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The Effect of Personalized Feedback on Small Enterprises' Finances in Uganda

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Abstract

This RCT examines the effect of a new finance training style during which participants are given personalized feedback on their financial business outcomes in addition to a “rule-of-thumb” training approach. We compare this to the effects of a “rule-of-thumb” training by itself and to a control group. Targeting about 500 small entrepreneurs in Uganda, we find that the personalized feedback training significantly improves outcomes at the six-months horizon. The index of primary outcomes increases by 0.258 SD units and overall savings improve by 0.257 SD units. Survey results suggest that feedback partly works by increasing motivation, in line with “feedback-intervention-theory.”

Keywords: Financial Training, Feedback, Small Business Growth, Economic Development.

JEL codes: O12, D22, O16, L26

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1 Introduction

Small entrepreneurs form a very important part of the economy in developing countries, with the majority of the work force either self-employed or working in small businesses. Despite the importance of small entrepreneurs for the economy, not only do they lack capital (e.g. De Mel, McKenzie, and Woodruff 2008; McKenzie and Woodruff 2008; Banerjee and Duflo 2014) but also the knowledge (e.g. Bloom et al. 2010; Bruhn, Karlan, and Schoar 2010; Bruhn and Zia 2013) necessary to grow their business. Hence, there are initiatives that on the one hand, offer additional capital or seek to improve credit access and, on the other hand, provide various kinds of business trainings. While these measures often go hand in hand, we focus only on trainings.

Overall, evidence on the impact of these trainings is encouraging (McKenzie and Woodruff 2013), as they mostly generate the desired effects to a significant extent. However, the economic sizes of these effects are often rather modest, thus raising doubts on the effectiveness of conventional business trainings. At the same time, trainings are very heterogeneous regarding their success. Ways to make trainings more successful include a “rule-of-thumb” approach (Drexler, Fischer, and Schoar 2014) and an individual counseling of entrepreneurs (Bruhn, Karlan, and Schoar 2018; Lafortune, Riutort, and Tessada 2018; Carpena et al. 2019).

Given this state of the literature, it is our aim to contribute toward an improvement in the effectiveness of financial business trainings for small enterprises. Existing research focuses on rather standard financial trainings, which are cost-effective as the same content is delivered to a large number of participants. In contrast, individual counseling, i.e. financial advice to entrepreneurs according to their specific needs, shows larger economic effects (Bruhn, Karlan, and Schoar 2018; Lafortune, Riutort, and Tessada 2018). Unfortunately, individual counseling is relatively costly. With this in mind, we develop a new form of training and analyze whether this training, which combines a (cost-effective) standard training curriculum with individualized aspects of counseling can lead to increased effectiveness. Hence, we include individualized elements in form of *feedback*, which are specific to each entrepreneur, into a finance training and call this training form “personalized feedback.”

In this study, we embed personalized *feedback* into a standard finance training for small entrepreneurs and examine its effectiveness compared to a pure finance training. Providing feedback, i.e. information regarding aspects of an individual’s performance, is known to foster learning processes and to contribute to changes in behavior, as shown, for example, in the areas of energy conservation (Karlin, F Zinger, and Ford 2015), problem drinking (Riper et al. 2009) and curbside recycling (Schultz 1999). To understand how feedback translates to changes in behavior, we draw on “feedback intervention theory” (Kluger and DeNisi 1996). The theory’s main argument is that behavior is regulated by comparisons of feedback to goals or standards, and hence, the identification of gaps between both (Kluger and DeNisi 1998). In turn, these detected discrepancies increase motivation to reduce perceived gaps. Furthermore, there is evidence that larger discrepancies lead to stronger changes in behavior, as shown by Kluger, Lewinsohn, and Aiello 1994 and Schultz 1999.

To give an example, finance trainings typically have a module where entrepreneurs are informed about the usefulness of savings for buffering shocks and building capital. Related to this, entrepreneurs state their investment plans and the respective capital they need to save, which leads to savings goals. As part of the feedback, we inform respondents about their past savings performance. Specifically, we inform respondents about the difference between how much they stated they needed to save during the baseline survey and how much they have actually saved at the six-months follow-up. This generates a discrepancy for each individual regarding her desired and actual savings amount. According to feedback intervention theory, explicitly informing individuals about their performance and revealing potential gaps fosters motivation and may strengthen efforts to change behavior. In the case of savings goals we can directly test whether awareness of larger discrepancies leads to increased savings.

In order to assess the effects of providing feedback, in addition to finance training, we conduct a randomized controlled trial (RCT) in the capital city of Uganda, Kampala. The sample is divided into three groups: one group receives a finance training only, the second treatment group receives the finance training *plus* personalized feedback (henceforth feedback training), and the third group is the control group. To rule out that effects in the treatment groups may be driven by contact and time spent with our training staff,

the control group receives health training that is unrelated to the content of the finance training.

Our randomized controlled trial is implemented based on an existing panel of around 500 micro and small enterprises. Thus we can use the existing regular panel waves and the past business performance, to have useful information about potential training participants. Our resource limitations allow for roughly a half hour training of each entrepreneur. The treatment consists of information in the form of a presentation that takes an average of 28 minutes and 32 minutes, for the finance and the feedback training, respectively; i.e. the feedback training is just 4 minutes longer on average. Given the sample size and the limited training input, it is unlikely that we obtain significant results with a conventional training form. Our minimum detectable effect size is 0.2667 under usual assumptions and, thus, high compared to an average effect size of financial education on financial behavior of below 0.1 SD units (Kaiser and Menkhoff 2017) or an effect size of training programs on business practices between 0.1-0.2 SD units (McKenzie and Woodruff 2013). Therefore, we aim for trainings with high expected effect size. Thus, our finance training is based on lessons learned from the “rule-of-thumb” approach, as introduced by Drexler, Fischer, and Schoar 2014. This training delivers the content in an easy and understandable way and shows relatively high effectiveness. In our study, the feedback training group receives the finance training of the other treatment plus an add-on, i.e. additionally provides feedback information about the situation of the entrepreneur and their small business.

We find that both trainings seem to generate desired changes in behavior, although effects of the conventional finance training are never statistically significant. The strongest effect of the feedback training is on the index of savings behavior with a highly significant effect size of 0.257 SDs; in this area, feedback training is more effective than the finance training. The feedback training also has a marginally significant effect on investment behavior. Finally, when we build an index covering the four main outcome areas of the training (investments, savings, profits, and loans), feedback training again has a significant effect. Regarding potential mechanisms of the feedback training, we exploit discrepancies induced by the feedback information. Discrepancies are reflected by the estimated time it will take respondents to reach their savings goal and show differential effects: they increase formal savings marginally more if they are further away from their savings goal

than if they are close, as predicted by feedback intervention theory (Kluger and DeNisi 1996).

While these described effects hold for a survey conducted six months after the intervention, effect sizes are much smaller in the endline survey 12 months after the training, with coefficients no longer statistically significant. These declining results are similar to Brooks, Donovan, and Johnson (2018), who compare standard training to mentorship, which can also be regarded as a personalized way to improve business skills. They attribute the fading effects to the changing and very specific problems that small business owners face and argue that mentorship programs are not effective once the relationship breaks down. Hence, there is no permanent human capital accumulation due to the mentorship training. The same may apply to our form of personalized feedback. Therefore, our results indicate that feedback should be regularly and repeatedly provided in order to reinforce and improve the long-term effectiveness of the personalized feedback training (Schultz 1999).

This paper is embedded in a larger literature examining small businesses trainings. Many of these trainings focus on financial concepts, as in this paper. Typically, they succeed, but the degree of success differs and there seems to be room for improvement. Several classroom training interventions find effects on business knowledge or business practices, but with muted or no effects on key business performance measures like revenues or profits (Bjorvatn and Tungodden 2010; Karlan and Valdivia 2011; Bruhn and Zia 2013; Gine and Mansuri 2014). Classroom trainings are the most common way to provide information. The training content is standardized and not adjusted to the particularities of specific firms. Interventions that take into account individual challenges of firms are those providing counseling services, where the content is tailored to the businesses' needs. Lafortune, Riutort, and Tessada 2018 randomly provide personalized counseling sessions to microentrepreneurs in Chile and find significant increases in household income. Another promising counseling intervention is conducted among Mexican enterprises by Bruhn, Karlan, and Schoar 2018. They find effects on productivity in the short run and employment in the long run. Encouraging results for increasing knowledge and improving information for small business owners is found in experimental studies that examine how business owners can learn from each other (Cai and Szeidl 2018; Fafchamps and Quinn

2018).

Our innovation is to combine a rule-of-thumb finance training approach with a personalized feedback and evidence from both strands of the literature suggests that this may be a promising way to proceed (Drexler, Fischer, and Schoar 2014; Bruhn, Karlan, and Schoar 2018; Lafortune, Riutort, and Tessada 2018; Carpena et al. 2019). However, this requires that information about the treatment groups is available or will be collected in advance. Moreover, cost issues may play a role as the preparation of personalized feedback needs more effort than standard classroom trainings.

This paper is structured into six further sections: Section 2 describes the experimental setting and Section 3 the data. Results are presented in Section 4, while Section 5 explores the underlying mechanism of the effectiveness of feedback. The sensitivity of our estimation results is probed in Section 6 and Section 7 concludes.

2 Experimental Setting

In this section we describe the implementation of our intervention, which consists of three treatment arms (Section ??) and our empirical strategy (Section ??).

2.1 Experimental Design

To foster financial knowledge among micro and small enterprises, we develop a *finance training*. This training covers: (i) business investments; (ii) savings; (iii) profits; (iv) business loans to finance investments; and (v) related minor topics, in particular separating household and business finances. A detailed curriculum of the content of each topic is shown in column (2) in Appendix Table ?. Regarding the design and delivery method of the finance training, we build on findings by Drexler, Fischer, and Schoar 2014. They provide evidence that trainings focusing on ease of understanding by providing simple rules of financial decision making (“rule-of-thumbs”) perform better than trainings focusing on the comprehensiveness of the material. Hence, we develop a training that is simple in its concepts and easy to understand. The training content is delivered in a compact way without delivering too many details or extensive exercises. Each content is summarized and depicted with easily memorized statements, framed as simple heuristics or routines

for financial decision making. To ensure that the content of our training is in line with the national financial inclusion strategy, our rule-of-thumbs are in accordance with the core messages regarding financial literacy by the Bank of Uganda (Central Bank).¹

The other treatment group receives personalized *feedback* in addition to the finance training. This additional component crucially marks the difference between both treatment groups. This treatment group receives feedback regarding the past financial performance of the business and the business owner's financial behavior. This feedback adds a personalized, i.e. an individual-specific, component to the training and, hence, bears similarities to individual counseling. To illustrate the trainings: while as part of the first treatment arm the finance training highlights the importance of having a savings goal and starting to save toward that goal (depicted as rule-of-thumb messages); the second treatment arm additionally provides feedback about whether the business owner actually has a savings goal and, if so, how much the business owner has already saved toward it. The individual feedback information is derived from the baseline survey. Hence, whenever our data allow, the second treatment group receives personalized feedback that is directly related to a rule-of-thumb message that was delivered as part of the finance training.

The control group receives health and safety information over a comparable length of time to avoid estimation bias from Hawthorne-type effects. The training focused on health and safety in the business and at home. It included information on, for example, safety precautions at the workplace and hygiene practices at home. The information provided for the finance training, the personalized feedback, and the control group is delivered and taught in face-to-face sessions by university educated and experienced local instructors. Prior to treatment implementation, the instructors completed an intensive five-day training and an additional two-day pilot. The instructor and respondent then met at the site of the respondent's business. During this meeting, the training content is delivered using a presentation on tablet PCs. After the presentation, each respondent receives a booklet that includes detailed descriptions of the content that was presented. The booklet also includes the rule-of-thumb messages and, additionally, if applicable, personalized feedback information. To encourage respondents to actively listen to the presentation and to foster interaction between instructor and respondent, we use several

1. See: https://www.bou.or.ug/opencms/bou/bou-downloads/Financial_Inclusion/Core-Messages-Financial-Literacy_August-2013.pdf, last checked on August 17th, 2018.

pedagogical tools, such as (very short) individual exercises, and include pictures and figures to illustrate concepts. The individual exercises include reflections about business investments and household budget. These reflections are noted in the booklet. Another exercise is a discussion on the advantages and disadvantages of savings and borrowing for investments. To ensure that all respondents could follow the contents of the training, the presentation and booklet are either in English or Luganda (the local native language) depending on the preferences and skills of the business owner. The presentation of all types of trainings takes between 20 and 32 minutes.² The training duration does not significantly differ between both treatment groups at any conventional significance level.

Our intervention was implemented in October 2017. Prior to implementation, we piloted all three trainings at a local market in July 2017 in Kampala. Baseline information was collected among 500 MSEs in September of the same year. Of these, 166 were assigned to the finance training, 165 to receive the additional feedback and 169 to the control group. The intervention was implemented during another round of business visits soon after the baseline survey. The midline data was collected six months after treatment implementation (April 2018), and the endline another six months later (i.e. 12 months after the trainings, in October 2018). Power calculations show that significant treatment effects cannot be expected in this setting from conventional training approaches, which realize effect sizes on the order of 0.1 SD units (Kaiser and Menkhoff 2017) and up to 0.2 (McKenzie and Woodruff 2013). Our experiment has 80 percent power to precisely detect (at $\alpha=0.05$) effect sizes as small as 0.2667 standard deviation (SD) units.

Attrition in our sample due to refusals, closed businesses, or change of business sectors is fairly low. Six months after the baseline survey, we follow up with 460 respondents (i.e. the attrition rate is 8 percent); due to increased tracking efforts, the attrition rate 12 months later is even lower: 7.6 percent. To test whether attrition is different between our treatment arms, we regress a binary attrition variable on both treatment indicators. In the short-run, attrition is not different between the treatment groups; however, in the long-run, firms in the control group are slightly more likely to drop out than those in the finance group (see Table A.2).

2. On average, 20 minutes are spent to deliver information to the control group, 28 minutes are spent for the finance training, and 32 minutes for the finance training plus feedback group.

2.2 Empirical Strategy

We estimate causal treatment effects by comparing both treatment groups (finance training and feedback training) to our control group. The relationship between both trainings and the outcome measures is estimated using an analysis of covariance (ANCOVA) estimation (McKenzie 2012). As entrepreneurs are randomly assigned to one of the treatments, we estimate the following equation to get unbiased estimates:

$$y_{i,t} = \alpha + \beta_1 \text{Finance Training}_{i,t} + \beta_2 \text{Feedback Training}_{i,t} + \theta y_{i(t-1)} + X_i' \gamma + \epsilon_{i,t} \quad (1)$$

where $y_{i,t}$ is the outcome variable, $\text{Finance Training}_{i,t}$ indicates being assigned to the first treatment group, $\text{Feedback Training}_{i,t}$ is an indicator for being assigned to the group that receives feedback in addition to the finance training, $y_{i(t-1)}$ is the pre-treatment measure of the outcome variable and X_i is a vector with controls for industry strata as suggested by Bruhn and McKenzie 2009. The parameters β_1 and β_2 give the “intention-to-treat (ITT)” effect, which is the effect of being assigned to one of the trainings. In case $y_{i,t}$ is binary, we estimate a linear probability model. While individuals in all treatment arms are free to participate in the information intervention that was part of a short survey, the non-compliance rate in our setting is very low. This is potentially driven by the small financial incentive that was offered to participants as a token of appreciation for their time. In addition, the intervention was conducted shortly after the baseline survey, which might have strengthened trust in our research team. The few non-compliers (2 percent) either refused to participate, could not be tracked, or were not available. Hence, due to the low non-compliance rate, our estimated ITT effect is of similar magnitude as the “treatment-on-the-treated (TOT)” effect.

In our analysis, we are interested if the overall effectiveness of each training on a family of different outcomes is significantly different from zero (see Duflo, Glennerster, and Kremer 2007). Therefore, we aggregate variables belonging to one family of outcomes to a standardized index following Kling, Liebman, and Katz 2007. The index z is the average of all $i=1, \dots, I$ standardized variables belonging to a family of outcomes. Specifically, $z = \frac{1}{I} \sum_{i=1}^I z_i^*$ where $z_i^* = \frac{y_i - \mu_i}{\sigma_i}$, y_i is an outcome variable, while μ_i and σ_i are the mean

and standard deviation of the respective outcome variable of the control group. In addition to the general impact of our different treatments (as captured by the indices), we are also interested in the intention-to-treat effect on individual outcomes. Consequentially, we test multiple hypotheses simultaneously, which might raise concerns as the probability of a false rejection may be higher than the usual significance level α . Therefore, we not only work with unadjusted p-values, but we also report family-wise adjusted p-values based on Westfall, S. Stanley Young, and Young 1993.³

3 Data

This section describes the sampling process of our study and the major differences between the different industry sectors represented in the sample (Section ??), the outcome variables (Section ??), and baseline descriptive statistics (Section ??).

3.1 Sample

Our intervention is conducted among a panel of micro and small enterprises (MSEs) in Kampala, Uganda. As part of the sampling process, 220 administrative areas (zones) with predominant business activity were identified based on interviews with the local administration. Subsequently, 21 zones were randomly selected for door-to-door screening. The sample is stratified with respect to the three main industry sectors: retail, manufacturing, and services, but also includes some entrepreneurs who have changed their sector of activity over time. These three industry sectors have quite distinctive characteristics.⁴ Table ?? shows descriptive differences between the industry sectors at the baseline in 2017.

[INSERT TABLE ?? ABOUT HERE]

The share of female owned enterprises is highest in the services sector (62 percent). This is not surprising, as most of these businesses operate in the field of hairdressing and beauty which are mostly owned by women. The sectors are also quite heterogeneous with respect

3. Family-wise adjusted error rates following Westfall, S. Stanley Young, and Young 1993 are applied in the financial education literature for example by Calderone et al. 2018.

4. Throughout the years of the panel survey, some businesses (17) started operating in industry sectors that are different from manufacturing, retail, or services sector. The sector of these businesses is summarized by the term “Remaining Sectors.”

to the educational level of the entrepreneur. While the overall share of entrepreneurs with higher education (upper secondary degree (A-level) or higher) is 34 percent in the overall sample, it is lowest among businesses in the services sector (22 percent). The average capital stock is highest in the manufacturing sector, where investments in machines represent the lion's share of total capital stock. In the retail industry, the average amount in inventory is comparatively high (whereby the stock in finished goods is larger than the stock in raw materials). In line with high levels of capital stock and inventory in these two industry groups, the number of sales in both groups outnumbers the sales of the services sector by far.

3.2 Outcome Variables

In the following analysis, we present treatment effects on four families of primary outcomes, as defined in the pre-analysis plan. These outcomes are related to investments, savings, profits, and loans, with each outcome family consisting of several variables.

The *investment* related outcomes include the following variables: whether the respondent has acquired any new physical capital, the total number of physical capital items purchased and its total value at purchasing prices since the last interview wave, which is six months for each follow-up wave. Physical capital comprises capital invested in tools, machines, furniture, or other items that are used in the business or production process. Finally, we use the amount of the current stock of inventory, which is the sum of raw materials and finished goods at the time of the survey interview.

Regarding the index on *savings*, we use an indicator whether someone has any savings and the total amount of savings held either in formal savings (held in bank accounts or with savings and credit cooperatives (SACCOs)) or informal savings (held with a rotating savings and credit association (ROSCA), money collectors, at home, with friends and neighbors, or in a mobile money account).⁵ Lastly, we use whether someone specifies a concrete savings goal as savings related outcome.

We consider several variables related to the *profit* of the firm. First, we take a survey question that directly asks for the firms' profit in the last four weeks, as suggested by De

5. Mobile money services are operated in Uganda by phone companies and, thus, not classified as part of the formal financial sector; however, their savings component is so small that classifying them as formal savings does not change any result qualitatively.

Mel, McKenzie, and Woodruff 2009. In addition, we calculate the value added as revenues minus costs. For the calculation of value added, we directly ask the entrepreneur for their total revenues (sales) and costs over the last month.

Lastly, we use two kinds of information about *loans* to capture the training-related borrowing behavior of entrepreneurs. The training does not just inform about the role of loans to increase business performance but also discusses the inherent risks of loans if they do not generate enough profitable business to cover all loan-related costs. Ideally, one would need detailed information about new loans and their consequences, which we do not have available. Thus, we use information whether entrepreneurs applied for a business loan and the loan amount, but we are aware that more loans are not necessarily the desired outcome of the training over shorter-term horizons.

In addition to these primary outcome families, the pre-analysis plan states a list of secondary outcomes: i.e. measures of financial literacy, financial awareness, financial attitudes and perceptions, financial planning, financial reflection, as well as separating household and business finances. As the training is short and does not focus on all of these issues explicitly (for example, there is no direct training on financial literacy), it may be expected that there are no or small effects to be reported on these secondary outcomes. Results about potential treatment effects on these variables are provided in Appendix Table C.1, a definition of all variables can be found in Appendix Table C.2.

3.3 Descriptive Statistics

Table ?? provides pre-intervention characteristics of the baseline survey by treatment status along with p-values for differences between the control group and each of the treatment groups (columns (5) and (7)).⁶ As the entrepreneurs are randomly assigned to each group, we expect them to be similar at baseline. Regarding entrepreneurial characteristics (Panel A), there are no significant differences between the groups. Unfortunately, regarding our main primary outcome indices, two imbalances between the control group and the group assigned to the finance trainings exist. As imbalances can occur by chance, we additionally test for joint orthogonality of the estimated parameters. We do this by running separate linear regressions for each treatment assignment indicator (versus the

6. All secondary outcomes are balanced at baseline. This is shown in Appendix Table C.3.

control group) on entrepreneurial characteristics and primary outcome indices. The corresponding F-statistics are presented in the last row of Table ?? and indicate that the null hypothesis, i.e. all coefficients are jointly equal to zero, cannot be rejected. Thus, the finance training group and the control group are not generally different from each other.

[INSERT TABLE ?? ABOUT HERE]

Panel (A) provides the socio-economic background characteristics of the entrepreneurs in our sample. The table shows that respondents are, on average, 38 years old; share a household with 4 other persons; 41 percent of the businesses are run by a women; 34 percent have higher education, meaning they have a upper secondary school degree (A-level) or higher; and 50 percent of the cases do not have employees as own-account workers.

The average business operates with invested physical capital of 5,827,000 UGX, i.e. 1,579 USD.⁷ This capital is invested in machines, tools, furniture, or other equipment used in production.

As shown in Panel B in Table 2 (and mentioned above), the saving index of the finance group at baseline is significantly higher than for the control and the opposite relation holds for the loan index. We show in the robustness analysis in Section ?? which variables cause this imbalance and that all ANCOVA estimations taking into account these imbalances confirm earlier findings.

4 Results

This section describes the causal treatment effects on our four families of outcome variables. While Section ?? summarizes the short- and long-term effects on aggregated outcomes measured as indices, Section ?? sheds light on the effect of the single components belonging to each outcome family, and Section ?? analyzes the effectiveness of the intervention for various subsamples. Section ?? examines costs of this intervention.

7. To account for enumeration errors, financial outcomes used in our analysis are winsorized at the 99th percentile, see Blattman, Fiala, and Martinez 2014; Karlan, Knight, and Udry 2015; Campos et al. 2017; Bruhn, Karlan, and Schoar 2018 who apply the same approach.

4.1 Main Treatment Effects

We begin by describing the short-term (six-month follow-up) effects of the *finance* and *feedback* training on primary business outcomes. The reported results, i.e. average intent-to-treat (ITT) effects and respective standard errors are reported in Table ??, Panel A, for all four families of business outcomes: investment, savings, profit, and loans. While results on these outcomes are shown in columns (1) to (4), column (5) shows the result on an “overall index,” which comprises all four primary outcome indices. The presented coefficients can be interpreted as the standardized mean difference of each assigned treatment group compared to the control group. For example, the finance training increases the investment index by 0.118 standard deviation units of the control group.

[INSERT TABLE ?? ABOUT HERE]

Overall, we find that almost all coefficients for both types of trainings are positive six months after intervention, indicating that business outcomes develop in the intended direction due to the training intervention. The only exception is the estimated effect on the loan index, whereby a negative effect here does not necessarily indicate a failure of the training as argued above. Beyond the expected coefficient signs, we find that their sizes are indeed quite large; this may be somewhat unexpected given the short training intervention of about half an hour but could be the result of training face-to-face.

Given the aforementioned limited statistical power of our study, we form an index of all four indices, i.e. an overall index, to test whether the treatments have an effect overall: indeed, this is the case. The effect size of the feedback training is 0.258 SD units and highly significant, while the effect of the finance training only is also sizeable at 0.07 SD units. To probe these estimates, we conduct a robustness analysis with regard to the construction of the overall index, which confirms our finding (see Section ??).

Turning to the two outcome families with very encouraging results, we find a significant effect of the feedback training on the saving and the investment index. The ITT effect on the savings index is large at 0.257, i.e. more than a quarter of a standard deviation for the control group. Here, we are also able to detect a significant differential effect between both treatment groups (p-value of 0.07), hence: receiving the feedback training increases the savings index more than receiving the finance training only. For the invest-

ment index, the estimated marginally significant effect is 0.197 SD units. The remaining estimated coefficients range between 0.021 and 0.233 SD units. As the estimated minimum detectable effect (MDE) size is 0.26, we cannot rule out a non-zero effect of the trainings on these indices. When we turn to the loan index, estimated coefficients are negative and insignificant. While this may look as if entrepreneurs do not plan to expand their business, which might be disappointing in general, the training focuses not on loan expansion but on the proper use of business loans, in particular on ensuring repayment capacity; these qualitative issues cannot easily be addressed in our data. Thus, we also calculate an “adjusted overall index” covering three indices (investment, savings and profit), which is slightly higher than the overall index based on four indices with 0.1 for the finance training and 0.325 for the feedback training. In addition we provide an estimation where we control for the sensitivity of our estimation results by controlling for neither lagged dependent variables nor industry strata (Appendix Table A.3), results remain robust.

While analyzing the short-term effects shows encouraging results, effects become much smaller 12 months after the intervention. The 12-months follow-up results, provided in Panel B, show that effect sizes are almost always smaller than after six months and that the respective coefficients are consistently insignificant. The adjusted overall index for the finance training decreases from 0.1 to -0.015, comparing 6 to 12 months, the indices for the feedback training decrease from 0.325 to 0.066. Overall, neither the finance training nor the feedback training are able to persistently improve behavior of the addressed entrepreneurs.⁸ It is especially striking that the ITT effect of the feedback training on the savings index vanishes in the long-term. However, as the training addresses topics related to savings and business investments at the same time, it cannot be ruled out that accumulated short-term savings are transformed into long-term business investments. Indeed, we find a positive and significant relationship between investment related outcomes

8. Appendix Table A.4 provides different specifications of the estimation of long- and short-term intention-to-treat effects. For reasons of comparison, Panel A and B of Appendix Table A.4 report the round-by-round short-and long-term results as already reported in the main result Table ???. Note that in Panel B of Table ??, we control for another intervention that was cross-randomized six months later in April 2018 on top of the existing one conducted in October 2017. This was a wall planner designed to plan savings in advance, with the intention of reaching a pre-specified savings goal. The estimation provided in Panel C of Appendix Table A.4, includes the interaction between both treatments. As shown, there are no complementarities between both treatments; hence, in our preferred long-term specification, we analyze effects by simply controlling for the second intervention conducted in April 2018. In addition to round-by-round treatment effects, we also provide average effects across rounds where we pool both follow-up rounds (this approach is also used by (De Mel, McKenzie, and Woodruff 2014; Karlan, Knight, and Udry 2015). Results are provided in Panels D and E (with additional interacted treatments).

(observed after 12 months) and savings related outcomes (observed after 6 months), as shown in Appendix Table A.5. Thus, there is reason to believe that accumulated savings are, to some extent, used to purchase business investments, which is one potential explanation why savings are muted in the long-term. We also test the effectiveness of our intervention on secondary outcomes. As mentioned in the introduction, these outcomes get less or even no attention in the trainings, and accordingly, the effects are small and insignificant throughout (see Online Appendix C).

We examine the sensitivity of our estimated treatment effects with respect to selective attrition using inverse probability weighting (IPW). The average survey attrition rate between baseline and midline (endline) is 8 (7.6) percent, ranging from 6.0 (4.8) percent for the finance training to 7.2 (7.2) percent for the feedback training and 10.65 (10.65) percent for the control group. We estimate inverse probability weights using the predicted probabilities of a logit model that models selection into mid- and endline. This is provided in Appendix Table A.2, where columns (1) and (2) model selection into midline and columns (3) and (4) into endline. Columns (1) and (3) control for treatments only while columns (2) and (4) additionally include controls for industry strata. Following this, we re-estimate our OLS model using a weighted regression based on probability weights of our preferred specification including industry controls; results are provided in Table ???. The IPW estimates are presented for the short-term effects in Panel A and for the long-term effects in Panel B. The estimated coefficients do not differ much from our original specification in Table ??, indicating that attrition does not distort our estimations.

[INSERT TABLE ?? ABOUT HERE]

4.2 Treatment Effects on Single Components

In this section, we present the causal effect of each training on the components that belong to one family of primary outcome measures. As we do not find effects in the long run, we provide estimated effects on single components in the short run only. In the order of presentation from above, we start with the effects on investment variables.

Investment. The investment index is made up of four variables, i.e. the decision to purchase physical capital, the associated total amount invested in physical capital, the

number of investments, and finally the inventory amount. In the six months since the last survey wave, 57 percent of the control group invested in physical capital; for those assigned to one of the treatment groups, the percentage is 2-4 points higher (see Table ??, column 2). This effect is not significant. While investment amounts also do not change to a statistically significant degree, these latter effects seem to be economically important: the feedback training leads to 28 percent greater physical capital, whereas the respective number for the finance training is close to zero. While the increase in the investment amount of both treatment groups is insignificant, we find that the feedback training leads to a significantly larger number of investments. Lastly, regarding the stock of inventory, the estimated coefficient is insignificant, but again the economic effects are non-negligible with 29 percent for the feedback training and 28 for the finance training respectively.

[INSERT TABLE ?? ABOUT HERE]

Savings. The effects on the components belonging to the savings index are reported in Table ?. We find no evidence that any of the trainings changes the extensive margin, meaning the number of business owners who save (column (2)). However, we find that the assignment to both trainings increases the savings amount at formal financial institutions to an economically sizeable degree (although statistically insignificant), i.e. 29 (28) percent for the finance (feedback) training group. Moreover, we find a significant effect of the feedback training on informal savings (column (4)): Participants in the feedback training increase their informal savings by 162,000 UGX (44 USD), which is an increase of around 64 percent. This effect is significantly larger for the feedback than for the finance training. Lastly, we show that our interventions have either no or small effects on formulating specific savings goals.

[INSERT TABLE ?? ABOUT HERE]

Profits. Next, we look at profits and their components. Table ?? shows that the feedback training, tentatively, has positive effects on profits, value added, sales and costs. However, only the effect on sales, is significant. While the average sales of the control group are 4,638,000 UGX (1,256 USD), the average sales of the feedback training group are 46 percent larger. As the average treatment effect of the finance training group on sales is slightly negative, this leads to a significant difference between the effects of both treatment

groups. We investigate different channels that may explain this large effect, including increases in working hours, number of employees, changes or improvements in products, services, and business processes. However, none of these channels can be verified. Instead, we find slight evidence that the savings index and informal savings serve as mediator for sales, explaining between 14 and 19 percent of the total effect (see Appendix Table A.6). Overall, the finance training does not have much impact on the profit variables; in contrast, the overall index regarding the feedback training indicates that it may have an impact but the coefficient is not statistically significant.

[INSERT TABLE ?? ABOUT HERE]

Business Loans. Table ?? shows the effect of both trainings on two items related to business loans. The first outcome variable is whether the participant applied for a business, hence productive, loan. The second variable is the business loan amount. We find no significant effects on these loan-related variables.

[INSERT TABLE ?? ABOUT HERE]

4.3 Heterogeneity

We further analyze heterogeneity in treatment effects with respect to gender, industry sector, educational level, financial literacy level, proxy variables for firm size (capital stock and sales), and being credit constrained (following Bigsten et al. 2003 and Dinh and Clarke 2012). We find additional beneficial effects for men when participating in the feedback training regarding savings outcomes. This finding is provided in Table ??.

[INSERT TABLE ?? ABOUT HERE]

To rule out that other factors correlated with gender are driving this beneficial effect for men, we re-estimate our model by controlling for variables with baseline differences between men and women. We control for levels of profit, sales, industry sector, education, whether the respondent is an own-account worker, number of employees, capital stock, formal savings, and whether the respondent feels pressure to share extra income. Additionally, we interact these variables with treatment assignment. Appendix Tables A.7 and A.8 show that irrespective of controlling for pre-intervention differences, men benefit

from the feedback training. This finding is in line with other research that finds training benefits for men, but lack evidence for women (Gine and Mansuri 2014; Berge, Bjorvatn, and Tungodden 2015).⁹ However, regarding the three other characteristics, we find no clear evidence for heterogeneous treatment effects with respect to education (Table A.9), financial literacy level (Table A.10), industry (Table A.11), proxy variables for firm size or being credit constrained (Table A.12).

4.4 Costs

While the feedback training is relatively successful, at least at the 6-months horizon, it is also obviously more costly than a rather conventional finance training. Thus, in this section, we show calculations in order to obtain an impression about absolute and relative costs, if one would think about a roll-out of such a program. We divide costs into fixed costs related to the development of the training and variable costs per entrepreneur being treated. Again, these costs depend on the specific circumstances, so we can only provide a rough estimation.

We calculate the fixed costs for the development of the finance training to be about 7,700\$ and, additionally, about 830\$ for the feedback module only. These costs cover the direct development of the trainings including further preparatory measures. They do not cover costs that occur in the process toward creating the specific trainings.

The variable costs for the treatments include the following: training of the enumerators, their time during training and in the field (i.e. salary), their further direct costs (such as transport, airtime, allowance, etc.), the same kind of costs for supervisors, costs for materials (such as printing the brochures), and finally a small financial reward to participants. The total variable costs are about 4,400\$ for 500 training participants (as the control group also receives some training), i.e. about 8.80\$ per participant. There is an additional cost for implementing the feedback information: while the process of including information about participants' financial behavior in the brochure can be automated in our setting, there is still some extra cost as manual corrections occur. These are calculated as about 4.5\$ per participant, and are complemented by survey time related costs

9. Regarding the literature that focuses on alleviating constraints of microenterprises, similarly beneficial effects for men are found when financial constraints are addressed by providing grants (De Mel, McKenzie, and Woodruff 2008, 2012).

of the 4 extra minutes which may lead to another half US-dollar, i.e. overall 5\$.

The total costs of the trainings covered here obviously depend on the circumstances and the number of individuals treated, as the latter leads to a distribution of fixed costs. In our case, the baseline information, including the necessary information about earlier financial behavior, is assumed to be given. Moreover, the field experiment is in a city, i.e. with limited transport time and costs. Finally, given the number of treated, allocating fixed costs to participants of the finance and the feedback training leads total unit costs of 29.70\$ for the finance and 35.60\$ for the feedback training.

However, taking into account a potential roll-out of the intervention would reduce the per unit costs due to larger treatment groups. Assuming a sample size of 1,000 per treatment arm would translate to changed per unit costs of the finance training of 12.20\$ and 13.50\$ for the feedback training. In comparison to other interventions providing financial education trainings, our costs are rather low: Cole, Sampson, and Zia 2011 estimate costs of 17\$ for 274 participants invited to receive a financial literacy training, Calderone et al. 2018 report 28\$ for a two-day training. In a study that also targets microenterprises, counseling costs amount to 75\$ per hour and the intervention provided in total 10 hours of counseling (Karlan, Knight, and Udry 2015).

Assuming a scenario in which elements of personalized feedback can be included into existing financial literacy or entrepreneurship trainings, marginal costs become even smaller. Many of these trainings last several weeks, meaning that the additional fixed costs would be reduced to the cost of feeding information about the entrepreneur into existing materials. In established settings these additional unit costs would be less than 5\$.

5 Why is the Provision of Feedback Effective?

Our results show that providing feedback in addition to a finance training has encouraging effects on several crucial business outcomes. Most promising is the statistical increase of the savings index by 0.257 SD units. In contrast, the effect size of the pure finance training is only 0.021 SD units and thus 8% of the feedback training effect. In this section, we analyze a concrete mechanism that can (partially) explain the observed changes in

behavior, according to feedback intervention theory.¹⁰

5.1 Underlying Mechanism of Providing Feedback

Feedback intervention theory (FIT) generally relates the provision of feedback to changes in individual behavior (Kluger and DeNisi 1996). Feedback in this context is information regarding business performance of the individual (Hattie and Timperley 2007). According to FIT, behavior is regulated by comparisons between a standard or a goal and the feedback, which result in a discrepancy. This perceived discrepancy is a vital source for the motivation and to move toward the standard. In the following, we link feedback intervention theory to changes in individuals' savings behavior. Specifically, we provide feedback to individuals regarding their desired and their actual savings goal amount. Each individual's desired savings goal amount serves as an equivalent to a standard in FIT theory. We are interested in examining whether providing feedback about their savings progress or, more specifically, the resulting gap indeed motivates people to change behavior as postulated by FIT. To investigate this and to distinguish between effects from the finance and the feedback training, we interact the resulting behavior gap with an indicator for assignment to each treatment arm. Thus, we estimate the following specification:

$$\begin{aligned}
 y_{i,t} = & \alpha + \beta_1 \text{Finance Training}_{i,t} + \beta_2 \text{Feedback Training}_{i,t} \\
 & + \beta_3 \text{Finance Training} * \text{Gap}_{i,t} + \beta_4 \text{Feedback Training} * \text{Gap}_{i,t} \quad (2) \\
 & + \beta_5 \text{Gap}_{i,t} + \theta y_{i(t-1)} + X_i' \gamma + \epsilon_{i,t}
 \end{aligned}$$

The variable *Gap* measures the discrepancy between the desired savings goal amount and the actual savings amount for each individual. The variable *Gap* is measured in months, reflecting the remaining time the individual has to keep on saving in order to reach their desired savings goal. This calculation is based on the monthly savings behavior of each individual at baseline. The crucial difference between the treatment groups, however, is in revealing this gap. Whereas the gap is revealed as feedback information to individuals assigned to the feedback training, it is not to individuals assigned to the finance training. We are particularly interested in the parameter β_4 of the equation above. β_4 indicates how

10. This section is of an explorative nature and was not part of our pre-analysis plan.

the revealed gap, communicated as part of the feedback training, affects $y_{i,t}$, in particular savings outcomes. In contrast, the parameter β_3 serves as counterfactual, as individuals receiving the finance training are not informed about their individual discrepancy. Hence, if feedback training enhances individuals' behavior due to an increased discrepancy as postulated by FIT, this would be reflected by a positive and significant parameter β_4 . In addition, we provide p-values for a test on the equivalence of β_3 and β_4 .

5.2 Evaluation of Providing Feedback about Savings Goals

In the following, we empirically analyze if providing feedback, which results in a discrepancy, enhances individuals' motivation and consequently improves savings outcomes. The discrepancy analyzed is the mismatch between an individual's desired savings and actual savings goal amount. The estimation results based on Equation 2 are provided in Table ??.¹¹

[INSERT TABLE ?? ABOUT HERE]

We begin by interpreting the estimated coefficient of the variable "Gap (in months)" (β_5). The almost consistent negative coefficient on each outcome variable reflects that the further away individuals are from reaching their savings goal, i.e. the larger the discrepancy is, the lower are the associated savings outcomes. However, the marginal effect of this discrepancy cannot be seen in isolation as assignment to treatment matters. Those individuals assigned to the feedback training have an additional positive effect. In sum, the marginal effect of the gap on the saving index and formal savings turns positive for those who receive the feedback training. This is in line with feedback intervention theory, following the theory's argumentation, an increasing gap between a feedback and a standard can have a motivational effect for the individual.

While we find a motivational effect through an increasing gap, its magnitude is small. Calculating the marginal effect for the median GAP months, which is 40, yields a marginal effect of the feedback training on the savings index of 0.16 SD units ($0.156+40*0.00009$) and of 33.70 UGX ($16.261+40*0.436$) on formal savings. Compared to the control group mean, this translates to an increase of 16 percent for the savings index and 4 percent for

11. The number of observations in this panel is slightly lower as this analysis is restricted to business owners who specify a concrete savings goal.

formal savings.

Regarding heterogeneous effects by gender, for the saving index variable we find that men respond significantly to the discrepancy communicated by the feedback (see Table ??). This could be one potential channel that explains, why the feedback training is more beneficial for men with regard to savings outcomes. However, this is not found for the female subsample. Regarding effects by levels of education, financial literacy, and industry there is no conclusive evidence that certain subgroups respond specifically strong to the communicated gap (analyses result are provided in Table A.13 and Table A.14).

[INSERT TABLE ?? ABOUT HERE]

In addition to the motivational effect suggested by FIT, other mechanisms are potentially at play here. One such mechanism is salience (see Bordalo, Gennaioli, and Shleifer 2013). The type of feedback that we are providing people with our intervention is not new for participants as all information was previously reported to us during the survey. Therefore, our intervention directs attention toward specific behaviors that participants were not thinking about previously. At the same time, it is possible that participants were unable to calculate how long they would have to save to reach their savings goal, even though they have all the necessary information regarding their own savings. In this case, the observed effect would also be explained by the additional information that our training provides. However, as the training was not designed to examine the mechanisms, we can only speculate about these.

6 Robustness Analysis

We perform four types of robustness checks to assess the sensitivity of our results. These checks underline that our findings are qualitatively robust. First, we construct alternatives of the overall index, for example, by considering all 14 original elements equally and independently from each other or by applying principal component analyses. Second, we further address the fact that there are imbalances in the loan and savings index by controlling for those variables that cause these imbalances or by controlling for imbalanced indices directly. Third, we give much attention to investigate potential spillover effects by

making use of GPS information to measure distances between entrepreneurs who belong to the treatment and control groups to analyze possible impacts of distance on outcomes. Fourth, we examine potential effects from attrition – in addition to inverse probability weighting presented in Section ?? – by estimating treatment effect bounds (Lee 2009). Due to the limited number of observations in our sample, this approach tentatively leads to lower bounds with insignificant effects. The robustness analysis is found in Online Appendix B.

7 Conclusion

Finance trainings are a standard tool that help small entrepreneurs, addressing their deficits in financial knowledge that limit the development of their businesses. In order to best use scarce training resources, there are various proposals on training design, among which a “rule-of-thumb” training approach seems to deliver. Another way to improve the effectiveness of financial education is counseling, basically providing an individualized training. While this also works well, it is costly. Thus, we follow an approach blending conventional classroom training and fully individualized training where we provide respondents feedback on their behavior and performance. The training, designed by us, covers the topics of investment strategies, savings, profits, risk diversification, separating business from personal finances, and record keeping. The length is about half an hour and, as such, quite cost effective. Trainers visit entrepreneurs at their business site, teach them, then leave a small booklet containing the training content. One treatment is a pure finance training at the workplace with “rule-of-thumb” elements as studied by Drexler, Fischer, and Schoar 2014. Another treatment provides the same finance training but with an additional feedback component, i.e. personalized information from the baseline survey on how the individual entrepreneur behaves and their firm financially performs.

We find that the finance training succeeds as expected but that finance training *plus* feedback has a surprisingly large additional impact. Simplifying results it seems fair to say that the add-on does not change the structure of impacts across outcomes but that it mainly amplifies the effectiveness. Specifically, at a six-months horizon, the feedback training effect on the saving index is 0.257 SD units and 0.258 SD units on the over-

all index, compared to 0.021 and 0.07 SD units for the finance training, respectively. An important factor for this advantage seems to be a motivational impact due to the personalized feedback, which is in line with feedback intervention theory.

These effects are not driven by increasing the input as the finance training needs an average of 28 minutes, while the feedback add-on takes only another 4 minutes. This means that the feedback training takes 14 percent longer than the pure finance training, while the effect on the overall index is more than three times larger. In sum, the short length of our intervention compared to related studies underpins that our feedback intervention is very promising. The time spent on business trainings is often between 15 hours (rule-of-thumb training provided by Drexler, Fischer, and Schoar 2014) and 36 hours (personal initiative training provided by Campos et al. 2017).

This raises the question: where do these large effects come from? First, it is known that financial education trainings work in general, that a “rule-of-thumb” approach tentatively works even better and that savings are typically the most successful outcome area. All this is confirmed by our study, so that neither effect size nor structure of effects is surprising. However, the large effect of the additional feedback is a new result. Obviously, this feedback information amplifies a desired change in behavior. While the training form of “personalized feedback” may have encouraging short-term results, there are caveats to be considered in future research. First, most of the realized positive effect measured after six months is lost at the horizon of 12 month horizon, indicating that the training intensity is insufficient or would benefit from repetition. Second, the personalized feedback requires appropriate available information about the targeted enterprises, otherwise its implementation will either be very expensive or impossible. Finally, this is a first study with a specific and small group of entrepreneurs, thus there is need for replication and extension.

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Table 1: Pre-Intervention Summary Statistics by Industry Sectors

	All		Industry Sectors							
			Services		Manufacturing		Retail		Remaining	
	n	mean	n	mean	n	mean	n	mean	n	mean
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Female	500	0.41	55	0.62	236	0.31	192	0.48	17	0.47
Higher education ^a	500	0.34	55	0.22	236	0.30	192	0.41	17	0.65
Capital stock (1000 UGX)	498	5827.57	55	2576.82	235	9292.12	191	2519.11	17	5623.82
Inventory (1000 UGX)	500	5082.89	55	1368.49	236	2280.71	192	9245.8	17	8984.53
Sales (1000 UGX)	499	7430.36	55	1826.37	236	8207.77	191	7851.62	17	10035.53

Source: Survey on micro and small enterprises in Uganda, wave October 2017, own calculations.

Notes: The table shows baseline summary statistics for the services, manufacturing, retail and remaining sectors.

^a Higher education is a dichotomous variable, where 1=upper secondary degree (A-level) and more, and 0=lower secondary degree (O-level) and less.

Table 2: Pre-Intervention Summary Statistics

	Obs.	Full Sample mean (sd)	Control (C) mean (sd)	Finance Training mean (sd)	Diff. from C [p-value] (5)	Feedback Training mean (sd)	Diff. from C [p-value] (7)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. Entrepreneurial Characteristics							
Age	494	37.61 (9.99)	38.03 (9.68)	37.06 (9.90)	-0.97 [0.37]	37.60 (10.44)	-0.43 [0.70]
Household size	500	4.35 (2.34)	4.52 (2.22)	4.20 (2.36)	-0.33 [0.20]	4.32 (2.44)	-0.20 [0.43]
Female	500	0.41 (0.49)	0.42 (0.49)	0.42 (0.49)	0.00 [1.00]	0.40 (0.49)	-0.01 [0.81]
Higher education ^a	500	0.34 (0.47)	0.31 (0.47)	0.36 (0.48)	0.05 [0.35]	0.35 (0.48)	0.03 [0.51]
Own-account	498	0.50 (0.50)	0.48 (0.50)	0.52 (0.50)	0.04 [0.44]	0.50 (0.50)	0.02 [0.70]
Capital stock (1000 UGX)	498	5,827.57 (22,633.07)	4,852.10 (14,577.70)	4,595.17 (10,653.70)	-256.93 [0.85]	8,144.40 (35,197.00)	3,292.30 [0.27]
B. Primary Outcome Indices^b							
Investment Index	500	0.02 (1.01)	0.00 (1.00)	0.02 (0.92)	0.02 [0.88]	0.01 (1.09)	0.01 [0.90]
Saving Index	500	0.15 (1.72)	0.00 (1.00)	0.18 (0.94)	0.18 [0.10]	0.08 (0.94)	0.08 [0.48]
Profit Index	484	0.03 (1.19)	0.00 (1.00)	0.07 (1.29)	0.07 [0.59]	-0.04 (1.15)	-0.04 [0.76]
Loan Index	500	-0.07 (0.81)	0.00 (1.00)	-0.16 (0.62)	-0.16 [0.07]	-0.04 (0.77)	-0.04 [0.67]
Joint orthogonality test							
F-statistic					1.05		0.18
Prob > F					0.40488		0.9978

Source: Survey on micro and small enterprises in Uganda, wave October 2017, own calculations.

Notes: The table provides summary statistics of baseline data and mean comparisons between finance training group and control group (column (5)) and feedback training group and control group (column (7)). Standard deviations are in parenthesis, p-values for differences of means appear in squared brackets.

^a Higher education is a dichotomous variable, where 1=upper secondary degree (A-level) and more, and 0=lower secondary degree (O-level) and less.

^b All primary outcome indices are standardized, using the mean and standard deviation of the control group.

Table 3: Intention-to-Treat Effects on Primary Outcome Indices

	Investment Index (1)	Saving Index (2)	Profit Index (3)	Loan Index (4)	Overall Index (5)
Panel A: 6-months follow-up results					
Finance Training	0.118 (0.117)	0.021 (0.119)	0.05 (0.126)	-.015 (0.108)	0.07 (0.11)
Feedback Training	0.197* (0.114)	0.257** (0.114)	0.233 (0.148)	-.037 (0.109)	0.258** (0.113)
$\beta_1 - \beta_2 = 0$ (p-value) ^a	0.51	0.07	0.28	0.82	0.13
R ²	0.09	0.14	0.19	0.26	0.27
Mean (SD) of control group	0.00 (1.00)	0.00 (1.00)	0.00 (1.00)	0.00 (1.00)	0.00 (1.00)
Observations	460	460	441	460	441
control for y_{t-1}	no	yes	yes	yes	yes
control for industry strata	yes	yes	yes	yes	yes
Panel B: 12-months follow-up results					
Finance Training	0.015 (0.107)	0.082 (0.104)	-.014 (0.102)	0.189 (0.147)	0.051 (0.108)
Feedback Training	0.137 (0.115)	0.019 (0.105)	0.031 (0.115)	-.024 (0.124)	0.043 (0.114)
April 2018 treatment	0.038 (0.093)	0.006 (0.083)	0.038 (0.091)	0.161 (0.117)	0.117 (0.093)
$\beta_1 - \beta_2 = 0$ (p-value) ^a	0.29	0.49	0.69	0.15	0.95
R ²	0.10	0.02	0.28	0.06	0.14
Mean (SD) of control group	0.00 (1.00)	0.00 (1.00)	0.00 (1.00)	0.00 (1.00)	0.00 (1.00)
Observations	454	454	443	454	443
control for y_{t-1}	yes	yes	yes	yes	yes
control for industry strata	yes	yes	yes	yes	yes

Source: Survey on micro and small enterprises in Uganda, waves October 2017, April 2018, and October 2018, own calculations.

Notes: The table shows intention-to-treat effects on the “investment index” (column 1), “saving index” (column 2), “profit index” (column 3), “loan index” (column 4) and “overall index” (column 5). Detailed intention-to-treat effects on variables belonging to the “investment index” can be found in Table ??, on the “saving index” in Table ??, on the “profit index” in Table ??, on the “loan index” in Table ?. Panel A (B) provides effects on 6 (12)-months follow-up information. Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

^a Test for equality of estimated coefficients of being assigned to finance and feedback training. Coefficients refer to equation (1).

Table 4: Intention-to-Treat Effects with Inverse Probability Weighting (IPW)

	Investment Index (1)	Savings Index (2)	Profit Index (3)	Loan Index (4)	Overall Index (5)
Panel A: 6-months follow-up results with IPW					
Finance Training	0.121 (0.116)	0.027 (0.119)	0.056 (0.124)	-.016 (0.11)	0.074 (0.11)
Feedback Training	0.204* (0.115)	0.263** (0.115)	0.243* (0.147)	-.035 (0.111)	0.268** (0.114)
$\beta_1 - \beta_2 = 0$ (p-value) ^a	0.49	0.07	0.26	0.85	0.12
Panel B: 12-months follow-up results with IPW					
Finance Training	0.028 (0.114)	0.102 (0.109)	0.04 (0.128)	0.162 (0.15)	0.077 (0.122)
Feedback Training	0.138 (0.121)	0.022 (0.108)	0.067 (0.126)	-.017 (0.128)	0.06 (0.122)
April 2018 treatment	0.068 (0.096)	0.014 (0.085)	0.04 (0.107)	0.163 (0.12)	0.129 (0.101)
Obs.	454	454	443	454	443
$\beta_1 - \beta_2 = 0$ (p-value) ^a	0.35	0.40	0.85	0.26	0.89
R ²	0.00	0.00	0.00	0.01	0.00
Mean (SD) of control group	1.00	1.00	1.00	1.00	1.00
Observations	454.00	454.00	443.00	454.00	443.00
control for y_{t-1}	yes	yes	yes	yes	yes
control for industry strata	yes	yes	yes	yes	yes

Source: Survey on micro and small enterprises in Uganda, waves October 2017, April 2018 and October 2018, own calculations.

Notes: Estimations in Panel A (B) are weighted with the inverse probability of selection into midline (endline) tracking, which is based on the logit model estimated in Table A.2. Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Intention-to-Treat Effects on Investment Index Components

	Investment Index (1)	Investment (yes/no) (2)	Investment Amount (3)	Number Investments (4)	Inventory Amount (5)
Finance Training	0.118 (0.117)	0.037 (0.057)	-10.646 (93.257)	0.118 (0.171)	905.266 (940.642)
Feedback Training	0.197* (0.114)	0.015 (0.056)	75.554 (102.994)	0.308* (0.185)	937.746 (859.862)
FWER Finance Training		0.91	0.94	0.91	0.85
FWER Finance Training + Feedback		0.75	0.72	0.27	0.72
$\beta_1 - \beta_2 = 0$ (p-value) ^a	0.51	0.70	0.39	0.29	0.98
R ²	0.09	0.02	0.09	0.08	0.35
Mean (SD) of control group	0.00 (1.00)	0.57 (0.50)	267.65 (906.08)	1.17 (1.56)	3278.84 (7552.10)
Observations	460	460	460	460	460
control for y_{t-1}	yes	yes	yes	yes	yes
control for industry strata	yes	yes	yes	yes	yes

Source: Survey on micro and small enterprises in Uganda, waves October 2017, and April 2018, own calculations.

Notes: The table shows short-term intention-to-treat effects on variables belonging to the investment index. Values of investment amount (column 3) and inventory amount (column 5) are given in 1000 UGX. Standard errors in parentheses. FWER are family-wise error rates calculated based on Westfall, S. Stanley Young, and Young 1993.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

^a Test for equality of estimated coefficients of being assigned to finance and feedback training. Coefficients refer to equation (1).

Table 6: Intention-to-Treat Effects on Saving Index Components

	Saving Index (1)	Saving (yes/no) (2)	Formal Saving (3)	Informal Saving (4)	Concrete Saving Goal (yes/no) (5)
Finance Training	0.021 (0.119)	-.010 (0.036)	279.123 (250.938)	27.393 (54.969)	-.003 (0.025)
Feedback Training	0.257** (0.114)	0.023 (0.034)	262.798 (211.544)	162.008*** (56.485)	0.013 (0.024)
FWER Finance Training		0.95	0.73	0.92	0.95
FWER Finance Training + Feedback		0.66	0.60	0.04	0.66
$\beta_1 - \beta_2 = 0$ (p-value) ^a	0.07	0.33	0.95	0.05	0.53
R ²	0.14	0.05	0.23	0.11	0.01
Mean (SD) of control group	0.00 (1.00)	0.88 (0.33)	953.60 (2121.08)	254.47 (335.76)	0.95 (0.22)
Observations	460	460	460	460	460
control for y_{t-1}	yes	yes	yes	yes	yes
control for industry strata	yes	yes	yes	yes	yes

Source: Survey on micro and small enterprises in Uganda, waves October 2017, and April 2018, own calculations.

Notes: The table shows short-term intention-to-treat effects on variables belonging to the saving index. Values of formal saving (column 3) and informal saving (column 4) are given in 1000 UGX. Standard errors in parentheses. FWER are family-wise error rates calculated based on Westfall, S. Stanley Young, and Young 1993. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

^a Test for equality of estimated coefficients of being assigned to finance and feedback training. Coefficients refer to equation (1).

Table 7: Intention-to-Treat Effects on Profit Index Components

	Profit Index	Profit	Value added	Sales
	(1)	(2)	(3)	(4)
Finance Training	0.05 (0.126)	119.600 (91.587)	-281.833 (638.359)	-170.905 (737.082)
Feedback Training	0.233 (0.148)	26.285 (81.195)	489.389 (439.134)	2141.606* (1246.624)
FWER Finance Training		0.37	0.81	0.81
FWER Feedback Training		0.57	0.43	0.13
$\beta_1 - \beta_2 = 0$ (p-value) ^a	0.28	0.30	0.19	0.08
R ²	0.19	0.16	0.03	0.31
Mean (SD) of control group	0.00 (1.00)	507.86 (737.68)	625.44 (4423.19)	4638.66 (7623.48)
Observations	441	441	441	441
control for y_{t-1}	yes	yes	yes	yes
control for industry strata	yes	yes	yes	yes

Source: Survey on micro and small enterprises in Uganda, waves October 2017, and April 2018, own calculations.

Notes: The table shows short-term intention-to-treat effects on variables belonging to the profit index. Standard errors in parentheses. Values of profit (column 2), value added (column 3), and sales (column 4) are given in 1000 UGX. FWER are family-wise error rates calculated based on Westfall, S. Stanley Young, and Young 1993. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

^a Test for equality of estimated coefficients of being assigned to finance and feedback training. Coefficients refer to equation (1).

Table 8: Intention-to-Treat Effects on Loan Index Components

	Loan Index (1)	Applied for Business Loan (yes/no) (2)	Business Loan Amount (3)
Finance Training	-.015 (0.108)	-.030 (0.038)	65128.810 (210590.000)
Feedback Training	-.037 (0.109)	-.029 (0.039)	-10487.070 (204427.200)
FWER Finance Training		0.65	0.74
FWER Feedback Training		0.73	0.96
$\beta_1 - \beta_2 = 0$ (p-value) ^a	0.82	0.97	0.68
R ²	0.26	0.07	0.51
Mean (SD) of control group	0.00 (1.00)	0.16 (0.37)	459801.32 (1.95e+06)
Observations	460	460	460
control for y_{t-1}	yes	yes	yes
control for industry strata	yes	yes	yes

Source: Survey on micro and small enterprises in Uganda, waves October 2017, and April 2018, own calculations.

Notes: The table shows short-term intention-to-treat effects on variables belonging to the business loan index. Value of business loan amount (column 3) is given in 1000 UGX. Standard errors in parentheses. FWER are family-wise error rates calculated based on Westfall, S. Stanley Young, and Young 1993.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

^a Test for equality of estimated coefficients of being assigned to finance and feedback training. Coefficients refer to equation (1).

Table 9: Heterogeneity Analysis by Gender: Short-term Intention-to-Treat Effects

	Investment Index (1)	Saving Index (2)	Profit Index (3)	Loan Index (4)	Overall Index (5)
Finance Training	0.014 (0.178)	-.098 (0.178)	0.104 (0.106)	-.115 (0.179)	-.080 (0.161)
Feedback Training	0.038 (0.173)	-.042 (0.165)	0.214 (0.191)	0.005 (0.18)	0.068 (0.173)
Finance Training * Male	0.193 (0.234)	0.192 (0.241)	-.129 (0.198)	0.155 (0.222)	0.239 (0.214)
Feedback Training * Male	0.292 (0.228)	0.494** (0.227)	0.004 (0.278)	-.089 (0.225)	0.309 (0.23)
Male	-.004 (0.156)	0.087 (0.143)	0.29** (0.12)	-.157 (0.164)	0.046 (0.15)
Feedback Training+ Feedback Training * Male=0	0.03	0.00	0.28	0.52	0.01
R ²	0.10	0.16	0.32	0.28	0.31
Mean (SD) of control group	0.00 (1.00)	0.00 (1.00)	0.00 (1.00)	0.00 (1.00)	0.00 (1.00)
Observations	458	458	439	458	439
control for y_{t-1}	yes	yes	yes	yes	yes
control for industry strata	yes	yes	yes	yes	yes

Source: Survey on micro and small enterprises in Uganda, waves October 2017, and April 2018, own calculations.

Notes: The table shows short-term heterogeneous treatment effects by gender and includes the interaction between both treatment groups with an indicator variable for being male. Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 10: Effect of Gap on Saving Outcomes

	Saving Index (1)	Saving (yes/no) (2)	Formal Saving (3)	Informal Saving (4)	Saving Goal (5)
Finance Training	0.042 (0.136)	-.017 (0.037)	238.349 (278.465)	-12.745 (72.183)	0.029 (0.027)
Feedback Training	0.156 (0.128)	-.012 (0.034)	16.261 (225.204)	140.683** (67.610)	0.013 (0.025)
Finance Training * Gap	-.0002 (0.0004)	-.00005 (0.0001)	-.315 (0.252)	0.071 (0.108)	-.0001 (0.0001)
Feedback Training * Gap	0.00009** (0.00004)	0.00004* (0.00002)	0.436*** (0.049)	-.002 (0.015)	-4.25e-06 (4.63e-06)
Gap	-.00006** (0.00003)	-.00004* (0.00002)	-.084** (0.042)	-.024** (0.01)	6.84e-06 (4.20e-06)
Obs.	379	379	379	379	379
$\beta_3 - \beta_4 = 0$ (p-value) ^a	0.43	0.40	0.00	0.49	0.37

Source: Survey on micro and small enterprises in Uganda, waves October 2017, and April 2018, own calculations.

Notes: The table shows short-term intention-to-treat effects on variables belonging to the saving index with an additional interaction of the treatment assignment with the discrepancy between an individuals desired and actual saving goal amount, expressed in months (“Gap”). Values of formal saving (column 3) and informal saving (column 4) are given in 1000 UGX. Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

^a The notation $\beta_3 - \beta_4 = 0$ (p-value) is based on equation (2) and tests whether the difference in finance training and feedback training interacted with the feedback gap are significantly different from each other. Specifically, it is tested: Finance Training * Gap - Feedback Training * Gap = 0.

Table 11: Heterogeneity Analysis: Effect of Saving Gap on Saving Outcomes

	All	Gender		Education ^a		Financial Literacy	
	(1)	Female	Male	Lower	Higher	< Median	> Median
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dependent Variable: Saving Index						
Finance Training	0.042 (0.136)	0.116 (0.206)	-0.041 (0.187)	0.054 (0.176)	0.054 (0.187)	0.131 (0.203)	-0.075 (0.202)
Feedback Training	0.156 (0.128)	0.009 (0.2)	0.33* (0.181)	0.304 (0.204)	0.093 (0.174)	0.282 (0.221)	0.108 (0.155)
Finance Training * Gap	-0.0002 (0.0004)	-0.0007 (0.0006)	0.0004 (0.0004)	-0.0008 (0.0009)	-0.00005 (0.0002)	0.0002 (0.0006)	-0.0003 (0.0005)
Feedback Training * Gap	0.00009** (0.00004)	-0.0003 (0.0003)	0.0001*** (0.00003)	-0.0003 (0.0007)	0.0001*** (0.00003)	-0.0004 (0.0004)	0.0001*** (0.00002)
Gap	-0.00006** (0.00003)	0.00008 (0.00009)	-0.00008*** (0.00002)	0.0002** (0.00008)	-0.00008*** (0.00002)	0.00009 (0.00009)	-0.0001*** (0.00002)
Obs.	379	154	223	142	232	207	172
$\beta_3 - \beta_4 = 0$ (p-value) ^b	0.43	0.61	0.47	0.67	0.38	0.39	0.38

Source: Survey on micro and small enterprises in Uganda, waves October 2017, and April 2018, own calculations.

Notes: The table shows short-term intention-to-treat effects on variables belonging to the saving index with an additional interaction of the treatment assignment with the discrepancy between an individuals desired and actual saving goal amount, expressed in months ("Gap"). While column (1) shows results for the whole estimation sample, results are show by gender in columns (2)(female) and (3) (male), by educational level in columns (4) (lower) and (5) (higher) and by financial literacy level in columns (6) (below median) and 7 (above median). Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

^a Higher education is a dichotomous variable, where 1=lower secondary degree (O-level) and more, and 0=up to primary education.

^b The notation $\beta_3 - \beta_4 = 0$ (p-value) is based on equation (2) and tests whether the difference in finance training and feedback training interacted with the feedback gap are significantly different from each other. Specifically, it is tested: Finance Training * Gap - Feedback Training * Gap = 0.