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Changing saving and investment behavior: the impact of financial literacy training and reminders on micro-businesses

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Abstract

In developing countries, savings is an important financial tool, particularly for micro-business with limited access to credit. However, micro-entrepreneurs often undersave, even when they have some surplus and the desire to save maybe because of knowledge gap and behavioral biases. To test the importance of these saving constraints, we offered four-hour financial literacy training and periodic SMS reminders for three months to randomly selected group of micro-entrepreneurs in Addis Ababa, Ethiopia.. While financial literacy training alone seemed ineffective, we find that reminders and joint treatment encouraged better saving behavior. Our results confirm earlier findings that savings can be limited by attention, whereas how entrepreneurs manage savings depends on their levels of financial literacy.

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I. Introduction

Promoting savings is important to the development of micro- and small enterprises, particularly in developing countries, for several reasons. First, savings could be one way of building adequate capital to overcome credit constraints and withstand transitory business shocks that are commonly faced by micro- and small enterprises (e.g., Dupas and Robinson 2013a).¹ Second, savings instruments offer a safer option for storing wealth than keeping money at home and can also be adopted as mechanisms to reduce the temptation of utilizing cash at hand; particularly for those who have present-biased preferences. Third, many poorly educated entrepreneurs operating small enterprises in developing countries have limited access to any form of banking services, and thus the use of savings instruments, such as bank accounts, represent the first opportunity they get to create a relationship with formal financial institutions, which might pave the way for obtaining credit at future dates. Fourth, for micro- and small businesses, the cost of internal financing of investment through savings is often much lower than the cost of accessing credit, the availability of which is often limited in developing countries (Evans and Jovanovic 1989). Fifth, savings help in case of emergencies.

The question that then arises is why micro-entrepreneurs in developing countries under-save. An intuitively appealing response is that, in an environment where people are generally impoverished and entrepreneurship is subsistence, there will not be adequate surplus that can be set aside for savings. There is, however, evidence from across numerous countries that even poor households do have some surplus, express a desire to save, and utilize various informal channels to save (e.g., Rutherford 2000; Banerjee and Duflo 2007; Collins et al. 2009). Alternatively, low saving rates may be the result of a knowledge gap and behavioral biases that diminish both the likelihood and the amount of savings by micro-entrepreneurs (Karlan, Ratan, and Zinman 2014).

Low levels of financial literacy often lead to suboptimal choices and typically to high levels of risk aversion in the allocation of resources due to overestimation of the business risk

¹Similar positive impacts of savings instruments are documented at the household level. Kaboski and Townsend (2005), for example, find that the provision of savings services to micro-finance clients has significantly led to long-term asset growth in Thailand. Similarly, Dupas and Robinson (2013a) find that the provision of savings accounts has enabled Kenyan villagers with accounts to withstand business shocks better without liquidating their assets compared with those without bank accounts.

and inadequate capability in dealing with it. Micro-entrepreneurs may under-save because they do not understand the benefit of saving, good opportunities for investment, or how to use savings instruments well. This tendency might have the combined effect of keeping micro-entrepreneurs in a “low-knowledge trap” (Banerjee 1992; Cole, Sampson, and Zia 2011; Drexler, Fischer, and Schoar 2014).

Psychological aspects that affect saving behavior, such as inattention, are also important in influencing the saving and investment behavior of micro-entrepreneurs (Mullainathan and Shafir 2013). Micro-entrepreneurs may initially plan to save regularly, but they often fail to keep it on ‘the top of their mind,’ especially when they are busy dealing with unexpected expenditures such as funerals (Dercon et al. 2006), a relative’s or a friend’s request for borrowed funds (Platteau 2000; Ashraf 2009), and yielding to drinking and gambling temptations (Laibson 1997; Gul and Pesendorfe 2001, 2004). Moreover, as a result of inattention or limited attention, micro- and small- business owners often find it cumbersome to regularly keep and check records, track payment and receipts, as well as manage cash flows (Atkinson et al. 2010). Due to such cognitive tendencies, entrepreneurs often undersave and, when they do save, they often rely on costly strategies to commit themselves to save their proceeds, as in, for example, the use of ROSCAs (Rotating Savings and Credit Associations) and “*Sususu*” (deposit collectors) in Eastern and Western Africa, respectively (Aryeetey and Udry 1997). Indeed, studies find that people can be induced to improve their saving behavior through short-term financial literacy training programs and hard and soft commitment-saving devices (Ashraf, Karlan, and Yin 2006; Atkinson et al. 2010; Dupas and Robinson 2013b; Karlan et al. 2014).

This study employs a novel experimental approach that relaxes savings constraints related to knowledge gap and limited attention to explore the effects of providing financial literacy training and reminders on saving behavior. The first intervention is based on a 4-hour-long financial literacy training to a randomly selected micro-entrepreneurs in Addis Ababa. Another group of randomly selected entrepreneurs was treated with periodic SMS reminders for about 3 months to encourage positive saving behavior. Fortnightly, these micro-entrepreneurs received SMS reminders containing a message about the importance of saving to “realize one’s dream”. A third group received both treatments, while the last group served as control and got neither treatment.

Our work contributes to the existing literature on a knowledge gap and behavioral biases in micro-entrepreneurs' saving in two important ways: (i) to our knowledge, none of the previous studies compare individual and joint effects of financial literacy training programs and SMS-reminders; our experimental design allows us to perform such comparisons; (ii) many of the existing studies often draw their sample from clients of banks or micro-finance institutions (e.g., Atkinson et al. 2010; Karlan et al. 2014); we expand the literature by employing data from a randomly selected sample of micro-entrepreneurs to examine the importance of financial literacy and reminders in more general settings.

In fact, individual and joint treatments affected the saving behavior of micro-entrepreneurs differently in a meaningful manner. We find that the micro-entrepreneurs assigned to the SMS reminder treatment were found to save a larger proportion of their income while reducing consumption. They also invested a greater percentage of their business proceeds and were more likely to save amounts that reach or even surpass their self-set saving targets. These effects of the SMS reminder are robust to model selection. By contrast, the entrepreneurs assigned to the joint treatment increased the deposit in an ordinary bank account, which did not happen for entrepreneurs assigned to the SMS-reminder treatment only. They also increased the percentage of saving goal achieved. Entrepreneurs assigned to the financial literacy group, however, experienced limited changes in their saving behavior.

The rest of the paper is organized as follows. The next section presents a brief review of the literature with focus on financial literacy training and reminders. Section III lays out the experimental design. Discussion on sampling and data is presented in section IV. The empirical strategy (econometric framework) and estimation results are discussed in section V. The final section concludes the paper.

II. Related literature

An important attribute of successful micro-entrepreneurs is their ability to save and reinvest their proceeds with the aim of expanding their businesses. Poor entrepreneurs, however, often seem to have limited access to safe and secure means of saving; they live in impoverished households where it is often difficult to store money. Indeed, when presented with instruments of

saving, take-up among poor households and micro-entrepreneurs has usually been very high (Dupas and Robinson 2013a; Goldberg 2014; Prina 2015).

Access to savings products is not only associated with higher take-up, it also seems to have significant investment and welfare impacts. For example, the practice of using bank accounts increased savings as well as education expenditures in Nepal (Prina 2015), improved household resistance to sudden health shocks in Kenya (Dupas and Robinson 2013b), helped in consumption smoothing in Chile (Kast et al. 2012), and increased farmers' investment in fertilizers in Malawi (Brune et al. 2011). We examine two possible mechanisms that can potentially stimulate financial inclusion and desirable financial behavior among micro-entrepreneurs: financial literacy training and SMS reminders.

Financial Literacy

To the extent that lack of knowledge about the benefits of saving deters entrepreneurs from using vital financial products, higher take-up can be promoted with financial education (Xu and Zia 2012; Atkinson and Messy 2013). More often than not, the vast majority of entrepreneurs in developing countries appear to have limited financial knowledge and hence their financial decision-making capacity is poor (Karlan and Morduch 2010; Cole et al. 2011; Xu and Zia 2012).² Consequently, even when access to savings instruments is available, lack of knowledge about financial concepts and how banks operate can prevent entrepreneurs from saving and reinvesting their business proceeds.

Financial literacy involves different forms of skills and knowledge that aid in the proper utilization of one's financial resources. It includes basic skills in numeracy, ability to calculate simple payoffs from investments, knowledge in budgeting, planning, and cash flow management using limited financial resources; as well as following heuristics-based financial decision-making rules such as separating business expenses from household expenses. Such types of skills are also crucial for efficient enterprise management. For example, preparing annual financial plans and statements will help expose the business' weakness and strength as well as identify areas and products where returns are high so as to deploy additional funds toward more profitable areas. In

² According to the 2011 Global Findex survey, for example, a quarter of the poorest 40 % of households in Sub-Saharan Africa do not have bank accounts (Demirguc-Kunt et al. 2015).

recognition of these potentials, short-term financial literacy training programs are increasingly considered as tools for improving the financial knowledge of entrepreneurs and thus financial decision making in many countries (Karlan et al. 2014). Drexler et al. (2014), for example, find a simple “rule-of-thumb” financial education program that teaches micro-entrepreneurs rudimentary bookkeeping practices to be more effective than a training program that teaches standard accounting practices in the Dominican Republic. Similarly, Bruhn and Zia (2011) find that financial training led to the adoption of new production processes, higher investment, and larger profitability in Bosnia and Herzegovina.

Other studies report less robust findings. Carpena et al.’s (2011) and Field, Jayachandran, and Pande’s (2010) experiments on financial education and literacy program in India, for example, did not yield significant improvements in knowledge and business outcomes, respectively. Similarly, Cole et al. (2011) find the impact of financial literacy education on saving behavior to be trivial in Indonesia, particularly compared with the effect of monetary incentive to use financial services.

These results suggest that the impact of financial literacy on saving is highly mixed and hence, drawing inference on the effectiveness (or lack thereof) of financial education from these studies to other settings might be difficult. Some of the results, for example, may uniquely reflect the nature of the studies’ sample where researchers often work with young clients of a bank, whose demographical makeup, such as level of education, is vastly different from poor households and entrepreneurs in other developing countries.

This study, which examines the impact of providing financial literacy training on business knowledge and saving behavior of micro-entrepreneurs in general settings, is therefore a useful addition to the existing literature to enhance our understanding of what works and what does not in the context of developing countries.

Text reminders

The impact of reminders and their potential for effecting desirable behavioral changes have long been studied in relation to the take-up of health care services and their impact on multiple outcomes of care (e.g., Krishna et al. 2009; Stockwell et al. 2012; Zolfaghari et al. 2012). Reminders have also been found to be useful in encouraging take-up of financial products and services. Reminders, for example, were found to encourage loan repayment by clients of a

microfinance institution in Uganda with the same order of magnitude as a 25% reduction in monthly interest rate (Cadena and Schoar 2011).

Need we be reminded to change our expenditure and saving behavior as well? We hypothesize that reminders can generate desirable saving behavior for the same reason that they appear to encourage healthy lifestyle and higher take-up of health services and better loan repayment. Micro-entrepreneurs can benefit from reminders as the cognitive load required to regularly keep alert of overconsumption or under-saving is not trivial. Micro-entrepreneurs, for example, sometimes tend to be inattentive to a wide array of key business expenditure that needs to be made in future dates (Duflo, Kremer and Robinson 2011). Reminders can bring such expenses to “the top of the mind,” improving entrepreneurs’ cash management (Karlan et al. 2014; Mullainathan and Shafir 2013). More precisely, reminders enable adjustment of decisions over time by altering the likelihood of remembering a decision made earlier, thereby creating a salient relationship between current choices and future expenditure plans (Karlan et al. 2014). Karlan et al. (2014) formulated a theoretical model that shows that inattentive individuals would likely undersave and that reminders can be effective instruments to enhance saving.

There are, however, very few empirical studies that examine the impact of reminders on saving behavior. Karlan et al. (2014) is one of these pioneering studies that provided targeted messages or letters to a random list of bank clients in Bolivia, Peru, and the Philippines to test whether reminders encourage savings. They find that reminders increased the likelihood of achieving the saving goal and total amount saved by 3% and 6%, respectively. Moreover, when comparing reminders that attach a particular saving plan to those that did not have a saving plan, reminders were twice more effective when saving plans were mentioned. Similarly, Atkinson et al. (2010) combined an offer of commitment saving devices with reminders to a group of account holders in Guatemala. They find that reminders encouraged the use of accounts and enabled account holders to reach their saving targets in time compared with those who did not get reminders.

Both of these studies drew their sample from commitment saving account holders and their results may therefore not be generalized to those not exposed to such types of saving devices. Moreover, the effect of reminders on saving and investment behavior of micro- and small-business owners is less studied. An important exception is McConnell’s (2012) messaging experiment that was designed to encourage market vendors in Ghana to save. In contrast to

Karlan et al. (2014) and Atkinson et al. (2010), the study finds no evidence that reminders significantly increase the use of formal saving instruments or saving amounts. The question on the effectiveness of reminders in encouraging better saving and investment decisions is thus far from settled.

III. Financial Training and Text Reminders

We collaborated with instructors at Addis Ababa University, School of Commerce to offer the financial literacy training arm of the treatment. Further to their strong academic background in financial planning and management, the instructors who offered the training had taken advanced courses in entrepreneurship and business incubation. They had also previously offered training on entrepreneurship, bookkeeping, and related business management skills to small business owners.

To the extent that the entrepreneur's level of financial literacy is strongly correlated with financial behavior, we presume that there is a large scope for improving both financial knowledge and practices through classroom-based training. However, consistent with Drexler et al.'s (2014) finding, we decided that the training will have to be very simple and compatible with the entrepreneur's skill levels and reasonably short in duration.³

The main objective of the financial literacy training was to induce micro-entrepreneurs to steadily shift their business proceeds from spending on non-essential items toward saving and investment. Accordingly, the training was designed to incorporate the following key elements: (a) teach participants the importance of planning, saving, and budgeting; (b) teach entrepreneurs to carefully weigh their options in using various forms of saving instruments to make more informed financial decisions; (c) encourage entrepreneurs to set achievable goals and regularly save some amount of their business proceeds to reach those goals; and (d) teach entrepreneurs how to keep records of business and household expenses separately. A brief outline of the training material is presented in Appendix 1.

³ The baseline survey showed that our sample of entrepreneurs do not have strong educational background with 8.7 average years of schooling and only about 15% of them having post-secondary education.

The instructors prepared a financial literacy training module, taking into consideration the baseline information that majority of the prospective trainees would mostly have a high school level of education. The module was then translated into the local language, Amharic, and distributed to training participants upon arrival. To maximize takeup, the training slots were offered over Saturdays and Sundays between May and June, 2014, and each randomly selected entrepreneur was supposed to attend one of them, which lasted for 4 hours.⁴ Several brainstorming questions that elicit entrepreneur's active contribution and that gauge their level of understanding of financial concepts and products were included in the training module. We invited 50 randomly selected entrepreneurs to each session by phone roughly 2 weeks before the actual date of training. To remind the entrepreneurs, our research assistant made scripted follow-up calls 2 days before the actual day of training. Take-up, however, was low, at 42%.

The second treatment, regular sending of text message reminders to entrepreneurs, closely mimicked the design of Karlan et al. (2014). Before reminders were sent out, all respondents in this treatment group were called by our research assistant and were informed that they would receive regular text messages reminding them to save every 2 weeks for 3 months. Except for a few respondents whose phones were switched off and were in locations that did not receive sufficiently strong network signals, all entrepreneurs expressed their willingness to receive the text message regularly. Moreover, upon receipt of these messages, many entrepreneurs called our research assistant to thank him for reminding them to save.

Except in the case of network failure and problems with an individual's mobile phone, the reminder messages were sent to all entrepreneurs in the treatment group as per scheduled dates. When messages were not sometimes delivered, they were resent on the second and third days.⁵ The reminder treatment was implemented from June to the last week of August in 2014. The third treatment combined financial literacy with reminders for another randomly selected group of entrepreneurs.

⁴ Initially, our plan was to offer the training during weekdays, but it was impossible because many participants admitted that they would not be able to come.

⁵ Only 1% and 3.6% of entrepreneurs assigned to the reminder and joint treatment groups, respectively, failed to receive the SMS messages because they were either unreachable due to network problems or their phones were switched off.

IV. Data and Experimental Design

To see the validity of our hypotheses regarding saving constraints, we analyzed our own survey data on micro-entrepreneurs in Ethiopia. Our sample was drawn from a national survey of micro- and small businesses carried out by the Ministry of Urban Development, Housing and Construction (MoUDC, the Ministry hereon) in 2012 in 13 large cities in Ethiopia. The Ministry survey randomly selected Enumeration Areas (EA) from these cities and a comprehensive list of micro- and small businesses operating in the selected EAs was prepared.⁶ From each EA, 12 firms were randomly selected and data on more than 3,000 micro- and small businesses were collected from the 13 cities (see MoUDC 2013).

Addis Ababa was one of the 13 selected cities in the Ministry survey. However, the survey instrument employed by the Ministry did not contain sufficient information that could serve our purpose. Thus, in 2013, we decided to conduct our own survey using the entire sample of firms in the Ministry survey from Addis Ababa. We developed a survey instrument that would enable us to collect a rich set of information including firm attributes and individual demographic characteristics and time and risk preferences. More importantly, our questionnaire contained a battery of indicators on saving and investment practices of entrepreneurs.

Subsequently, baseline data were collected from 515 micro- and small enterprises involved in different sectors in December 2013.⁷ The four major subsectors where the sampled enterprises were operating are services and retail business, manufacturing, construction, and urban agriculture. A preponderance of the enterprises were in services and retail business (57%), followed by the manufacturing subsector (30%). About 12% of the firms were engaged in construction and only four firms were operating in urban agriculture. Due to the unique nature of the business and the small sample size, we decided to exclude all the 4 firms in urban agriculture, and also 3 outliers from our analysis throughout this study. We thus have 508 sample micro-enterprises in the baseline.

⁶ The Central Statistical Agency (CSA) of Ethiopia defines enumeration area as “a unit of land delineated for the purpose of enumerating population and housing units without omission and duplication.” EAs are geographically delineated to consist of 150-200 housing units in urban areas.

⁷ There were more than 600 firms in the MoUDC (2013) survey in Addis Ababa. In 2013, some of the firms, particularly those who were cooperative-based were found to have stopped operation and disbanded. We managed to contact 515 of those that survived in 2013.

In April 2014, to examine whether relaxing the saving constraints affects the likelihood and amount of saving, we randomly assigned these sample entrepreneurs to one of three treatment groups or to a control group. Our sample was thus composed of enterprises that received (1) a financial literacy training, (2) SMS messaging that encouraged saving, (3) both financial literacy training and SMS messaging, or (4) neither of the two (the control group). The interventions then took place from May to June 2014. We conducted the end-line survey in 1 year's time after the baseline in December 2014. We managed to interview 426 firms but found that the other 82 have exited from the market. We analyzed the determinants of attrition from the sample and we found that none of the treatment statuses are correlated with the state of exit (results are available upon request).⁸ We mainly analyzed these 426 firms below.

To test the quality of randomization, Table 1 presents the baseline mean values of several individual and business characteristics of entrepreneurs assigned to the three treatment groups and the control group (see Appendix 2 for definition of the key terms). For each variable and for each treatment type, the test of the equality of means of the variables between each treatment group and the control is conducted.

Table 1 shows that the treatment and control groups were well-balanced overall. Although there were small differences in a few variables, we will control for them in the regression analysis below to minimize bias and increase the precision of the estimates.

Table 2 presents the baseline values of saving, expenditure, and business performance indicators.⁹ Saving size was not statistically different between the treatment and control groups; actual average saving size per entrepreneur was about 1028 birr.¹⁰ Baseline income level,

⁸ To address possible attrition bias, we will control for all explanatory variables used here in the following analysis.

⁹ In the 2014 survey round, we have also inquired about entrepreneurs' access to credit. Our data showed that 50% of our sample enterprises have never borrowed money from any sources, including family and friends, and only two enterprises (0.45%) had borrowed from banks and about 16% had borrowed from MFIs. Given that about 37.7% of the enterprises said they have formally applied for a business loan, the proportion of entrepreneurs who got loans was small. Entrepreneurs who never applied for a loan were also asked why they did not apply. About 49% stated that they did not need a loan. Yet 19% and 8% of them mentioned lack of collateral and high interest rate, respectively, to be key reasons for not lodging loan applications with formal financial institutions. Moreover, when asked how much they can borrow in case of emergency in 2 weeks' time, 30% of the entrepreneurs claimed that they cannot borrow any amount from any sources. About 17% said they can get more than 20,000 birr (about 1000 USD) in emergency loan in 2 weeks. All these taken together give credence to the assertion that many micro-enterprises are credit-constrained in developing countries.

¹⁰ One dollar was exchanged for 19.01 birr in December, 2013. In December, 2014, the exchange rate increased to 20.06 birr for a dollar.

measured by self-reported gross profit earned in November 2013, was also balanced across the treatment and control groups. This was the dominant source of income and averaged 1985 birr in the past 30 days, which was only slightly less than the average monthly GDP per capita in PPP, 2215 birr.¹¹ We also found that more than 80% of the entrepreneurs have ordinary bank accounts and that the average amount of deposit in the past 30 days ranged from 128 birr to 382 birr. As to informal saving, about 29% of the entrepreneurs are members of *Iqub* (ROSCA).

The cost of saving is another important predictor of saving. Because our sample entrepreneurs are operating their business in Addis Ababa, the capital city of Ethiopia, it is not surprising that they have good access to bank branches. Making a deposit takes only half an hour and their perceived forgone earnings ranged from 7 to 12 birr in 2013.

In spite of the easy access to financial instruments, sample entrepreneurs may not be fully sophisticated in terms of accounting activities. Drexler et al. (2014) stress that separating business and personal accounts enables entrepreneurs to recognize the profitability of their business and also serves as a commitment device not to misuse working capital. More than 50% of their sample micro-entrepreneurs in the Dominican Republic separated the accounts, whereas our sample entrepreneurs did not, consistent with their modest participation in management training in the past (Table 1). Table 2 presents that they invested 7–13% of their household expenditure back to business, while 60% was spent on food and house rent. Entrepreneurs assigned to the financial training treatment group spent a slightly lower proportion of their business proceeds on food and house rent and more on household durables than did the control group entrepreneurs. Further, 37% of the sample entrepreneurs kept records on business transactions, which fell between 25% in Ghana (Mano et al. 2012) and 63% in Kenya (Mano et al. 2014). While only 28% of the entrepreneurs also kept records on defective products, most entrepreneurs inspected product quality before marketing. Treatment and control group entrepreneurs did not also differ in terms of business performance measures, such as sales, value added and gross profit (not shown but available on request). In sum, we cannot reject the null hypothesis of equality of the means of saving, income, expenditure, business practices, and performance indicators for each of the treatment groups with the control group at the outset.

¹¹ Ethiopia's average annual GDP per capita PPP is USD1329 in 2013 and USD1425 in 2014, according to the world development indicators (<http://data.worldbank.org/data-catalog/world-development-indicators>).

Table 3 presents the post-treatment values for saving, expenditure, and business performance, by treatment status, in December 2014. The average amount of savings was significantly higher for the SMS reminder treatment. Moreover, this average saved amount has increased by 76.3% since December 2013 for entrepreneurs treated with SMS-reminder, while it increased by only 20% among the control group. Table 3 also shows that SMS-reminder was associated with saving a greater proportion of sales revenue, and more desire to save larger amounts. The joint treatment has substantially increased the likelihood of achieving saving goals, and proportion of sales revenue saved. Most importantly, as we expected, the joint treatment also increased the amount of money entrepreneurs deposited in the banks. Indeed, while there are slight differences in the means between the SMS reminder and joint treatment groups, the test of equality of means shows that none of the difference in the means of the saving variables are statistically significant; i.e., the SMS-reminder and joint treatment effects are comparable across all the outcome variables. In contrast, the financial training treatment did not have any impact on saving practices. This may be because the reminder component in the reminder treatment and the joint treatment played an important role to induce the entrepreneurs to take action whereas only providing information in the financial training treatment was not enough to change behavior. We further explore this conjecture in the next section by controlling for relevant factors using the regression analysis.

A striking finding is also that the entrepreneurs assigned to the financial training treatment arm tended to use *Iqub* (ROSCA) significantly less compared with both the control group and the other treatment groups. *Iqub* membership remained at about 20.5%, whereas the control group gained membership from 28% to 34%. Given that ROSCAs are costly saving strategies, this correlation is quite intuitive. Still, *Iqub* can serve as a commitment saving device.

Table 3 also shows that the SMS-reminder treatment has increased the proportion of business proceeds that was invested back to the business to 35%, compared with 27 % in the control group. The higher investment on the business appears to be the result of spending cuts on food and house rent. Entrepreneurs assigned to the SMS-reminder treatment spent 41% of their business proceeds on food and house rent, which is significantly less than the amount spent by entrepreneurs who are assigned to either of the other treatment groups or the control. The reduction also constitutes a 20 percentage points decline from December, 2013. This suggests that SMS-reminders encouraged a more frugal way of living without compromising essential

expenditures such as health, education, clothing, and footwear. Also, given that income levels did not vary by treatment status,¹² the higher saving amount observed among entrepreneurs assigned to the SMS-reminder treatment suggests that micro- and small businesses suffer from cash management problems because of limited attention. By contrast, the joint treatment increased deposits in ordinary bank accounts and increased the percentage of saving goal achieved. To measure the treatment effects more precisely, we employ regression analysis and control for relevant observable characteristics below.

V. Empirical Strategy and Discussion of Results

Following McKenzie (2012), we ran an analysis of covariance (ANCOVA) regression, regressing the saving outcome on its lag as well as the treatment status dummies and other controls. ANCOVA regression yields important gains in power over the differences-in-differences (DID) regression, which used to be a major analytical tool for randomized controlled trials (DID regression results are also largely similar and are available upon request).¹³ The ANCOVA regression can be expressed as follows:

$$S_{iA} = \alpha + \sum_k \beta_k Z_{ki} + \theta S_{iB} + X_{iB}\gamma + \varepsilon_i$$

where S_{iA} denotes the saving outcomes of individual i *after* receiving the treatment, Z_{ki} is the dummy variable for the randomized treatment k , which refers to (1) financial literacy training, (2) SMS reminder, (3) joint treatment, with (4) the control group as the default status.¹⁴ While

¹² In fact, average income in the control group was higher than the income levels in any of the treatment arms, although differences were not statistically significant.

¹³ According to McKenzie (2012), the ratio of the DID variance to the ANCOVA is $2/[1+\rho]$, where ρ is the autocorrelation coefficient. For example, when $\rho = 0$, we need twice the sample size when using DID to get the same power as that obtained in ANCOVA.

¹⁴ Alternatively, we also tried the following specification: (1) Construct a dummy variable TRAINING which is one for entrepreneurs assigned to the financial literacy treatment or the joint treatment, and zero otherwise; (2) REMINDER dummy is one for the entrepreneurs assigned to the SMS reminder treatment or the joint treatment, and zero otherwise; (3) JOINT dummy is one for the entrepreneurs assigned to the joint treatment and zero otherwise; (4) Regress saving and other outcome variables on the above explanatory variables and the other controls and estimate ITT; (5) Analogously, we estimated ATT. The implications obtained from the estimation results are essentially the same. We do not report them to save the space, but they are available upon request.

subscript B denotes the data point *before* receiving the treatment, X denotes the vector of the other controls. We would estimate the regression parameters α, β_k, θ , and γ , and ε_i is the error term. We are primarily interested in the value of β_k , which measures the intention to treat effect (ITT), that is, the average increment in the saving outcome of each treatment group in excess of the saving outcome of the control group.

Replacing the random assignment dummy Z_{ki} with the actual take-up dummy D_{ki} , which is to be instrumented by Z_{ki} , we can estimate the local average treatment effect (LATE). The SMS reminder was sent exclusively to the entrepreneurs assigned to the SMS reminder and the joint treatment groups. The attendance rate in the financial literacy training was 42% among the financial training group and 41% among the joint treatment group, but no other attendees. Further, all the treatments were received by the intended entrepreneurs only, and there were no *always-takers*, who would receive treatments regardless of their treatment assignment. This implies that our estimated LATE is equivalent to the average treatment effect on the actually treated entrepreneurs (ATT) (see Theorem 4.4.2 of Angrist and Pischke 2009).

Table 4 presents the estimated coefficients of the treatment dummies in the ANCOVA regressions—ITT estimates in the upper panel and LATE estimates in the lower panel.¹⁵ We also ran alternative OLS regressions, which do not control for the lagged outcomes, and the results are not reported here but essentially the same as the ANCOVA estimates. We can see from Table 4 that the financial literacy training did not significantly change the entrepreneur's saving behavior. This result suggests that the lack of knowledge or financial literacy alone may not be the only reason entrepreneurs tend to undersave.

By contrast, the SMS reminder significantly increased the savings-to-sales ratio by 40 % (0.13 standard deviation unit), the percentage of business proceeds reinvested back to business by 78 % (0.45 standard deviation unit), and the percentage of saving goal achieved by 114%

¹⁵ The coefficients of the other explanatory variables are omitted to save space but are available upon request. More importantly, to check whether the attrition of a few sample entrepreneurs could have caused any serious bias in the treatment estimates, we ran the probit on sample attrition. The estimation results, not reported but available upon request, suggest that treatment status is not correlated with attrition. Although few other explanatory variables are correlated with attrition, they are controlled in the ANCOVA regression to alleviate potential bias. We thus conclude that the attrition bias is not a serious concern.

(0.34 standard deviation unit).¹⁶ Entrepreneurs assigned to the SMS-reminder also experienced a 97% increment in their total savings (0.41 standard deviation unit). In principle, the SMS reminder was received by all the entrepreneurs assigned to the SMS reminder treatment. This is why ITT estimates are close to LATE (and also ATT) estimates. As expected from the nature of the treatment, the SMS reminder did not affect the financial literacy score nor did it affect whether the entrepreneur saves or not. In fact, none of our treatments induced entrepreneurs who did not save before to newly start saving.

While financial literacy alone had no effect on financial literacy score, joint treatment significantly increased the score by 0.28 point on average (ITT) and by 0.60 point for those entrepreneurs who actually received the financial training as well as SMS reminders (LATE and also ATT). The positive effects associated with the joint treatment arm might be the result of complementarity between reminders and the financial literacy training, which can arise when reminders alert entrepreneurs who received the training to go back and check the training materials to acquire more knowledge. Joint treatment also significantly increased the percentage of saving goal achieved by 114% on average (0.34 standard deviation unit). Most importantly, joint treatment also significantly increased the deposit in the ordinary bank account by 481% (1.33 standard deviation unit). The financial literacy training alone did not increase the deposit. The results are similar under the LATE specification indicated in the lower panel of Table 4.

In other words, whereas the training participants may have appreciated the value of the bank deposit as a useful financial tool, the training participation alone did not induce them to increase the deposit. But they actually increased the amount of bank deposit only when additionally receiving the SMS reminders to attend to their financial and business goals. This result contributes to our understanding of entrepreneurs in developing economies as rational agents (Schultz, 1964). The acquisition of useful knowledge alone may not necessarily change

¹⁶ The percentage changes are calculated by dividing the regression coefficient by the baseline sample averages. For example, 40 % is calculated by dividing the coefficient in Table 4, 0.06, by the baseline average for the SMS-reminder group indicated in Table 2, 0.15. Standard deviation units are calculated by taking the ratio between the regression coefficients and the standard deviations in the baseline for the subgroup. For example, as indicated in Table 4, the coefficient on the SMS reminder dummy in column 3 is 0.06 and the baseline standard deviation for savings-to-sales ratio is 0.25. SMS reminder treatment is thus associated with 0.24 standard deviation higher savings-to-sales ratio.

the behavior of rational agents, but we can help them to adopt it by drawing their attention to their original objectives.

To test whether the effect of reminder treatment is different from that of joint treatment for each of the specifications presented in Table 4, we conducted F-test on their coefficients. Except for specifications indicated in columns 1 and 4, we find no statistically significant difference between joint and reminder treatment in both ATT and ITT set ups. In column 1, the F-test shows that the joint treatment is associated with statistically higher financial literacy score compared to the reminders treatment. On the other hand, column 4 shows that the reminder treatment appears to significantly increase percentage of business proceeds reinvested back to the business compared to the effect of the joint treatment, which is not distinguishable from zero.

Our results indicate that saving behavior is driven by limited attention, which can be altered by SMS reminders. Furthermore, the entrepreneurs who attended the financial literacy training learned the basic financial management. Beyond the fact that the SMS reminder and the joint treatment influenced the saving outcome, we wish to know whether our treatment had any effect on *Iqub*, a typical informal saving club, membership and business practices, particularly those closely related with financial management. For this purpose, we ran the ANCOVA regression on *Iqub* membership and business practices. More specifically, we estimated the treatment effects on whether the entrepreneur (1) is a member of *Iqub*, (2) keeps records of business transactions, (3) keeps records of defective products, or (4) inspects quality of products. Table 5 presents the estimation result, and it suggests that our treatment did not significantly affect the adoption of selected business practices. Yet, column 1 of Table 5 indicates that the financial literacy treatment led to a significant decline in *Iqub* membership. ROSCAs such as *Iqub* are often ideal saving instruments for people with low levels of financial literacy and time-inconsistent preference.¹⁷

To deepen our understanding of the effects of the three treatments, we also analyzed the following different regressions results. We estimated: (1) the heterogeneous treatment effects on the saving outcomes across diverse aspects, including entrepreneur's education level and the initial loan status; (2) the treatment effects on business performance in peak and slack seasons,

¹⁷ We find that entrepreneurs who have time-inconsistent preference are also more likely to belong to *Iqub* (results available upon request).

respectively (e.g., Bruhn and Zia, 2011); (3) the treatment effects on the risk and time preference parameters. But we did not find any significant results. We do not report the results to save the space.

VI. Conclusions

In developing countries, micro-entrepreneurs tend to have insufficient credit access, even though they are increasingly expected to play important roles in production and employment. Alternatively, they could internally retain their earnings and make them available for future projects. It is unfortunate, however, that they often fail to save sufficiently. This study explores the reason behind this failure and attempts to explore how we can help micro-entrepreneurs to internally finance and expand their business. In particular, we hypothesized that micro-entrepreneurs do not recognize the importance of internally accumulating financial resources and they also lack the necessary financial skills. Another possibility is that, even if they initially have the intention of saving, it is difficult to keep it up over the course of their business operation, where they repeatedly encounter unexpected temptations and pressures of expenditure, including others request for borrowing.

To empirically test the validity of these hypotheses, we conducted randomized controlled trials with 426 sample micro-entrepreneurs operating in Addis Ababa, Ethiopia. Specifically, we randomly assigned the sample entrepreneurs to four groups: (1) the financial literacy treatment; (2) the SMS reminder treatment; (3) the joint treatment; and (4) the control. Using the ANCOVA regression method, we find that the SMS reminder significantly increased the savings-to-sales ratio, the percentage of business proceeds reinvested back to business, total savings amount, deposits in ordinary bank accounts and the percentage of saving goal achieved. Further, joint treatment significantly increased the financial literacy score, the percentage of saving goal achieved, and, in particular, deposit amount in ordinary bank account. The effect of the SMS-reminder and joint treatment is largely comparable across most of the outcome variables.

We find that we can help entrepreneurs to adopt useful knowledge by sending them reminders. The entrepreneurs who received only the financial literacy training did not significantly increase saving. While the entrepreneurs who received only the SMS reminders increased their savings by reducing daily expenditure on food and house rent, those entrepreneurs who received both financial literacy training and SMS reminders increased their

savings by making use of bank accounts. In short, the amount of savings is crucially driven by attention, which can be altered with SMS reminders, whereas how they manage savings depends on the financial literacy of the entrepreneur, which may be improved by financial literacy training. Sending SMS reminders is not costly, but we find it effective. This is good news for future development policies.

References

- Angrist, Joshua and Jörn-Steffen Pischke. 2009. *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton University Press, New Jersey.
- Aryeetey, Earnest and Christopher Udry. 1997. "The characteristics of informal financial markets in Sub-Saharan Africa." *Journal of African Economies* 6, no.1: 161-231.
- Ashraf, Nava, Dean Karlan, and Wesley Yin. 2006. "Tying Odysseus to the mast: evidence from a commitment savings product in the Philippines." *Quarterly Journal of Economics* 121, no.2: 635-672.
- Ashraf, Nava. 2009. "Spousal control and intra-household decision making: an experimental study in the Philippines." *American Economic Review* 99, no.4: 1245-1277.
- Atkinson, Jesse, Alain de Janvry, Craig McIntosh, and Elisabeth Sadoulet. 2010. "Creating incentives to save among microfinance borrowers: a behavioral experiment from Guatemala." Mimeo, University of California at Berkeley.
- Atkinson, Adele and Flore-Anne Messy. 2013. "Promoting financial inclusion through financial education: OECD/INFE evidence, policies and practice." no. 34. OECD Publishing.
- Banerjee, Abhijit. 1992. "A simple model of herd behavior." *Quarterly Journal of Economics* 107, no. 3: 797-817.
- Banerjee, Abhijit and Esther Duflo. 2007. "The economic lives of the poor." *Journal of Economic Perspectives* 21, no.1: 141-168.
- Bruhn, Miriam and Bilal Zia. 2011. "Stimulating managerial capital in emerging markets: the impact of business and financial literacy for young entrepreneurs." World Bank Policy Research Working Paper Series, No. 5642. The World Bank.
- Brune, Lasse, Xavier Giné, Jessica Goldberg, and Dean Yang. 2011. "Commitments to save: A field experiment in rural Malawi." World Bank Policy Research Working Paper Series. No. 5748. The World Bank.
- Cadena, Ximena and Antoinette Schoar. 2011. "Remembering to pay? Reminders vs. financial incentives for loan payments." National Bureau of Economic Research, No. W17020.
- Carpena, Fenella, Shawn Cole, Jeremy Shapiro, and Bilal Zia. 2011. "Unpacking the causal chain of financial literacy." World Bank Policy Research Working Paper Series, No. 5798. The World Bank.

- Cole, Shawn, Thomas Sampson, and Bilal Zia. 2011. "Prices or knowledge? What drives demand for financial services in emerging markets?" *The Journal of Finance* 66, no. 6: 1933-1967.
- Collins, Daryl, Jonathan Morduch, Stuart Rutherford, and Orlanda Ruthven. 2009. *Portfolios of the Poor: How the World's Poor Live on \$2 a Day*. New Jersey: Princeton University Press.
- Demirguc-Kunt, Asli, Leora Klapper, Dorothe Singer, and Peter Van Oudheusden. 2015. "The Global Findex Database 2014: measuring financial inclusion around the world." Policy Research Working Paper Series, No. 7255, The World Bank.
- Dercon, Stefan, Tessa Bold, Joachim De Weerd, and Alula Pankhurst. 2006. "Group-based funeral insurance in Ethiopia and Tanzania." *World Development* 34, no. 4: 685-703.
- Drexler, Alejandro, Greg Fischer, and Antoinette Schoar. 2014. "Keeping it simple: financial literacy and rules of thumb." *American Economic Journal: Applied Economics* 6, no. 2: 1-31.
- Duflo, Esther, Michael Kremer, and Jonathan Robinson. 2011. "Nudging farmers to use fertilizer: theory and experimental evidence from Kenya." *American Economic Review* 101, no. 6: 2350-2390.
- Dupas Pascaline and Jonathan Robinson. 2013a. "Savings constraints and microenterprise development: evidence from a field experiment in Kenya." *American Economic Journal: Applied Economics* 5, no. 1: 163-192.
- _____. 2013b. "Why don't the poor save more? Evidence from health savings experiments." *American Economic Review* 103, no. 4: 1138-1171.
- Evans, David S. and Boyan Jovanovic. 1989. "An estimated model of entrepreneurial choice under liquidity constraints." *Journal of Political Economy* 97, no. 4: 808-827.
- Field, Erica, Seema Jayachandran, and Rohini Pande. 2010. "Do traditional institutions constrain female entrepreneurship? A field experiment on business training in India." *American Economic Review* 100, no. 2: 125-29.
- Goldberg, Jessica. 2014. "Products and Policies to Promote Saving in Developing Countries." IZA World of Labour.
- Gul, Faruk and Wolfgang Pesendorfe. 2001. "Temptation and self-control." *Econometrica* 69, no. 6: 1403-1436.
- Gul, Faruk and Wolfgang Pesendorfe. 2004. "Self-control, revealed preference and consumption choice." *Review of Economic Dynamics* 7, no. 2: 243-264.

- Kaboski, Joseph and Robert M. Townsend. 2005. "Policies and impact: an analysis of village-level microfinance institutions." *Journal of the European Economic Association* 3, no. 1: 1-50.
- Karlan, Dean, Aishwarya Ratan, and Jonathan Zinman. 2014. "Savings by and for the poor: a research review and agenda." *Review of Income and Wealth* 60, no. 1: 36-78.
- Karlan, Dean and Jonathan Morduch. 2010. "Access to finance." *Handbook of Development Economics* 5: 4703-4784.
- Kast, Felipe, Stephan Meir, and Dina Pomeranz. 2012. "Under-savers anonymous: evidence on self-help groups and peer pressure as a savings commitment device." NBER Working Paper no. 18417. National Bureau of Economic Research.
- Krishna, Santosh, and Suzanne Austin Boren, and Andrew Balas. 2009. "Healthcare via cell phones: a systematic review." *Journal of Telemedicine and e-Health* 15, no. 3: 231-240.
- Laibson, David. 1997. "Golden eggs and hyperbolic discounting." *Quarterly Journal of Economics* 112, no. 2: 443-477.
- Mano, Yukichi, John Akoten, Yutaka Yoshino, and Tetsushi Sonobe. 2014. "Teaching KAIZEN to small business owners: an experiment in a metalworking cluster in Nairobi." *Journal of the Japanese and International Economies* 33: 25-42.
- Mano, Yukichi, Alhassan Iddrisu, Yutaka Yoshino, and Tetsushi Sonobe. 2012. "How can micro and small enterprises in Sub-Saharan Africa become more productive? The impacts of experimental basic managerial training." *World Development* 40, no. 3: 458-468.
- McConnell, Margaret. 2012. "Between Intention and Action: An Experiment on Individual Savings." Harvard School of Public Health Working Paper, available at: <http://www.margaretmcconnell.com/papers/IntentionSavings.pdf>.
- McKenzie, David. 2012. "Beyond baseline and follow-up: the case for more T in experiments." *Journal of Development Economics* 99, no. 2: 210-221.
- MoUDC. 2013. "Survey on Micro and Small Enterprises (MSEs) in Selected Major Cities of Ethiopia." Addis Ababa, Ministry of Urban Development and Construction Survey Report. Available at http://www.mwud.gov.et/c/document_library/get_file?uuid=28a0fa5f-8689-4828-9244-7187413fb248&groupId=10136
- Mullainathan, Sendhil and Eldar Shafir. 2013. *Scarcity: Why Having Too Little Means So Much*. New York: Time Books, Henry Holt & Company LLC.

- Platteau, Jean-Philippe. 2000. *"Institutions, Social Norms, and Economic Development."* Amsterdam: Harwood Academic Publishers.
- Prina, Silvia. 2015. "Banking the poor via savings accounts: evidence from a field experiment." *Journal of Development Economics* 115, July: 16-31.
- Rutherford, Stuart. 2000. *The Poor and Their Money*. New Delhi: Oxford University Press.
- Schultz, Theodore W. 1964. *Transforming Traditional Agriculture*. New Heaven: Yale University Press.
- Stockwell, Melissa, Olshen Kharbanda, Andres Martinez, Marcos Lara, David Vawdrey, Karthik Natarajan, and Vaughn I. Rickert. 2012. "Text4Health: impact of text message reminder--recalls for pediatric and adolescent immunizations." *American Journal of Public Health* 102, no. 2: 15-21.
- World Development Indicators. 2015. Available at <http://data.worldbank.org/data-catalog/world-development-indicators>.
- Xu, Lisa, and Bilal Zia. 2012. "Financial literacy around the world: an overview of the evidence with practical suggestions for the way forward." World Bank Policy Research Working Paper No. 6107. The World Bank.
- Zolfaghari, Mitra, Seyedeh Mousavifar, Shadan Pedram, and Hamid Haghani. 2012. "The impact of nurse short message services and telephone follow-ups on diabetic adherence: which one is more effective?" *Journal of Clinical Nursing* 21, no. 13-14: 1922-1931.

Table 1. Baseline characteristics of entrepreneurs and their business and balancing test (December, 2013)

December, 2015)

Variable	Treatment Status			Control	All
	Financial Training	SMS Reminder	Joint Treatment		
Demographics and experience					
% male	69.9	72.6**	60.2	58.5	63.9
Age	37.2	36.8	36.4	36.8	36.8
Years of schooling	8.55	8.23	8.98	8.7	8.64
Years of working experience	7.5	6.6	5.9	7.0	6.8
% with working experience in formal sector	28.9	29.8	24.1	34.7	30.5
% with management training	26.5	17.9	27.7	25.0	24.4
% with production training	42.2	31.0	34.9	30.7	33.8
Years of operation	8.1	7.7	7.3	6.8	7.3
% enterprise is self-initiated	75.9	81.0	80.7	84.1	81.2
% with parents in private business	31.3	16.7	30.1	25.0	25.6
Number of siblings in a similar business	0.3	0.19	0.22	0.19	0.22
Time preference (% of entrepreneurs)					
Perceived patience score (0 very impatient, 10 very patient)	3.3	3.7	3.5	3.2	3.4
Somewhat patient	12.1	7.1	20.5	10.8	12.2
Time-consistent	92.8	89.3	89.2	92.1	91.1
Present-biased	4.8	3.6	4.8	1.1	3.1
More impatient in future than in present	2.4	7.1	6.0	6.8	5.9
Discount rate between today and in 3 months' time (%)	230	202	241	224	224
Risk preference					
Risk taker (%)	31.3	32.5	19.3	26.3	27.1
Risk neutral (%)	2.4	2.4	4.8	5.1	4.0
Risk averse (%)	66.3	65.1	75.9	68.6	68.9
Financial literacy and cognitive skills					
Financial literacy score (max=4)	2.7	2.3	2.3	2.4	2.4
Digit span recall score (max=8)	2.9	2.9	3.2	2.8	2.9
Subsectors (% of enterprises)					
Manufacturing	28.9	33.3	38.6	30.1	32.2
Construction	10.8	13.1	8.4	4.6	8.2
Retail and service	60.2	53.6	53.0	65.3	59.6
Number of observations	83	84	83	176	426

Notes: Except for the digit span exercise, the mean values for all the variables are from the baseline data collected in December 2013. See Appendix 2 for definition of key terms used in this table. * $p < 0.10$ and ** $p < 0.05$ in the test of the equality of means with the control group.

Table 2. Baseline values for saving, expenditure, and business performance indicators and balancing test (December 2013)

Variable	Treatment Status				All
	Financial Training	SMS Reminder	Joint Treatment	Control	
Savings					
Total amount of saving in the last 30 days (birr)	914	1088	1566	800.6	1028
% of saving goal achieved	49.6	65.1	79.9	49.6	58.6
Savings-to-sales ratio	0.07	0.15	0.15	0.09	0.11
% with a bank account	81.9	84.5	84.3	80.7	82.4
Amount deposited in a bank in the last 30 days (birr)	141	382	104	128	176
% who are <i>Iqub</i> (ROSCA) members	20.5	32.1	34.9	28.4	28.9
% with special housing savings account at CBE ¹	56.6	52.3	55.4	63.1	58.2
Income					
Profit from business in the last 30 days (birr)	2116	2286	1905	1816	1985
Cost of saving					
Minutes spent in making deposits in the nearest bank	27.4	30.1	30.4	27.9	28.8
Distance to the nearest bank to make deposit (in km)	0.98	1.49	1.34	0.89	1.11
Transport cost to make deposits (in birr)	0.63	3.99	0.81	0.61	1.32
Forgone business income when commuting to make deposits (in birr) ²	5.92	8.18	11.5	8.18	9.55
Expenditure in the last 3 months (%)					
Invested back to business	13.2	7.3	8.4	9.8	9.7
Food and house rent	55.2	60.3	60.4	61.0	59.6
Clothing and footwear	3.6	4.2	4.7	4.6	4.4
Health and education	7.4	6.8	7.0	7.3	7.1
Household durables	1.3	1.2	1.0	1.0	1.0
Consumption of alcohol and entertainment	3.3	3.5	2.2	3.5	3.2
Other expenditures	2.8	3.3	2.9	3.6	3.3
Business practice					
Keeps records of business transactions	37.8	41.7	34.9	33.9	36.4
Keeps records of defective products	31.3	27.4	26.8	33.1	30.4
Inspects quality of products before marketing them	98.8	90.5	92.8	95.4	94.6
Number of observations	83	84	83	176	426

Notes. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$ in the test of the equality of means with the control group.

1. Saving for housing at CBE a type of forced savings where people would be kicked out of the program for failing to save, and those who save quickly and constantly get a better chance of winning the housing raffle. Because of this difference in nature from the rest of saving, we decided to treat them separately.

2. Forgone business income when commuting to make deposits (in birr) is measured by asking the respondent how much money they lose in earned income when they go to the nearest bank to make deposits.

3. In the calculation of mean value of bank deposits, we remove one outlier indicating a bank deposit amounting to 70,000 birr.

Table 3. Impact on business knowledge, financial decision, business practice, and business performance (2014)

Variable	Treatment Status				All
	Financial Training	SMS Reminder	Joint Treatment	Control	
Savings					
Total amount of saving in the last 30 days (birr)	914	1918*	1362	963	1220
% of saving goal achieved ^a	52.3	114.1***	97.8**	56.4	74.7
Savings-to-sales ratio	0.07	0.11***	0.09***	0.06	0.08
% with a bank account	85.5	86.9	84.3	86.9	86.2
Amount deposited in a bank in the last 30 days (birr)	373	628	815**	319	487
% who are <i>Iqub</i> (ROSCA) members	20.7**	31.0	28.9	33.9	29.6
% with special housing savings account at CBE	50.6	52.4	52.4	58.6	54.6
Income					
Profit from business in the last 30 days (birr)	3838	4741	4827	5043	4706
Cost of saving					
Minutes spent in making deposits in the nearest bank	20.6	22.9	21.3	21.5	21.5
Distance to the nearest bank to make deposit (in km)	0.95	0.95	0.84	0.77	0.86
Transport cost to make deposits (in birr)	0.70	1.32	0.66	0.48	0.73
Forgone business income when commuting to make deposits (in birr) ¹	22.8	18.1	25.4	16.8	19.9
Expenditure in the last 3 months (%)					
Invested back to business	25.6	34.5*	25.1	27.3	27.9
Food and house rent	49.1	40.7**	50.5	47.5	47.1
Clothing and footwear	8.1	7.5	6.9	7.3	7.4
Health and education	8.6	8.7	10.9	10.1	8.9
Household durables	1.6***	0.7	0.9	0.7	0.9
Consumption of alcohol and entertainment	2.4	2.5	1.9	2.7	2.5
Other expenditures	5.5	5.5	3.8	4.2	4.6
Business practice					
Keep records of business transactions	44.6	44.1	45.8	51.1	47.4
Keep records on defective products	25.3	27.4	27.7	23.3	25.4
Inspect quality of products before marketing them	79.5	73.8	85.5	76.7	78.4
Number of observations	83	84	82	174	426

Notes. ^aWe drop three outliers that reported the value of saving goals to be more than 2500 %. * p < 0.10, ** p < 0.05 and *** p < 0.01 in the test of the equality of means with the control group.

In the calculation of mean value of bank deposits, we remove one outlier indicating a bank deposit amounting to 6,000,000 birr.

Table 4. Estimated effects of getting financial literacy treatment, reminder treatment, and both treatments in 2015 (ITT and LATE)

VARIABLE	Financial literacy score	Saving dummy (Yes=1)	Savings-to-sales ratio	% business proceeds invested back to business	Total saved amount in the last 30 days	% of saving goal achieved	Deposited amount in the last 30 days
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ANCOVA estimates (ITT)							
Financial training	-0.07 (0.12)	0.02 (0.07)	0.01 (0.02)	0.67 (2.98)	9.51 (467.89)	10.70 (22.93)	94.83 (235.88)
SMS reminder	0.00 (0.12)	0.07 (0.07)	0.06*** (0.02)	5.67* (2.97)	1,060.30** (468.59)	74.21*** (23.04)	384.76 (236.68)
Joint treatment	0.28** (0.12)	0.06 (0.07)	0.04* (0.02)	-2.38 (2.96)	389.93 (469.30)	49.51** (22.87)	501.08** (236.04)
P value of F test between SMS and joint treatment	0.05**	0.89	0.39	0.02**	0.22	0.14	0.68
Number of Observations	422	420	422	422	420	419	421
ANCOVA IV estimates (LATE)							
Financial training	-0.17 (0.29)	0.06 (0.16)	0.03 (0.04)	1.56 (7.30)	35.72 (1,142.28)	27.85 (56.18)	251.31 (575.52)
SMS reminder	0.01 (0.12)	0.07 (0.06)	0.06*** (0.02)	5.62* (2.93)	1,069.95** (457.40)	75.31*** (22.60)	396.43* (230.85)
Joint treatment	0.60** (0.25)	0.13 (0.14)	0.08* (0.04)	-5.20 (6.47)	879.30 (1,036.89)	110.33** (49.94)	1,123.82** (515.83)
P value of F test between SMS and joint treatment	0.01***	0.65	0.59	0.08*	0.84	0.40	0.14
Number of observations	422	420	422	422	420	419	421

Notes. Standard errors are in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table 5. OLS and IV estimates of the effects of getting financial literacy, reminder, and both treatments on ROSCA membership and business practice indicators

VARIABLE	ITT				LATE			
	Is a member of <i>Iqub</i> (Yes=1)	Keeps records of business transactions	Keeps records of defective products	Inspects quality of products	Is a member of <i>Iqub</i> (Yes=1)	Keeps records of business transaction	Keeps records of defective products	Inspects quality of products
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Financial training	-0.10* (0.06)	-0.10 (0.07)	0.00 (0.05)	0.02 (0.05)	-0.25* (0.14)	-0.26 (0.17)	0.02 (0.13)	0.05 (0.13)
SMS reminder	0.00 (0.06)	-0.08 (0.07)	0.01 (0.05)	-0.05 (0.05)	0.00 (0.06)	-0.08 (0.07)	0.02 (0.05)	-0.06 (0.05)
Joint treatment	-0.05 (0.06)	-0.04 (0.07)	0.02 (0.05)	0.06 (0.05)	-0.13 (0.13)	-0.09 (0.14)	0.05 (0.11)	0.14 (0.12)
Number of observations	421	419	420	421	421	419	420	421

Notes. Standard errors are in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Appendix 1: Brief outline of the financial literacy training

Outline

1. Financial Planning, Budgeting, and Savings

- Learn how to plan with respect to business proceeds by first taking stock of their expenditures and then critically exploring ways to reduce expenses and save the difference
- Learn the importance of discussing budgets with family/spouse on a monthly basis
- Lessons on how to prioritize expenditure and ways of cutting back on non-essential expenses
- Prepare and follow a budget in line with expenses
- Know the advantages of properly recording business transactions, such as revenue, expenses, credits and loans.

2. Saving strategies

- Examine various saving options looking at the risk/reward trade-offs. Among others, saving options include saving money under a mattress, ROSCA, bank, microfinance, and with relatives and friends
- Banks
 - Types of accounts
 - Minimum balance to open a savings account
 - Account operating mechanisms (There are, for example, two types of operating mechanisms: individual or jointly; the latter involves “AND” or “AND/OR” types)
 - Benefits from using formal bank accounts
 - Required documents

3. Goal setting and planning

- Learn about the need to set specific, achievable, and realistic goals and work towards them. There should be a deadline for each goal. At the end of the training, we will ask each participant to come up with such goals for the next 3 months.
- Lessons on how to live within their means and not spend excessively

Appendix 2: Definition of key terms

1. The measures of time preference are generated from respondent's choices in the following two games: i) receiving 1000 birr tomorrow or receiving 1100 birr in 1 month and ii) receiving 1000 birr in 1 month or receiving 1100 birr in 2 months. "Somewhat patient" individuals prefer 1100 birr a month later from 1000 birr tomorrow (Dupas and Robinson 2013b). "Time-consistent" respondents are either those who choose "1000 birr tomorrow" in game (i) and "1000 birr in 1 month" in game (ii), or those who choose "1100 birr in 1 month" in game (i) and "1100 birr in 2 months" in game (ii). In contrast, "time-inconsistent" respondents are either those who choose "1000 birr tomorrow" in game (i) and "1100 birr in 2 months" in game (ii), or those who choose "1100 birr in 1 month" in game (i) and "1000 birr in 1 month" in game (ii). "Present-biased" respondents are those who choose "1000 birr tomorrow" in game (i) and "1100 birr in 2 months" in game (ii). This behavior may be explained by higher discount rate in the short run than in the long run. Respondents are "More patient in the future than in the present" if they have higher discount rates in the future than in the present; they choose "1100 birr in 1 month" in game (i) and "1000 birr in 1 month" in game (ii). "Discount rate between today and in 3 months' time" indicates how much the respondents would like to receive in 3 months' time to be indifferent with receiving 1000 birr today, it is calculated in percent form using $\left(\frac{T_3 - 1000}{1000}\right) \times 100 (\%)$ where T_3 denotes the amount in 3 months' time proposed by the respondent.
2. Risk preference is captured as follows. Respondents were offered a choice between receiving 2000 birr for sure or playing a game that pays 4000 birr with a probability of 0.5 and zero birr with a probability of 0.5 in a hypothetical lottery game. The variables "risk taker," "risk averse," and "risk neutral" are dummies that assume the value 1 if the respondent chooses the lottery game, the sure bet, or is indifferent between the two options, respectively.
3. Following Cole et al. (2011) and Xu and Zia (2012), financial literacy score is constructed by adding the number of correct answers a respondent provided to four basic financial literacy questions. The questions are:
 - Q1) Suppose you borrow 1000 birr from a money lender at an interest rate of 2 percent per month, with no repayment for 3 months. After 3 months, do you owe (Options are 1. Less than 1020 birr 2. Exactly 1020 birr 3. Greater than 1020 birr 4. Don't know)
 - Q2) Do you think you can open a bank account with an amount as low as 50 birr? (Options are 1. Yes 2. No 3. Don't know)
 - Q3, Suppose you need to borrow 500 birr. Two persons offer you a loan. The first loan requires you to pay back 600 birr in 1 month. The second loan requires you to pay back 500 birr plus 15% interest rate in 1 month's time. Which loan would you prefer? (Options are 1. The first loan 2. The second loan 3. Both are equal)
 - Q4. If you have 1000 birr in a savings account earning 1% interest per annum, and prices for goods and services rise at 2% over a 1-year period, with the money in your account you can buy. (Options are 1. More goods and services in 1 year's time compared with today 2. Less goods and services in 1 year's time compared with today; 3. The same amount of goods and services in 1 year's time compared with today)

4. Digit-span score tests cognition by presenting cards labeled with different digit numbers to respondents for 10 seconds and asking the respondent to recall the digits in the exact same order as displayed earlier after the card is taken away from him. The exercise starts recalling from a four-digit number and increases in difficulty with the final card containing an 11-digit number.