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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 may be because of a knowledge gap and behavioral biases. We employed an experimental approach relaxing these savings constraints to explore the effects of providing financial literacy training and reminders to micro-entrepreneurs in Ethiopia. While financial literacy training alone seemed ineffective, the reminders significantly increased the savings-to-sales ratio by 54.5%, the percentage of business proceeds reinvested back to business by 91.0 %, and the percentage of savings goal achieved by 116%. Joint treatment significantly increased the percentage of savings goal achieved by 66.5% and deposit in an ordinary bank account by 84%. Our results confirm earlier findings that savings can be limited by attention, whereas how entrepreneurs manage savings depends on their levels of financial literacy [151 words].

JEL Codes: D92, E21, L26

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I. Introduction

Aid agencies and researchers have devoted much time and resources to study and help improve micro-entrepreneurs' access to credit, as, for example, witnessed by the explosive growth of micro-finance institutions in developing countries. Some studies, however, show that the impact of improving credit access on micro-enterprise performance is not always clear cut (Akoten, Swada, and Otsuka 2006; McPherson and Rous 2010; Karlan and Zinman 2011; Banerjee et al. 2013; Angelucci 2015). Moreover, many micro-enterprises continue to find accessing credit on favorable terms difficult. Hence, investments for their start-up and growth are often financed internally (Brealey and Meyers 2000; Carpenter and Petersen 2002; Guariglia, Xiaoxuan, and Song 2011; Chen and Guariglia 2013). While credit can potentially help meet micro-entrepreneurs' upfront resource demand for fixed and working capital, it does little to promote internal financing or savings on its own (Karlan and Zinman 2011). Complementing credit access, a myriad of interventions that promote internal financing of investment is increasingly recognized as an important tool to mobilize limited resources by stimulating desirable savings and investment behavior (e.g. Brune et al. 2011; Kast, Meir, and Pomeranz 2012; Karlan, Ratan, and Zinman 2014; Goldberg 2014).

Promoting savings is important to enterprise development 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

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.

small businesses, the cost of internal financing of investment through savings is often much lower than the cost of accessing credit (Evans and Jovanovic 1989). Fifth, savings help in case of emergencies.

The question that then arises is why do micro-entrepreneurs in developing countries undersave. 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 et al. 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 and inadequate capability in dealing with it. Micro-entrepreneurs may undersave 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. 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 “*Susus*” (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. The training was offered by university lecturers at the School of Commerce, Addis Ababa University. The lecturers have a rich experience in conducting similar training programs to small business owners in Ethiopia. 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 this issue in two important ways: (i) most research 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; (ii) 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.

We find that periodic SMS reminders significantly changed the saving behavior of entrepreneurs. The entrepreneurs assigned to the reminder treatment were found to save a larger proportion of their income, invest 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. Similarly, the entrepreneurs assigned to the joint treatment increased the percentage of saving goal achieved. They also increased the deposit in an ordinary bank account, which did not happen for entrepreneurs assigned to the SMS-reminder treatment only. In contrast, entrepreneurs assigned to the financial literacy group experienced limited changes in their saving behavior. This may be because there is limited supply of strong saving instruments such as a commitment savings account, which would help them overcome the problem of inattention, rather than an ordinary bank account, which may partially overcome

temptation but may not be strong enough against demand from outside (Dupas and Robinson, 2013b). It also failed to meaningfully change business knowledge as evidenced by lack of correlation with test scores on financial literacy questions.

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, takeup among poor households and micro-entrepreneurs has usually been very high (Goldberg 2014). To empirically investigate whether limited access to saving instruments affects the ability to save, Dupas and Robinson (2013a), for example, conducted a field experiment by availing access to non-interest-bearing savings accounts with withdrawal charges to women market vendors and male bicycle taxi drivers in Kenya. They find that takeup of savings accounts was about 87% and that women vendors in the treatment group frequently used the accounts, increased their investments by 38–56 %, and increased their private daily expenditures by 37% more than did the women in the control group. Similarly, Prina (2015) finds a comparable takeup rate of 84% among a sample of randomly selected female respondents who were offered a simple bank account free of charge in Nepal.

Access to savings products is not only associated with higher takeup, 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). The lack of financial inclusion or limited use of financial services can thus

potentially cause significant welfare losses on poor unbanked people in developing countries, thereby amplifying the importance of access and use of financial products. 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 takeup can be promoted with financial education (Xu and Xia 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 Xia 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. The observations that micro-entrepreneurs in many developing countries do not keep proper accounts of their transactions, do not know how to prepare budget and financial plans, and do not understand the importance of separating the business from the household are expressions of low levels of financial education (Bruhn, Karlan, and Schoar 2010; Abebe and Sonobe 2012; Mano et al. 2012; Mano et al. 2014).

Financial literacy involves all 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. Without understanding the importance of saving and earmarking a certain proportion of business proceeds to savings, micro-enterprises will not be able to accumulate an adequate level of capital and expand in size. Such types of skills are also crucial to efficient enterprise management. For example, preparing annual financial plans and

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).

statements will help expose the business' weakness and strength as well as identify areas and products where returns are high so as to deploy more funds toward more profitable areas.

While business knowledge is long recognized to be essential in operating enterprises efficiently, especially for young entrepreneurs who have little experience running businesses, financial education is gaining in importance only recently (Karlan and Valdivia 2011; Cole et al. 2011; Drexler et al. 2014). Formal education systems in many developing countries, for example, do not teach financial skills beyond simple arithmetic in mathematics and accounting courses. Short-term financial literacy training programs are thus increasingly considered as tools for improving the financial knowledge of entrepreneurs in many countries (Karlan et al. 2014). However, the effectiveness of such forms of intervention in stimulating better financial decision-making—and hence business outcomes—remains a debated research topic. Relatedly, empirical evidence on the impact of financial literacy on improving financial knowledge and thus changing financial decisions appears to be highly mixed.

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. Compared with the standard accounting training program, the “rule-of-thumb” financial education program increased business revenue, improved record keeping, and increased the likelihood that participating micro-entrepreneurs keep business expenses separate from personal expenses. 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.

A much more nuanced effect of financial education is reported by Bernheim, Garrett, and Maki's (2001) study of the impact of state-mandated financial education on saving for high school students in the U.S.; they report that financial education led to a paltry 1.5 percent increment in saving rate. This finding was, however, countered as spurious with poor identification assumptions by Cole and Shastry (2008). Augmenting the above study with large census data and controlling for state fixed effects, the non-parametric estimation of the treatment indicated that the intervention may not have had a meaningful impact on saving behavior.

Other studies report even 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.

In short, the vast majority of interventions that aim at improving the use of financial products or access to financial services mainly try to attend to the low use of financial instruments and improve attitudes toward financial institutions. Although there is almost a universal consensus on the low state of financial literacy in developing countries (e.g., Cole et al. 2011; Xu and Zia 2012), the empirical question as to how to improve financial literacy and secure its attendant benefits largely remains unanswered. Many of the financial literacy interventions to date, for example, do not appear to greatly expand the business knowledge and practices of micro-entrepreneurs (Carpena et al. 2011; Karlan et al. 2014). Further, there are numerous types of financial literacy programs ranging from a one-hour on-site consultation to several months of classroom-based training programs, rendering interpretation and comparison of results difficult. What are the best ways to teach financial education and how best to do that and which components of financial literacy programs generate the highest impact with the lowest cost are some of the unresolved questions that make the existing research on this topic incomplete.

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 takeup of health care services. Krishna et al. (2009), for example, extensively reviewed 25 studies in 13 countries to study how text messages and cellphones are used in health care services. The review suggests that using text messages from once a week to five times a day helped meet multiple outcomes of care, including preventing smoking, taking medicine, and minimizing the number of failed doctor's appointments. In a similar study, Zolfaghari et al. (2012) administered short messages and telephone followups to 77 type-2 diabetes patients in Iran to explore effective ways of guiding patients to adhere to diabetes therapy. A randomly selected group of patients received telephone calls for 3 consecutive months, twice a week in the first month and once a week for the remaining 2 months, while patients in the SMS group received about six messages every week for 3 months. Results from the study indicate that both the telephone and text reminder interventions have improved adherence to diabetic treatment. By sending standard automated texts to randomly assigned 1,187 obstetrics patients at a community-based clinic in New York City, Stockwell et al. (2012) tested if reminders could increase influenza vaccination. After 5 weeks of continued texts on influenza vaccination and two reminders alerting the patients to doctor's appointments, the treatment group experienced a 30% higher rate of vaccination compared with the control group.

Reminders have also been found to be useful in encouraging takeup 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 takeup 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 undersaving 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 (Mullainathan and Shafir 2013; Karlan et al. 2014). 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. The example in Box 1 summarizes the main message of the model in less abstract and more illustrative manner.

BOX 1. Example of inattention bias (inspired by Karlan et al. 2014)

Suppose an entrepreneur, who is retailing ready-made garment products, is planning to also start making clothes in 6 months' time. To finance her new line of business, she plans to save enough amount from her business proceeds that would enable her to buy her first sewing machine in the same period. Assuming a concave utility function, the entrepreneur would ideally pay for the sewing machine by smoothing the expenditure over her lifetime, including some amount of saving over the next 6 months. If the entrepreneur is inattentive, however, she may forget her investment plan and choose to continue with the same pattern of consumption she had before her investment plan was hatched. At the end of the 6 months thus, she will not have saved enough amount to buy the machine. She will thus be confronted with two options, scrapping the investment plan altogether or financing the investment disproportionately through debt. Giving up on the investment plan would waste a rare opportunity microenterprise owners get to grow and expand their business so it is not desirable. The second option is also problematic because small businesses are heavily credit-constrained and, even if they have access to credit, the cost of borrowing is often prohibitively high, seriously denting the returns from the new investment. If the entrepreneur is periodically reminded about her investment plan and the attendant benefits from the investment, however, she would likely improve her attention, balancing the current consumption decisions with the need for saving to be able to buy the sewing machine in 6 months' time. Thus, reminders have the potential to improve an entrepreneur's current behavior by overcoming attention failure that could possibly preclude the entrepreneur from making lumpy high-return investment in the future.

There are, however, very few empirical studies that examine the impact of reminders on saving behavior. Karlan et al. (2014) is one of these 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 on 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. Experimental Design

We collaborated with instructors at Addis Ababa University, School of Commerce, who offered the financial literacy training arm of the treatment. The School of Commerce is a renowned institution for producing young professionals in the fields of business and management and for offering business consultancy services to large firms in the financial and insurance industry in Ethiopia. Further to their strong academic background in financial planning and management, the instructors that 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. Moreover, our 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 gone to vocational schools or colleges after high school (more on sample characteristics and sampling shortly).

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 and better financial decisions; (c) encourage entrepreneurs to set achievable goals and regularly save some amount of money from their business proceeds to reach those goals; and (d) teach entrepreneurs how to keep records of income and expenses separately and prepare a budget regularly. A brief outline of the training material is presented in Appendix 1.

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 Amharic and distributed to training participants upon arrival. To maximize takeup, the training was offered over the weekends (Saturdays and Sundays) between May and June, 2014.³ 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. The brainstorming questions were particularly useful for instructors to make minor adjustments in the training material to make the training content compatible with the skills of the participants. Each entrepreneur was invited to a session that lasted for about 4 hours. We invited 50 randomly selected entrepreneurs to each of the two training sessions 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. Takeup, however, was low, at 42%. Appendix 4 analyzes the determinants of take-up or attendance in training. Aside from the significant effects of the reminder and joint treatment, we find that businesses that were older, larger in size in terms of capital stock, time-consistent, and run by females were less likely to attend the financial literacy training. Larger firms were likely to have higher opportunity cost, whereas time-inconsistent entrepreneurs, if sufficiently sophisticated,

³Initially, 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.

were more highly appreciative of financial literacy and instruments to help control their intertemporal choice. The women's lack of participation could be explained by several factors including tradition practices that negatively influence female entrepreneurship, the subsistence nature of most of the female-operated businesses and the limited growth ambitions exhibited by such businesses (examples from other countries include McKenzie and Weber 2009; Field et al. 2010; Sonobe and Otsuka 2014, page 195). While we have not recorded times of arrival and departure, only a very few left early but some came late. We gave the participants 50 birr (2.5 USD) for lunch and transport allowance.

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.⁴ 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 Following Karlan et al. (2014), messages were designed in two ways: with gain and loss framing. The gain framing message was "*Do not forget to save: if you continuously save, you can realize your dream*" and the loss framing message was "*Do not forget to save: if you do not continuously save, you cannot realize your dream*". Although we randomly assigned the gain and loss framing to the reminder treatment group, because of limited power, we cannot separate the effect of framing.

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. Sampling and Data

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) in 2012 in 13 large cities in Ethiopia. Enumeration areas (EA) in these cities were randomly selected and a comprehensive list of micro- and small businesses operating in these areas was prepared.⁶ From each EA, 12 firms were randomly selected and data on more than 3,000 micro- and small businesses were generated from the 13 cities (see MoUDC 2013).

Firms, our unit of analysis, were sampled from Addis Ababa in the MoUDC 2012 survey. However, the survey instrument 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 from Addis Ababa. We developed a survey instrument that would enable us to collect a rich set of information including, but not limited to, 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 manufacturing, construction, services and retail business, 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 urban agriculture. Due to the unique nature of the business and the small sample size, we decided to exclude the four firms in urban agriculture from our analysis throughout this study. We thus have 511 sample micro-enterprises in the baseline.⁸

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 2012 survey. 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.

⁸ We further excluded three outliers from the sample.

In April 2014, to examine whether relaxing the saving constraints affects the likelihood and amount of saving, we randomly assigned, using STATA command *runiform*, 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. Appendix 5 analyzes the determinants of attrition from the sample. Importantly, we found that none of the treatment statuses correlated with state of exit.⁹ 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. For each variable and for each treatment type, equality of the means of the variables between each treatment group and the control is conducted.

Table 1 reveals a number of interesting characteristics of the sample. First, across the treatment groups as well as in the control, about two-thirds of the businesses were operated by male entrepreneurs in their mid-30s. There was a statistically significant difference in gender between entrepreneurs assigned to the SMS-reminder treatment and the control group; nearly 73% of entrepreneurs assigned to the SMS-reminder treatment were males compared with 59% in the control. Second, most of the sample enterprises were self-initiated businesses (81%), which were founded and run by entrepreneurs with prior work and training experience. The sample enterprises have been operating for about 7.3 years and run by entrepreneurs who had attended about 9 years of schooling and worked on average for about 7 years prior to their current enterprise. Similarly, a sizable number of entrepreneurs had prior experience in the formal sector ranging from 24% in the joint treatment sample to 35% in the control sample. In terms of participation in training, save for the SMS-reminder group, nearly a quarter of the entrepreneurs had taken management training and more than 30% had attended production skills training.

Third, the survey also measured preference parameters, financial literacy, and cognitive skills, which may have important relationships with saving behavior (Ashraf et al. 2006; Dupas

⁹ To address possible attrition bias, we will control for all explanatory variables used here in the following analysis.

and Robinson 2013a). Looking at time preference, Table 1 indicates that majority of entrepreneurs were impatient. We elicited time preference using both subjective evaluation of own-time preference and through a hypothetical time-preference game. Regarding the former, entrepreneurs were asked to judge their level of patience on a scale of 0 (very impatient) to 10 (very patient). The subjective evaluation average ranged from 3.2 in the control group to 3.7 in the reminder treatment group, suggesting that overall level of patience (3.4 out of 10) is not high. In addition to, self-perception of patience, we elicited the entrepreneurs' time preference from respondents' choices in the following two hypothetical 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. Consistent with the subjective evaluation, the majority of entrepreneurs exhibited impatience. For example, the largest proportion of entrepreneurs whom we label as "somewhat patient" was associated with the joint treatment category (about 20.5% of them in this category).¹⁰ This result is strikingly similar to the time preference behavior of rural Kenyans studied by Dupas and Robinson (2013a).

As expected, about 91% of the sample respondents were time-consistent, meaning that they do not switch their current preference in the future as long as they are confronted with the same set of options.¹¹ Table 1 also shows that entrepreneurs assigned to the financial training and joint treatments were slightly more present-biased than the control group.¹² Such entrepreneurs are characterized by a higher discount rate in the short run than in the long run. Only 2.4% of entrepreneurs who were assigned to the financial literacy training exhibited more patience in the future than in the present in contrast to about 7 % in the control.

¹⁰ "Somewhat patient" individuals preferred 1100 birr a month later over 1000 birr tomorrow (Dupas and Robinson 2013).

¹¹ "Time-consistent" respondents are either: (1) those who choose both "1000 birr tomorrow" in game (i) and "1000 birr in 1 month" in game (ii) or (2) those who choose both "1100 birr in 1 month" in game (i) and "1100 birr in 2 months" in game (ii).

¹² "Present-biased" respondents are those who choose "1000 birr tomorrow" in game (i) and "1100 birr in 2 months" in game (ii), or, in other words, those entrepreneurs who are impatient now and patient later. In game (i), we intentionally proposed the reward for tomorrow rather than today. This is called the "front-end delay" method, which corrects biased choice toward current rewards because entrepreneurs may lack confidence in receiving rewards in the future due to low credibility and high transaction costs associated with future payment (see Harrison Lau and Williams 2002; Bauer Chytilová and Morduch 2012).

Fourth, measures of risk preference calculated based on the decision of entrepreneurs to play a hypothetical lottery game (risk taker), choose the safe bet (risk averse) or be indifferent between playing the game and the safe bet (risk neutral) seem to be balanced across the treatment and control groups.¹³ Yet, more than two-thirds of the entrepreneurs were found to be risk averse. Fifth, the treatment and control group entrepreneurs scored comparable values when tested for financial literacy¹⁴ and ability to recall digits correctly.¹⁵ The average respondent correctly answered more than half of the financial literacy questions, scoring 2.4 out of 4.0 points. In the digit span score test, the average respondent correctly remembered 2.9 out of 8 digit numbers. Sixth, the distribution of the subsectors was balanced across the treatment and control groups.

In short, 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.¹⁶ Except for the amount of saving for housing at the Commercial Bank of Ethiopia (CBE), the baseline values of saving-related variables were balanced well (see Appendix 2 for

¹³ Respondents were offered a choice between (1) receiving 2000 birr for sure or (2) 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.

¹⁴ Following Cole et al. (2011) and Xu and Zia (2012), financial literacy score was constructed by adding the number of correct answers that a respondent provided for four basic financial literacy questions.

¹⁵ 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. Aside from being part of a basic individual characteristic, digit-span measures innate ability to remember important events such as intertemporal saving decisions. The exercise starts recalling eight numbers in total, from a four-digit number and increasing in difficulty with the final card containing 11-digit number.

¹⁶ 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 do 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.

detailed description of the variables listed in this paper).¹⁷ For example, saving size was not statistically different between the treatment and control groups; actual average saving size per entrepreneur was about 510 birr; and the average amount that entrepreneurs would like to save was 832 birr. Baseline income level, 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.¹⁸ 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 was from 128 birr to 382 birr. As to informal saving, about 29% of the entrepreneurs are members of *Iqub* (ROSCA). Furthermore, more than half of the entrepreneurs also have special housing savings account at the CBE. Those who save regularly would get a better chance of winning the housing raffle, whereas people who fail to save would be kicked out of the program. The deposit cannot be withdrawn. Because of these unique features, we treated this CBE housing saving independently.

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 offices. 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

¹⁷ The housing savings account is part of the government-run housing development project. It bears an interest rate of 5%, which is equal to the saving rate of personal savings account. Participants are obliged to save a fixed amount and not allowed to make withdrawals once they started saving. If one withdraws his/her saving from the housing savings account, she/he is effectively expelled from the housing scheme and would also be ineligible to register for other housing programs in the future. So this is a strictly limited-purpose commitment saving device with harsh penalties for non-compliance.

¹⁸ 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>).

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. Furthermore, 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 differ in terms of business practices and performance measures as indicated in the last rows of Table 2. In December 2013, average sales revenue was 10,100 birr; the value added 4,000 birr; and gross profit 2,000 birr.¹⁹ While capital stock was 26,400 birr on average, capacity utilization rate was 42%. The average sample entrepreneur also employed three workers to operate their business.

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.

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 115% and 33% since December 2013 for entrepreneurs treated with SMS-reminder and financial training, respectively, while it increased by only 28% among the control group. Table 3 also shows that SMS-reminder was associated with saving a greater proportion of income, more desire to save larger amounts, higher likelihood of achieving saving goal, and larger amount of saving for housing at CBE. The joint treatment has substantially increased the amount of money entrepreneurs deposited in the banks, while having no effect on the other saving variables. In contrast, the financial training treatment did not have any impact on saving practices. This may be because those who attended the training were engaged in smaller businesses, which did not offer much room for changing their saving behavior.

¹⁹ Value added is sales revenue minus material cost and utility (electricity and water) cost, whereas gross profit is value added minus labor cost.

A striking finding is also that the entrepreneurs assigned to the financial literacy treatment arm tended to use *Iqub* (ROSCA) compared with both the control group and the entrepreneurs treated with SMS reminders and joint interventions. *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. This suggests that SMS-reminders encouraged consumption smoothing and 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,²⁰ 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 would employ regression analysis and control for relevant characteristics below.

V. Empirical Strategy and Discussion of Results

As the entrepreneurs were similar in each baseline characteristic across treatment status (Tables 1 and 2), the probit regression of treatment status on baseline characteristics also suggests that the random assignment of treatment status was successful (Appendix 3). Moreover, Table 3 shows that the SMS reminder group had significantly greater savings, higher percentage of saving goal achieved, and larger reinvestment, and that the joint treatment group had significantly higher percentage of saving goal achieved and larger amount deposited in a bank in the post-treatment

²⁰ 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.

period. To measure the effects of the financial literacy training, the SMS reminder messages and the joint treatment more precisely, we would run regressions, controlling for other potential determinants of saving.

More specifically, 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. We used the ANCOVA regression because there are 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).²¹ 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. While 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 takeover dummy D_{ki} , which is to be instrumented by Z_{ki} , we can estimate the local average treatment effect (LATE). Because the random assignment dummy Z_{ki} is independent of the entrepreneur's characteristics, it satisfies the exogeneity assumption of the instrumental variable approach. Moreover, the random assignment dummy Z_{ki} is strongly correlated with the takeover dummy D_{ki} , which is the other premise of a valid instrumental variable. 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

²¹ 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.

other attendees (See Appendix 4 for the strong correlation between attendance and assignment to training). Furthermore, 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.²² We also report the alternative OLS estimates, which do not control for the lagged outcomes, in Appendices 6 and 7, and the results are essentially the same. We can see from Table 4 that the financial literacy training did not significantly change the entrepreneur’s saving behavior. This result suggests that knowledge or financial literacy alone may not be the only reason entrepreneurs tend to undersave. But it is important to note that the training emphasized rudimentary financial knowledge and techniques. The financial literacy score in Table 1, which measures the entrepreneur’s understanding of basic concepts in finance, seems to suggest that the entrepreneurs already knew much about them. In fact, the financial literacy score was not significantly different between the financial training group and the control group after the training.

By contrast, the SMS reminder significantly increased the savings-to-sales ratio by 54.5% (0.12 standard deviation unit), the percentage of business proceeds reinvested back to business by 91.0% (0.51 standard deviation unit), and the percentage of saving goal achieved by 116% (0.45 standard deviation unit).²³ Entrepreneurs assigned to the SMS-reminder also experienced a 137% increment in their total savings (0.40 standard deviation unit) and 115 % higher deposit amounts in ordinary bank account (0.16 standard deviation unit). In principle, the SMS reminder was received by all the entrepreneurs assigned to the SMS reminder treatment. This is why ITT

²² 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 of sample attrition. The estimation results reported in Appendix 5 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.

²³ 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 0.49. SMS reminder treatment is thus associated with 0.12 standard deviation higher savings-to-sales ratio.

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.

Joint treatment significantly increased financial literacy 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). Joint treatment also significantly increased the percentage of saving goal achieved by 66.5% on average (ITT) and by 148.2% for those entrepreneurs who actually received both training and reminders (LATE and also ATT). Joint treatment also significantly increased the deposit in the ordinary bank account by 139% (0.64 standard deviation unit) and by more than 633% (1.39 standard deviation unit) for those entrepreneurs who actually got both treatments.

There was no significant difference among the treatment and control groups regarding whether the entrepreneur has a housing savings account at the CBE and its deposit amount. We observed this result probably because this account is not as convenient as a usual saving commitment account in the sense that the money deposited in this housing account cannot be diverted for other purposes. Moreover, because CBE obliges the participants to save a fixed amount, there is not much room for the account holders' behavior to change.²⁴

We have come to understand 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* 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

²⁴ Interestingly, however, a specification that trims the bottom 1 percentile and the top 99 percentile of the distribution of saving for housing purposes shows that reminders increase housing savings amount by as much as 25%.

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 (the results remain the same across different specifications as indicated in Appendix 8). ROSCAs such as *Iqub* are often ideal saving instruments for people with low levels of financial literacy and time-inconsistent preference. As indicated in Appendix 9, entrepreneurs who have time-inconsistent preference are also more likely to belong to *Iqub*.

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 find out 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 relatives' urgent 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 by 54.5% (0.12 standard deviation unit), the percentage of business proceeds reinvested back to business by 91.0% (0.51 standard deviation unit), savings amount by 137% (0.40 standard deviation unit), deposits in ordinary bank accounts by 115% (0.16 standard deviation unit), and the percentage of saving goal achieved by 116% (0.45 standard deviation unit). Moreover, joint treatment significantly increased the financial literacy score by 0.27 points on average (ITT) and by 0.60 points for those entrepreneurs who actually received the financial training as well as SMS reminders (ATT). Joint treatment also significantly increased the percentage of saving goal achieved by 66.5% on average (ITT) and by 148.2% for those entrepreneurs who actually received both financial training and SMS reminders (ATT). It also had a significant effect on deposit in the ordinary bank account, increasing it by 139%.

We find that 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. Future research projects would help us learn more about the optimal content and intensity of financial literacy training.

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

Variable	Treatment Status				All
	Financial Training	SMS Reminder	Joint Treatment	Control	
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)¹					
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 preference²					
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 skills³					
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. * $p < 0.10$ and ** $p < 0.05$ in mean test with the control group.

¹The 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, 2013). "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.

²Risk 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)

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.

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 saved in the last 30 days (birr)	457	749	328	503	509
Amount entrepreneur would like to save per month given his income (birr)	744	961	933	744	832
% 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	186	128	192
% 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
Amount of savings for housing at CBE (birr)	808*	620	511	462	565
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
Business performance (10³birr)					
Sales in November 2013	8.1	10.1	15.7	8.5	10.1
Value added in November 2013	4.0	4.6	4.4	3.6	4.0
Gross profit in November 2013	2.1	2.3	1.9	1.8	2.0
Capital stock as of November 2013	31.2	27.8	20.3	26.2	26.4
Capacity utilization rate in November 2013 (%)	43.4	43.3	43.1	41.1	42.4
Number of employees as of November 2013	3.31	3.46	3.10	3.00	3.17
Number of observations	83	84	83	176	426

Notes. * p < 0.10, ** p < 0.05 and *** p < 0.01 in mean test with the control group.

1. Saving for housing at CBE is almost a sort 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 have 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. Variability of sales is measured by taking the difference between sales in peak month and sales in slack month.

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					
Amount saved in the last 30 days (birr)	645	1586*	1071	700	937
Amount entrepreneur would like to save per month given his income (birr)	1419	2154*	1241	1206	1436
% of saving goal achieved ^a	44.7	96.7***	81.2**	45.8	62.5
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
Amount of savings for housing at CBE (birr)	519	635*	556	457	521
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
Business performance (10³birr)					
Sales in November 2014	29.7	21.6	16.9	18.5	21.0
Value added in November 2014	6.4	7.4	6.9	7.4	7.1
Gross profit in November 2014	5.0	6.0	5.4	6.0	5.7
Capital stock as of November 2014	29.2	33.0	26.7	36.0	32.2
Capacity utilization rate in November 2014 (%)	46.2	50.7	52.0	51.6	50.4
Number of employees as of November 2014	1.77	1.77	1.65	1.39	1.59
Number of observations	83	84	82	174	426

Notes. ^aWe control for 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 mean test with the control group.

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	Saved amount in the last 30 days	% of saving goal achieved	With a bank account	Deposited amount in the last 30 days	Has a housing savings account at CBE	Saved amount for housing at CBE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ANCOVA estimates (ITT)										
Financial training	-0.07 (0.12)	0.02 (0.07)	0.01 (0.02)	0.67 (2.98)	32.36 (468.07)	10.70 (22.93)	-0.02 (0.06)	99.63 (236.29)	-0.02 (0.05)	-25.19 (60.37)
SMS reminder	0.00 (0.12)	0.07 (0.07)	0.06*** (0.02)	5.67* (2.97)	955.94*** (469.26)	74.21*** (23.04)	0.05 (0.06)	372.55 (236.98)	0.01 (0.05)	78.26 (60.25)
Joint treatment	0.28** (0.12)	0.06 (0.07)	0.04* (0.02)	-2.38 (2.96)	454.01 (469.21)	49.51** (22.87)	-0.03 (0.06)	530.54** (235.72)	-0.00 (0.05)	22.31 (60.03)
Number of Observations	422	420	422	422	420	419	422	422	422	422
ANCOVA IV estimates (LATE)										
Financial training	-0.17 (0.29)	0.06 (0.16)	0.03 (0.04)	1.56 (7.30)	90.48 (1,142.75)	27.85 (56.18)	-0.04 (0.14)	261.96 (575.93)	-0.06 (0.13)	-61.11 (145.07)
SMS reminder	0.01 (0.12)	0.07 (0.06)	0.06*** (0.02)	5.62* (2.93)	968.18** (457.85)	75.31*** (22.60)	0.03 (0.06)	386.86* (231.34)	0.01 (0.05)	79.10 (58.86)
Joint treatment	0.60** (0.25)	0.13 (0.14)	0.08** (0.04)	-5.20 (6.47)	1,014.78 (1,026.78)	110.33** (49.94)	-0.06 (0.13)	1,178.61* (510.08)	-0.00 (0.11)	47.56 (130.37)
Number of observations	422	420	422	422	420	419	422	422	422	422

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)	-0.09 (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: Description of variables used in the analysis

Variable	Description
Male	Percentage of firms owned by male entrepreneurs or whose lead person are males in case of cooperatively owned firms
Age	Age of the owner or the lead person
Years of schooling	Highest completed years of schooling achieved by the owner/lead person
Years of working experience	Total years of experience of the owner/lead person
% with working experience in formal sector	Percentage of the owner/lead person in the sample who had worked in the formal sector
% with management training	Percentage of firms which took formal training on management and financial skills
% with production training	Percentage of firms involved in technical/skill-based training
Years of operation	Number of years the enterprise was actively engaged in business
% enterprise is self-initiated	Percentage of firms established by the owner's initiative as opposed to those initially established by the state
% with parents in private business	Percentage of firms whose owner's mother or father was a business owner
Number of siblings in a similar business	Total number of brothers or sisters of the owner of the enterprise who are involved in a similar business before the owner started business
Perceived patience score (0 very impatient, 10 very patient)	Respondent's own rating of his/her level of patience on a scale from 0= very impatient to 10=very patient
Somewhat patient	A respondent who preferred 1100 birr a month later from 1000 birr tomorrow
Time-consistent	Respondents who showed a similar pattern of behavior when asked to choose between a guaranteed income of 1000 or 1100 of income sometime later
Present-biased	Respondents who preferred guaranteed income of lesser amount in the near future than wait for more income at a later time
More impatient in the future than in present	Respondents who have higher discount rate in the future than in the present
Discount rate between today and in 3 months' time (%)	Amount of money a respondent will be willing to receive in 3 months' time to be indifferent to receiving a 1000 birr today.
Risk taker (%)	A respondent who chose to play a hypothetical lottery game when an offer that pays 2000 birr for sure or playing a game that pays 4000 birr with equal probability of winning or losing was made
Risk neutral (%)	A respondent who was indifferent between accepting the sure payment of 2000 birr or playing the lottery in a hypothetical lottery game when an offer that pays 2000 birr for sure or playing a game that pays 4000 birr with equal probability of winning or losing was made
Risk averse (%)	A respondent who chose to accept the sure amount of 2000 birr in a hypothetical lottery game when an offer that pays 2000 birr for sure or playing a game that pays 4000 birr with equal probability of winning or losing was made
Financial literacy score (max=4)	Three questions were asked the respondents to check how financially literate they are. The questions are about interest calculation, minimum bank deposit requirement, and knowledge of inflation. Finally, respondents were rated out of a maximum of four points.
Digit span recall score (max=8)	Measures the cognition ability of the respondent where the respondent is allowed to look at a number written on a card for 10 seconds only and asked to remember what was written on the card.

Manufacturing	Percentage of firms engaged in the manufacturing sector
Construction	Percentage of firms engaged in the construction sector
Retail and service	Percentage of firms engaged in the retail and services sector
Total amount saved in the last 30 days (birr)	Total amount of money saved, including cash at home and on hand
Amount entrepreneur would like to save per month given his income (birr)	Largest possible amount of savings the owner would like to save per month
% of saving goal achieved	Percentage of money the owner actually saved, given the amount he would like to save
Savings-to-sales ratio	The ratio of savings amount to sales revenue.
% with a bank account	Ratio of firms that have opened an ordinary savings account
Amount deposited in a bank in the last 30 days (birr)	Total amount of money the firm managed to deposit in the 30 days before the interview
% with special housing savings account at CBE	Percent of firms that have opened a mortgage account at CBE to qualify for the state-run housing project
Amount of savings for housing at CBE (birr)	Total amount of money deposited at the CBE special housing account
Profit from business in the last 30 days (birr)	Total amount of money the firm earned during the month of October
Minutes spent in making deposits in the nearest bank	Total time taken to make deposits to the nearest bank
Distance to the nearest bank to make deposit (in km)	Distance in kilometers of the nearest bank the firm could make deposits at
Transport cost to make deposits (in birr)	Total amount of money spent on transportation by the firm to make deposits at the bank
Forgone business income when commuting to make deposits (in birr)	Money that is lost in earned income by the firm when making deposits at the nearest bank
Invested back to business	Percentage of proceeds from business in the last 3 months that is invested back to the business
Food and house rent	Percentage of business proceeds of the last 3 months which is spent on food and house rent
Clothing and footwear	Percentage of last 3 months' business proceeds spent on clothing and footwear
Health and education	Percentage of last 3 months' business proceeds spent on education, health and medical expenses
Household durables	Percentage of business proceeds of the last 3 months spent on purchase of household durables
Consumption of alcohol and entertainment	Percentage share of business proceeds of the last 3 months spent on consumption of alcoholic beverages, khat and/or tobacco
Keeps records of business transactions	Frequency of keeping records of business transactions by the business firm
Keeps records of defective products	Firms that keep records of the defective products
Inspects quality of products before marketing them	Firms that answered "yes" to the question "Do you inspect quality of products before selling them?"

Appendix 3: Evidence of randomization (probit; marginal effects)

VARIABLE	Financial Training	SMS Reminder	Joint Treatment	Financial Training	SMS Reminder	Joint Treatment
	(1)	(2)	(3)	(4)	(5)	(6)
Entrepreneur is male (Yes=1)	0.04 (0.04)	0.06 (0.04)	-0.02 (0.04)	0.05 (0.04)	0.04 (0.04)	-0.03 (0.05)
Entrepreneur's age	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)
Years of schooling	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.01)	-0.00 (0.01)	0.00 (0.01)
Years of prior experience	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Has working experience in formal sector (Yes=1)	-0.04 (0.04)	0.00 (0.04)	-0.05 (0.04)	-0.03 (0.04)	0.01 (0.05)	-0.06 (0.04)
Had taken training in production skills as of December 2013(Yes=1)	0.06 (0.05)	-0.01 (0.04)	0.01 (0.05)	0.09 (0.06)	-0.05 (0.05)	0.03 (0.05)
Had taken training in management skills as of December 2013 (Yes=1)	-0.02 (0.05)	0.00 (0.00)	0.00 (0.00)	-0.05 (0.06)	0.01 (0.01)	-0.00 (0.01)
Year of operation	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)
Enterprise is own initiative (Yes=1)	-0.03 (0.05)	0.01 (0.05)	-0.01 (0.05)	-0.04 (0.06)	0.06 (0.06)	-0.00 (0.06)
Parents in private business (Yes=1)	0.05 (0.04)	-0.04 (0.04)	0.03 (0.04)	0.06 (0.05)	-0.07 (0.04)	0.03 (0.05)
Has siblings in similar business before the start of own business (Yes=1)	0.02 (0.03)	-0.02 (0.03)	0.01 (0.03)	0.02 (0.03)	-0.00 (0.03)	-0.01 (0.03)
Discount rate between today and in 3 months' time (%)				0.00 (0.01)	-0.01 (0.01)	0.00 (0.01)
Time inconsistent (Yes=1)				-0.01 (0.07)	0.03 (0.07)	0.06 (0.07)
Risk taker (Yes=1)				0.14 (0.14)	0.17 (0.14)	-0.09 (0.09)
Risk averse (Yes=1)				0.09 (0.10)	0.10 (0.10)	-0.01 (0.10)
Financial literacy score (max=4)				0.04* (0.02)	-0.01 (0.02)	-0.03 (0.02)
Digit span recall score (max=8)				-0.01 (0.02)	-0.01 (0.02)	0.03** (0.02)
Manufacturing sector (Yes=1)				-0.03 (0.04)	0.02 (0.05)	0.08* (0.05)
Construction sector (Yes=1)				0.02 (0.10)	0.24* (0.14)	-0.01 (0.09)
Number of observations	508	508	508	422	422	422

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

Appendix 4: Estimated linear probability model of attendance rate in the financial literacy training

VARIABLE	Attendance rate in the financial literacy training when assigned to the financial literacy training regime			Attendance rate in the financial literacy training when assigned to the joint treatment regime			Attendance rate in the financial literacy training when assigned to either treatment regime		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Financial training	0.40*** (0.03)	0.40*** (0.03)	0.40*** (0.03)	-0.00 (0.03)	-0.01 (0.03)	-0.01 (0.03)	0.40*** (0.04)	0.39*** (0.04)	0.39*** (0.04)
SMS reminder	0.00 (0.03)	0.00 (0.03)	-0.00 (0.03)	-0.00 (0.03)	-0.01 (0.03)	-0.01 (0.03)	-0.00 (0.04)	-0.01 (0.04)	-0.01 (0.04)
Joint treatment	-0.01 (0.03)	-0.01 (0.03)	-0.02 (0.03)	0.46*** (0.03)	0.46*** (0.03)	0.45*** (0.03)	0.45*** (0.04)	0.44*** (0.04)	0.44*** (0.04)
Entrepreneur is male (Yes=1)	0.03 (0.02)	0.03 (0.02)	0.01 (0.03)	0.03 (0.02)	0.03 (0.02)	0.03 (0.03)	0.06* (0.03)	0.06* (0.03)	0.05 (0.04)
Entrepreneur's age	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Years of schooling	0.01** (0.00)	0.01* (0.00)	0.01* (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.01 (0.00)	0.00 (0.00)	0.00 (0.00)
Years of prior experience	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Has a working experience in formal sector (Yes=1)	-0.03 (0.02)	-0.02 (0.03)	-0.02 (0.03)	-0.04 (0.03)	-0.03 (0.03)	-0.04 (0.03)	-0.07* (0.04)	-0.06* (0.04)	-0.06 (0.04)
Had taken training in production skills as of December 2013(Yes=1)	0.06* (0.03)	0.06*** (0.03)	0.05 (0.03)	-0.03 (0.03)	-0.02 (0.03)	-0.01 (0.03)	0.03 (0.04)	0.04 (0.04)	0.04 (0.05)
Had taken training in management skills as of December 2013 (Yes=1)	-0.00 (0.03)	-0.01 (0.03)	-0.00 (0.03)	-0.01 (0.03)	-0.02 (0.03)	-0.03 (0.03)	-0.01 (0.05)	-0.03 (0.05)	-0.03 (0.05)
Year of operation	-0.00* (0.00)	-0.00* (0.00)	-0.00* (0.00)	-0.00* (0.00)	-0.00* (0.00)	-0.00* (0.00)	-0.01*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)
Enterprise is own initiative (Yes=1)	0.01 (0.03)	0.01 (0.03)	0.03 (0.04)	-0.07** (0.03)	-0.08** (0.03)	-0.09** (0.04)	-0.06 (0.05)	-0.07 (0.05)	-0.06 (0.05)
Parents in private business (Yes=1)	0.02 (0.03)	0.02 (0.03)	0.02 (0.03)	0.02 (0.03)	0.02 (0.03)	0.02 (0.03)	0.04 (0.04)	0.04 (0.04)	0.04 (0.04)
Has siblings in similar business before the start of own business (Yes=1)	0.01 (0.02)	0.01 (0.02)	0.02 (0.02)	0.00 (0.02)	0.00 (0.02)	-0.00 (0.02)	0.01 (0.02)	0.01 (0.02)	0.02 (0.02)
Time inconsistent (Yes=1)	0.03 (0.04)	0.03 (0.04)	0.03 (0.04)	0.03 (0.04)	0.08** (0.04)	0.09** (0.04)	0.11** (0.05)	0.11** (0.05)	0.11** (0.05)
Risk taker (Yes=1)	-0.02 (0.06)	-0.02 (0.06)	-0.00 (0.06)	-0.00 (0.06)	0.05 (0.06)	0.05 (0.06)	0.03 (0.08)	0.03 (0.08)	0.04 (0.08)
Risk averse (Yes=1)	0.02 (0.06)	0.02 (0.06)	0.03 (0.06)	0.03 (0.06)	0.07 (0.06)	0.07 (0.06)	0.09 (0.08)	0.09 (0.08)	0.10 (0.08)

Appendix 5: Estimated probit model of attrition

VARIABLE	Dependent variable is Exit, which is equal to 1 for enterprises that are not observed in 2014 and to 0 otherwise.			
	(1)	(2)	(3)	(4)
Financial training	-0.01 (0.04)	-0.00 (0.04)	-0.01 (0.04)	-0.02 (0.04)
SMS reminder	-0.01 (0.04)	-0.01 (0.04)	-0.02 (0.04)	-0.02 (0.04)
Joint treatment	0.00 (0.04)	0.01 (0.04)	0.01 (0.04)	0.01 (0.04)
Entrepreneur is male (Yes=1)		0.08*** (0.03)	0.08*** (0.03)	0.04 (0.03)
Entrepreneur's age		0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Years of schooling		-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)
Years of prior experience		-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Has a working experience in formal sector (Yes=1)		0.09** (0.04)	0.08** (0.04)	0.09** (0.04)
Had taken training in production skills as of December 2013(Yes=1)		-0.08** (0.04)	-0.08** (0.04)	-0.13*** (0.03)
Had taken training in management skills as of December 2013 (Yes=1)		0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Year of operation		-0.01** (0.00)	-0.01** (0.00)	-0.01* (0.00)
Enterprise is own initiative (Yes=1)		-0.14** (0.06)	-0.14** (0.06)	0.03 (0.05)
Parents in private business (Yes=1)		0.00 (0.04)	0.00 (0.04)	0.01 (0.04)
Has siblings in similar business before the start of own business (Yes=1)		-0.05 (0.03)	-0.05 (0.03)	-0.03 (0.03)
Time inconsistent (Yes=1)			0.01 (0.05)	0.00 (0.05)
Risk taker (Yes=1)			0.17 (0.13)	0.28* (0.15)
Risk averse (Yes=1)			0.11 (0.08)	0.16** (0.07)
Financial literacy score (max=4)			-0.00 (0.02)	0.00 (0.02)
Manufacturing sector (Yes=1)				-0.05 (0.03)
Construction sector (Yes=1)				0.50*** (0.12)
Number of observations	508	508	504	504

Notes. Standard errors in parentheses * p<0.1, ** p<0.05, *** p<0.01.

Appendix 6: Estimated effects of getting financial literacy, reminder, and both treatments in 2015 (ITT)

VARIABLE	Financial literacy score	Saving dummy (Yes=1)	Savings-to-sales ratio	% business proceeds invested back to business	Saved amount in the last 30 days	% of saving goal achieved	With a bank account	Deposited amount in the last 30 days	Has a housing savings account at CBE	Saved amount for housing at CBE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
OLS without baseline controls										
Financial training	-0.02 (0.13)	-0.03 (0.17)	0.01 (0.02)	-1.70 (3.14)	-54.29 (451.54)	-2.23 (22.40)	-0.07 (0.07)	53.98 (230.19)	-0.08 (0.07)	6.58 (65.25)
SMS reminder	0.03 (0.13)	0.07 (0.17)	0.05** (0.02)	7.14** (3.18)	886.24** (449.72)	59.14*** (22.40)	0.03 (0.07)	309.51 (229.25)	-0.06 (0.07)	70.06 (64.98)
Joint treatment	0.30** (0.13)	0.20 (0.17)	0.03* (0.02)	-2.26 (3.18)	371.51 (453.41)	42.84* (22.40)	-0.01 (0.07)	495.36** (230.19)	-0.06 (0.07)	25.87 (65.25)
OLS with baseline controls for entrepreneurial characteristics and business sector										
Financial training	-0.05 (0.12)	0.02 (0.17)	0.01 (0.02)	-0.25 (3.17)	16.66 (461.51)	6.24 (22.66)	-0.02 (0.06)	93.11 (233.93)	-0.08 (0.06)	20.31 (64.49)
SMS reminder	-0.01 (0.12)	0.17 (0.17)	0.05*** (0.02)	7.84** (3.17)	901.19* (459.12)	67.11*** (22.62)	0.06 (0.06)	340.19 (232.55)	-0.06 (0.06)	97.13 (64.11)
Joint treatment	0.29** (0.12)	0.19 (0.18)	0.04* (0.02)	-1.92 (3.15)	439.57 (459.77)	50.58** (22.47)	0.00 (0.06)	522.68** (232.11)	-0.03 (0.06)	43.00 (63.99)
OLS with baseline controls for entrepreneurial characteristics, sector and risk and time preferences										
Financial training	-0.07 (0.12)	0.01 (0.2)	0.01 (0.02)	0.18 (3.09)	15.68 (468.31)	10.72 (22.90)	-0.02 (0.06)	96.33 (236.35)	-0.08 (0.06)	11.37 (63.85)
SMS reminder	0.00 (0.12)	0.2 (0.2)	0.06*** (0.02)	6.61** (3.12)	989.16** (469.00)	74.35*** (23.02)	0.06 (0.06)	389.52 (236.58)	-0.07 (0.06)	92.85 (63.91)
Joint treatment	0.27** (0.12)	0.2 (0.2)	0.04* (0.02)	-1.98 (3.09)	427.97 (469.21)	49.88** (22.84)	-0.01 (0.06)	529.12** (235.79)	-0.05 (0.06)	32.24 (63.70)
Number of observations	426	424	422	422	424	423	426	426	423	422

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

Appendix 7: IV estimates of the effects of getting financial literacy, reminder, and both treatments (LATE)

VARIABLE	Financial literacy score	Saving dummy (Yes=1)	Savings-to-sales ratio	% business proceeds invested back to business	Saved amount in the last 30 days	% of saving goal achieved	With a bank account	Deposited amount in the last 30 days	Has a housing savings account at CBE	Saved amount for housing at CBE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
OLS without baseline controls										
Financial training	-0.04 (0.31)	-0.03 (0.16)	0.02 (0.05)	-4.12 (7.63)	-132.5 (1,093.9)	-5.45 (54.61)	-0.16 (0.16)	131.77 (557.22)	-0.20 (0.16)	16.06 (158.67)
SMS reminder	0.03 (0.13)	0.03 (0.07)	0.05** (0.02)	7.14** (3.19)	823.34 (997.2)	59.1*** (22.37)	0.03 (0.07)	1,082.0** (498.56)	-0.06 (0.07)	56.50 (141.97)
Joint treatment	0.65** (0.28)	0.17 (0.15)	0.07* (0.04)	-4.83 (6.82)	886.2** (446.28)	93.58* (48.86)	-0.02 (0.14)	309.51 (227.33)	-0.14 (0.15)	70.06 (64.73)
OLS with baseline controls for entrepreneurial characteristics and business sector										
Financial training	-0.13 (0.29)	0.01 (0.16)	0.03 (0.05)	-0.78 (8.00)	48.58 (1,133.3)	16.20 (55.88)	-0.05 (0.15)	240.56 (573.71)	-0.19 (0.16)	51.48 (158.92)
SMS reminder	-0.00 (0.12)	0.07 (0.06)	0.05*** (0.02)	7.74** (3.13)	907.43** (450.85)	67.8*** (22.33)	0.05 (0.06)	347.74 (228.33)	-0.05 (0.06)	97.75 (63.25)
Joint treatment	0.65** (0.26)	0.17 (0.15)	0.08* (0.04)	-4.20 (6.78)	987.42 (1,015.07)	112.0*** (49.11)	0.00 (0.13)	1,159.7** (504.78)	-0.08 (0.14)	95.92 (139.82)
OLS with baseline controls for entrepreneurial characteristics, sector and risk and time preferences										
Financial training	-0.17 (0.29)	0.04 (0.16)	0.03 (0.05)	0.04 (7.73)	50.53 (1,143.84)	27.88 (56.19)	-0.06 (0.15)	254.71 (576.61)	-0.20 (0.16)	29.33 (156.32)
SMS reminder	0.01 (0.12)	0.08 (0.06)	0.06*** (0.02)	6.32** (3.05)	998.8** (457.77)	75.39*** (22.60)	0.04 (0.06)	401.7* (230.88)	-0.06 (0.06)	93.58 (62.59)
Joint treatment	0.60** (0.25)	0.16 (0.15)	0.08* (0.04)	-4.33 (6.62)	958.74 (1,030.83)	110.78** (49.74)	-0.03 (0.13)	1,175.6** (510.83)	-0.11 (0.14)	72.09 (138.49)
Number of observations	426	424	422	420	424	423	426	426	423	422

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

Appendix 8: OLS and IV estimates of the effects of getting financial literacy, reminder, and both treatments on business practice indicators

VARIABLE	ITT				LATE			
	Is a member of <i>Iqub</i> (Yes=1) (1)	Keeps records of business transactions (2)	Keeps records of defective products (3)	Inspects quality of products (4)	Is a member of <i>Iqub</i> (Yes=1) (5)	Keeps records of business transaction (6)	Keeps records of defective products (7)	Inspects quality of products (8)
OLS without baseline controls								
Financial Training	-0.12** (0.05)	-0.07 (0.07)	0.02 (0.06)	0.03 (0.05)	-0.31** (0.15)	-0.16 (0.16)	0.05 (0.14)	0.07 (0.13)
SMS reminder	-0.02 (0.06)	-0.07 (0.07)	0.04 (0.06)	-0.03 (0.05)	-0.10 (0.13)	-0.07 (0.07)	0.04 (0.06)	-0.03 (0.05)
Joint treatment	-0.04 (0.06)	-0.05 (0.07)	0.04 (0.06)	0.09 (0.05)	-0.03 (0.06)	-0.12 (0.15)	0.10 (0.13)	0.19 (0.12)
OLS with baseline controls for entrepreneurial characteristics								
Financial Training	-0.11* (0.06)	-0.08 (0.07)	-0.00 (0.05)	0.02 (0.05)	-0.29* (0.15)	-0.19 (0.17)	0.00 (0.13)	0.05 (0.13)
SMS reminder	0.02 (0.06)	-0.07 (0.07)	0.01 (0.05)	-0.05 (0.05)	-0.08 (0.13)	-0.06 (0.07)	0.02 (0.05)	-0.06 (0.05)
Joint treatment	-0.03 (0.06)	-0.04 (0.07)	0.01 (0.05)	0.07 (0.05)	0.01 (0.06)	-0.10 (0.15)	0.03 (0.11)	0.16 (0.12)
OLS with baseline controls for entrepreneurial characteristics and risk and time preferences								
Financial Training	-0.11** (0.06)	-0.09 (0.07)	0.00 (0.05)	0.02 (0.05)	-0.31** (0.15)	-0.23 (0.17)	0.02 (0.13)	0.07 (0.13)
SMS reminder	0.02 (0.06)	-0.08 (0.07)	0.01 (0.05)	-0.05 (0.05)	-0.10 (0.13)	-0.07 (0.07)	0.02 (0.05)	-0.06 (0.05)
Joint treatment	-0.03 (0.06)	-0.04 (0.07)	0.02 (0.05)	0.07 (0.05)	0.01 (0.06)	-0.10 (0.15)	0.04 (0.11)	0.15 (0.12)
Number of observations	425	426	426	426	425	426	426	426

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

Appendix 9: OLS and IV estimates of the effects of getting financial literacy, reminder, and both treatments on *Iqub* membership

VARIABLE	ITT	LATE
	Is a member of <i>Iqub</i> (Yes=1)	Is a member of <i>Iqub</i> (Yes=1)
Financial training	-0.10* (0.06)	-0.25* (0.14)
SMS reminder	0.00 (0.06)	0.00 (0.06)
Joint treatment	-0.05 (0.06)	-0.13 (0.13)
Was an <i>Iqub</i> member in 2013 (Yes=1)	0.26*** (0.05)	0.27*** (0.05)
Entrepreneur is male (Yes=1)	-0.06 (0.05)	-0.06 (0.05)
Entrepreneur's age	-0.00* (0.00)	-0.00* (0.00)
Years of schooling	-0.00 (0.01)	-0.00 (0.01)
Years of prior experience	0.01** (0.00)	0.01** (0.00)
Has a working experience in formal sector (Yes=1)	-0.02 (0.05)	-0.03 (0.05)
Had taken training in production skills as of December 2013(Yes=1)	0.14** (0.06)	0.15** (0.06)
Had taken training in management skills as of December 2013 (Yes=1)	0.00 (0.07)	-0.00 (0.06)
Year of operation	-0.00 (0.01)	-0.00 (0.0)
Enterprise is own initiative (Yes=1)	-0.03 (0.06)	-0.02 (0.06)
Parents in private business (Yes=1)	0.05 (0.05)	0.06 (0.05)
Has siblings in similar business before the start of own business (Yes=1)	-0.04 (0.03)	-0.04 (0.03)
Discount rate between today and in 3 months' time (%)	0.01 (0.01)	0.00 (0.01)
Time inconsistent (Yes=1)	0.20*** (0.08)	0.21*** (0.07)
Risk taker (Yes=1)	0.03 (0.12)	0.03 (0.11)
Risk averse (Yes=1)	0.07 (0.11)	0.09 (0.11)
Financial literacy score (max=4)	0.01 (0.02)	0.01 (0.02)
Digit span recall score (max=8)	-0.02 (0.02)	-0.01 (0.02)
Manufacturing sector (Yes=1)	0.01 (0.05)	0.01 (0.05)
Construction sector (Yes=1)	-0.31*** (0.10)	-0.30*** (0.10)
Constant	0.36** (0.17)	0.33* (0.17)
Observations	421	421
R-squared	0.168	0.160