Digital remittances for migrant workers in India: an unfulfilled promise

Achyuta Adhvaryu[*] Raphaelle Aulagnon[†] Ishita Batra[‡] Smit Gade[§]
Karan Nagpal[¶] Anant Nyshadham[‖]

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Abstract

We study the impact of a workplace program providing training on digital payment applications on the use of such technology for remittances among migrant workers. We find that training in a classroom increases the use of digital payment applications by about 5 percentage points, and individualized training increases use by about 10 percentage points. These increases are large relative to pre-treatment means. The increase in use of digital payments is driven by use for remittance, at least for the individualized treatment - neither treatment had an impact on the use of digital payments for non-remittance purposes. Moreover, as for the more exploratory results, the frequency of remitting and amount remitted do not change. Program cost data paired with these estimates reveal low cost-effectiveness. We discuss potential remaining challenges to adoption of digital payment technologies.

Keywords: financial inclusion, migrants, digital payment technologies, remittances, ready-made garments, India

[*]University of Michigan, NBER, BREAD, Good Business Lab, WDI; adhvaryu@umich.edu
[†]Bocconi University, Good Business Lab
[‡]IDinsight
[§]Good Business Lab
[¶]IDinsight
[‖]University of Michigan, NBER, BREAD, Good Business Lab

1 Introduction

Digital payment technologies[1] have transformed the personal finances of millions of low-income households around the world. In particular, with the rapid rise in access to mobile phones, households that could not previously access the formal financial sector can now send and receive money quickly, safely, and at negligible cost through mobile phones. This has helped them to cope better with economic shocks; save more to improve their health, education, and agricultural productivity; and participate actively in the formal financial sector (Jack and Suri, 2014 (1), Lee et al., 2021 (2), Mbiti and Weil, 2011 (3), Bhalla et al., 2022 (4)).

Such technologies may be particularly valuable for migrant workers who can use them to send remittances back home. While international migrants have long had access to formal remittance channels, internal migrants in low- and middle-income countries have faced higher transaction costs and had fewer options, and hence have had to rely on high-risk informal channels to send money home. For example, in a survey conducted by the Centre for Digital Financial Inclusion (CDFI), 57% internal migrants stated that they send cash home through friends, family, relatives and informal agents (CDFI, 2018 (5)). Digital payment channels – for frexample, mobile applications – can solve these challenges. Such benefits are likely to be large in India, where the number of internal migrants has risen sharply over the past 20 years (Tumbe, 2018 (6), CDFI, 2018 (5)), and where migrants remit a large percentage of their wages home (Tumbe, 2011 (7), CDFI, 2018 (5)) through high-risk informal remittance channels.

However, despite growing ownership of mobile phones and smartphones in India [2], and the availability of several digital payment options, adoption and usage of digital payments remains low. As per the 2017 Findex survey, nearly half the adults did not send or receive money via digital payment channels even

[1]The definition of digital payments usually covers all cash-free channels, including debit cards. However, in our study, we have used digital payments to cover only those methods in which a phone is used to send or receive money. This is the definition we explained to study participants during the surveys and the intervention.

[2]Between 2015 and 2018, the percentage of Indians aged between 18 and 34 years who owned a smartphone increased from 27% to 37%, as per the Pew Research Center, 2019 release.

once in the past year (Findex, 2017 (8)). This is especially true among women: 14% of Indian women reported making a digital payment in the past year, compared to 26% of men (Findex, 2017 (8)).

In the 2021 Findex survey, it is stated that only about 12 percent of adults, that is fewer than 20 percent of account owners, made a digital merchant payment. Two-thirds of those who made a digital merchant payment did so for the first time after the onset of COVID-19, suggesting that the pandemic may have spurred the adoption of digital payments even in the case of India, with low adoption of digital merchant payments (Findex, 2021 (9)).

Several barriers could be restricting the adoption of digital payments among mobile phone owners: first, potential users may not know about digital payment options that they can use to send remittances. Second, even when they know about the existence of these options, they may not know how to use them. Third, even potential users who have some knowledge of the digital payment options may need more practice before they start feeling comfortable using the technology and trusting it. In addition to these barriers, there could also be regulatory and access-related barriers that prevent usage. For example, low internet access can be a barrier, as well as regulatory requirements to link the user's phone number with their bank account.

To measure the extent to which knowledge and familiarity barriers can be addressed using training, we conducted a randomized controlled trial to assess the impact of workplace training on the use of digital payment technologies. We also collected data to assess the extent to which regulatory and access-related requirements prevent migrant workers from using digital payments, even when knowledge barriers have been addressed.

Our intervention was a training session on digital payments, which was provided to 702 female migrant workers in Bangalore, India. The training aimed at building knowledge of digital payment applications, and provided opportunities to practice sending and receiving money. We provided this intervention in

two formats: a standard classroom training format, in which a trainer trained 20-30 workers; and a more individualized format, in which a trainer provided personalized, step-by-step support to 5-6 workers at a time. Participants in both intervention arms also received SMS messages reminding them that they could use digital payments two days after the training session, as well as just before their next salary was disbursed. We compare the use of digital payments for all purposes, and for sending remittances in particular, in these groups with a control group that did not receive any intervention. The experiment was pre-specified, with the Pre-Analysis Plan registered on February 28, 2020.

At baseline, only 5.7 % participants used digital payment applications for all purposes. We find that classroom training increased the use of digital payment applications by about 5 percentage points, and individualized training increased digital payment use by about 11 percentage points. However, when it comes to using digital payments specifically for remittances, only the individualized training had a statistically significant effect, increasing the use of digital payments for remittances by 7-8 percentage points. We find no effects on the amount remitted, participants' perception of financial stress, or salience of account information (knowledge of one's bank account balance) for either intervention.

As many as 85% of the participants at endline did not use digital payment options at all, in spite of being invited to a training session. Survey data indicates that the training was effective at addressing knowledge barriers.[3] We document the extent of the regulatory and access requirements that prevent participants from using digital payments, even when knowledge and familiarity barriers have been addressed. Some of these requirements include that the person have access to internet, that the person's mobile number be linked to their bank account, and that there be sufficient balance on the mobile number (these requirements are discussed in section 3.2). We argue that it is necessary to help people meet regulatory and access requirements, in addition to providing large-scale training to address knowledge gaps, in order to achieve the promised digital financial revolution.

[3]97% of workers who attended a training session (and responded to the survey endline) said they thought it was beneficial to use digital payment applications. 88% of attendees thought the quality of the training session was good.

First, we contribute to the literature on the adoption of digital payments and their effects on the adopters. While the rapid adoption of such products and services, and their beneficial effects, has been documented in several contexts (Jack and Suri, 2014 (1), Lee et al., 2021 (2)), the Indian context has been characterized by very slow adoption (Ligon et al., 2014 (10)). This is potentially driven by relative popularity of mobile money vs. UPI, low ownership of smartphones, low transferability of money from mobile money to bank accounts.(Harihareswara et al., 2021 (11)).

Second, we contribute to a growing literature on how low-cost encouragement programs can lead to large-scale adoption of beneficial products and technologies. Low-cost nudges and assistance programs that have helped overcome initial adoption barriers in other settings (education loans, financial subsidies, pension for widows; (Bettinger et al., 2012 (12), Deshpande and Li, 2018 (13), and Gupta, 2017 (14)). We studied whether similar barriers applied to the use of digital payment applications, and found that eliminating these barriers does increase the take-up rate (albeit not very much due to infrastructure and regulatory requirements).

The rest of the paper is organized as follows. Section 2 discusses the study context. Section 3 discusses the data sources and the construction of key variables. Section 4 describes the estimation strategy and results. Section 5 concludes.

2 Study Context

2.1 About migrant workers in the garment industry in India

The garment industry is a vital part of the economy for many developing countries (Staritz, 2010 (15)). India is the second-largest textile exporter in the world. In 2020, the garment sector accounted for around 10% of exports of goods, and was responsible for 4% of overall employment in India (ILO, 2020

(16)).

The garment sector in India is an excellent setting for studying the financial behavior of female migrant workers. In 2020, the garment industry accounted for 7% of female employment (ILO, 2020 (16)). A large number of these female workers have migrated from rural self-employment to wage labor in urban areas (WBDI, 2012 (17)).

Shahi Exports Private Limited (Shahi), the firm we partnered with to do this study, is the largest private garment exporter in India, and a significant employer of unskilled and semi-skilled female labor [4]. Migrant workers employed by Shahi typically live in gender-segregated hostels near the factories. These hostels are run by an independent NGO.

2.2 Study Design

For the study, we selected 16 women's hostels for Shahi factory workers in the Bangalore region. Each of the workers living in these hostels works at one of 7 Shahi factories.

From the population of workers in the 16 selected hostels, we selected for our study all workers who had smartphones in November 2019 [5]. Since the intervention took place in January 2020, we also removed from the sample workers who had left the factory in the intervening two months. Our total sample size was 702 workers.

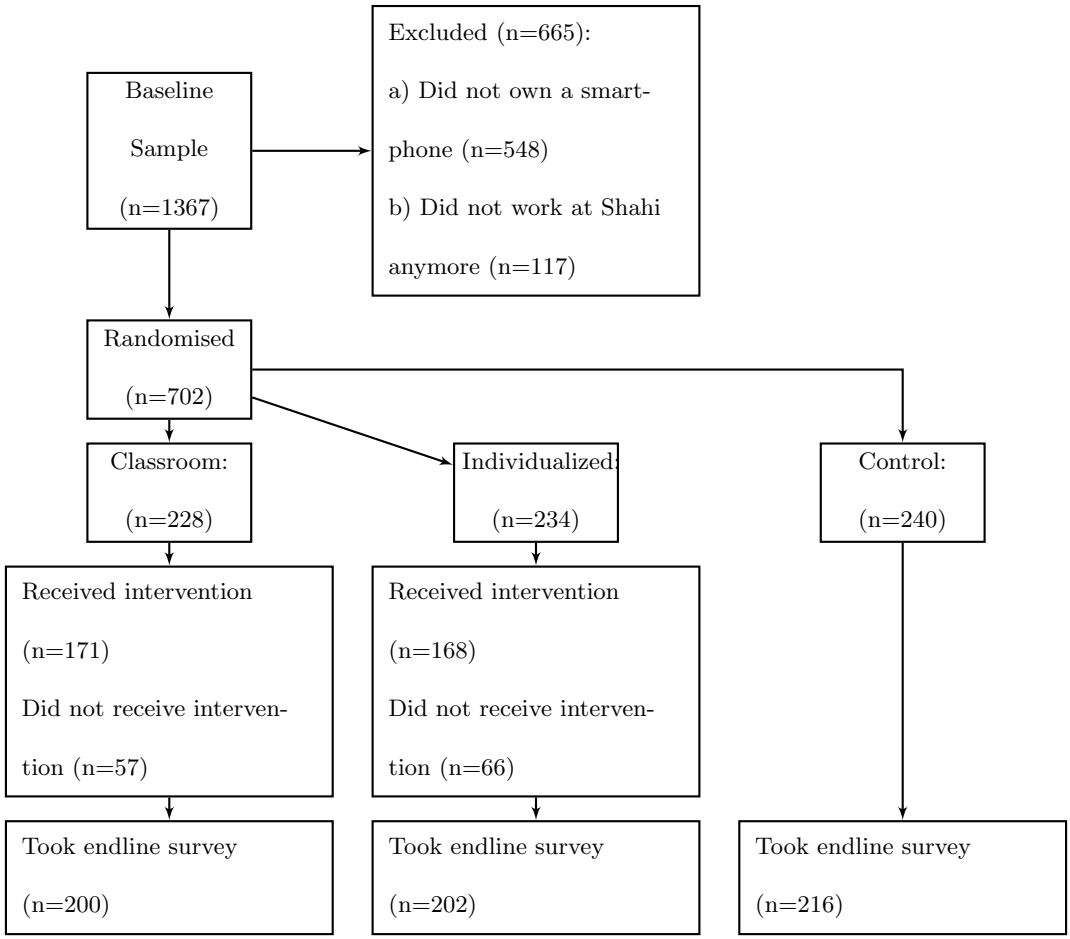
We then randomly assigned these workers to the control group or to one of two treatment groups (classroom training or individualized training). Randomization was at the individual level, stratified by factory and reported phone number-bank account linkage status at baseline (Phone number-bank

[4] https://economictimes.indiatimes.com/news/economy/policy/apparel-industry-model-holds-the-key-for-indias-job-creation-requirements/articleshow/62514682.cms

[5] We had initially expected to be able to provide training to both smartphone and feature phone users. However, the available digital payment technology on feature phones through (∗99#) was not successful at the piloting stage, because workers found the interface difficult to understand.

account linkage is required for setting up a digital payments account). We conducted randomization once, in January 2020, after the baseline was completed. 228 workers were randomly assigned to the classroom training treatment group and 234 to the individualized training treatment group. The remaining 240 workers were assigned to the control group and did not receive any intervention. Figure 1 below shows the number of participants at each stage of the study.

Figure 1: Flowchart of participants' progress through the phases of the trial



2.3 Intervention design

The intervention consisted of a training session on digital payments. HR staff at the factory informed workers in the treatment arms about the training session one day in advance. Workers in treatment arms were asked to bring all items that would be necessary to set up a digital payments account: their debit card, smartphone, and the SIM card linked to their bank account (if the SIM card was linked).

Training took place on factory premises at the end of the workday. Each training session lasted one hour and covered the same content: information on digital payment applications and a guided walkthrough explaining how to sign up for a digital payment application and use it to send money. Participants who successfully created UPI ids (i.e. signed up for the application) were given 50 INR (around 0.7 USD) and encouraged to practice sending money to others in the classroom using the technology.

The two training types/treatment groups are:

> Classroom Treatment: In this treatment arm, 1 trainer and 1 assistant conducted a training session for a classroom of 20-30 participants.
>
> Individualized Treatment: In this treatment arm, 4-6 trainers and assistants divided the classroom into groups and conducted the training. Each group had 5 participants per trainer.

The content of the individualized training was the same as the content in the classroom training. However, trainers in the individualized training session had more time to troubleshoot issues with each participant, given the lower trainer-to-participant ratio. Trainers were more involved in troubleshooting issues, demonstrating on participants' phones, and resolving errors on a case-by-case basis. In contrast, trainers in the classroom treatment did not solve issues individually.

Within two days after the training session, we sent participants an SMS message with a video reviewing the steps for using the digital payment application. We sent another reminder SMS to participants

just before they received their next salary, including again the link to the video and reminding them they could use digital payment applications to remit money. The SMS reminders and video links were identical for both the classroom training and the individualized training.

2.4 Digital payments technology

In our study, we trained workers to use Unified Payments Interface (UPI) technology for making payments. UPI allows users to create a unique id (a UPI id) linked to their bank account, which, in turn, is linked to their mobile number. People can send money from one UPI id to another. This technology is different from mobile money (such as M-Pesa and PayTM), in which users create a virtual wallet and deposit money to this wallet using bank accounts or cash. Transactions using mobile money are conducted between virtual wallets, whereas in UPI transactions, money is moved directly and immediately between bank accounts.

BHIM (Bharat Interface for Money) is a mobile application that leverages UPI technology to allow people to send and receive money from their bank accounts. The BHIM app is one of many digital payment applications that leverages UPI technology. We chose this app for our study because it was offered in study participants' native languages and had a simple interface. However, we expect our results to be generalizable to any UPI application, since they offer similar functionalities.

3 Data

We used data from three sources in our study: survey data, data from the intervention, and administrative data from the factory.

3.1 Surveys

We conducted two rounds of primary surveys to measure the use of digital payment applications.

1. The baseline survey of 1367 workers was conducted in November 2019; it concluded before employees received their December paycheck. From the baseline sample of 1367, we selected the 819 workers who had smartphones. Of these, 702 workers were still working at the firm just before the start of the intervention in end of January 2020. These 702 workers formed the sample for our study.

2. The endline survey was completed in February 2020. From the study sample of 702 workers, we were able to survey 618 workers in the endline survey - 556 in-person interviews and 62 though phone interviews.

Both surveys collected data on digital literacy, current financial behavior, remittance means and use, the use of digital payments, financial monitoring, response to shocks, and perception of financial strain. The endline survey also collected feedback on the training sessions.

3.2 Data from intervention

In the training sessions, we collected attendance data and progress data. Progress data captured how many of the steps for sending money using digital payments each worker was able to complete successfully. These steps are three-fold:

1. Workers meet infrastructure requirements: The infrastructure requirements each worker needs to meet are: her mobile number must be linked to her bank account, the SIM card with this mobile number must be in her smartphone, her mobile phone should have balance, and she should have

brought her debit card to the session. If these requirements are not met, a worker will not be able to set up the digital payments application on her phone.

2. Workers set up the digital payments application on their phones: In order to set up the digital payment application, each worker needs to successfully download the application and set up a UPI id. Successfully downloading the application is contingent on having internet access and adequate storage space on her phone; note that we provided internet access during the training session. Setting up a UPI id requires the worker to receive a passcode via SMS on her phone, and successfully enter this passcode and her debit card information into the app.

3. Workers send and receive money using the digital payment application: Workers should be able to use the application to send and receive money.

Figure 2 in the appendix reports the proportion of each group successfully completing each step.

3.3 Workplace administrative data

The factory provided us with workers' demographic characteristics (date of birth, date of joining, gender, native language, hometown, and marital status), as well as their daily attendance data, monthly salary, and last date of employment.

3.4 Summary Statistics and Balance Checks

Table 1 presents summary statistics of our main outcome variables at baseline, as well as balance checks for baseline values of key variables. Outcome variables are: remittance behavior, use of digital payment applications, and amount remitted monthly. Balance check variables are: age, marital status, native language, awareness of digital payments methods, remittance fees, financial stress, whether tracking

bank balance, and ease of coming up with 4000INR for an emergency.

Table 1: Summary Statistics at Baseline.

		Total average			Difference in means		
	Total	Control (C)	Classroom (CR)	Individualized (I)	(C)-(CR)	(C)-(I)	(CR)-(I)
Age (years)	23.6	23.3	23.8	23.7	-0.50	-0.32	0.18
	(4.16)	(3.75)	(4.43)	(4.30)	(0.38)	(0.37)	(0.41)
Marital Status[a]	0.047	0.033	0.066	0.043	-0.032	-0.0094	0.023
	(0.21)	(0.18)	(0.25)	(0.20)	(0.020)	(0.018)	(0.021)
Language[b]	0.50	0.49	0.46	0.55	0.027	-0.055	-0.082*
	(0.50)	(0.50)	(0.50)	(0.50)	(0.046)	(0.046)	(0.046)
Remittance dummy[c]	0.86	0.85	0.85	0.89	0.0033	-0.035	-0.038
	(0.34)	(0.35)	(0.36)	(0.31)	(0.033)	(0.031)	(0.031)
Awareness of digital payment method[d]	0.63	0.62	0.60	0.67	0.019	-0.054	-0.074
	(0.48)	(0.49)	(0.49)	(0.47)	(0.045)	(0.044)	(0.045)
Use of digital payment methods[e]	0.05	0.05	0.04	0.06	0.00	-0.01	-0.02
	(0.23)	(0.23)	(0.21)	(0.25)	(0.020)	(0.022)	(0.022)
Quantity remitted[f]	3719.1	3560.4	3848.7	3755.6	-288.3	-195.1	93.1
	(3769.1)	(3101.7)	(4574.2)	(3527.6)	(363.1)	(305.4)	(380.7)
Remittance fees[f]	60.2	58.1	64.9	57.9	-6.77	0.25	7.02
	(64.6)	(50.2)	(88.9)	(48.4)	(7.30)	(4.86)	(7.23)
Stress index	1.1×10^{-10}	-0.077	-0.019	0.097	-0.058	-0.17*	-0.12
	(1.00)	(0.98)	(0.98)	(1.03)	(0.092)	(0.093)	(0.094)
Aware of bank balance[g]	0.68	0.67	0.66	0.70	0.0060	-0.036	-0.042
	(0.47)	(0.47)	(0.47)	(0.46)	(0.045)	(0.044)	(0.044)
Ease of coming up with 4000INR[h]	0.98	0.99	1	0.94	-0.012	0.047	0.060
	(0.65)	(0.62)	(0.66)	(0.67)	(0.059)	(0.059)	(0.062)
Number of observations	702	240	228	234	468	474	462

[a] 0, single ; 1, married [b] 0, Non-Odia; 1, Odia [c] 0, not remitting; 1, remitting [d] 1, have heard about digital payment methods [e] 0, not using;1, using [f] in past 30 days, in INR [g] 0, not tracking their bank balance; 1 tracking [h] for an emergency. between 0 and 2

Table Notes:

All variables were collected during the baseline survey cycle. The table includes all workers interviewed at baseline, including attrited participants.

* indicate significance at the 10% critical level.

The stress index is an indicator variable created using a weighted average of three indicator variables (stress related to consumption, stress related to remittance, and overall financial stress). The index is a z-score unit, with higher values corresponding to "positive" outcomes, , i.e. lower levels of stress.

The emergency variable is on a Likert scale from 0 to 2; respectively from "very difficult, or not possible", "possible, but not easy", to "quite easy". A high variable corresponds to a "positive" outcome, i.e. a better ability to come up with 4000 INR if necessary.

The table covers the full sample interviewed at baseline, which was randomized in January 2020. Summary statistics for the subsample interviewed in person, as well as for the non-attrited sample, are shown respectively in table A3 and table A4. Indeed, given the high employee turnover, some of the endline surveys were conducted remotely.

The average worker is about 24 years old, unmarried. 50% of workers speak Odia, 87% remit money home, and 6% know about digital payments methods. At baseline, 6% of all workers use digital payment

methods and 86% of them remit money home. Workers remitted on average 3719 INR (around 50 USD) in the previous month (note that the average wage is 8890 INR (around 120 USD)). Remittances represent 53% of their wage for the subsample remitting at baseline. Finally, workers who sent remittances in the past month spent an average of 60 INR (around 0.8 USD) on remittance fees.

4 Results

4.1 Estimating equation

The treatment effects of the interventions are estimated using an ANCOVA specification for the main outcomes of interest, and more generally for all outcomes of interest. We estimate the treatment effect for each of the treatment arms compared to the control group, and evaluate the difference across the treatment arms.

$$y_i = \beta_1 T_{1i} + \beta_2 T_{2i} + \delta y_i^B + \gamma X_i + h + \epsilon_i \tag{1}$$

For an individual i in stratum h, the variables are defined as follows. y_i is the outcome variable at endline, T_{1i} is the treatment dummy that takes the value of 1 for participants in the treatment group 1 (classroom) and 0 for those in the control group or in treatment group 2. T_{2i} is the treatment dummy that takes the value of 1 for participants in the treatment group 2 (individualized) and 0 for those in the control group or in treatment group 1. y_i^B is the outcome variable at baseline, X_i a vector of individual-level controls, h strata-level fixed effects and ϵ_i standard errors at the individual-level.

β_1 identifies the (intent to treat) treatment effect of the treatment 1 with respect to the control group, and β_2 identifies the (intent to treat) treatment effect of the treatment group 2 with respect to the

control group. To test the effectiveness of the intensive training with respect to the classroom training, we evaluate the statistical significance of the linear combination (β_2 - β_1).

Results are weighted by the the probability of being interviewed at endline using Inverse Probability Weighting (IPW) (Wooldridge, 2020 (18)) [6].

4.2 Results

4.2.1 Use of digital payment applications and use of digital payment applications for remittance

Table 2 shows the impact of the interventions on the use of digital payment applications and use of digital payment applications for remittance.

We find that the classroom training increased the use of digital payment applications by 5 percentage points (from 6% to 11%), and the individualized training increased use by 10 percentage points (from 6% to 16%). However, the difference between the two treatment arms (5.67 percentage points) is not statistically significant at 5% with p-value of 0.108.

When the outcome variable is use of digital payment applications specifically for remittance, the treatment effect is lower for both treatments. The point estimates decrease from 5 percentage points to 3.6 percentage points for classroom training and from 10.4 percentage points to 6.7 percentage points for individualized training. The treatment effect is significant at the 5% level for the individualized training, and is not statistically significant for the classroom training. However, if we restrict the sample to the workers who reported sending remittances at baseline (column 5 and 6 in Table 2), we

[6]The weights are created following the strategy outlined in Wooldridge, 2020 (18)) - a probit specification with the dummy variable of being present at endline on the treatment indicator, including control variables and strata fixed effects. From this specification, we predict the probability that the worker is in the data, and use the inverse of this predicted probability as the sample weight in all the regressions.

find statistically significant positive impacts for both treatments: 6 percentage points for the classroom treatment and 8.5 percentage points for individualized training. Restricting the sample to workers who were remitting at baseline allows us to see the change in how workers change the medium of remittance, whereas including the full sample shows the change in medium together with the change in remittance behaviour.

In all three specifications discussed above (use of digital payments, use of digital payments for remittances in the full sample, and use of digital payments for remittances in the restricted sample), we are unable to detect difference between the two treatment arms.

Table 2: Impact of treatment on use of digital payment applications and use of digital payment applications for remittances.

	Use of digital payment applications					
	Total		For remittances		For remittances, conditional[a]	
	(1)	(2)	(3)	(4)	(5)	(6)
Classroom (CR)	0.0502*	0.0494*	0.0373	0.0365	0.0605**	0.0606**
	(0.0276)	(0.0280)	(0.0263)	(0.0259)	(0.0303)	(0.0303)
Individualized (I)	0.107***	0.104***	0.0779***	0.0677**	0.0860**	0.0853**
	(0.0335)	(0.0333)	(0.0296)	(0.0292)	(0.0346)	(0.0347)
Number of observations	617	617	617	617	482	482
Control mean	0.0554	0.0554	0.0505	0.0505	0.0595	0.0595
Additional control variables	No	Yes	No	Yes	No	Yes
Difference in means (I) - (CR)	0.0567	0.0548	0.0405	0.0312	0.0255	0.0248
	(0.0351)	(0.0351)	(0.0311)	(0.0308)	(0.0373)	(0.0376)

[a]: conditional on remitting at baseline

Table Notes:

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

The control mean of the dependent variable is the mean at baseline of the non-attrited subsample.

All regressions include a constant, the outcome variable at baseline, as well as strata fixed effects. Additional control variables, when included, are: Age, Native state, Marital Status, Financial stress index at baseline, Remittance dummy at baseline, Monthly remittance amount at baseline, Use of digital payment applications at baseline.

All regressions account for sample attrition using inverse probability weighting; strata, outcome at baseline, and additional controls listed above are included in the probit regression used to calculate weights.

4.2.2 Use of digital payments applications beyond remittances

We find no treatment impact on the use of digital payment beyond remittances, as reported in Table 3. This suggests that training sessions did not lead to a rise in the use of digital payments for non-

remittance purposes, such as purchasing goods, paying bills etc. It also suggests that the increase in the use of digital payment applications is largely driven by use for remittance.

Table 3: Impact of treatment on use of digital payment applications beyond remittances.

	(1)	(2)
Classroom (CR)	-0.00376	-0.00560
	(0.0174)	(0.0173)
Individualized (I)	0.00577	0.00434
	(0.0195)	(0.0196)
Number of observations	617	617
Control mean	0.0141	0.0141
Additional control variables	No	Yes
Difference in means (I) - (CR)	0.00952	0.00994
	(0.0205)	(0.0205)

Table Notes:
Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1).
The control mean of the dependent variable is the mean at baseline of the non-attrited subsample.
All regressions include a constant, the outcome variable at baseline, as well as strata fixed effects. Additional control variables, when included, are: Age, Native state, Marital Status, Financial stress index at baseline, Remittance dummy at baseline, Monthly remittance quantity at baseline, Use of digital payment applications at baseline.
The dependent variable takes 1 as value if the respondent was using digital payment applications to do any of the following: to make bill payments, to buy goods, to receive money from someone living in the city, to receive money from someone living outside of the city, to repay money she had borrowed, to lend money to someone).
All regressions account for sample attrition using inverse probability weighting; strata, outcome at baseline, and additional controls listed above are included in the probit regression used to calculate weights.

4.3 Cost-Effectiveness

The cost of the intervention includes both fixed costs, such as stationery and printing expenses, and variable costs, such as trainer transportation and remuneration. Table 4 below reports cost-effectiveness results. Despite relatively smaller effect size compared to the individualized training, classroom training is more cost-effective at increasing the number of people who use digital payment applications. In the individualized training, we spent on average 1206 INR for every participant in the individualized training who used digital payment afterwards, versus 814 INR per participant in the classroom training. As a matter of comparison, it would take approximately 16 months to amortize the investment cost in the classroom group and 24 months in the individualized group, considering the average remittance fees

paid (60 INR).

Table 4: Cost-Effectiveness by intervention type.

Treatment	Per person in each arm	Per person succeeding during the training session	Per person using dgp at endline	Per person remitting with dgp next month
Classroom	96	845	814	999
Individualized	211	1150	1206	1595

Table Notes:
Dgp refers to digital payment applications. Costs are in INR.

5 Conclusion

Technology has been one of the paths to financial inclusion across the developing world (Ideas42, 2018 (19)). In this article, we test two different kinds of training for digital payment applications among female migrant workers in India. We then provide evidence of the effect of two forms of training on the use of digital payment applications. We find that classroom training increases the use of digital payment applications by about 5 percentage points, and individualized training increases digital payment use by 11 percentage points. When it comes to using digital payments for remittances, only the individualized training is statistically significant, increasing the use of digital payments for remittances by 7-8 percentage points. We find no effects on remittance amounts, perceived financial stress, or salience of account information.

Such increase is valuable in itself, as it reveals the ability of training to improve usage rate. However, the low use rate of digital payments at endline highlights strong technological and regulatory requirements that prevent people from fully benefiting from digital payment applications (Jack and Suri, 2014 (1)).

As financial inclusion is a critical building block for poverty reduction, there have been extensive regulatory changes aimed at making both existing products more accessible and creating customized products

for marginalized populations (Ideas42, 2018 (19)). We believe the findings discussed in this paper show there is still room to help remove substantial barriers to use of digital payment applications that still exist in the Indian context.

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6 Appendix

6.1 Attrition

We find low levels of attrition overall; overall, 618 of 792 (88 percent) baseline workers could be surveyed at endline. The tables below show further attrition results. First, a regression of the attrition dummy on the treatment dummy shows no difference in the likelihood of attrition between the two treatment and control groups (Table A1).

Table A1: Attrition per treatment arm.

	Total Average				T-test difference		
	Control (C)	Classroom (CR)	Invidualized (I)	Total	(C) - (CR)	(C) - (I)	(CR) - (I)
Attrition	0.100	0.123	0.137	0.120	-0.023	-0.037	-0.014
	(0.019)	(0.022)	(0.023)	(0.012)			
Number of observations	240	228	234	702			

Table Notes:
The value displayed for t-tests are the differences in the means across the groups. None of these differences are significant.

Second, a regression of the primary outcomes and baseline characteristics (Table A2) on the attrition dummy reveals no significant overall difference in outcomes at baseline between attrition and non-attrition workers for most outcomes.

Table A2: Attrition balance checks for baseline characteristics.

	Full sample	Non-Attrited	Attrited	Difference in means
Age (years)	23.6	23.7	23.0	0.74
	(4.16)	(4.21)	(3.75)	(0.45)
Marital Status[a]	0.047	0.050	0.024	0.026
	(0.21)	(0.22)	(0.15)	(0.019)
Language[b]	0.50	0.50	0.52	-0.025
	(0.50)	(0.50)	(0.50)	(0.058)
Remittance dummy[c]	0.86	0.86	0.89	-0.032
	(0.34)	(0.35)	(0.31)	(0.037)
Awareness of digital payment method[d]	0.63	0.63	0.60	0.030
	(0.48)	(0.48)	(0.49)	(0.057)
Use of digital payment methods[e]	0.057	0.057	0.060	-0.0029
	(0.23)	(0.23)	(0.24)	(0.028)
Quantity remitted[f]	3719.1	3593.5	4642.9	-1049.3
	(3769.1)	(3299.4)	(6170.6)	(686.2)
Remittance fees[f]	60.2	58.4	72.6	-14.1
	(64.6)	(63.0)	(74.3)	(9.06)
Stress index	1.1×10^{-10}	-0.0091	0.067	-0.076
	(1.00)	(1.00)	(0.97)	(0.11)
Aware of bank balance[g]	0.68	0.67	0.72	-0.045
	(0.47)	(0.47)	(0.45)	(0.054)
Ease of coming up with 4000INR[h]	0.98	0.95	1.14	-0.19**
	(0.65)	(0.64)	(0.66)	(0.077)
Number of observations	702	618	84	702

[a] 0, single ; 1, married [b] 0, Non-Odia; 1, Odia [c] 0, not remitting; 1, remitting [d] 1, have heard about digital payment methods [e] 0, not using;1, using [f] in past 30 days, in INR [g] 0, not tracking their bank balance; 1 tracking [h] for an emergency. between 0 and 2

Table Notes:

The table includes all workers interviewed at baseline. Unlike the attrited subsample, the non-attrited group interviewed at endline. The two last outcomes (attendance and sending money) apply for treated respondents only (either in the classroom or intervention arm).

The last column displays the differences in the means across the groups.

** indicates significance at the 5% critical level.

The stress index is an indicator variable created using a weighted average of three indicator variables (stress related to consumption, stress related to remittance, and overall financial stress). The index is a z-score unit, with higher values corresponding to "positive" outcomes, , i.e. lower levels of stress.

The emergency variable is on a Likert scale from 1 to 4; respectively from "does not know", "very difficult, or not possible", "possible, but not easy", to "quite easy". A high variable corresponds to a "positive" outcome, i.e. a better ability to come up with 4000 INR if necessary.

6.2 Spillovers

Although the study design did not include a direct calculation of spillover effects, two questions related to these were included in the endline surveys. We asked the control group respondents whether they heard about the training, and whether they were taught by someone who attended the training on how to use digital payment applications. This question was asked in in-person endline surveys only. 70% of the subsample interviewed (192 out of the 240 control respondents) heard about the sessions, while 11% reported being taught how to use digital payment applications by workers having attended the training session.

We find that the difference in the use of digital payments (+13pp) and use of digital payments for remittances (+15pp) is statistically significant across groups who reported or not being taught how to use digital payments applications through someone having attended the training session.

However, we believe the actual spillover rate (approximately 11% if one extrapolates to the whole control group) is quite low, given that the randomization unit was the workers and that workers share rooms and live in the same hostels. This reinforces the statement that barriers to taking up digital payment applications are high.

Spillovers, if anything, understates the actual treatment effects reported in the results section of the paper.

6.3 Balance statistics for subsamples (in person endline/non-attriters)

Table A3: Summary Statistics at baseline, in person surveys sample.

	Total	Control (C)	Classroom (CR)	Individualized (I)	(C)-(CR)	(C)-(I)	(CR)-(I)
Age (years)	23.6	23.3	23.7	23.9	-0.43	-0.59	-0.16
	(4.16)	(3.79)	(4.21)	(4.49)	(0.42)	(0.43)	(0.46)
Marital Status[a]	0.046	0.036	0.056	0.045	-0.020	-0.0085	0.012
	(0.21)	(0.19)	(0.23)	(0.21)	(0.022)	(0.021)	(0.023)
Language[b]	0.50	0.49	0.49	0.52	-0.0019	-0.027	-0.025
	(0.50)	(0.50)	(0.50)	(0.50)	(0.052)	(0.052)	(0.053)
Remittance dummy[c]	0.86	0.85	0.85	0.89	0.0015	-0.044	-0.046
	(0.34)	(0.36)	(0.36)	(0.31)	(0.037)	(0.035)	(0.036)
Awareness of digital payment method[d]	0.63	0.60	0.62	0.66	-0.021	-0.059	-0.038
	(0.48)	(0.49)	(0.49)	(0.47)	(0.051)	(0.050)	(0.051)
Use of digital payment methods[e]	0.059	0.052	0.051	0.073	0.0012	-0.021	-0.022
	(0.23)	(0.22)	(0.22)	(0.26)	(0.023)	(0.025)	(0.026)
Quantity remitted[f]	3607.5	3294.3	3621.5	3931.5	-327.2	-637.2*	-310.0
	(3331.5)	(3154.5)	(3073.6)	(3727.4)	(324.3)	(360.4)	(362.5)
Remittance fees[f]	56.5	52.2	57.4	60.0	-5.19	-7.82	-2.63
	(48.2)	(45.4)	(49.2)	(49.8)	(5.37)	(5.32)	(5.64)
Stress index	0.020	-0.040	-0.018	0.12	-0.022	-0.16	-0.14
	(1.01)	(0.99)	(0.99)	(1.05)	(0.10)	(0.11)	(0.11)
Aware of bank balance[g]	0.68	0.66	0.65	0.72	0.0025	-0.059	-0.062
	(0.47)	(0.48)	(0.48)	(0.45)	(0.051)	(0.049)	(0.050)
Ease of coming up with 4000INR[h]	0.97	0.98	0.99	0.93	-0.015	0.047	0.062
	(0.64)	(0.61)	(0.64)	(0.65)	(0.066)	(0.066)	(0.069)
Number of observations	547	192	177	178	369	370	355

[a] 0, single ; 1, married [b] 0, Non-Odia; 1, Odia [c] 0, not remitting; 1, remitting [d] 1, have heard about digital payment methods [e] 0, not using;1, using [f] in past 30 days, in INR [g] 0, not tracking their bank balance; 1 tracking [h] for an emergency. between 0 and 2

Table Notes:

All variables were collected during the baseline survey cycle. The table includes all workers interviewed interviewed at endline during in-person surveys.

* indicate significance at the 10% critical level.

The stress index is an indicator variable created using a weighted average of three indicator variables (stress related to consumption, stress related to remittance, and overall financial stress). The index is a z-score unit, with higher values corresponding to "positive" outcomes, , i.e. lower levels of stress.

The emergency variable is on a Likert scale from 0 to 2; respectively from "very difficult, or not possible", "possible, but not easy", to "quite easy". A high variable corresponds to a "positive" outcome, i.e. a better ability to come up with 4000 INR if necessary.

Table A4: Summary Statistics at baseline, Non-attriters sample.

	Total	Control (C)	Classroom (CR)	Individualized (I)	(C)-(CR)	(C)-(I)	(CR)-(I)
Age (years)	23.7	23.5	23.8	23.8	-0.39	-0.34	0.048
	(4.21)	(3.85)	(4.29)	(4.50)	(0.40)	(0.41)	(0.44)
Marital Status[a]	0.050	0.037	0.065	0.050	-0.028	-0.012	0.015
	(0.22)	(0.19)	(0.25)	(0.22)	(0.022)	(0.020)	(0.023)
Language[b]	0.50	0.49	0.48	0.53	0.0061	-0.044	-0.050
	(0.50)	(0.50)	(0.50)	(0.50)	(0.049)	(0.049)	(0.050)
Remittance dummy[c]	0.86	0.84	0.85	0.89	-0.012	-0.044	-0.031
	(0.35)	(0.37)	(0.35)	(0.32)	(0.035)	(0.033)	(0.034)
Awareness of digital payment method[d]	0.63	0.61	0.61	0.67	-0.0020	-0.062	-0.060
	(0.48)	(0.49)	(0.49)	(0.47)	(0.048)	(0.047)	(0.048)
Use of digital payment methods[e]	0.057	0.056	0.050	0.064	0.0056	-0.0088	-0.014
	(0.23)	(0.23)	(0.22)	(0.25)	(0.022)	(0.023)	(0.023)
Quantity remitted[f]	3593.5	3391.2	3652.5	3751.5	-261.3	-360.3	-99.0
	(3299.4)	(3136.9)	(3071.3)	(3671.5)	(304.5)	(335.1)	(337.5)
Remittance fees[f]	58.4	55.1	62.6	57.9	-7.52	-2.89	4.62
	(63.0)	(46.5)	(86.6)	(49.6)	(7.46)	(5.07)	(7.59)
Stress index	-0.0091	-0.073	-0.030	0.080	-0.043	-0.15	-0.11
	(1.00)	(0.97)	(1.00)	(1.05)	(0.097)	(0.100)	(0.10)
Aware of bank balance[g]	0.67	0.65	0.65	0.71	0.00081	-0.054	-0.055
	(0.47)	(0.48)	(0.48)	(0.46)	(0.048)	(0.047)	(0.047)
Ease of coming up with 4000INR[h]	0.95	0.97	0.97	0.92	-0.0073	0.052	0.059
	(0.64)	(0.61)	(0.67)	(0.65)	(0.063)	(0.062)	(0.066)
Number of observations	618	216	200	202	416	418	402

[a] 0, single ; 1, married [b] 0, Non-Odia; 1, Odia [c] 0, not remitting; 1, remitting [d] 1, have heard about digital payment methods [e] 0, not using;1, using [f] in past 30 days, in INR [g] 0, not tracking their bank balance; 1 tracking [h] for an emergency. between 0 and 2

Table Notes:

All variables were collected during the baseline survey cycle.

The table includes all workers interviewed at endline.

None of the differences are significant at the 10% level.

The stress index is an indicator variable created using a weighted average of three indicator variables (stress related to consumption, stress related to remittance, and overall financial stress). The index is a z-score unit, with higher values corresponding to "positive" outcomes, , i.e. lower levels of stress.

The emergency variable is on a Likert scale from 0 to 2; respectively from "very difficult, or not possible", "possible, but not easy", to "quite easy". A high variable corresponds to a "positive" outcome, i.e. a better ability to come up with 4000 INR if necessary.

6.4 Exploratory results

6.4.1 Remittance quantity, perception of financial stress and perception of financial control

Table A5: Impact of treatment on remittance quantity, perceived financial stress and control.

	Remittance quantity (winsorized)		Perceived financial Stress		Knows bank account balance (binary)	
	(1)	(2)	(3)	(4)	(5)	(6)
Classroom (CR)	-209.939	-189.315	-0.031	-0.044	0.001	-0.000
	(307.27)	(309.83)	(0.10)	(0.10)	(0.04)	(0.04)
Individualized (I)	-218.826	-194.312	-0.112	-0.125	0.022	0.018
	(302.00)	(302.17)	(0.10)	(0.10)	(0.03)	(0.04)
Number of observations	615	615	545	545	523	523
Control mean	3413.586	3413.586	-0.124	-0.124	0.650	0.650
Additional Control Variables	No	Yes	No	Yes	No	Yes
Difference in means (CR) - (I)	8.887	4.996	0.081	0.081	-0.020	-0.018
Se (CR)-(I)	304.357	305.634	0.108	0.108	0.035	0.035

Table Notes:

None of the coefficients are significant at the 10% level.

All regressions include a constant, the outcome variable at baseline, as well as strata fixed effects. Additional control variables, when included, are: Age, Native state, Marital Status, Financial stress index at baseline, Remittance dummy at baseline, Monthly remittance quantity at baseline, Use of digital payment applications at baseline.

The remittance quantity is in INR. The outcome variable was top-coded at 99%.

The "Perceived Financial Stress" outcome relies on the stress index. The stress index is an indicator variable created using a weighted average of three indicator variables (stress related to consumption, stress related to remittance, and overall financial stress). The index is a z-score unit (considering the full sample), with higher values corresponding to "positive" outcomes, , i.e. lower levels of stress. This question was asked at baseline and at endline in-person surveys, but not at endline phone surveys.

The "Knows her bank account balance" outcome relies on an indicator which measures whether the respondent is aware of the current balance of her bank account. It is coded as 1 if the respondent reports knowing the current balance of her bank account; 0 otherwise. This question was asked at baseline and at endline in-person surveys, but not at endline phone surveys.

All regressions account for sample attrition using inverse probability weighting; strata, outcome at baseline, and additional controls listed above are included in the probit regression used to calculate weights.

6.4.2 Remittance frequency and fees

Table A6: Impact of treatment on remittance frequency and remittance fees.

	Remittance frequency (Poisson)		Remittance fees	
	(1)	(2)	(3)	(4)
Classroom (CR)	-0.0207	-0.0140	-7.7063	-6.3907
	(0.0722)	(0.0728)	(5.3651)	(5.3821)
Individualized (I)	-0.0438	-0.0324	-4.8911	-4.4366
	(0.0740)	(0.0736)	(5.3643)	(5.3465)
Number of observations	542	542	482	482
Control mean	0.7299	0.7299	55.6427	55.6427
Additional Control Variables	Yes	Yes	No	Yes
Difference in means (CR) - (I)	0.0231	0.0184	-2.8152	-1.9542
Se (CR)-(I)	0.0743	0.0748	5.2754	5.2328

Table Notes:

None of the coefficients are significant at the 10% level.

The control mean of dependent variable is the non-attrited subsample mean at baseline. All regressions include a constant, the outcome variable at baseline, as well as strata fixed effects. Additional control variables, when included, are: Age, Native state, Marital Status, Financial stress index at baseline, Remittance dummy at baseline, Monthly remittance quantity at baseline, Use of digital payment applications at baseline.

The remittance quantity is in INR. The outcome variable was top-coded at 99%.

The frequency outcome relies on an indicator, which takes value between 0 and 3, respectively "less than once a month", "once a month"; "twice a month"; and "three times or more".

The remittance fees outcome is in INR. The outcome is top-coded at 99%.

All regressions account for sample attrition using inverse probability weighting; strata, outcome at baseline, and additional controls listed above are included in the probit regression used to calculate weights.

6.5 Barriers and access requirements: breakdown per steps

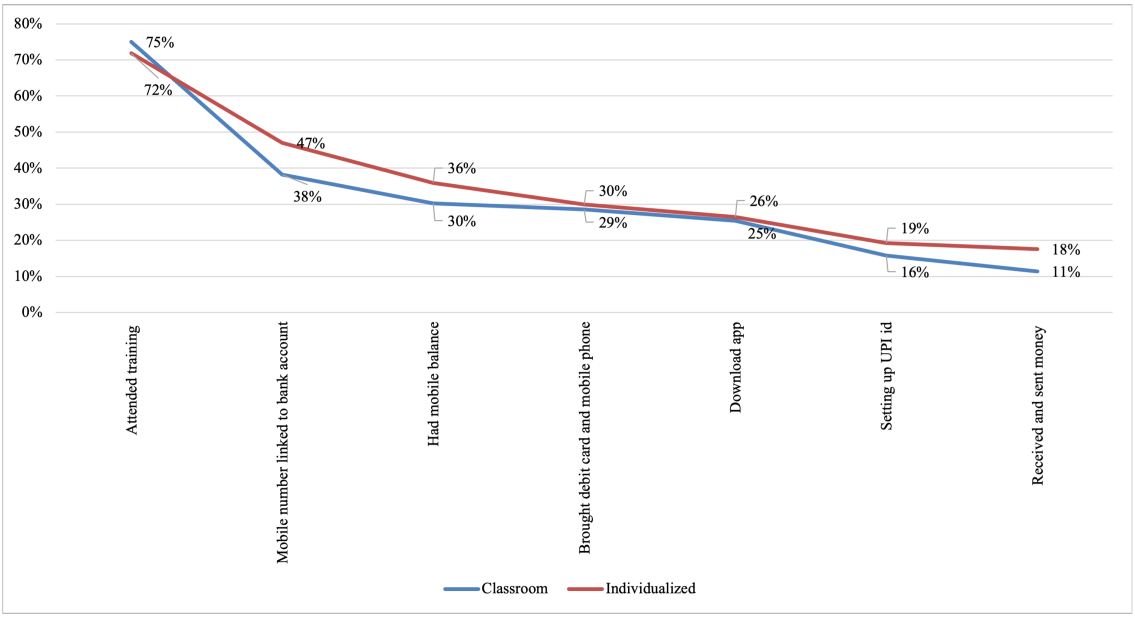

Figure 2: Proportion of each group successfully completing each step