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**Article**

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## GENERAL & APPLIED ECONOMICS | LETTER

# Business training programs and microenterprise formalization in Peru

Manuel Barron<sup>1\*</sup>

**Abstract:** A large share of workers in developing countries are constrained to self-employment mainly due to lack of opportunities in wage employment, becoming entrepreneurs *de facto* constrained to the informal sector, with meager profits and poor working conditions. In response to this problem, several governments offer business training programs targeted at these entrepreneurs with two aims: to improve business outcomes and to promote enterprise formalization. This paper explores the relation between business training programs and formalization using data of 1,133 participants in two entrepreneurship programs in Peru. Difference-in-differences with various matching techniques indicate that formalization increased by 20–25 percentage points 2 years after program participation. This study presents suggestive evidence of three potential mechanisms behind this increased formalization rates: the opportunity to reconsider participants' original business plans, the demystification of the tax procedures, and access to seed capital.

**Subjects:** Labour Economics; Employment & Unemployment; Development Economics

**Keywords:** entrepreneurship; training; microenterprise formalization

**JEL:** M13Entrepreneurship; M53Training; O12Microeconomic Analyses of Economic Development

## 1. Introduction

In low- and middle-income countries, workers are commonly self-employed due to lack of opportunities in wage employment (Gindling & Newhouse, 2014). They become entrepreneurs by necessity, and hence are seldom prepared to manage a business (Block & Koellinger, 2009; Jayachandran, 2020; Poschke, 2013; Puente et al., 2019; Urbano & Aparicio, 2016). As a result, their profits are meager, and their activities are usually constrained to the informal sector (La Porta & Shleifer, 2014). Furthermore, the owner-operator's cognitive biases are reflected in the firm's strategies and performance, reinforcing the effects of the lack of hard skills (Kremer et al., 2019).

To palliate this problem, government agencies around the world implement business training programs targeted at these small-scale entrepreneurs, aiming at improving their performance and incentivizing these businesses to join the formal sector. The evidence on their effects is yet inconclusive. In a review of business training program evaluations, McKenzie and Woodruff (2014) show that these programs have been effective in assisting prospective owners launching new microenterprises but seem to have had limited effects on performance of existing businesses, although this may be partly due to low statistical power and attrition problems. Moreover, the effect that these programs may have on formalization remains largely unexplored.

This paper contributes filling this gap by studying the effects of two entrepreneurship programs on microenterprise formalization in Peru. The programs, ran by Peru's Ministry of Labor, target entrepreneurs from low socioeconomic status and offer training that includes business plan development, marketing techniques, basic accounting, and information on simplified tax systems available to microenterprises. Business formalization is an important outcome for the government,

so the workshops include talks and testimonies by former participants, around the costs and benefits of joining the formal sector in terms of bureaucracy as well as the potential of businesses to grow upon joining larger value chains, access to finance and government contracts, and offer advice on how to access simplified tax regimes.

The main finding is that the programs led to a substantial increase in formalization among its participants. Two years after program completion, difference-in-differences (DID) estimates paired with various matching techniques indicate that participants were 20 to 25 percentage points more likely to have a tax ID number than the control group. This effect is considerable, especially given the evidence by La Porta and Shleifer (2014) that informal firms rarely become formal. Similarly, the share of businesses with an operating license and businesses issuing sales receipts roughly tripled compared to their pre-program rates, although this evidence is only suggestive, as these variables are not available for the control group.

In addition, the DID estimates indicate that 2 years after the program, participants had on average between 0.8 and 0.9 additional employees more than the control group. This is a considerable increase, since the pre-program mean was 1.0 employee, although not transformative of the nature of these businesses, as 90% of them had fewer than 5 employees. Furthermore, depending on the specification, program beneficiaries were 9% to 18% more likely to work more than four hours a day in their businesses. Increased labor demand paired with increased time allocation is a strong indication of higher business revenues.

The survey collected by the Ministry of Labor points at likely mechanisms behind these effects, which seem to be a combination of the hard and soft skills acquired during the workshops, as well as seed funding offered to those with the best business plans. These data are complemented with information from semi-structured interviews to program participants and government officials.

This paper contributes to the literature on the effects of business training programs on micro-enterprise outcomes by showing that these programs can promote business formalization. The fact that microenterprise formalization is an elusive outcome in the developing world (Bruhn & McKenzie, 2014) underscores the importance of this finding. The business training programs studied in this paper provide information on the process of formalization as well as its costs and potential benefits, as well as in-person training on tax filing and on the procedures to access simplified tax schemes, and offer seed funding to top-performing participants. These components together mimic the main characteristics of policies that have been found to effectively boost formalization (see e.g., Benhassine et al., 2018; De Mel et al., 2013; Zucco et al., 2020).

The paper is structured as follows. Section 2 presents an overview of the literature. Section 3 describes the setting and the data. Section 4 discusses the empirical approach. Section 5 reports the results on outcomes and mechanisms, while section 6 concludes.

## 2. Literature review

In low- and middle-income countries, workers are commonly constrained to self-employment due to lack of opportunities in wage employment (Jayachandran, 2020).<sup>1</sup> They become entrepreneurs by necessity, and hence are seldom prepared to manage a business. Moreover, Abor and Quartey (2010) state that they are subject to many factors that undermine their development. These can be external, like obsolete technology, lack of access to international markets, and asymmetric incidence of regulation on them, or internal, including poor management and financial skills. Del Brio and Junquera (2003) further stress other internal obstacles these firms face, such as managers' orientation towards short-term results and lack of ability to react towards environmental changes, as well as the inability to build strong social networks.

In response to these issues, government agencies all over the developing world implement training programs targeted at these entrepreneurs. However, in a review of business training

evaluations, McKenzie and Woodruff (2014) show that these initiatives, although popular, have rather limited success (although low power and attrition can explain the lack of significant effects in some studies), and there is no consensus on which are the best interventions for these entrepreneurs (Cravo & Piza, 2019). For example, Aragon-Sanchez et al. (2003) show with a sample of European small and medium enterprises (SMEs), that there is only a moderate association between training and performance, measured by several variables of effectiveness and profitability. However, a number of studies have shown that under certain conditions, management trainings can have rather important, positive effects, like basic-level (Mano et al., 2012) and personalized trainings (Sullivan, 2000), which can even have long-term impact on firms' performance. Business plan competitions among small-scale entrepreneurs can also be effective on boosting the ones with highest potential, as McKenzie (2017) shows for the case of Nigeria, although at the expense of short-term costs for the participants.

There is also an important branch of the literature that emphasizes the need to offer funding to small-scale entrepreneurs to counteract their lack of access to financial markets. In a review of impact evaluations of entrepreneurship programs, Cho and Honorati (2014) show that, although these programs on their own do not improve firms' performance conclusively, combining training with financing support do improve firm performance, especially among female entrepreneurs. Berge et al. (2015) provide an example for a training program targeted at small-scale entrepreneurs in Tanzania, in which only those beneficiaries of trainings combined with seed capital saw improvements in sales and profits. Similarly, Blattman et al. (2016) show that a skill-training program in Uganda paired a 150 USD financial package aimed at women had persistent effects in their incomes.

Given the lack of formal business training of these entrepreneurs, an important component that could help them is a financial or accounting training. Some studies focus on the relevance of financial training and their success on improving firm performance (Calderon et al., 2020; Karlan & Valdivia, 2011). Others build upon the importance of giving these financial lessons in an informal way, following heuristics, like Drexler et al. (2014) show for the Dominican Republic case that informal financial training can reduce in 8 percentage points the probability of making accounting mistakes, as well as increasing profits, in entrepreneurs who lack management skills, while formal financial training only works with highly skilled workers. The latter result is similar to that of Skimmyhorn (2016), who finds that a personal financial management course in the US army increased savings along the extensive margin 1 year after the course (by 15 percentage points) and up to 4 years after the course (by 8 percentage points).

Although there is no empirical evidence on the effect of business training programs on formalization, one could expect such a relation to arise. A number of papers study the effect of providing information about the benefits of formalization and the registration process. Given that benefits of joining the formal sector are uncertain, information alone may not increase the likelihood of formalizing a business, as documented by Benhassine et al. (2018) for Benin and by De Andrade et al. (2016) for Brazil. Similarly, tax simplification programs alone can also fail to promote formalization (Piza, 2018). However, several studies find that some degree of success can be achieved if information is offered together with tax mediation services (Benhassine et al., 2018), funding (De Mel et al., 2013), or individualized training (Zucco et al., 2020). Given that the business training programs in our study setting include all these components, we could expect them to increase formalization. Exploring this relation is the main contribution of this paper. The next section describes the setting and the data that used in the analysis.

### 3. Setting and data

#### 3.1. Setting

Peru is a middle-income country with large informal sector. Constructing a trustworthy estimate of the size of the informal economy is difficult, but based on household survey data, the country's

Ministry of Production (2017) estimates that 50% of microenterprises in Peru are informal and employ around 70% of the working population. Most of these enterprises are operated by their owners, who typically lack formal business education. While a microenterprise is defined as a firm with up to 10 workers, 98% of them have at most five workers. Informal worker earnings can be approximated by the income of self-employed workers. In 2017, self-employed workers earned on average around US\$ 232 per month (Ministry of Production, 2017), below the minimum wage in the formal sector US\$ 255 per month. These characteristics are similar to several countries in Latin America, where micro and small enterprises are the leading creators of employment (International Labor Organization, 2015). There are around 10 million micro and small enterprises in the region, generating 47% of employment in the region (127 million workers). Together with self-employed workers, they account for 75% of employment in the region. Their working conditions are meager (International Labor Organization, 2015) and their productivity measures are dramatically lower than large firms (World Bank, 2012). Using household survey data for 18 Latin American countries, International Labor Organization (2015) estimates that microenterprise workers earnings are on average 56% of earnings in large enterprises, while self-employed workers earn 44% of that figure.

Peru's Ministry of Labor implements a number of programs that aim to boost productivity among microenterprises and attract them to the formal sector. Its two flagship programs are "Jovenes Productivos" (Productive Youths) and "Impulsa Peru" (Boost Peru). Both programs share a strong entrepreneurship component, although their target population differs: Jovenes Productivos targets 18 to 29-year olds living in poverty, while Impulsa Peru focuses on any self- or under-employed individual that is not targeted by Jovenes Productivos. These programs also offer skill certification workshops to workers interested in accessing wage employment, but this paper focuses on participants of the entrepreneurship workshops, which between 2012 and 2017 trained more than 22,000 entrepreneurs.

Participants receive training in cognitive and socio-emotional skills and receive assistance in developing a "life project", which involves picturing their long-term personal goals and finding the best ways to achieve them. Regarding entrepreneurship, participants receive technical assistance in the formulation and generation of business plans. A particular feature of this program is its aim to promote formalization, mainly by demystifying the view of the Tax Authority. In the in-depth interviews, program participants revealed they initially had a negative view of the tax authority, mainly due to the perception that any mistake on their part, like miscalculating sales taxes or failing to report sales on time, would be interpreted as tax evasion and lead to large fines. To counteract these perceptions, a substantial portion of the workshops consisted in teaching participants how to issue sales receipts, calculating taxes and enrolling in simplified tax regimes. A second message that is transmitted in these workshops regards the potential gains from formalization. There are a number of examples highlighting how remaining informal can hinder the growth of their businesses, constraining informal enterprises to the informal sector, with virtually no possibility of joining larger, more profitable, supply chains.

### 3.2. Data

This paper relies on two sources of data. First, a survey of 1,133 beneficiaries conducted by the Ministry of Labor, which includes data on formalization and business performance at the start of the program and 2 years upon completion, as well as perceptions about the quality of the program. The survey includes data for 633 Jovenes Productivos beneficiaries trained in 2013 and interviewed in 2015, as well as 500 Impulsa Peru beneficiaries trained in 2015 and interviewed in 2017. Table 1 presents the main descriptive statistics of the beneficiary survey. Almost 60% of beneficiaries are women, and the median age is 29. Roughly 60% of beneficiaries had some tertiary education, almost equally split between vocational and university education.

Most of these entrepreneurs were informal at baseline. Prior to joining the program, only 15% of them had a valid tax ID number, only 18% had an operating license, and only 13% issued sales receipts. At the time of the survey these figures had risen to 42%, 58% and 46%, respectively. Before joining the

program, just a quarter of participants earned more than US\$ 230 per month, while at the time of the survey this figure tripled. These changes are accompanied by a major change in investment in the business, which doubled from US\$ 1,213 before the program to US\$ 2,564 after the program. This is partly because 29% of participants received seed funding from the program, but the change occurred along the entire distribution of investment in business. Median investment in the business also doubled, from US\$ 909 prior to the program to US\$ 1,969 at the time of the survey. Figure 1 shows a clear shift of the entire distribution of investment in the business.

Almost 90% of participants considered the workshops to be of good or very good quality. A key component of these programs is seed funding, which is offered to the top performing participants in every cohort. Twenty-eight percent of respondents received seed funding from the program, and most recipients considered it to be important (22%) or very important (77%) in the subsequent development of their businesses. One of the program's weak component is mentoring. Continued mentoring is an important component of business training programs, as it helps participants apply and adapt the lessons from the workshops to their businesses. Almost half of the participants either received mentoring but considered it of poor quality (16%) or did not receive mentoring at all (30%).

Hence, while the program was far from perfectly implemented, it seems to have a number of desirable components identified in the literature, like high-quality workshops and seed funding that could have led to improvements in formalization and business outcomes. To investigate this issue in more depth, and to examine whether the improvements in the main outcomes could owe to economy-wide shocks or trends it is necessary to construct a plausible control group that can provide a reliable estimate of counterfactual values for these outcomes. To do so I use the self-employment module of Peru's National Household Survey, which is used to construct the control group as detailed in section 3, using a pool of 13,798 self-employed individuals that are matched to the 1,133 program beneficiaries. I use all variables available in both surveys to match these individuals to the treatment group: sex, age, level of education and province of residence. The National Household Survey also includes data on whether the business has a tax ID, number of employees and daily hours of work allocated to the business. However, it does not include data on investment in the business, on whether the business has an operating license or whether it issues sales receipts.

**Table 1. Descriptive statistics—program beneficiaries**

Age (median)	29	Earns more than US\$ 230	
% Female	59%	Pre-program	24%
Level of Education		Post-program	75%
Secondary	23.1%	Workshop quality	
Vocational	33.9%	Good or very good	89%
University	41.5%	Regular or poor	11%
Has operating license		Mentoring quality	
Pre-program	18%	Good or very good	54%
Post-program	58%	Regular or poor	16%
Issues official sales receipt		Was not mentored	30%
Pre-program	13%	Received seed funding	29%
Post-program	46%	Perceptions regarding seed funding	
Median investment in the business (US\$)		Very important	75%
Pre-program	909	Important	22%
Post-program	1,969	Not important	3%

Notes: Program participants joined the program in 2013 and were surveyed in 2015. Source: Beneficiary Survey, Ministry of Labor.



To shed light on the mechanisms behind the effects on formalization and employment, they survey data is complemented with in-depth semi-structured interviews with local government officials as well as former program participants from the region of Arequipa. The interviews lasted for 30 minutes and tried to capture the participants' experience and recommendations for future versions of the program. Ten former beneficiaries and three regional officials participated in the interviews. The insights from the Ministry of Labor's staff in Lima complemented the information obtained from the interviews.

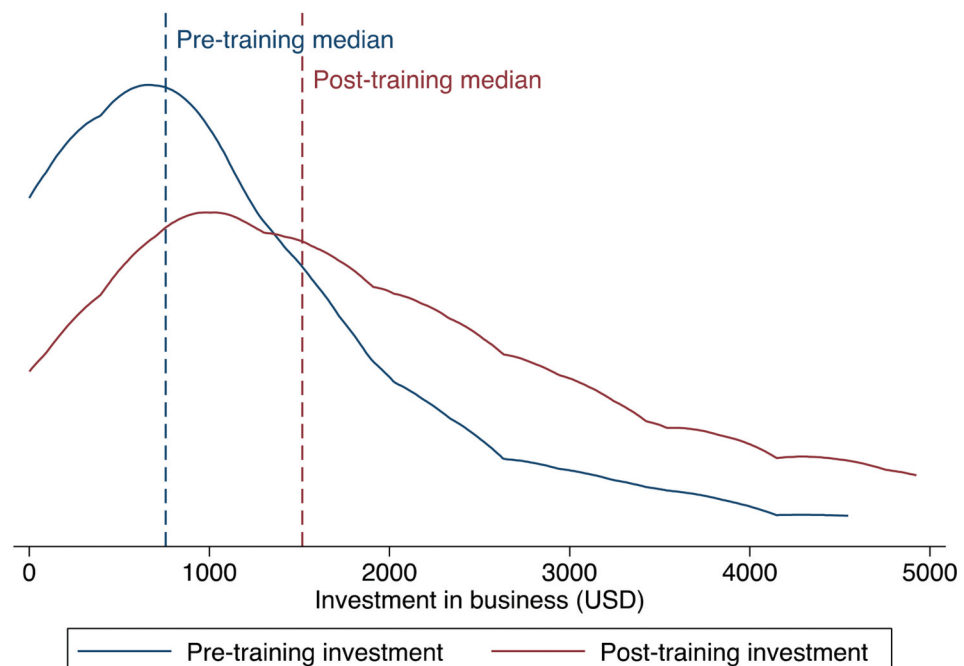
#### 4. Empirical approach

The ideal analysis would exploit exogenous variation in program participation, which would allow to estimate program impacts by comparing outcomes across treated and control groups. Regrettably, there is no source of exogenous variation in program participation. In our study setting, the best available alternative is to exploit longitudinal data. The Ministry of Labor collected data right before participating in the program and 2 years after completion. However, the Ministry only collected data on program participants, so identifying a plausible control group was the next challenge. I use data from the self-employment module in Peru's National Household Surveys to construct a control group for each cohort of beneficiaries.

I use two matching methods to construct the control group: nearest neighbor matching and kernel matching. Nearest neighbor consists in finding, for each beneficiary, a match in the control group with the same values of a set of characteristics. I matched beneficiaries to non-beneficiaries based on all individual characteristics available in both surveys in the respective years, requiring exact matching on sex, level of education, and province of residence, and the closest possible age. Kernel matching consists in matching beneficiaries to non-beneficiaries based on the same variables as above. Instead of requiring exact matching, the variables are used to estimate a propensity score  $\psi$  which estimates the probability of being treated and is used as an input in the regression below.

**Figure 1. Investment in business before and after participating in the program.**

Notes: This figure shows the density of investment in business before and after participating in the program. Source: Beneficiary Survey, Ministry of Labor.





Having identified a plausible control group, the next step is to their estimate pre-period variable values. Since the National Household Survey is a cross-section, I construct the pre-program outcomes for the control group using synthetic panels, which despite its limitations has been shown to perform reasonably well for Peru, and in particular its National Household Surveys (Cruces et al., 2015). This methodology consists in estimating the outcome variable in the 2013 sample based on covariates and using the estimated coefficients and the same covariates in the 2015 survey to obtain an estimate of the 2013 value of the outcome variable ( $y_{2013,i}$ ). The same procedure is used to construct  $y_{2015,i}$  for the “Impulsa Peru” control group. With this, I estimate a difference-in-differences model:

$$\hat{\Delta}y_i = y_{t,i} - \hat{y}_{t-2} = \alpha_0 + \delta B_i + \lambda \psi + \varepsilon_i$$

where  $\psi$  is the propensity score. Alternatively, I estimate differences-in-differences with nearest neighbor and kernel matching. The estimating regression becomes:

$$\hat{\Delta}_{MDID} = \sum_{i \in \{I^1 \cap S^*\}} \left\{ \hat{\Delta}y_{i1} - \sum_{j \in \{I^0 \cap S^*\}} \omega_{ij} \hat{y}_{j0} \right\} w_{ij}$$

In this expression  $I^1$  is the set of beneficiaries,  $I^0$  is the control group,  $S^*$  is the common support,  $\omega_{ij}$  weights the control unit  $j$  as a match for the treated unit  $i$ , and  $w$  re-weights the observations in order to reconstruct the outcome distribution in the treated sample. Standard errors are bootstrapped with 1,000 repetitions. For further details, see Gertler et al. (2016) and Volpe Martincus and Carballo (2008).

## 5. Results

### 5.1. Outcomes

This section reviews the main results in the paper. Prior to joining the program, 15% of participants had a tax ID number, our main measure of formalization. Two years after program completion, participants were 20 to 25 percentage points more likely to have a valid tax ID number than the control group. The fact that all five empirical specifications provide similar estimates is reassuring regarding the robustness of these results. There are similarly large changes in our secondary measures of formalization, the share of businesses with a valid operation permit and the share of businesses that issue sales receipts, which tripled 2 years after program completion. An important limitation of this study is that these variables are not available for the control group. Hence the analysis is constrained to the before-after comparison, which usually provides little insight on what would have happened with program beneficiaries had they not participated in the program. Measures of firm performance could change for a number of reasons, like entrepreneur’s motivation or widespread economic growth. In the case of formalization, however, the before-after comparison is somewhat informative given the finding by La Porta and Shleifer (2014) and Bruhn and McKenzie (2014) that informal firms rarely make the transition to formality.

A potential limitation of the beneficiary survey is that it only includes beneficiaries that successfully completed the program. Although there are no official figures on the number of dropouts, the figure is around 25% according to in-depth interviews with officials and program participants. Despite some participants drop out of the program to join the formal sector, most of them drop out precisely because they see no profitability in becoming formal. Therefore, we can provide a lower bound on the effect on formalization. Under the assumption that all dropouts remain informal, DID estimates on the share of beneficiaries with tax ID number would be between 15 and 19 percentage points, depending on the specification.

Rows 2 and 3 in Table 2 explore potential program effects on employment outcomes. Row 2 shows that 2 years after the program, participants had on average 0.8–0.9 additional employees

compared to the control group. Given the baseline mean of 1.0 employee, this implies roughly a two-fold increase in the number of employees. This change is considerable, but not transformative of the structure of these enterprises. Together with the entrepreneur this amounts to three-worker firms on average, and only 10% of beneficiaries had more than 5 employees 2 years after program completion.

Row 3 shows that program participants are more likely to work more than four hours per day in their microenterprises. The estimated effects are more varied than in the previous cases, ranging from 4 percentage points (DID and Matching to the nearest neighbor) to 8 percentage points (DID and Matching to the three or five nearest neighbors). The results from DID and DID and kernel matching lie between these figures, at 6 percentage points. The latter figure amounts to a 14% increase with respect to the baseline rate of 0.44. An increase in time allocated to the business, together with the increased investment in the business reported in section 3.2, is suggestive that the businesses are more profitable or have higher growth potential than the counterfactual.

## 5.2. Mechanisms

Given the limited information available in the surveys, in an effort to shed light on the mechanisms behind the effects reported in the previous section I conducted in-depth interviews with 10 former program participants and three field officers. These were conducted in the region of Arequipa in March 2017. This section reports the cases of two participants that capture large that summarize the experience of program beneficiaries: Ruth, who had no prior formal business training, and Alex, who was working towards his college degree when he joined the program. Here are summaries of their testimonies.

Ruth: “Prior to joining Impulsa Peru, I used to sell eggs door-to-door. One of my clients recommended me to take part of the program. It required a lot of effort because I was tired at night, but I realized the instructors were trying to help me, and they gave me several tips on how to improve. First, they asked me why I sold eggs. I had never asked myself that question. I realized that I sold eggs because my mother used to do the same, but I had never considered selling something else. The facilitator recommended me to go to the market and ran a small survey. I like baby clothing. I noticed that several stores had baby clothing, but all of them were competing for the cheapest price. I decided to go into higher quality niche. It was risky, but my husband and I agreed to go for it. At first, my shop was almost empty, but little by little I started selling more, and I kept paying myself a daily salary and saved the rest to purchase more and more merchandising. Now my store is full.”

**Table 2. Program impacts on formalization and employment**

	Baseline Mean	DID	Matching			
			1	Neighbors 3	5	Kernel matching
Has Tax ID	0.15	0.205*** (0.027)	0.250*** (0.039)	0.259*** (0.028)	0.254*** (0.025)	0.205*** (0.021)
Number of Employees	1.00	0.843*** (0.116)	0.866*** (0.120)	0.928*** (0.084)	0.951*** (0.081)	0.831*** (0.062)
Works more than four daily hours in the business	0.44	0.061** (0.032)	0.035 (0.064)	0.081** (0.040)	0.079** (0.037)	0.064** (0.029)

Standard errors reported in parentheses, clustered at the province level. Statistically significant at the 90(\*), 95(\*\*) and 99(\*\*\*) percent confidence. Source: Beneficiary Survey, Ministry of Labor and National Household Survey.

Alex: “The program helped me and my classmates develop basic management techniques like conducting SWOT analysis. Also, maintaining a customer base and increasing customer fidelity. Some participants even started businesses together. I planned to start an anime-themed juice bar, but after a while I realized I should not focus that much on the anime because there is no market for it.”

Ruth and Alex allow to illustrate the breadth of program beneficiaries. While Ruth had no prior formal training in management, Alex already had taken marketing and basic accounting courses in college. The heterogeneity in backgrounds was apparent in the interviews, as Alex mentioned SWOT (strengths, weaknesses, opportunities and threats) analysis and customer loyalty strategies, while Ruth did not show a strong command of technical business terms. However, both Alex and Ruth reported having benefited from the program by reconsidering their original business plans and tailoring them better to the market. The program provided space and time for these entrepreneurs to think about their businesses in the long term.

In addition, interviewees and program officials reported that seed funding worked as an added incentive to participate and do well in the class. In fact, 28% of surveyed beneficiaries received seed funding. The vast majority of recipients reported the funding was significant or very significant in the development of their businesses. However, in-depth interviews revealed that some participants became demoralized when they realized they were too far behind to obtain the seed funding. Also, officials report that some participants dropped out when they realized their businesses would take a couple of months before having positive cash flows.

## 6. Conclusion

This paper studies the effects of two large business training programs on microenterprise formalization in Peru. DID estimates with various matching techniques indicate that business training programs in Peru increased formalization of small-scale entrepreneurs, measured primarily by the proportion of enterprises that have a valid tax ID number. This outcome has not been explored in the literature, which has focused on several dimensions of business performance. The increase in formalization in this setting is in line with a number of related studies that show that interventions can foster business formalization when they offer information together with funding, tax mediation services, or individual training (e.g., Benhassine et al., 2018; De Mel et al., 2013; Zucco et al., 2020), components that are present in the business training programs in this study setting.

In-depth interviews suggest three important forces behind this effect: the opportunity to reconsider their business plan, the demystification of the tax procedures and access to seed capital. Future research should investigate these mechanisms in more depth. The interviews also pointed to a need to strengthen the post-workshop support and mentoring networks. This could improve business outcomes and formalization further, but it is necessary to consider the costs attached to this increased support especially considering the scarce resources available.

This study’s findings need to be taken with caution for two main reasons. The main caveat is regarding the quantitative results. The comparison across treatment groups is based on strong assumptions. Despite treatment and control individuals have the same age, education, work status, and live in the same province, it is not possible to guarantee comparability in other dimensions, like motivation. Even other variables that are usually available in surveys like sector of the economy, experience or unemployment duration could be used to improve the comparability of treatment and control individuals at baseline. However, these variables are not available in the survey ran by the Ministry. Therefore, differences in outcomes reported in this paper could owe to differences in any of these variables. The econometric approach employed in this paper is the best alternative given data availability, but it can only partially ameliorate this concern.

A second important caveat lies on the self-reported nature of these outcomes, which makes answers prone to desirability bias and could be overstating the estimated effects on formalization. However, if these effects were spurious, one could expect improvements in business formalization (the question with more desirability bias) with no improvements in labor demand or with an overall poor perception of workshop quality, which do not have such a strong desirability bias component. Hence, although it is not possible to formally discard desirability bias a driver of these results, it does not seem to be a major concern.

Future studies can improve on these caveats and incorporate other outcomes in the analysis. For instance, this paper provides no evidence on whether or how the workers and their families' vulnerability situation changed. Hence, it is possible that formalization and the resulting business activity were not coupled with welfare improvements. The data does not allow to identify where the additional workers are coming from either, or the aggregate effects on the economy.

Finally, despite the program seems to have increased formalization substantially, roughly 60% of its beneficiaries remained in the informal sector. It is important to understand the reasons that hold the stragglers back, as well as the type of the incentives required for them to join the formal sector, and the costs attached to them. If these entrepreneurs are the least productive, the cost of having them join the formal sector may outweigh the benefits of doing so (see e.g., Benhassine et al., 2018).

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#### Note

1. This section does not aim to provide a comprehensive literature review, but to highlight some of the most important studies in the field.

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## Appendix—Description of the variables in the analysis

- **Sex.** Male or female
- **Age.** In years
- **Level of education.** Primary, secondary, vocational, university.
- **Province of residence.** Province of residence
- **Has operating license.** Indicator that the business has municipal permit to operate.
- **Issues sales receipt.** Indicator that the business issues sales receipts.
- **Has Tax ID.** Indicator that the business has a tax ID number (*Registro Único de Contribuyentes* or *RUC*, in Spanish)
- **Number of employees.** Number of employees
- **Works more than 4 hours per day in the business.** Indicator that the entrepreneur works more than 4 hours per day in the business.
- **Investment in the business (USD).** Investment in the business in USD. The variable was originally measured in Nuevos Soles (S/.), transformed to USD using the exchange rate 1USD = S/. 3.25
- **Earns more than \$230.** Indicator that the entrepreneur earns more than USD 230 monthly from the business. The variable was originally measured in Nuevos Soles (S/.), transformed to USD using the exchange rate 1USD = S/. 3.25
- **Did not receive mentoring.** Indicator that the program participant did not receive mentoring upon completion of the program.
- **Workshop quality.** Perceived quality of the workshops offered by the program (Poor, regular, good, or very good)
- **Mentoring quality.** Perceived quality of the mentoring received (Poor, regular, good or very good)
- **Received seed funding.** Indicator that the program beneficiary received seed funding at program completion.
- **Perceptions on the importance of seed funding for their business.** Seed funding recipient's perception on the importance of seed funding for the subsequent performance of their business (not important, important, very important).



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