sector dummy has significant coefficients, pointing to the usefulness of work experience in the formal sector in business operation.

An interesting result is that the other training participation variable has a positive and highly significant coefficient in the sales revenue regression but not in the value added or profit regression. This pattern of significance stands in contrast to that of the key coefficient β_1. These contrasting results lend strong support to our hypothesis that a training program teaching KAIZEN will help enterprises reduce waste in intermediate inputs and wasted time and effort, which is a neglected aspect of management in conventional training programs emphasizing increases in output and sales.

An alternative approach to estimate the training impacts with panel data is to use the lagged dependent variables model. In the labor economics literature, it is well known that the earnings histories of participants in labor training programs in the United States typically exhibit a pre-program dip (e.g., Ashenfelter, 1978; Ashenfelter and Card, 1985). The lagged dependent variables model is employed to deal with the pre-program dip (Angrist and Pischke 2009; Abadie, Diamond, and Hainmueller 2007). We applied this model to our data even though the business performance of the participants in our training program did not show a pre-program dip but was persistently declining and worse than the

[8] The significantly low sales revenue in 2006 can be explained by a fire in Kariobangi in that year.

performance of the non-participants throughout the period before the training program, as shown in Table 4. The results were qualitatively similar to the results shown in Table 5.

Table 6 presents the results of the random-effects model estimation of the training effects on the adoption of recommended practices. Although we have to be cautious in interpreting the results because of the social desirability bias, three findings seem noteworthy. First, the coefficient on the interaction between the participation dummy and the year 2008 dummy is significant in every column. Second, this interaction has a particularly large and significant coefficient in the last two columns, indicating that the training encouraged the adoption of one of the essential housekeeping practices. Third, the schooling variable and the other training participation variable have significant coefficients only in the regressions of record keeping and analysis as shown in the first four columns, not in the KAIZEN practice. These results lend further support to the hypothesis that the KAIZEN training improves an important but neglected aspect of management.

Finally, we report in Table 7 as well as Table A and Figures A-1 and A-2 in the Appendix the results of applying the differences-in-differences propensity-score matching (DID-PSM) method (Rosenbaum and Rubin 1983; Heckman, Ichimura, and Todd 1997, 1998; Smith and Todd 2005).[9, 10] Although there are variants of matching methods available in the literature, Smith and Todd (2005) present suggestive evidence for the

[9] Matching methods have been widely applied to non-experimental data from developing economies (Diaz and Handa 2006; Iddrisu *et al*. 2009; Park and Wang, 2010; Todo, 2011). For example, Rosholm, Nielsen, and Dabalen (2007) use the PSM to evaluate the impacts of technical training programs for workers on labor productivity in Kenya and Zambia, and Behrman *et al*. (2009) use both DID-PSM and DID-bias-corrected matching (BCM) to evaluate schooling impacts of conditional cash transfers on young children in Mexico.

[10] We use STATA command *psmatch2* (version 3.1.3) developed by Leuven and Sianesi (2008) to implement the DID-PSM matching.

advantage of local-linear matching over standard kernel matching methods.[11] We employ local-linear regression matching, an extension of local-linear matching that adjusts for the remaining difference in the covariates between the participants and the matched non-participants based on the local-linear regression (Heckman, Ichimura, and Todd 1997).[12]

The first step of this method is to calculate the propensity score matching based on the estimated probit models similar to those reported in Table 2. We estimated two probit models: the first is exactly the same as the model in column (1), and the second model does not control sales revenues but uses the entrepreneur's characteristics as of 2005. The first probit model is intended to obtain difference-in-differences propensity scores in the case in which outcomes in 2007 and 2008 are compared.[13] The second model is intended to compare outcomes in 2005 and 2008.[14] The second step is to check the validity of matching, which is done in Appendix.

Table 7 shows the results of the DID-PSM estimation of the training impacts on business performance and the adoption of practices. This table has two rows corresponding to the two models just mentioned above and six columns corresponding to three indicators of business performance and three practice adoption rates. According to these rows, the impacts of the training on business performance are positive and generally significant, and the impacts on value added and profit are particularly significant. These

[11] These advantages include a faster rate of convergence near boundary points and greater robustness to different data design densities. See Fan (2002, 2003).
[12] In contrast to regression adjustment estimators, bias-corrected nearest-neighbor matching estimators have the disadvantage of not being fully efficient (Abadie and Imbens, 2006).
[13] When we additionally incorporated the sales revenues in 2002 to 2007 into the probit model, the resulting PSM estimates of the KAIZEN training effects were not very different from the estimates reported in this paper.
[14] We also tried to additionally incorporate the sales revenue only in 2005 into the probit model, and obtained associated PSM estimates of the KAIZEN training effects quite similar to the estimates reported in this paper.

results lend support to the hypothesis that the KAIZEN training boosts profitability rather than sales. The estimated impacts are stronger in row (2) (i.e., when difference in differences is taken between 2008 and 2005) than in row (1) (i.e. when difference in differences is taken between 2008 and 2007), which is consistent with our findings from Tables 4 and 5. It is also noteworthy that the estimated impacts on the adoption of practices are all significant as shown in columns (4) to (6), and that the magnitude of the impact on the KAIZEN variable is larger than that on record keeping and analysis, which is consistent with the result shown in Table 6.

5. Conclusions

Recently a number of randomized controlled experiments have been conducted in developing countries to estimate the impacts of basic business training on the self-employed, microenterprises, and small enterprises with a view to providing an intellectual basis for designing effective technical cooperation. Such basic training programs usually emphasize business planning skills, marketing skills, and financial literacy. They seldom teach even the principles of production management and quality management, including simple housekeeping rules. KAIZEN and lean manufacturing are approaches to this neglected but important aspect of management. The impacts of extensive training programs designed to teach KAIZEN or lean manufacturing to large enterprises have already been assessed in some recent studies. The present study is one of the few attempts that have been made to assess a small-scale, inexpensive training program that teaches basic KAIZEN to small enterprise owners.

The estimated impacts of our training program on sales revenues are statistically insignificant, but those on value added and profits are significant and economically strong.

By contrast, those business owners who received other business training in the past had significantly greater sales revenues, but their value added and profits are not significantly different from the averages. These results support our hypothesis that KAIZEN training boosts value added and profits by reducing wasted materials and activities. We hasten to add, however, that our estimates of the training impacts are subject to self-selection bias because our controlled experiment was not randomized due to circumstances beyond our control.

Our examination of the factors associated with self-selection into training participation suggests that the participants tended to be the business owners who attached relatively high value to knowledge and had relatively low opportunity costs of participating in the training program. In other words, it is likely that the right persons for the training participated in the program. This would be a non-negligible part of the reason why the training program had strong impacts on business performance.

These results of our analyses point to several agendas for future studies. One is to assess, by means of randomized controlled trials, the pure causal effects of training programs that teach not only basic but also intermediate and advanced levels of KAIZEN, in order to find out what training contents are cost-effective. It is also important to examine the process in which new management techniques are implemented within a firm, involving the internal training of workers. The diffusion process of new management techniques and other knowledge is also worth investigating. Another agenda is to determine how to secure good matching between training contents and participants. We also need to better understand the major determinants of participating in this type of training programs and applying what participants learn to the business successfully. The compilation of further studies in these two directions are warranted because the overall

impact of a management training program increases with both its pure causal effect and the participation of persons who are highly motivated to learn from the training.

Appendix: Balancing Test

To see whether the matching is successful, we perform the balancing tests proposed by Sianes (2004) and Dehejia and Wahba (1999, 2002), which rely on the *t*-test of equality in the mean of each covariate between the participants and the non-participants, and the pseudo-*R* squared and likelihood ratios obtained from the estimation of the probit model of participation. As shown in Table A, the after-matching probit models have no explanatory power. This confirms that matching is successful.

The participants and the non-participants differ in terms of entrepreneur's observable characteristics. The differences are apparent in Figures A1 and A2, which show the histograms of the propensity scores calculated from the probit models. If we simply compared the average performance of the participants with that of the non-participants, we would fail to isolate the effects of the training participation from the effects of the entrepreneur's characteristics. If the participants and non-participants differed completely, however, it would be impossible to estimate the counterfactual performance based on the performance of the matched non-participants. Thus, the distribution of propensity score for the participants and that for the non-participants must have a common range of support, in order for the matching estimation to be feasible. Figures A-1 and A-2 clearly show that there exists such a common support, and we compare only the training participants and the non-participants belonging to this support.

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Table 1. Characteristics of the sample entrepreneurs as of 2005

	Participants (1)	Non-participants (2)	*p*-value for H_0: (1)-(2)=0
Number of observations	34	51	
Age	39.5	36.4	0.112
Years of schooling	12.0	11.7	0.694
Work experience in formal sector (yes = 1)	0.79	0.51	0.008***
Other training program participation (yes = 1)	0.27	0.06	0.007***
Years of operation	10.6	7.4	0.026**

Note. *** and ** indicate the 1 and 5 percent levels of statistical significance, respectively.

Table 2. Correlates with participation

	(1)	(2)
Entrepreneur's age	-0.0003	-0.0006
	(-0.02)	(-0.03)
Years of schooling	-0.05	-0.04
	(-1.13)	(-0.76)
Work experience in formal sector	0.76**	0.91***
	(2.24)	(2.54)
Other training participation	0.96**	1.07**
	(2.44)	(2.48)
Years of operation	0.04	0.05*
	(1.36)	(1.65)
Sales revenue in 2005 (million Ksh)		-0.002**
		(-2.32)
Intercept	-0.75	-0.76
	(-0.90)	(-0.89)
LR chi-squared	18.03***	22.61**

Notes. This table shows the estimated probit model of participation in the training program. The number of observations is 85. Entrepreneur's age, the years of operation, and the other training participation dummy used in this table are the values as of 2007. The numbers in parentheses are *z*-values. ***, **, and * indicate the 1, 5, 10 percent levels of statistical significance, respectively.

Table 3. Correlates with attendance and test score

	Attendance rate		Test score	
	(1)	(2)	(3)	(4)
Entrepreneur's age	-0.07	-0.07	-0.33	-0.34
	(-0.40)	(-0.39)	(-1.22)	(-1.24)
Years of schooling	0.18	0.19	1.75**	1.89**
	(0.41)	(0.41)	(2.63)	(2.69)
Work experience in formal sector	-6.55**	-6.70*	-4.70	-5.23
	(-2.05)	(-1.97)	(-0.97)	(-1.03)
Other training participation	-0.64	-0.71	4.67	3.32
	(-0.22)	(-0.22)	(1.04)	(0.69)
Years of operation	-0.15	-0.15	-0.18	-0.18
	(-0.66)	(-0.63)	(-0.53)	(-0.50)
Sales revenue in 2005 (million Ksh)		0.28		-0.29
		(0.21)		(-0.15)
Intercept	102.4***	102.1***	65.5***	65.7***
	(11.58)	(11.01)	(4.87)	(4.75)
R-squared	0.15	0.15	0.35	0.37

Notes. This table focuses on the 34 participants. The dependent variable in columns (1) and (2) is the number of days attended as a percentage of the total number of training days, while that in columns (3) and (4) is the test score in the percentage of the full score. The numbers in parentheses are *t*-values. ***, **, and * indicate the 1, 5, 10 percent levels of statistical significance, respectively.

Table 4. Mean business results and percentage of sample enterprises that have adopted recommended practices by participation status, 2000-2008

	Business results (per month, 1,000 constant Ksh in 2000)					
	Sales revenue		*Value added*		*Gross profit*	
	Participants	Non-participants	Participants	Non-participants	Participants	Non-participants
	(1)	(2)	(3)	(4)	(5)	(6)
2000	153.5	261.1	72.2	118.6	41.6	93.2
2002	126.8	226.4	49.7	104.1	26.1	81.4
2005	135.1	195.1	53.7	95.8	28.1	65.1
2006	117.4	154.0	51.7	73.2	37.7	54.6
2007	120.4	180.0	50.6	69.4	35.2	45.0
2008	162.2	182.1	76.4	60.9	61.0	38.0

	Adoption of practices (% of the entrepreneurs)					
	keeping records		*reviewing records*		*setting in order*	
	Participants	Non-participants	Participants	Non-participants	Participants	Non-participants
	(7)	(8)	(9)	(10)	(11)	(12)
2000	26.9	32.1	23.1	35.7	15.4	46.4
2002	35.3	37.2	26.5	27.9	20.6	32.6
2005	45.4	54.0	39.4	52.0	30.3	42.0
2006	55.9	61.2	50.0	57.1	41.2	46.9
2007	61.8	64.0	55.9	60.0	41.2	54.0
2008	85.3	72.5	79.4	68.6	73.5	62.7

Table 5. Random-effects estimates of the impacts of the training program on real sales, value added, gross profits per month (1,000 constant Ksh in 2000)

	Sales revenue		Value added		Gross profit	
	(1)	(2)	(3)	(4)	(5)	(6)
Participant×Year 2008	28.17	33.23	44.87**	54.34**	51.10**	63.31**
	(0.92)	(0.87)	(2.20)	(2.22)	(2.38)	(2.48)
Participant	-141.3***	-145.0***	-58.67***	-64.13***	-49.61***	-60.05***
	(-3.00)	(-3.03)	(-2.80)	(-2.76)	(-2.59)	(-2.65)
Years of schooling	8.99	9.58	3.31	4.09	1.58	2.65
	(1.40)	(1.49)	(1.17)	(1.32)	(0.61)	(0.88)
Work experience in formal sector	112.9**	125.4***	52.57**	57.07**	53.17***	59.60***
	(2.36)	(2.63)	(2.51)	(2.52)	(2.80)	(2.71)
Other training participation	112.3***	114.3**	10.27	5.65	-3.07	-3.18
	(3.29)	(2.54)	(0.51)	(0.22)	(-0.16)	(-0.13)
Entrepreneur's age	0.84	0.37	0.56	0.31	0.08	-0.24
	(0.31)	(0.14)	(0.47)	(0.24)	(0.08)	(-0.19)
Years of operation	6.96*	5.68	2.61	1.56	2.00	1.11
	(1.84)	(1.50)	(1.57)	(0.87)	(1.32)	(0.64)
Year 2002	-5.01	-6.33	-7.97	-10.28	-5.20	-7.38
	(-0.22)	(-0.24)	(-0.53)	(-0.61)	(-0.33)	(-0.42)
Year 2005	-8.81	-10.56	-6.12	-9.483	-9.97	-13.24
	(-0.39)	(-0.40)	(-0.41)	(-0.57)	(-0.64)	(-0.76)
Year 2006	-45.29**		-21.45		-12.78	
	(22.41)		(-1.44)		(-0.82)	
Year 2007	-32.61		-24.11		-19.01	
	(-1.44)		(-1.61)		(-1.21)	
Year 2008	-27.08	-31.05	-36.62**	-43.14**	-33.00*	-40.95**
	(-1.04)	(-1.00)	(-2.13)	(-2.17)	(-1.83)	(-1.97)
Intercept	-7.83	0.026	7.475	13.06	18.92	23.17
	(-0.07)	(0.00)	(0.15)	(0.23)	(0.40)	(0.43)
Fixed-effect estimates: Participant×Year 2008	26.28	26.28	52.18**	52.18**	62.63**	63.31**
	(0.69)	(0.69)	(2.11)	(2.11)	(2.43)	(2.48)
Hausman test χ^2	2.25	8.44	0.70	0.83	0.70	0.08
[*p*-value]	[0.95]	[0.133]	[1.00]	[0.975]	[0.99]	[1.00]

Notes. The number of observations is 466 in columns (1), (3), and (5), and 299 in columns (2), (4), and (6). The numbers in parentheses are *z*-values for random-effects estimates and *t*-values for fixed-effects estimates, both based on robust standard errors. ***, **, and * indicate the 1, 5, 10 percent levels of statistical significance, respectively.

Table 6. Random-effects estimates of the impacts of the training program on the adoption of recommended practices

	Keeping records		Analyzing records		Set in order	
	(1)	(2)	(3)	(4)	(5)	(6)
Participant×Year 2008	0.14**	0.14*	0.14***	0.14*	0.22***	0.25***
	(2.00)	(1.77)	(2.00)	(1.71)	(2.84)	(2.93)
Participant	-0.05	-0.05	-0.19	-0.12	-0.17*	-0.19*
	(-0.49)	(-0.55)	(-1.18)	(-1.43)	(-1.71)	(-1.99)
Years of schooling	0.04***	0.04***	0.04***	0.04***	0.004	0.01
	(3.66)	(3.77)	(3.54)	(3.68)	(0.31)	(0.72)
Work experience in	0.05	0.02	0.14	0.13	0.09	0.09
formal sector	(0.58)	(0.21)	(1.52)	(1.47)	(0.081)	(0.90)
Other training	0.17**	0.16*	0.12*	0.14	0.07	-0.01
participation	(2.20)	(1.92)	(1.58)	(1.55)	(0.91)	(-0.11)
Entrepreneur's age	-0.004	-0.002	0.003	0.003	-0.004	-0.002
	(-0.74)	(-0.36)	(0.51)	(0.60)	(-0.75)	(-0.36)
Years of operation	-0.01	-0.01	-0.01	-0.003	0.01	0.01
	(-1.40)	(-0.92)	(-1.03)	(-0.43)	(1.16)	(1.20)
Year 2002	0.02	0.04	-0.04	-0.02	-0.005	-0.001
	(0.40)	(0.81)	(-0.67)	(-0.29)	(-0.11)	(-0.02)
Year 2005	0.19***	0.20***	0.18***	0.20***	0.10**	0.10**
	(3.66)	(3.76)	(3.72)	(3.75)	(2.32)	(2.13)
Year 2006	0.26***		0.25***		0.15***	
	(5.17)		(5.03)		(3.55)	
Year 2007	0.30***		0.29***		0.20***	
	(5.89)		(5.78)		(4.44)	
Year 2008	0.39***	0.40***	0.37***	0.38***	0.29***	0.29***
	(6.70)	(6.33)	(6.47)	(6.03)	(5.30)	(4.75)
Intercept	-0.01	-0.097	-0.28	-0.317	0.35	0.23
	(-0.05)	(-0.47)	(-1.34)	(-1.58)	(1.50)	(1.01)
Fixed-effects estimates:	0.13*	0.13	0.14*	0.13	0.21**	0.24**
Participant×Year 2008	(2.00)	(1.62)	(2.07)	(1.64)	(2.37)	(2.39)
Hausman test χ^2	†	2.84	1.34	1.50	3.91	2.47
[*p*-value]		[0.724]	[0.99]	[0.91]	[0.79]	[0.78]

Notes. The number of observations is 466 in columns (1), (3), and (5), and 299 in columns (2), (4), and (6). The numbers in parentheses are *z*-values for random-effects estimates and *t*-values for fixed-effects estimates, both based on robust standard errors. ***, **, and * indicate the 1, 5, 10 percent levels of statistical significance, respectively. † indicates that the asymptotic assumptions of the Hausman test are not met.

Table 7. DID-PSM estimates of training effects

	Sales revenue (1)	Value added (2)	Gross profit (3)	Keeping records (4)	Analyzing records (5)	Set in order (6)
(1) Difference between 2007 and 2008	53.10*	59.83*	57.83*	0.18**	0.18**	0.30***
	(1.90)	(1.93)	(1.86)	(2.26)	(2.40)	(4.09)
(2) Difference between 2005 and 2008	14.99	73.25*	89.14**	0.20*	0.28***	0.30***
	(0.29)	(1.68)	(2.08)	(1.77)	(3.36)	(3.83)

Notes. The local linear regression matching method developed by Heckman, Ichimura, and Todd (1997; 1998) was used to match participants and non-participants. Row (1) looks at DID comparing values in 2007 (before the training) and 2008 (after the training), while row (2) compares values in 2005 (before the training) and 2008 (after the training). The propensity score used in row (1) comes from the estimated probit model reported in column (1) of Table 2, while that in row (2) uses the propensity score based on the same model as in column (1) of Table 2 except that it uses the entrepreneur's age and the years of operation as of 2005. ***, **, and * indicate the 1, 5, 10 percent levels of statistical significance, respectively.

Table A. Balancing test for DID-PSM

	2007 as baseline			2005 as baseline		
	Participants	Non-participants	*t*-value for (1) - (2) = 0	Participants	Non-participants	*t*-value for (4) - (5) = 0
	(1)	(2)	(3)	(4)	(5)	(6)
Entrepreneur's age	39.1	41.3	-0.98	36.9	38.1	-0.50
Years of schooling	12.1	12.9	-0.73	12.6	12.9	-0.65
Work experience in formal sector	0.82	0.85	-0.33	0.81	0.80	0.12
Other training participation	0.36	0.31	0.48	0.22	0.22	0.01
Years of operation	11.7	13.7	-1.30	9.6	10.8	-0.73
Summary statistics for the probit model						
Pseudo R^2	0.035			0.016		
LR chi2	3.21			1.00		
p >chi2	0.67			0.99		

Notes. The first three columns of this table show the results of the balancing test for the DID-PSM estimation reported in row (1) of Table 7, and the next three columns of this table correspond to row (2) of Table 7. The participants and non-participants in columns (1) and (2) are matched by using the propensity score obtained from the estimated probit model reported in column (1) of Table 2, and those in columns (4) and (5) are matched based on the propensity score obtained from the estimated probit model with the same model as in column (1) of Table 2 except that it uses the entrepreneur's age and the years of operation as of 2005.

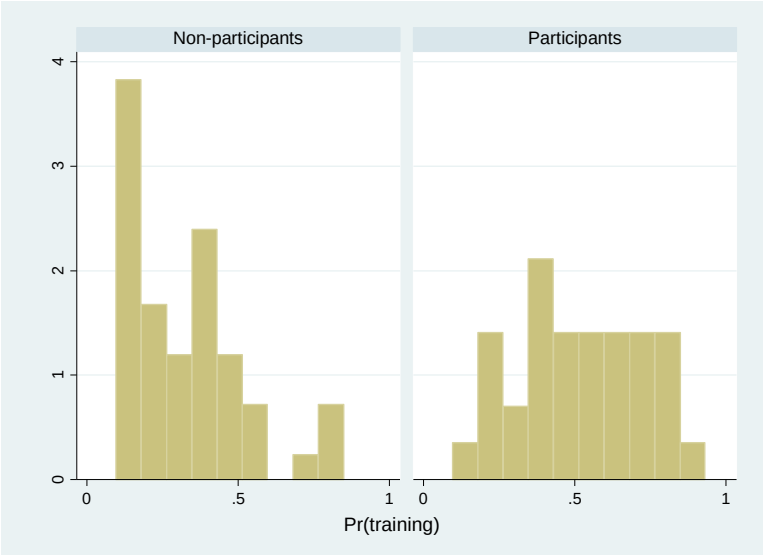

Figure A-1. Estimated propensity score by training participation corresponding to DID-PSM 2008-2007 reported in row (1) of Table 7

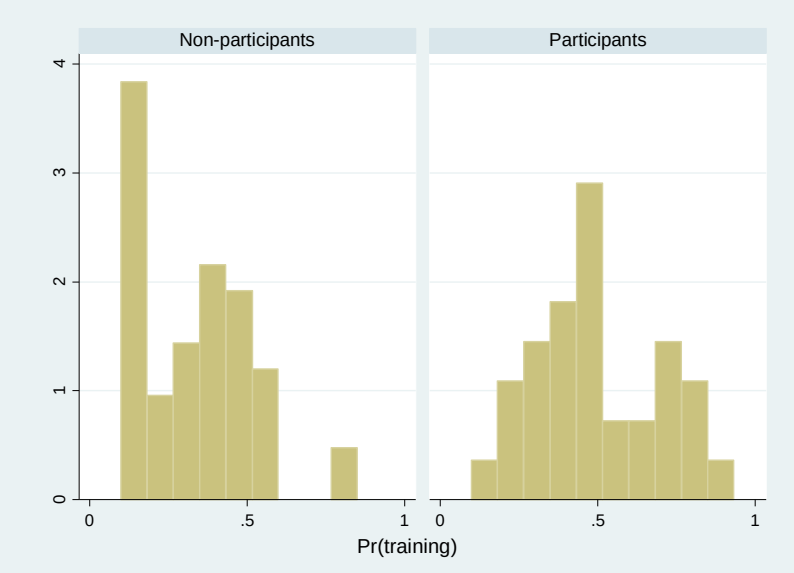

Figure A-2. Estimated propensity score by training participation corresponding to DID-PSM 2005-2008 reported in row (2) of Table 7