Virtual Business Networks and Knowledge Diffusion: Experimental Evidence from Liberia*

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Abstract

Small business owners in low-income settings may have limited information on good business strategies. While training programs have been extensively studied, another potential source of learning is through peer interaction–but many lack access to business networks that facilitate this. This paper examines the effect of virtual discussion groups of 4-6 micro-entrepreneurs each on business outcomes in Liberia. In an experiment involving 1,131 entrepreneurs, the treated group joined weekly phone discussions on business challenges, sales strategies, and financial management. We find that the intervention significantly influenced entrepreneurs' business practices and strategies, with effects concentrated in three key areas. First, we find that treated participants use more innovative business strategies, including new marketing approaches and sales locations. Second, they are more likely to adopt digital technologies for business use. Finally, treated entrepreneurs shift away from seeking advice from friends and family, instead building professional relationships with peer business owners. For each output, moderator summaries of each discussion session allow us to directly map observed effects to specific topics and business strategies discussed during these meetings. While we do not find significant effects on short-term profits or revenues, our results suggest that low-cost virtual platforms can facilitate knowledge transfer and business practice adoption among micro-entrepreneurs in developing countries.

*NOTE: This paper is a work in progress. Only reduced-form results have been presented here. We are currently conducting a mediation analysis to link treatment effects to the text of the Business Discussion Groups.

1 Introduction

The proliferation of new technologies, such as social media applications and digital messaging platforms, has significantly transformed the landscape of information sharing. By facilitating seamless and instantaneous connections among individuals, these technologies have enabled the rapid exchange of ideas and fostered creativity and innovation (Aghion & Howitt, 1992; Forman *et al.*, 2005; Acemoglu *et al.*, 2016). This paper explores how a virtual platform can extend the benefits of business networks to micro-entrepreneurs in the context of a developing economy.

While traditional business training programs have been extensively studied, their impact on firm performance has been shown to sometimes be limited (McKenzie & Woodruff, 2014). A key challenge is that these programs tend to deliver standardized knowledge, which may not address the specific, immediate concerns of individual entrepreneurs. In contrast, peer networks can facilitate more flexible, context-specific learning by enabling entrepreneurs to exchange ideas and collaborate on solving pressing business challenges. By allowing discussions to evolve based on the real-time needs of participants, these networks can create a dynamic environment for problem-solving and innovation, which can lead to more relevant and actionable business insights. Virtual platforms further expand the potential of such networks, offering a scalable way to provide entrepreneurs in resource-constrained environments with access to the benefits of peer learning (Vega-Redondo *et al.*, 2024).

In a field experiment conducted in Liberia, we examine the impact of virtual business discussion groups on business outcomes. A total of 1,131 entrepreneurs were randomly assigned to either a treatment group or a control group. The 434 entrepreneurs in the treatment group were initially invited to an in-person meeting where they were matched with other entrepreneurs resulting in groups of 4-6 members each. After this ini-

tial meeting, the groups continued to meet weekly over the phone for six weeks. These discussions, moderated by a facilitator, focused on a different topic each week, including business challenges, sales strategies, savings techniques, income diversification, and business growth. When a business issue was raised, moderators facilitated group brainstorming sessions, encouraging participants to share their experiences and propose solutions. The group composition remained consistent throughout the intervention to promote trust and encourage open sharing of information.

The entrepreneurs showed a strong interest in participating. Although attendance at the first in-person meeting was relatively low at 48%, those who attended the initial meeting were likely to stay engaged. Conditional on attending the first meeting, the median participant attended five out of the six meetings.

Moderators systematically documented the group discussions, providing us with rich data to analyze participant engagement and the content of their exchanges. Although this data is available only for the treatment group by design, it offers valuable insights into the topics discussed and the level of interaction among participants. Specifically, we observe that participants actively exchanged specific operational strategies they had put in place, including marketing and customer retention techniques and savings management practices. Access to the detailed content of the business discussions allows us to directly map the causally identified treatment effects to the business strategies debated during the meetings.

Both before and three months after the intervention, entrepreneurs from treatment and control groups completed a comprehensive survey. The survey assessed a wide range of outcomes, including business performance, management practices, personal and household finances, social networks, digital adoption, and self-motivation. The results indicate that the intervention had a positive and significant impact on participating businesses.

Entrepreneurs in the treatment group were significantly more likely to adopt innovative practices, particularly in areas such as marketing strategies and the choice of sales locations. They also demonstrated improvements in core business practices, including developing business plans, visiting competitors, and offering special deals to new customers. Additionally, participants were more digitally active, as evidenced by greater ownership and use of cellphones, particularly for business, and greater ownership of mobile money accounts. Participating entrepreneurs also show a greater use of social media for business activities. Lastly, the intervention strengthened participants' networks, making them more inclined to seek business advice from fellow entrepreneurs rather than relying on friends and family.

The effect of digital technologies on knowledge diffusion has been extensively studied, particularly in developing economies where such technologies can help overcome traditional market barriers. Recent empirical work has focused on documenting how digital technologies, particularly mobile phones and social media, can reduce information frictions and transaction costs (Jensen, 2007; Jack & Suri, 2014), which can be particularly high for small businesses. In the context of developing economies, several studies have shown that digital technology adoption can improve market access, reduce price dispersion, and enhance business practices (Aker, 2010; Hjort & Poulsen, 2019). However, the literature also highlights significant disparities in the use of technology, with many small businesses facing barriers such as limited digital literacy, uncertain returns, and network externalities that may slow initial adoption (Foster & Rosenzweig, 2010). These barriers underscore the importance of digital platforms that provide a low-cost and scalable opportunity for social learning and have an important role to play for small businesses.

Business discussion groups have emerged as an effective mechanism for social learning and peer effect, and encourage knowledge dissemina-

tion and business practices adoption. Field experiments have shown that bringing entrepreneurs together for structured discussions can lead to significant improvements in business practices and performance. Cai & Szeidl (2018) demonstrate that regular meetings among mid-size business owners in China facilitated valuable knowledge transfers and increased firm revenue. Similarly, regular group meetings between randomly matched microentrepreneurs and a mentor (on top of a cash grant) in Uganda seem to yield positive benefits for refugee men (Baseler *et al.*, 2025). The mechanism through which firm-to-firm interactions can operate in these contexts appears to be multifaceted: they both encourage information diffusion and technology adoption (Beaman *et al.*, 2021; Hardy & McCasland, 2021) and increase opportunities for collaborations (Asiedu *et al.*, 2023).[1] Our paper provides some of the first experimental evidence on how virtual platforms can extend the reach and impact of business networks among microentrepreneurs, showing they can effectively facilitate knowledge transfer without requiring costly in-person meetings. In addition, the detailed data on discussion content provides unique insight into the mechanisms through which peer learning occurs in business discussion groups.

2 Experimental design

All participants business discussion groups were applicants to the Liberian SSB. The groups were held between May and June of 2023.The primary objective of these groups was to improve business outcomes by addressing information frictions faced by small firms through a low-cost, information-sharing platform.

The selection of participants was done in two stages. At first, six out

[1] (Asiedu *et al.*, 2023) shows that virtual pairwise discussions can be effective in improving business collaborations and innovation adoption among women entrepreneurs in Ghana. Our paper is different in that we encourage group discussions, in groups larger than pairs, and that we do not focus on promoting collaboration between businesses but rather information sharing on business-related topics.

of the fourteen communities were randomly selected to participate in the intervention. In these communities, we applied a set of restrictions to select the sample of participants. Since we had undertaken pilot activities in some of these communities, all the participants who had been offered to participate in the pilot phase were removed from the sample. As feedback from the pilot indicated that discussions worked best if participants were in similar sectors, we limited the sample to two retail sectors, "Trades and Retail of Foods and Drinks" and "Clothing and Shoes".[2] Within each community, 50 individuals were randomly selected, stratified on business revenue (below vs. above median), grant winning status and sector of activity. Upon arrival to their community's in-person meeting, participants were then randomly assigned to one of six groups, and each group was assigned a moderator.

After the first in-person meeting in these six communities, 153 participants out of the 300 invited had attended the in-person meeting. This turnout rate, while encouraging, was short of our target of 200, which power calculations required. We therefore decided to extend the intervention by selecting two additional communities to participate in the intervention.[3] We applied the same sector restrictions on these communities as we did on the other six. Around 70 participants in each of these newly selected communities were randomly chosen and invited, and around 30 participants came to their community's in-person meeting. In our final sample of 1,131 eligible participants from the eight communities, 434 were invited (the "treatment group") and 209 showed up to the first in-person meeting (the "treated group").

Within each of the eight communities, participants in the treatment group were invited to an initial in-person meeting, held at a convenient location

[2]These are the two most common sectors in our sample of grant applicants.

[3]These two additional communities were selected based on convenience for the field implementation team.

within their respective communities. Upon arrival, participants were randomly assigned to their discussion group, consisting of five to six members. Each community encompasses multiple market areas, which provided two methodological advantages: first, it ensured sufficient geographic dispersion of participants to minimize pre-existing business relationships, and second, it reduced the likelihood of direct market competition among participants operating in the same sector. This design choice aimed to facilitate open knowledge sharing while minimizing strategic concerns about information disclosure to competitors.

To incentivize attendance at this first meeting, transportation expenses were covered and lunch was provided. During the in-person meeting, a moderator guided the group discussions, posing questions and encouraging participants to share information about their business challenges. These groups continued to meet weekly for the next five weeks, but virtually, through conference calls, with the same moderator facilitating the discussions. Importantly, the composition of the groups did not change throughout the intervention, including the moderator, which promoted trust within the group and encouraged participants to share their experiences and propose solutions. Participants who attended all sessions received a small incentive of USD 1.

Each group meeting focused on a different business topic. In the first in-person meeting, some time was spent introducing how the business discussion groups would work and went through logistics for attending the subsequent conference calls. After this short introduction, participants joined their groups and their assigned moderator for an hour-long in-person group discussion. In this first meeting participants were asked to present themselves and their business, and discuss the challenges they faced and ideas on how to overcome them.

In all following weeks, participants met virtually, through conference

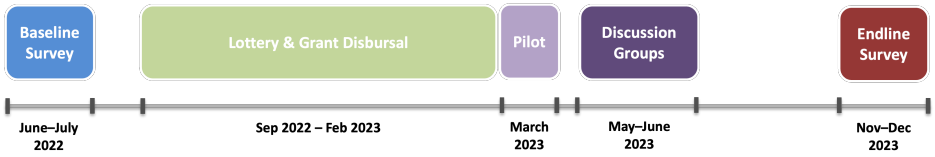

FIGURE 1: PROJECT TIMELINE

calls. The second week was dedicated to sharing innovative business strategies and tactics that the participants used to sell their goods. The third week focused on saving strategies. The fourth week focused on income diversification. In the fifth week, the participants discussed how they found motivation and inspiration as a small business owner and how they managed stress. In the sixth and final week, participants reflected on what they had learnt over the past weeks as well as avenues for business growth. Topics for each meetings were decided by the research team in coordination with a business specialist.

The moderators were trained by the same business specialist to enhance their skills in facilitating group discussions.[4] The role of the moderator was limited to floating the topic of the meeting, encouraging each of the participants to speak up and taking short notes on everyone's interventions. In particular, the moderators were specifically asked to not share their own views or give any advice to the participants.

Figure 1 provides the timeline for the project.

3 Empirical Results

Descriptive Analysis

Participation in the Intervention

Table 1 presents summary statistics on take-up of business discussion groups. Upon being randomly selected to participate, participants were contacted and asked whether they were interested in joining the intervention. Out of

[4]See the appendix for the training syllabus

the 434 invited participants, 280 said they were interested. The first meeting, in-person, took place at a centrally located venue within each of the eight selected communities. These meetings were attended by a total of 209 participants, representing an overall take-up rate of about 48%. Within each community, all participants who showed up on the day of in-person meeting were randomly assigned to one of six groups. While the big majority of groups had five to six members, in two communities, low participation resulted in a few groups having only three or four members. As each of the eight communities had six discussion groups, this brings the total number of groups to 48 groups overall. The average attrition rate over the following weeks was about 25 percent with little variation across the weeks and the median participant attended 5 out of the 6 meetings, suggesting that absences were spread across different participants rather than reflecting systematic dropout.

TABLE 1: SUMMARY STATISTICS ON TREATMENT TAKE-UP

	# of obs	Prop. of sample
In sample	1126	1.000
Invited to participate	434	0.385
Consented to participate	280	0.249
Attended in-person meeting	209	0.186
Attended second meeting	156	0.139
Attended third meeting	159	0.141
Attended fourth meeting	154	0.137
Attended fifth meeting	155	0.138
Attended sixth meeting	162	0.144

Participant Recall and Perceived Impact of Business Discussion Groups

In the survey conducted three months after the intervention, participants in the business discussion groups were asked to recall the topics they discussed during the sessions. Importantly, participants were not prompted with a predefined list; instead, enumerators recorded the topics mentioned

by the respondents using a multiple-selection format. For each topic recalled, participants were then asked whether they found it useful. Table 2 summarizes the frequency of topic recollection and perceived usefulness. The results indicate that the topic on finances, which included saving strategies, was the most frequently recalled topic, with three-quarters of participants mentioning them, and it was also rated as the most useful. Additionally, more than half of the participants recalled discussing growth and sales strategies, as well as business challenges.[5]

TABLE 2: SUMMARY STATISTICS ON MEMORY OF DISCUSSION TOPICS

	# of obs	Prop. of treatment
Invited to participate	434	1.000
Remembers being invited	216	0.498
Remembers having participated	204	0.470
Remembers discussing challenges	115	0.564
Discussing challenges was useful	52	0.255
Remembers discussing sales	108	0.529
Discussing sales was useful	63	0.309
Remembers discussing finances	153	0.750
Discussing finances was useful	133	0.652
Remembers discussing income	51	0.250
Discussing income was useful	24	0.118
Remembers discussing partners	66	0.324
Discussing partners was useful	24	0.118
Remembers discussing growth	110	0.539
Discussing growth was useful	69	0.338

Notes : Business challenges, sales, finances, income streams, partnerships , and growth strategies correspond to the topics of each of the six weeks of meetings, in this order. At endline, all participants are asked what topics they remember discussing in the meetings, and the enumerator selects each of the topics mentioned by the respondent. For each topic that the respondent remembers discussing, he/she is asked whether he/she found that topic useful.

Respondents were asked about their participation in the business discussion sessions, specifically how many sessions they attended, their perception of the impact of the groups on their business, and whether they would recommend the program to others. Participants were also asked

[5]One topic, motivation and inspiration, was unintentionally omitted from the enumerator's list of options; instead, enumerators had the option to select "creating partnerships for business growth".

about two types of connections formed through the program: the number of acquaintances[6] they maintained contact with after the intervention, and among these, the number they consulted for business advice. Table 3 provides summary statistics for these variables. The results indicate that participants found the business discussion groups to be highly beneficial for their businesses and expressed strong likelihood of recommending the program. While most respondents reported not maintaining contact with individuals they met through the intervention, 40 respondents did report staying in touch with at least one person from the sessions, and 16 indicated they sought business advice from these contacts.

TABLE 3: SUMMARY STATISTICS ON SELF-REPORTED TREATMENT EFFECT

	# of obs	Mean	Min	Max	Median
Sessions attended (self-rep)	203	3.54	0	8	4
Impact on business (1 to 3)	204	2.82	1	3	3
Would recommend (0 to 10)	204	8.67	0	10	10
# of acquaintances from treatment	203	0.36	0	15	0
# of advisors from treatment	204	0.13	0	4	0

Notes : The number of sessions attended is self-reported. Impact scale of 1 to 3 corresponds to not at all useful (1), to very useful (3). Recommendation scale of 0 to 10 corresponds to not likely (0) to very likely (10).

Content of Discussions

Moderators recorded all meetings and were asked to provide a written summary of the discussion after each meeting. This allows us to analyze precisely the content of the discussions and to get a good overview of the specific topics discussed.

The first meeting invited the participants to discuss the challenges they faced in their businesses and ideas on how to overcome them. Challenges frequently discussed included the depreciation of the Liberian Dollar (LD) against the US dollar, risks of selling goods on credit, high competition,

[6] Acquaintances are defined as individuals outside the respondent's family circle who visit or are visited by the respondent regularly.

seasonal nature of the business, electricity shortages and bad road connectivity. The participants sometimes offered suggestions such as opening up a new income stream when one's primary business is seasonal in nature.

The second week was dedicated to sharing business strategies and tactics that the participants used to help sell their goods. Main tactics included ensuring product variety and quality (keeping the business site clean, making food taste good, etc.), good customer relations (talking politely, giving discounts or selling on credit), advertisement (using a megaphone or saving a customers' number to call them up later), choosing the selling location strategically, and comparing one's price with the competitors' prices.

The third week focused on saving strategies. The discussions mainly revolved around the pros and cons of different saving options: bank, mobile money, saving groups (locally called *susus*), or cash (typically in a "cash box", at home). For instance, here is what one participant said in favor of saving groups: *I use daily/short term susu and yearly club as a means of saving. I prefer these means of saving because it makes it binding upon me to ensure that I don't temper with my principle or use my profits anyhow. With deadline dates set to make payments into these different susus and clubs, it's more like a target that I have to keep pursuing and with that, I am able to keep a positive and stabilize financial attitude that keeps my business money save and growing eventually*. In addition, some groups discussed whether one should save from the principal or from the profits.

The fourth week focused on income diversification. Participants discussed the various income streams that they had and how they managed them (for instance, bike taxi service in the morning and selling minutes and data in the evening). Besides, the challenges of having multiple income streams were also discussed: insufficient capital to start a new business and the risk involved in doing so, the difficulties of managing multiple businesses simultaneously, and the possible necessity of relying on some-

one who may be dishonest.

In the fifth week, the participants discussed how they found motivation and inspiration as a small business owner and how they managed stress. The extra income, financial independence, respect from friends and family, and female empowerment came up as the main sources of motivation. Furthermore, the participants shared their experiences about times when they felt like giving up (COVID, harassment by city police, customers who bought goods on credit refusing to pay back, etc.) and how they managed to keep going on.

In the final week, participants reflected on what they had learnt over the past weeks as well as avenues for business growth. The pros and cons of registering a small business came up as one of the talking points. The participants also talked about the changes that they planned to implement or had already implemented in their business strategies. It seems that the sessions on sales strategies, saving strategies and business diversification had the most impact. Below are examples of what a couple of participants said, quoted verbatim:

"I never used to give things out for sell pay, but I learned from this meeting from a fellow colleague that customers can be trusted depending on the relationship and I started giving goods out for sell pay[7] *which has boosted my business to another level. Now my customers wait for me to bring goods before buying as they don't wanna buy from anyone else because of the relationship we have built over the time."*

"I learnt a lot from my friends during these six weeks. Firstly, I learned about having another source of income and I've already tried it and it's working for me. Before I started this meeting I was selling only flour but after one of the meetings I decided to apply what I learned so I start frying kala and it's going so well. I also learned how to manage my money and avoid spending on things that will break

[7] "Sell pay" is the Liberian expression for "selling on credit".

the business to collapse. Now whenever I come from buying my business I can sit and calculate all my expenses and then decide on how much I will see the goods and how much profit I will get."

Treatment Effect of Business Discussion Groups

The sample of participants for the business discussion groups was a sub sample of the applicants to the SSB program. Therefore, some participants took part in both business discussion groups as well as received the cash grant intervention. For simplification, in the analysis of the treatment effect that follows, we focus on the sample that was *not* randomly selected to receive the grant. Tables presenting summary statistics on this restricted sample are presented in the Appendix Section 2. Regression tables including the effect of both treatments and their combination are presented in Appendix Section 2. Results show that while the treatment effect of business discussion groups are similar using both estimation strategies, the effect of the business discussion groups and the effect of the grant do not seem to be complements. When all grant winners who are excluded from the sample, a variable controlling for lottery attendance is added to the estimation equation.[8]

Attrition

Out of the 1,126 entrepreneurs in our sample, 1,039 answered the endline survey, which represents an attrition of around 8%. There was no differential attrition, with 404 out of 434 entrepreneurs in the treatment group responded to the endline survey (7% attrition), and 635 out of 692 in the control group (8%). Appendix Table A.5 shows that there is balance between those who responded at endline and those who did not.

[8]Indeed, while, conditional on attending, winning the lottery is a random event, attending is not. Controlling for attendance may thus capture underlying differences between respondents who attended and those who did not.

Sample Balance

Table A.4 shows balance between treatment and control group, conditional on answering the endline survey. Most variables do not show strong significant differences between treatment and control, and differences are small in magnitude. One exception are business revenues, and a variable measuring category of business revenue is added as a control in all specifications.

TABLE 4: BALANCE TABLE, CONDITIONAL ON ANSWERING THE ENDLINE SURVEY

	(1)		(2)		(1)-(2)	
	Not invited to discussion groups		Invited to discussion groups		Pairwise t-test	
Variable	N	Mean/(SD)	N	Mean/(SD)	N	P-value
Female	412	0.798	264	0.769	676	0.442
		(0.466)		(0.471)		
Age	412	37.060	264	36.701	676	0.737
		(13.840)		(13.409)		
Single	412	0.318	264	0.355	676	0.394
		(0.525)		(0.552)		
No. of hh members	412	4.465	263	4.483	675	0.934
		(2.898)		(2.563)		
Literate	412	0.574	263	0.650	675	0.087*
		(0.590)		(0.546)		
Has formal education	412	0.684	263	0.762	675	0.057*
		(0.564)		(0.485)		
Age at first employment	412	21.371	264	21.706	676	0.530
		(6.522)		(6.924)		
Poverty score (intake)	412	29.640	264	30.590	676	0.485
		(16.518)		(17.716)		
Risk aversion index	412	3.531	264	3.467	676	0.505
		(1.206)		(1.242)		
No. of businesses owned in past 5 years	412	1.425	263	1.396	675	0.631
		(0.816)		(0.703)		
Has an active business	412	0.912	263	0.852	675	0.041**
		(0.296)		(0.410)		
Business motivation index	412	0.055	264	0.061	676	0.595
		(0.134)		(0.130)		
Business support activities index	412	0.672	264	0.685	676	0.580
		(0.321)		(0.309)		
Business challenges index	407	5.274	259	5.332	666	0.768
		(2.411)		(2.457)		
Total revenues	412	44.686	263	35.379	675	0.025**
		(57.461)		(49.039)		
Total cost	412	29.453	263	22.162	675	0.054*
		(57.542)		(40.652)		
Profits	412	15.234	263	13.217	675	0.620
		(55.078)		(49.005)		

Notes : All variables are measured at baseline, with the sole exception of poverty score. The business motivation index combines respondents' level of agreement to 6 statements on their reasons for running a business. The higher the index, the higher the level of motivation to run a business. The business support activities index combines how often respondents undertake 9 different activities such as advertising, offering discounts, etc. to support their business. The business challenges index averages how severely (measured on a 10-point scale) respondents face 7 different challenges such as access to finance, corruption, etc. The higher the index, the higher the severity of the challenges faced. Total revenues, total costs and profits have been computed by summing over all current businesses and winsorizing at the 5% level. The sample in this table is conditional on answering the endline survey, and not winning the SSB grant. A similar table including grant winners is included in the Appendix.

Estimation Strategy

We estimate the effect of business discussion groups with the following specification:

$$y_{ij} = \alpha + \delta BDG_i + X_{ij}\beta + \epsilon_{ij}$$

where y_{ij} is the outcome of firm i in market j, BDG_i is a dummy that takes the value 1 if firm i is invited to participate in business discussion groups and X_{ij} is a vector of controls. α is the intercept and δ captures the effect of being invited to the business discussion groups.

Since not all business owners who were invited to participate in the business discussion groups actually participated, we also estimate the following specification, which uncovers the treatment-on-the-treated-estimate:

$$y_{ij} = \alpha + \delta \widehat{BDG_i} + X_{ij}\beta + \epsilon_{ij}$$

where $\widehat{BDG_i}$ is a dummy that takes the value 1 when firm i participates in the discussion groups, and is instrumented by BDG_i, a dummy that take the value 1 when firm i is invited to participate. Under some assumptions, the coefficients δ and γ now capture the effect of participating in the intervention.

Treatment Effect on Innovation and Business Practices

The most striking effect of the business discussion groups is on the adoption of businesses practices. Table 5 shows the effect of business discussion groups on these outcomes. Participants are about 54% more likely to have adopted an innovation in the past two years. Questions on innovation include whether the participant started buying inputs from new suppliers, started selling new products or services, changed marketing techniques, changed how the goods or services are produced, or started selling prod-

ucts or services in new communities. Discussion groups also significantly increased the innovation adoption score, a standardized sum of the innovation variables. The score improvement is largely a result of introducing a new selling location or changing marketing technique (Appendix Table A.12).

Participants in business discussion groups also have a higher financial planning index. This index is a standardized sum of variables on the businesses' knowledge and usage of business plans, accounting books, and calculations of sales, losses and profits. Results on the treatment effect on each variable of the index shows that this is effect is mostly driven by learning what a business plan is, as well as writing one (Appendix Table A.13).

Lastly, participants seem to have a higher market intelligence index, although the effect on this index is lower in magnitude and not significant. The market intelligence index is a standardized sum of variables on whether interviewees have visited their competitors businesses, asked their customers for feedback, talked with their suppliers for trends in their sector or for price negotiation, or advertised their goods. When each variable of the index is investigated separately, the effect of business discussion groups is not clear, except treated participants are significantly more likely to use special offers to attract customer (Appendix Tables A.14 and A.15)

TABLE 5: AVERAGE IMPACT OF DISCUSSION GROUPS ON BUSINESS PRACTICES

	Innovation Adoption (any)		Innovation Adoption (index)		Financial Planning (index)		Market Intelligence (index)	
	Intent-to-Treat							
Invited to Discussion Groups	0.049*	0.061**	0.17**	0.19***	0.16**	0.17**	0.075	0.071
	(0.03)	(0.03)	(0.07)	(0.07)	(0.08)	(0.08)	(0.08)	(0.08)
	Treatment-on-the-Treated							
Participated in Discussion Groups	0.097*	0.12**	0.33**	0.38***	0.31**	0.34**	0.15	0.14
	(0.05)	(0.05)	(0.14)	(0.14)	(0.15)	(0.15)	(0.15)	(0.15)
Controls	NO	YES	NO	YES	NO	YES	NO	YES
Control Mean	0.221	0.221	-0.055	-0.055	-0.096	-0.096	-0.036	-0.036
Standard dev.	0.415	0.415	0.956	0.956	0.937	0.937	0.962	0.962
Observations	1418	1418	1418	1418	1418	1418	1418	1418

Notes : Standard errors are in parentheses and are robust. Controls are measured at baseline and include category for business revenue, sector dummies, and whether participants attended the lottery (when invited). The outcome in columns (1) and (2) is a dummy that takes the value 1 if the interviewee has adopted at least one innovation in the past two years. The outcomes in columns (3) and (4) is a standardized sum of the same variables on innovation adoption. Outcomes on columns (5) and (6), and columns (7) and (8) are, respectively, standardized sums of questions about financial planning and market intelligence.

Treatment Effect on Digitalization

Participants in business discussion groups are more likely to own cellphones and use them for business purposes. Given that the discussions were conducted over the phone, some of the observed effect is a mechanical effect of simply participating in the treatment. However the substantial magnitude of the treatment effect suggests that other mechanisms are at play.

Table 6 shows business discussion groups' participants access and use of cellphones has increased with the treatment. Participants' households are 46% more likely to own cellphones, and participants are 44% more likely to be able to use cellphones. Business owners who participate in the discussion groups spend over three times more on using their phones for business purposes compared to those in the control group. Notably, the survey was conducted four months after the final group discussion, and respondents

were asked about their phone usage in the week immediately preceding the survey. This timing suggests that the observed increase in phone usage is not solely a direct result of participating in the discussion groups.

Lastly, among respondents who save, those in the treatment group are somewhat more likely to have a mobile money account. While 84% of savers in the control group already own a mobile money account, this figure rises to 94% in the treatment group, nearly reaching full adoption.[9]

TABLE 6: AVERAGE IMPACT OF DISCUSSION GROUPS ON PHONE USAGE

	Household owns a cellphone		Can use a cellphone		Use of phone for business (hours)		Has mobile money account	
	Intent-to-Treat							
Invited to Discussion Groups	0.11***	0.10***	0.079**	0.078**	0.95*	0.99*	0.056	0.061*
	(0.04)	(0.04)	(0.04)	(0.04)	(0.51)	(0.51)	(0.03)	(0.03)
	Treatment-on-the-Treated							
Participated in Discussion Groups	0.21***	0.21***	0.16**	0.16**	1.88*	1.94*	0.097	0.10*
	(0.08)	(0.08)	(0.08)	(0.08)	(1.01)	(1.00)	(0.06)	(0.06)
Controls	NO	YES	NO	YES	NO	YES	NO	YES
Control Mean	0.447	0.447	0.362	0.362	0.788	0.788	0.841	0.841
Standard dev.	0.497	0.497	0.481	0.481	5.390	5.390	0.366	0.366
Observations	1418	1418	1418	1418	675	675	420	420

Notes : Standard errors are in parentheses and are robust. Controls are measured at baseline and include category for business revenue, sector dummies, and whether participants attended the lottery (when invited). Columns (3) and (4) refer to whether the respondent has the possibility to use a cellphone (irrespective of the household owning a cellphone). Columns (5) and (6) report treatment effects on the number of hours the respondent spent using their phone for business in the week preceding the survey. This question was only asked at endline. Columns (7) and (8) report the treatment effect on a variable that takes the value one if the respondents owns an active mobile money account. This question about whether respondents have a mobile money account was inadvertently only asked to the respondents who reported they were able to save, hence the drop in sample size.

Table 7 shows one possible way that participants make use of their phones: social media. While participants in business discussion groups are not significantly more likely to use social media platforms, among those who do

[9]Note that the question about whether respondents have a mobile money account was inadvertently only asked to the respondents who reported they were able to save. Consequently, we only know whether the respondents own a mobile money account among those who save.

use social media, the treatment influenced how they use these platforms. Respondents in the treatment group were nearly three times as likely to use social media for calls and business purposes. While these effects are modest in magnitude, they are relatively large when considering the low levels of social media use for calls or business among the control group.

TABLE 7: AVERAGE IMPACT OF DISCUSSION GROUPS ON SOCIAL MEDIA USAGE

	Social media user (Y/N)		Purpose for using social media: Calls		Purpose for using social media: Messages		Purpose for using social media: Business	
	Intent-to-Treat							
Invited to Discussion Groups	0.021	0.014	0.024*	0.023*	-0.00037	0.00012	0.037**	0.036**
	(0.04)	(0.04)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)
	Treatment-on-the-Treated							
Participated in Discussion Groups	0.041	0.027	0.047*	0.045*	-0.00073	0.00024	0.073**	0.071**
	(0.08)	(0.08)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Controls	NO	YES	NO	YES	NO	YES	NO	YES
Control Mean	0.456	0.456	0.026	0.026	0.041	0.041	0.031	0.031
Standard dev.	0.498	0.498	0.158	0.158	0.199	0.199	0.174	0.174
Observations	1418	1418	1418	1418	1418	1418	1418	1418

Notes : Standard errors are in parentheses and are robust. Controls are measured at baseline and include a category for business revenue, sector dummies, and whether participants attended the lottery (when invited). Respondents are asked whether they use social media, and which platform. For each platform they are then asked what they use the social media platform for. Survey options calls, messages, voice messages, group messages, social cohesion, entertainment, education, and business. Responses where then aggregated by respondent, over all platforms used.

Treatment Effect of Discussion Groups on Social Networks

Business discussion groups significantly changed who the participants interact with on a regular basis, and who they ask for business advice.

Participants in business discussion groups do not report having a greater total number of 'acquaintances'—defined as people outside their immediate household whom they visit frequently or who visit them. They do report having a greater number of acquaintances who are business owners, though this effect is not statistically significant. However, when exam-

ining the *proportion* of acquaintances who are business owners, the effect becomes highly significant, showing that among the people they interact with, participants are more likely to interact, in person, with other business owners. Consistently, participants also report being significantly less likely to ask friends or family for business advice.

TABLE 8: AVERAGE IMPACT OF DISCUSSION GROUPS ON SOCIAL NETWORKS

	Has acquaintances		Number of acquaintances		Number of acquaintances business owners		Share of acquaintances business owners		Asked friends or family for business advice (Y/N)	
	Intent-to-Treat									
Invited to Discussion Groups	-0.018	-0.020	0.0075	-0.0041	0.089	0.087	0.099***	0.100***	-0.075**	-0.070*
	(0.03)	(0.03)	(0.19)	(0.19)	(0.11)	(0.11)	(0.04)	(0.04)	(0.04)	(0.04)
	Treatment-on-the-Treated									
Participated in Discussion Groups	-0.035	-0.040	0.015	-0.0080	0.18	0.17	0.20***	0.20***	-0.15**	-0.14*
	(0.07)	(0.07)	(0.38)	(0.38)	(0.22)	(0.22)	(0.07)	(0.07)	(0.07)	(0.07)
Controls	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Control Mean	0.744	0.744	1.948	1.948	1.151	1.151	0.624	0.624	0.666	0.666
Standard dev.	0.437	0.437	1.983	1.983	1.401	1.401	0.397	0.397	0.472	0.472
Observations	676	676	676	676	676	676	499	499	1418	1418

Notes : Standard errors are in parentheses and are robust.Controls are measured at baseline and include category for business revenue, sector dummies, and whether participants attended the lottery (when invited). Acquaintances are defined as people outside their immediate household whom they visit frequently or who visit them.

Treatment Effect of Discussion Groups on Business Profits and Savings

Participation in business discussion groups did not have a significant impact on business revenues, costs, or profits in the week preceding the survey (9). While respondents in the treatment group report slightly lower revenues and higher costs—potentially reflecting them testing out new marketing techniques, products, services, or sales locations—these effects are not statistically significant. Similarly, participants report lower business profits, this effect size is big though not significant, and no significant changes are observed in the amount of their personal savings.

TABLE 9: AVERAGE IMPACT OF DISCUSSION GROUPS ON BUSINESS PROFITS

	Business Revenues (USD)		Business Costs (USD)		Business Profits (USD)		Personal Savings (USD)	
	Intent-to-Treat							
Invited to Discussion Groups	-2.30	-4.31	2.97	2.73	-5.26	-7.05	-0.11	-0.88
	(5.21)	(5.14)	(4.55)	(4.55)	(4.68)	(4.63)	(7.50)	(7.50)
	Treatment-on-the-Treated							
Participated in Discussion Groups	-4.56	-8.52	5.89	5.40	-10.4	-13.9	-0.21	-1.74
	(10.34)	(10.17)	(9.02)	(8.99)	(9.29)	(9.16)	(14.83)	(14.75)
Controls	NO	YES	NO	YES	NO	YES	NO	YES
Control Mean	48.119	48.119	32.614	32.614	15.505	15.505	68.557	68.557
Standard dev.	65.106	65.106	56.525	56.525	58.576	58.576	93.109	93.109
Observations	1418	1418	1418	1418	1418	1418	1386	1386

Notes : Standard errors are in parentheses and are robust. Controls are measured at baseline and include category for business revenue, sector dummies, and whether participants attended the lottery (when invited). Variables on revenues, costs, and profits, are asked separately for all the businesses owned by the respondent, and then aggregated over all the respondent's businesses. These questions refer to the past week. Personal savings are asked separately from questions on businesses. This question refers to the past three months. The sample size for personal savings is smaller as some respondents refused to respond or did not know the answer. All outcomes in this tables are winsorized at the five percent level.

While participants in business discussion groups are not more or less likely to save, the saving behavior appears to have changed among those who do save (Table 10). Specifically, participants are approximately 14 percentage points less likely to save in the form of cash (compared to a control mean of 0.20). Although other common forms of saving, such as saving groups, mobile money, or bank accounts, show positive changes due to the treatment, these effects are not statistically significant. This finding aligns with discussions frequently raised in the business discussion groups, where some participants highlighted the risks associated with keeping savings in cash.

TABLE 10: AVERAGE IMPACT OF DISCUSSION GROUPS ON SAVINGS

	Savings (Y/N)		Typically saves in saving group		Typically saves in mobile money		Typically saves in cash		Typically saves in bank account	
	Intent-to-Treat									
Invited to Discussion Groups	-0.031	-0.032	0.0043	0.0073	0.036	0.030	-0.086**	-0.080*	0.014	0.013
	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.03)	(0.03)
	Treatment-on-the-Treated									
Participated in Discussion Groups	-0.062	-0.063	0.0073	0.012	0.062	0.051	-0.15**	-0.14*	0.024	0.022
	(0.07)	(0.07)	(0.09)	(0.09)	(0.08)	(0.08)	(0.07)	(0.07)	(0.05)	(0.05)
Controls	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Control Mean	0.642	0.642	0.465	0.465	0.275	0.275	0.232	0.232	0.083	0.083
Standard dev.	0.480	0.480	0.500	0.500	0.447	0.447	0.423	0.423	0.276	0.276
Observations	1418	1418	420	420	420	420	420	420	420	420

Notes : Standard errors are in parentheses and are robust. Controls are measured at baseline and include a category for business revenue, sector dummies, and whether participants attended the lottery (when invited). Savings refer to the period of the last three months. Questions on where the respondent typically saves were inadvertently asked only to respondents who indicated having saved in the past three months, hence the smaller sample size.

4 Conclusion

This study provides novel evidence on how virtual business networks can effectively facilitate knowledge transfer and encourage the adoption of improved business practices and strategies, even in settings with limited digital literacy. The intervention's success in promoting business innovation,improving the usage of digital devices, and reshaping business networks suggests that virtual platforms can help overcome traditional barriers to information sharing and learning among small businesses.

The substantial improvements in digital technology adoption and usage among treated entrepreneurs - including increased mobile phone usage for business purposes and greater mobile money adoption - indicate that exposure to peer learning can accelerate digital transformation at the firm level. While we do not detect significant short-term impacts on business profits, the documented changes in business practices and professional networks may yield returns over a longer time horizon.

Our results have important implications for business development programs in developing economies. The relatively low cost and scalability of virtual platforms, combined with their effectiveness in promoting knowledge sharing and practice adoption, suggest they could be a valuable tool for policymakers seeking to support micro-enterprise growth. Future research could explore the longer-term impacts of such interventions and examine how the structure of discussion groups shapes the topics and discussions to optimize their effectiveness.

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A Appendix

1 Moderators' Training Syllabus

- Session 1: Icebreaker Activity
- Session 2: Introduction / Project Background
  - Introduction - Give an overview of the project and the objectives as well as the role they will pay.
- Session 3: Small Business Basics
  - Understanding how micro enterprises function - In this session we will break down the business basics of micro enterprises and how they function. This will help give the moderators a better understanding of the business position of the small group participants.
  - The Value Chain - In this session we will go through the value chain from vegetable production to sale. This will provide context to the specific business that the small group participants are involved in and will shed light on the experiences of the participants.
- Session 4: Moderating Small Groups
  - Introduction to the small groups - overview of the small groups, their purpose and their goals as well as an introduction to the rules of the small group discussions.
  - Roles and Responsibilities - In this session we will go through the moderatorâs roles and responsibilities, moderatorâs authority and characteristics of effective moderation.

- Communication Skills - This session will cover effective communication strategies, conflict resolution and de-escalation techniques, and best practices with communicating in small groups.
- Group Management - This session will cover, understanding group dynamics, managing group norms and culture, encouraging participation, and facilitation.
- Technical Training - This session will go through how to use the platform and it features, using moderation tools, and troubleshooting when there are technical issues.
- Group Exercises - In this session we will do some practical group exercises.

2 Additional Tables

Business Discussion Groups, Descriptive Statistics

TABLE A.1: SUMMARY STATISTICS ON TREATMENT TAKE-UP

	# of obs	Prop. of sample
In sample	740	1.000
Invited to participate	286	0.386
Consented to participate	178	0.241
Attended in-person meeting	136	0.184
Attended second meeting	105	0.142
Attended third meeting	107	0.145
Attended fourth meeting	101	0.136
Attended fifth meeting	104	0.141
Attended sixth meeting	114	0.154

TABLE A.2: SUMMARY STATISTICS ON MEMORY OF DISCUSSION TOPICS

	# of obs	Prop. of treatment
Invited to participate	434	1.000
Remembers being invited	216	0.498
Remembers having participated	204	0.470
Remembers discussing challenges	115	0.564
Discussing challenges was useful	52	0.255
Remembers discussing sales	108	0.529
Discussing sales was useful	63	0.309
Remembers discussing finances	153	0.750
Discussing finances was useful	133	0.652
Remembers discussing income	51	0.250
Discussing income was useful	24	0.118
Remembers discussing partners	66	0.324
Discussing partners was useful	24	0.118
Remembers discussing growth	110	0.539
Discussing growth was useful	69	0.338

Notes : Business challenges, sales, finances, income streams, partnerships , and growth strategies correspond to the topics of each of the six weeks of meetings, in this order. At endline, all participants are asked what topics they remember discussing in the meetings, and the enumerator selects each of the topics mentioned by the respondents. For each topic that the respondent remembers discussing, he/she is asked whether he/she found that topic useful.

TABLE A.3: SUMMARY STATISTICS ON SELF-REPORTED TREATMENT EFFECT

	# of obs	Mean	Min	Max	Median
Sessions attended (self-rep)	203	3.54	0	8	4
Impact on business (1 to 3)	204	2.82	1	3	3
Would recommend (0 to 10)	204	8.67	0	10	10
# of acquaintances from treatment	203	0.36	0	15	0
# of advisors from treatment	204	0.13	0	4	0

Notes : The number of sessions attended is self-reported. Impact scale of 1 to 3 corresponds to not at all useful (1), to very useful (3). Recommendation scale of 1 to 10 corresponds to not likely (1) to very likely (10).

Regression Tables with Both Treatments

Estimation Strategy

We estimate the effect of business discussion groups among businesses that were in the randomization sample, with the following specification, :

$$y_{ij} = \alpha + \delta BDG_i(1 - T_{ij}) + \gamma BDG_i T_{ij} + \lambda(1 - BDG_i)T_{ij} + X_{ij}\beta + \epsilon_{ij}$$

where y_{ij} is the outcome of firm i in market j, BDG_i is a dummy that takes the value 1 if firm i is invited to participate in business discussion groups. T_{ij} is the grnat treatment status ($T_{ij} = 1$ if firm i won the lottery, and $T_{ij} = 0$ if firm i did not), and X_{ij} is a vector of controls. α is the intercept, δ captures the effect of being invited to the business discussion groups on firms who did not win the lottery. γ captures the combined effect of being invited to the business discussion groups and winning the grant lottery. λ captures the effect of winning the grant lottery, on businesses who were not invited to the business discussion groups.

Since not all businesses who were invited to participate in the business discussion groups actually participated, we also estimate the following specification, which uncovers the treatment-on-the-treated-estimate:

$$y_{ij} = \alpha + \delta \widehat{BDG_i}(1 - T_{ij}) + \gamma \widehat{BDG_i} T_{ij} + \lambda(1 - \widehat{BDG_i})T_{ij} + X_{ij}\beta + \epsilon_{ij}$$

where $\widehat{BDG_i}$ is a dummy that takes the value 1 when firm i participates in the discussion groups, and is instrumented by BDG_i, a dummy that take the value 1 when firm i is invited to participate. Under some assumptions, the coefficients δ and γ now capture the effect of participating in the intervention.

Balance

TABLE A.4: BALANCE TABLE OF BASELINE VARIABLES BETWEEN DISCUSSION GROUP PARTICIPANTS AND NON-PARTICIPANTS (ENDLINE RESPONDENTS ONLY)

	(1) Not randomized into BCI		(2) Randomized into BCI		(1)-(2) Pairwise t-test	
Variable	N	Mean/(SD)	N	Mean/(SD)	N	P-value
Female	635	0.808 (0.394)	404	0.795 (0.405)	1039	0.599
Age	635	36.910 (11.922)	404	37.163 (11.671)	1039	0.736
Single	635	0.372 (0.484)	404	0.358 (0.479)	1039	0.649
No. of hh members	635	4.526 (2.464)	403	4.553 (2.389)	1038	0.860
Literate	635	0.608 (0.489)	403	0.620 (0.486)	1038	0.688
Has formal education	635	0.704 (0.457)	403	0.734 (0.442)	1038	0.288
Age at first employment	635	21.246 (5.836)	404	21.584 (6.051)	1039	0.369
Poverty score (intake)	635	29.222 (14.842)	404	30.857 (15.204)	1039	0.087*
Risk aversion index	635	3.562 (0.995)	404	3.439 (1.111)	1039	0.064*
No. of businesses owned in past 5 years	635	1.405 (0.659)	403	1.397 (0.632)	1038	0.852
Has an active business	635	0.891 (0.311)	403	0.878 (0.327)	1038	0.523
Business motivation index	635	0.052 (0.120)	404	0.061 (0.123)	1039	0.275
Business support activities index	635	0.669 (0.288)	404	0.678 (0.269)	1039	0.590
Business challenges index	625	5.199 (2.006)	399	5.241 (2.010)	1024	0.740
Total revenues	635	43.682 (51.104)	403	36.352 (40.788)	1038	0.015**
Total cost	635	27.701 (46.966)	403	24.629 (42.437)	1038	0.287
Profits	635	15.980 (46.590)	403	11.723 (39.187)	1038	0.128

Notes : All variables are measured at baseline, with the sole exception of poverty score. The business motivation index combines respondents' level of agreement to 6 statements on their reasons for running a business. The higher the index, the higher the level of motivation to run a business. The business support activities index combines how often respondents undertake 9 different activities such as advertising, offering discounts, etc. to support their business. The business challenges index averages how severely (measured on a 10-point scale) respondents face 7 different challenges such as access to finance, corruption, etc. The higher the index, the higher the severity of the challenges faced. Total revenues, total costs and profits have been computed by summing over all current businesses and winsorizing at the 5% level.

Attrition

TABLE A.5: BALANCE TABLE OF BASELINE VARIABLES BETWEEN ENDLINE RESPONDENTS AND NON-RESPONDENTS

	(1) Did not respond at endline		(2) Responded at endline		(1)-(2) Pairwise t-test	
Variable	N	Mean/(SD)	N	Mean/(SD)	N	P-value
Female	92	0.839 (0.399)	1039	0.802 (0.462)	1131	0.395
Age	92	40.270 (19.031)	1039	37.190 (13.829)	1131	0.128
Single	92	0.374 (0.587)	1039	0.347 (0.543)	1131	0.668
No. of hh members	91	4.562 (2.987)	1038	4.511 (2.800)	1129	0.877
Literate	91	0.558 (0.641)	1038	0.601 (0.579)	1129	0.534
Has formal education	91	0.606 (0.644)	1038	0.708 (0.540)	1129	0.140
Age at first employment	92	19.869 (8.059)	1039	21.540 (6.784)	1131	0.053*
Poverty score (intake)	92	31.427 (16.182)	1039	30.020 (17.131)	1131	0.425
Risk aversion index	92	3.733 (0.781)	1039	3.516 (1.214)	1131	0.015**
No. of businesses owned in past 5 years	91	1.437 (0.947)	1038	1.408 (0.771)	1129	0.778
Has an active business	91	0.872 (0.446)	1038	0.892 (0.347)	1129	0.664
Business motivation index	92	0.044 (0.125)	1039	0.055 (0.132)	1131	0.403
Business support activities index	92	0.593 (0.482)	1039	0.676 (0.318)	1131	0.104
Business challenges index	89	4.905 (2.604)	1024	5.265 (2.431)	1113	0.207
Total revenues	91	37.378 (39.964)	1038	40.416 (54.201)	1129	0.500
Total cost	91	25.102 (45.984)	1038	26.210 (51.775)	1129	0.827
Profits	91	12.277 (39.978)	1038	14.205 (51.892)	1129	0.666

Notes : All variables are measured at baseline, with the sole exception of poverty score. The business motivation index combines respondents' level of agreement to 6 statements on their reasons for running a business. The higher the index, the higher the level of motivation to run a business. The business support activities index combines how often respondents undertake 9 different activities such as advertising, offering discounts, etc. to support their business. The business challenges index averages how severely (measured on a 10-point scale) respondents face 7 different challenges such as access to finance, corruption, etc. The higher the index, the higher the severity of the challenges faced. Total revenues, total costs and profits have been computed by summing over all current businesses and winsorizing at the 5% level.

Treatment Effect on Innovation and Business Practices

TABLE A.6: AVERAGE IMPACT OF DISCUSSION GROUPS ON BUSINESS PRACTICES

	Innovation Adoption (any)		Innovation Adoption (index)		Financial Planning (index)		Market Intelligence (index)	
	Intent-to-Treat							
Randomized in BDG only	0.049*	0.060**	0.17**	0.19***	0.16**	0.17**	0.075	0.070
	(0.03)	(0.03)	(0.07)	(0.07)	(0.08)	(0.08)	(0.08)	(0.08)
Won Lottery only	0.14***	0.15***	0.50***	0.52***	1.18***	1.26***	0.14*	0.15*
	(0.03)	(0.03)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)
Randomized in BDG and Won Lottery	0.15***	0.14***	0.42***	0.39***	1.21***	1.26***	0.20**	0.21**
	(0.03)	(0.03)	(0.09)	(0.09)	(0.09)	(0.10)	(0.09)	(0.10)
	Treatment-on-the-Treated							
Participated in BDG only	0.097*	0.12**	0.33**	0.38***	0.31**	0.33**	0.15	0.14
	(0.05)	(0.05)	(0.15)	(0.14)	(0.16)	(0.16)	(0.15)	(0.15)
Won Lottery only	0.14***	0.15***	0.50***	0.52***	1.18***	1.26***	0.14*	0.15*
	(0.03)	(0.03)	(0.08)	(0.08)	(0.08)	(0.09)	(0.08)	(0.08)
Participated in BDG and Won Lottery	0.30***	0.27***	0.81***	0.76***	2.36***	2.45***	0.38**	0.41**
	(0.06)	(0.07)	(0.18)	(0.18)	(0.19)	(0.20)	(0.18)	(0.19)
Controls	NO	YES	NO	YES	NO	YES	NO	YES
Control Mean	0.209	0.209	-0.070	-0.070	-0.004	-0.004	-0.019	-0.019
Standard dev.	0.407	0.407	0.960	0.960	0.972	0.972	0.972	0.972
Observations	2168	2168	2168	2168	2168	2168	2168	2168

Notes : Standard errors are in parentheses and are robust. Controls are measured at baseline and include category for business revenue, sector dummies, and whether participants attended the lottery (when invited). The outcome in columns (1) and (2) is a dummy that takes the value 1 if the interviewee has adopted at least one "innovation" in the past two years. The outcomes in columns (3) and (4) is a standardized sum of the same variables on innovation adoption. Outcomes on columns (5) and (6), and columns (7) and (8) are, respectively, standardized sums of questions about financial planning and market intelligence.

Treatment Effect on Digitalization

TABLE A.7: AVERAGE IMPACT OF DISCUSSION GROUPS ON PHONE USAGE

	Household owns a cellphone		Can use a cellphone		Use of phone for business (hours)		Has mobile money account	
	Intent-to-Treat							
Randomized in BDG only	0.11***	0.11***	0.079**	0.079**	0.95*	0.97*	0.056*	0.061**
	(0.04)	(0.04)	(0.04)	(0.04)	(0.53)	(0.53)	(0.03)	(0.03)
Won Lottery only	-0.022	-0.037	-0.043	-0.043	0.80	0.63	0.12***	0.10***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.56)	(0.64)	(0.03)	(0.03)
Randomized in BDG and Won Lottery	-0.034	-0.046	-0.0015	-0.0012	0.78	0.62	0.11***	0.092**
	(0.05)	(0.05)	(0.05)	(0.05)	(0.66)	(0.73)	(0.03)	(0.04)
	Treatment-on-the-Treated							
Participated in BDG only	0.21***	0.21***	0.16**	0.16**	1.88*	1.91*	0.097*	0.10**
	(0.08)	(0.08)	(0.08)	(0.07)	(1.06)	(1.05)	(0.05)	(0.05)
Won Lottery only	-0.022	-0.036	-0.043	-0.043	0.80	0.65	0.12***	0.11***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.56)	(0.65)	(0.03)	(0.03)
Participated in BDG and Won Lottery	-0.066	-0.088	-0.0030	-0.0010	1.52	1.25	0.20***	0.17**
	(0.09)	(0.10)	(0.09)	(0.10)	(1.28)	(1.43)	(0.06)	(0.07)
Controls	NO	YES	NO	YES	NO	YES	NO	YES
Control Mean	0.450	0.450	0.363	0.363	0.918	0.918	0.870	0.870
Standard dev.	0.498	0.498	0.481	0.481	5.654	5.654	0.336	0.336
Observations	2168	2168	2168	2168	1038	1038	734	734

Notes : Standard errors are in parentheses and are robust. Controls are measured at baseline and include category for business revenue, sector dummies, and whether participants attended the lottery (when invited). Columns (7) and (8) report the treatment effect on a variable that takes the value one if the respondents owns an active mobile money account. The question about whether respondents have a mobile money account was inadvertently only asked to the respondents who reported they were able to save.

TABLE A.8: AVERAGE IMPACT OF DISCUSSION GROUPS ON SOCIAL MEDIA USAGE

	Social media user (Y/N)		Purpose for using social media: Calls		Purpose for using social media: Messages		Purpose for using social media: Business	
	Intent-to-Treat							
Randomized in BDG only	0.021	0.016	0.024*	0.023*	-0.00037	-0.00074	0.037**	0.037**
	(0.04)	(0.04)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)
Won Lottery only	0.066	0.088**	0.019	0.018	-0.0086	-0.00083	0.051***	0.055***
	(0.04)	(0.04)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Randomized in BDG and Won Lottery	-0.051	-0.022	0.028*	0.029*	-0.018	-0.0099	0.025	0.030
	(0.05)	(0.05)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
	Treatment-on-the-Treated							
Participated in BDG only	0.041	0.032	0.047*	0.045*	-0.00073	-0.0015	0.073**	0.072**
	(0.08)	(0.08)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Won Lottery only	0.066	0.088**	0.019	0.018	-0.0086	-0.00082	0.051***	0.055***
	(0.04)	(0.04)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Participated in BDG and Won Lottery	-0.099	-0.042	0.055*	0.057*	-0.034	-0.019	0.049	0.059
	(0.09)	(0.10)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)
Controls	NO	YES	NO	YES	NO	YES	NO	YES
Control Mean	0.446	0.446	0.026	0.026	0.036	0.036	0.032	0.032
Standard dev.	0.497	0.497	0.161	0.161	0.186	0.186	0.176	0.176
Observations	2168	2168	2168	2168	2168	2168	2168	2168

Notes : Standard errors are in parentheses and are robust. Controls are measured at baseline and include a category for business revenue, sector dummies, and whether participants attended the lottery (when invited). Respondents are asked whether they use social media, and which platform. For each platform they are then asked what they use the social media platform for. Survey options calls, messages, voice messages, group messages, social cohesion, entertainment, education, and business. Responses where then aggregated by respondent, over all platforms used.

Treatment Effect of Discussion Groups on Social Networks

TABLE A.9: AVERAGE IMPACT OF DISCUSSION GROUPS ON SOCIAL NETWORKS

	Has acquaintances		Number of acquaintances		Number of acquaintances business owners		Share of acquaintances business owners		Asked friends or family for business advice (Y/N)	
	Intent-to-Treat									
Randomized in BDG only	-0.018	-0.019	0.0075	-0.0031	0.089	0.084	0.099***	0.099***	-0.075**	-0.071*
	(0.04)	(0.04)	(0.19)	(0.19)	(0.11)	(0.11)	(0.04)	(0.04)	(0.04)	(0.04)
Won Lottery only	-0.042	-0.060	-0.052	-0.12	0.051	0.070	0.053	0.059	0.0040	0.034
	(0.04)	(0.04)	(0.20)	(0.23)	(0.12)	(0.14)	(0.04)	(0.04)	(0.04)	(0.04)
Randomized in BDG and Won Lottery	-0.090**	-0.10**	-0.30	-0.34	-0.11	-0.084	0.057	0.062	0.062	0.083*
	(0.04)	(0.05)	(0.23)	(0.26)	(0.14)	(0.15)	(0.05)	(0.05)	(0.05)	(0.05)
	Treatment-on-the-Treated									
Participated in BDG only	-0.035	-0.038	0.015	-0.0057	0.18	0.17	0.20***	0.20***	-0.15**	-0.14*
	(0.07)	(0.07)	(0.37)	(0.37)	(0.22)	(0.22)	(0.07)	(0.07)	(0.07)	(0.07)
Won Lottery only	-0.042	-0.060	-0.052	-0.12	0.051	0.072	0.053	0.062	0.0040	0.034
	(0.04)	(0.04)	(0.20)	(0.23)	(0.12)	(0.14)	(0.04)	(0.04)	(0.04)	(0.04)
Participated in BDG and Won Lottery	-0.18**	-0.20**	-0.58	-0.67	-0.21	-0.16	0.11	0.13	0.12	0.16*
	(0.09)	(0.10)	(0.45)	(0.51)	(0.27)	(0.30)	(0.09)	(0.10)	(0.09)	(0.09)
Controls	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Control Mean	0.726	0.726	1.891	1.891	1.126	1.126	0.630	0.630	0.675	0.675
Standard dev.	0.446	0.446	2.117	2.117	1.404	1.404	0.398	0.398	0.469	0.469
Observations	1037	1037	1037	1037	1037	1037	746	746	2168	2168

Notes : Standard errors are in parentheses and are robust.Controls are measured at baseline and include category for business revenue, sector dummies, and whether participants attended the lottery (when invited).

Treatment Effect of Discussion Groups on Business Profits and Savings

TABLE A.10: AVERAGE IMPACT OF DISCUSSION GROUPS ON BUSINESS PROFITS

	Business Revenues (USD)		Business Costs (USD)		Business Profits (USD)		Personal Savings (USD)	
	Intent-to-Treat							
Randomized in BDG only	-2.30	-4.79	2.97	2.33	-5.26	-7.13	-0.11	-1.30
	(5.49)	(5.37)	(4.94)	(4.94)	(4.98)	(4.92)	(7.70)	(7.67)
Won Lottery only	23.1***	20.9***	18.2***	15.2***	4.85	5.72	78.1***	79.3***
	(5.79)	(6.00)	(5.21)	(5.51)	(5.25)	(5.49)	(8.19)	(8.65)
Randomized in BDG and Won Lottery	19.3***	21.8***	29.2***	27.7***	-9.87	-5.86	37.9***	41.1***
	(6.81)	(6.94)	(6.13)	(6.38)	(6.18)	(6.36)	(9.62)	(10.00)
	Treatment-on-the-Treated							
Participated in BDG only	-4.56	-9.53	5.89	4.57	-10.4	-14.1	-0.21	-2.65
	(10.91)	(10.65)	(9.83)	(9.78)	(9.89)	(9.75)	(15.25)	(15.16)
Won Lottery only	23.1***	20.9***	18.2***	15.2***	4.85	5.70	78.1***	79.3***
	(5.80)	(6.02)	(5.22)	(5.52)	(5.25)	(5.50)	(8.21)	(8.68)
Participated in BDG and Won Lottery	37.6***	42.3***	56.8***	53.8***	-19.2	-11.5	74.2***	80.4***
	(13.26)	(13.57)	(11.95)	(12.45)	(12.02)	(12.41)	(18.87)	(19.67)
Controls	NO	YES	NO	YES	NO	YES	NO	YES
Control Mean	48.632	48.632	34.032	34.032	14.600	14.600	70.160	70.160
Standard dev.	64.709	64.709	59.215	59.215	58.488	58.488	91.829	91.829
Observations	2168	2168	2168	2168	2168	2168	2109	2109

Notes : Standard errors are in parentheses and are robust. Controls are measured at baseline and include category for business revenue, sector dummies, and whether participants attended the lottery (when invited). Variables on revenues, costs, and profits, are asked separately for all the businesses owned by the respondent, and then aggregated over all the respondent's businesses. These questions refer to the past week. Personal savings are asked separately from questions on businesses. This question refers to the past three months. All outcomes in this tables are winsorized at the five percent level.

TABLE A.11: AVERAGE IMPACT OF DISCUSSION GROUPS ON SAVINGS

	Savings (Y/N)		Typically saves in saving group		Typically saves in mobile money		Typically saves in cash		Typically saves in bank account	
	Intent-to-Treat									
Randomized in BDG only	-0.031	-0.032	0.0043	0.0061	0.036	0.031	-0.086**	-0.081**	0.014	0.014
	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.03)	(0.03)
Won Lottery only	0.24***	0.21***	0.033	0.0017	-0.014	0.041	-0.12***	-0.13***	0.064**	0.061*
	(0.04)	(0.04)	(0.05)	(0.06)	(0.04)	(0.05)	(0.04)	(0.04)	(0.03)	(0.03)
Randomized in BDG and Won Lottery	0.22***	0.20***	-0.034	-0.056	0.14***	0.19***	-0.12***	-0.14***	0.045	0.043
	(0.04)	(0.05)	(0.06)	(0.06)	(0.05)	(0.06)	(0.04)	(0.05)	(0.03)	(0.04)
	Treatment-on-the-Treated									
Participated in BDG only	-0.062	-0.064	0.0073	0.010	0.062	0.052	-0.15**	-0.14**	0.024	0.023
	(0.07)	(0.07)	(0.09)	(0.09)	(0.08)	(0.08)	(0.07)	(0.07)	(0.05)	(0.05)
Won Lottery only	0.24***	0.21***	0.033	0.0019	-0.014	0.041	-0.12***	-0.13***	0.064**	0.061*
	(0.04)	(0.04)	(0.05)	(0.06)	(0.04)	(0.05)	(0.04)	(0.04)	(0.03)	(0.03)
Participated in BDG and Won Lottery	0.43***	0.39***	-0.064	-0.11	0.26***	0.36***	-0.22***	-0.27***	0.084	0.081
	(0.09)	(0.09)	(0.10)	(0.12)	(0.09)	(0.11)	(0.08)	(0.09)	(0.06)	(0.07)
Controls	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Control Mean	0.664	0.664	0.456	0.456	0.311	0.311	0.206	0.206	0.094	0.094
Standard dev.	0.473	0.473	0.499	0.499	0.463	0.463	0.405	0.405	0.292	0.292
Observations	2167	2167	734	734	734	734	734	734	734	734

Notes : Standard errors are in parentheses and are robust. Controls are measured at baseline and include a category for business revenue, sector dummies, and whether participants attended the lottery (when invited). Savings refer to the period of the last three months. Questions on where the respondent typically saves were inadvertently asked only to respondents who indicated having saved in the past three months.

Treatment Effect of Discussion Groups on Each Component of Innovation, Financial Planning and Market Intelligence Indices

TABLE A.12: AVERAGE IMPACT OF DISCUSSION GROUPS ON VARIOUS COMPONENTS OF INNOVATION INDEX

	New Suppliers		New Products		New Marketing Techniques		New Production Technology		New Communities	
	Intent-to-Treat									
Invited to Discussion Groups	-0.019	-0.00030	-0.011	0.0072	0.078**	0.092**	0.021	0.027	0.061*	0.069**
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.02)	(0.02)	(0.03)	(0.03)
	Treatment-on-the-Treated									
Participated in Discussion Groups	-0.038	-0.00058	-0.022	0.014	0.15**	0.18**	0.040	0.053	0.12*	0.13**
	(0.08)	(0.08)	(0.08)	(0.07)	(0.08)	(0.07)	(0.05)	(0.04)	(0.06)	(0.06)
Controls	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Control Mean	0.120	0.120	0.093	0.093	0.085	0.085	0.039	0.039	0.081	0.081
Standard dev.	0.325	0.325	0.290	0.290	0.279	0.279	0.193	0.193	0.273	0.273
Observations	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418

Notes : Standard errors are in parentheses and are robust. Controls are measured at baseline and include a category for business revenue, sector dummies, and whether participants attended the lottery (when invited). Variables are binary and magnitudes can therefore be interpreted as probabilities.

TABLE A.13: AVERAGE IMPACT OF DISCUSSION GROUPS ON VARIOUS COMPONENTS OF FINANCIAL PLANNING INDEX

	Knows Business Plan		Has Written Business Plan		Keeps Accounting Books		Calculates Sales, Profits or Losses	
	Intent-to-Treat							
Invited to Discussion Groups	0.15***	0.15***	0.066*	0.072**	0.029	0.046	-0.032	0.0021
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
	Treatment-on-the-Treated							
Participated in Discussion Groups	0.29***	0.29***	0.13*	0.14**	0.057	0.089	-0.063	0.0041
	(0.09)	(0.09)	(0.07)	(0.07)	(0.08)	(0.08)	(0.08)	(0.07)
Controls	NO	YES	NO	YES	NO	YES	NO	YES
Control Mean	0.402	0.402	0.129	0.129	0.293	0.293	0.870	0.870
Standard dev.	0.491	0.491	0.336	0.336	0.455	0.455	0.336	0.336
Observations	1418	1418	1418	1418	1418	1418	1418	1418

Notes : Standard errors are in parentheses and are robust. Controls are measured at baseline and include a category for business revenue, sector dummies, and whether participants attended the lottery (when invited). Variables are binary and magnitudes can therefore be interpreted as probabilities.

TABLE A.14: AVERAGE IMPACT OF DISCUSSION GROUPS ON VARIOUS COMPONENTS OF MARKET INTELLIGENCE INDEX

	Visited Competitors To See Prices		Visited Competitors To See Products		Asked Customers Their Preferences		Asked Former Customers Reasons for Stopping		Asked Suppliers Successful Products	
	Intent-to-Treat									
Invited to Discussion Groups	0.11	0.11	0.16	0.17*	-0.066	-0.037	0.0091	0.012	-0.077	-0.068
	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
	Treatment-on-the-Treated									
Participated in Discussion Groups	0.21	0.21	0.31	0.32*	-0.13	-0.071	0.018	0.022	-0.15	-0.13
	(0.19)	(0.19)	(0.19)	(0.19)	(0.20)	(0.19)	(0.19)	(0.18)	(0.20)	(0.19)
Controls	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Control Mean	2.477	2.477	2.417	2.417	2.454	2.454	2.698	2.698	2.349	2.349
Standard dev.	1.148	1.148	1.128	1.128	1.144	1.144	1.075	1.075	1.161	1.161
Observations	1394	1394	1394	1394	1397	1397	1396	1396	1392	1392

Notes : Standard errors are in parentheses and are robust. Controls are measured at baseline and include a category for business revenue, sector dummies, and whether participants attended the lottery (when invited). Each variables takes 4 possible values- Never, Once, Mostly and Always, coded 1, 2, 3 and 4 respectively. This table is being shown for indicative purposes only as magnitudes have no direct interpretation.

TABLE A.15: AVERAGE IMPACT OF DISCUSSION GROUPS ON VARIOUS COMPONENTS OF MARKET INTELLIGENCE INDEX (CONTINUED)

	Used Special Offer To Attract Customers		Did Advertisement		Negotiated Lower Prices With Supplier		Compared Prices/Quality From Diff. Suppliers	
	Intent-to-Treat							
Invited to Discussion Groups	0.21**	0.21**	-0.011	-0.032	0.083	0.082	-0.12	-0.12
	(0.09)	(0.09)	(0.11)	(0.11)	(0.10)	(0.10)	(0.10)	(0.09)
	Treatment-on-the-Treated							
Participated in Discussion Groups	0.40**	0.41**	-0.021	-0.062	0.16	0.16	-0.23	-0.23
	(0.18)	(0.18)	(0.22)	(0.21)	(0.19)	(0.19)	(0.19)	(0.18)
Controls	NO	YES	NO	YES	NO	YES	NO	YES
Control Mean	2.456	2.456	2.184	2.184	2.903	2.903	3.062	3.062
Standard dev.	1.104	1.104	1.273	1.273	1.110	1.110	1.071	1.071
Observations	1390	1390	1389	1389	1396	1396	1394	1394

Notes : Standard errors are in parentheses and are robust. Controls are measured at baseline and include a category for business revenue, sector dummies, and whether participants attended the lottery (when invited). Each variables takes 4 possible values- Never, Once, Mostly and Always, coded 1, 2, 3 and 4 respectively. This table is being shown for indicative purposes only as magnitudes have no direct interpretation.