# Can Mobile-Linked Bank Accounts Bolster Savings?

# Evidence from a Randomized Controlled Trial in Sri Lanka*

Suresh de Mel      Craig McIntosh      Ketki Sheth      Christopher Woodruff

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**Abstract**

In developing economies, mobile-linked services have the potential to significantly reduce deposit transaction costs and provide a new conduit for the flow of savings into banks. We test this premise by introducing a product that permits Sri Lankan households to deposit mobile airtime balances directly into a formal bank using a new mobile money interface. Randomizing access and prices at the individual level and using high frequency panel survey data, we find a small increase in savings deposits with the partner institution and formal banks more generally, but no change in overall savings. When the deposit transaction costs are completely removed, only 26 percent of those offered the service use it, and only 7 percent use it frequently. Overall, our results imply that deposit transaction costs are not a significant barrier to increasing savings, limiting the potential gains of mobile-linked savings products for financial inclusion.

Keywords:      Financial Services, Savings, Mobile Money

JEL Codes:      O16, O31, D14

# 1 Introduction

A majority of the world's poor are unbanked. This is troubling given well-identified studies showing that inducing the unbanked to use bank accounts causes large impacts on business investment (Dupas and Robinson, 2013), health and education (Prina, 2015), income (Schaner, 2018), and labor supply (Callen et al., 2019). Given the benefits of savings accounts, how can we stimulate their active usage among the unbanked? Dupas et al. (2018) show that simply reducing the fixed cost of opening a bank account is not sufficient to generate widespread usage. This raises the possibility that the key barrier is the high transactions costs of using the accounts rather than the fixed costs of opening the accounts. Given the small size of typical deposits of the working poor, the time and pecuniary costs of traveling to the bank may make regular use of formal savings accounts impractical.

We report on a field experiment in Sri Lanka that reduced ongoing banking deposit transactions costs by allowing participants to make deposits into regular bank savings accounts through any mobile phone agent using their mobile phone. Because mobile agents far outnumber bank branches, the mobile-linked bank accounts reduce the time and travel costs of making deposits. More broadly, mobile money typically allows free deposits but charges for withdrawals. This focus on minimizing deposit transaction costs is well-founded: deposits tend to be more frequent than withdrawals, and asymmetric deposit and withdrawal costs may serve as an efficient commitment device. If deposit transaction costs are a key barrier to savings, then mobile-linked accounts could increase formal savings. This promise of mobile-linked financial services has led to significant resources being devoted to facilitating their spread.[1] Despite the push to link mobile money to conventional interest-bearing bank accounts (Goss et al., 2011), progress in building these products has been slow (Suri, 2017), and experimental evidence on the impact of mobile savings is scarce.[2] This slow growth raises questions of whether mobile-linked saving products will generate significant demand and increase savings mobilization, and whether the willingness to pay for these services can support their development and sustainability.

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[1]For example, the Bill and Melinda Gates Foundation's strategy for financial inclusion focuses on broadening "the reach of low cost digital financial services" and India's 2016 demonitization is often justified as a push to transition to a digital economy.

[2]Mobile money penetration remains low in most countries; fewer than one in four households globally use *any* mobile money service. Moreover, mobile money systems are rarely integrated with formal banks (or even integrated across telecom companies), limiting options for true mobile banking services (Suri, 2017). Suri (2017) describes availability of mobile money-integrated banking services in only five countries.

Participants in our experiment were randomly assigned to a control group or one of four treatment groups that differed in the fees charged to make a mobile deposit. Our largest treatment group paid no fee to use the service, providing a measure of the increase in demand for formal savings when deposit-related transactions costs are reduced nearly to zero.[3] As such, our study complements Dupas et al. (2018) in reducing the ongoing deposit transactions costs associated with using a bank account. By varying the fees across our treatment arms from 8 percent of the deposit – slightly more than the partner's estimated cost – to zero, we are able to provide evidence on the willingness to pay for mobile banking services, and to estimate the related elasticity of demand. Using high-frequency household income and expenditure surveys, we examine the effect of accounts on overall household savings, consumption, and labor earnings.

We have three main findings. First, use of the service was limited, even for those assigned to the zero fee treatment group. While 80 percent of participants opened the bank account and participated in demonstrations on how to make deposits, only 26 percent made at least one deposit through the mobile service, and only 7 percent made 10 or more deposits. Though we find some heterogeneity in usage in expected directions - women and those living at intermediate distances from bank branches were more frequent users - the usage levels remain low in all subgroups.[4] In addition, total saving deposits are not significantly greater as a function of gender or distance, though we cannot rule out potentially large effects. The modest adoption rates are in line with those found in several other studies introducing innovations designed to reduce transaction costs (e.g., Dupas et al., 2018; Flory, 2011; Ashraf, Karlan and Yin, 2006).

Second, we find that the mobile-linked deposit service caused a 44 percent increase in saving deposits in the partner bank and a 29 percent increase in savings in the formal banking sector more generally. However, there was no increase in total household savings. Moreover, these percentage gains are relative to a very small control-group mean, and hence do not correspond to meaningful increases in the amount deposited into formal savings, even with the partner bank. Not surprisingly then, we see no change in household welfare measures, such as household consumption or labor earnings. Furthermore, a significant proportion

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[3]To confirm the mobile deposit service reduced the effective deposit transaction costs, our intervention included measures to eliminate other potential barriers to savings deposits: 1) assistance with opening the partner bank account, including payment of the $4.55 minimum balance requirement, 2) a mobile phone and SIM card, and 3) personalized demonstrations on using the service, including two transfers of $.45 into the participant's own account.

[4]Women theoretically have greater concern for other-control (Ashraf, 2009), more restricted mobility, and smaller average deposits, all features potentially addressed by the technology. Those living at intermediate distances would arguably most value reduction in transaction costs for deposits, but not be deterred by excessive withdrawal costs.

of the gain in bank saving deposits comes through the traditional channel of depositing savings at the bank branch. This suggests that once the account was opened, those interested in using it were willing to incur the in-person deposit transaction costs even when the mobile-deposit service was free to use. This provides our strongest evidence that on-going deposit transactions costs are not a barrier to the use of savings accounts.

Third, and consistent with the account access itself playing a larger role than the mobile channel, we find a general lack of responsiveness to the (randomly assigned) price levied for the mobile deposit service. The amount deposited through the mobile channel does not decrease consistently as the fee increases. Only at the 8 percent fee do we observe reduced usage of the mobile deposit service. But even then, our data suggest that the fee simply shifted the deposits from the mobile channel to the traditional in-person channel, with no overall difference in the amount deposited with the partner bank.[5]

Taken together, these three findings suggest that deposit transaction costs are unlikely to be the major barrier inhibiting formal savings in this context. Our modest impacts from providing an ever-present, private, and free mobile deposit service can be seen as bounding the counterfactual deposit cost. While it is true that adoption of the mobile deposit service involves both trust and cognitive costs, we aimed to minimize these costs by designing an interface that closely mimicked the common practice of putting minutes on a mobile phone. We provide evidence that learning costs and lack of trust are unlikely to be driving our results: the majority who use the service once did not continue to use it, we observe no heterogeneity in savings by education or familiarity with mobile technology, and survey responses indicate that users have trust in the service. Thus, our results suggest that the benefits of removing deposit transaction costs were not greater than overcoming relatively small learning and trust costs. On the other hand, we find suggestive evidence that *withdrawal* transaction costs are an important part of the story: the strongest impacts are found at intermediate distances (2-5 km) from a bank branch, a distance at which more individuals are unbanked but the transaction costs associated with withdrawals[6] may not be prohibitively high.

With the strong push for financial inclusion built on the premise of reducing market imperfections in formal financial markets, understanding the impact of digital finance is particularly important. Our inter-

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[5]Others have found long run impact and responsiveness to interest rates provided for savings, such as Schaner (2018). A key difference may be that individuals can more easily avoid the fees in our context by depositing savings at the bank, or that individuals respond differently to fees (i.e., losses) than interest received on savings (i.e., gains).

[6]Analogous to our description of deposit traction costs, withdrawal transaction costs refer to all costs related to withdrawals, such as the time and pecuniary costs of traveling to the bank for making a withdrawal.

vention focuses on reducing deposit transaction costs, mirroring the typical structure of mobile money and mobile saving products. Our analysis is based on a large individual-level randomized controlled trial with high-frequency panel data on savings for over two years. The significant sample size and length of study, near-perfect compliance with the randomization, and low attrition all bolster the internal validity of our causal interpretation. In addition, our measures not only capture savings with the partner institution, but also estimate impact on total savings and formal savings, which have implications on financial intermediation and economic growth.

This experiment provides one of the first estimates of the effect of mobile-deposit services on savings, contributing to growing literatures on the uses of mobile money and on the importance of transaction costs for savings mobilization. The handful of studies examining mobile-linked savings generally find results consistent with ours, despite being in settings where mobile money is more popular.[7] These studies observe no significant increases in total savings - increases in the mobile-linked savings product are directly offset by reductions in alternative saving devices. Similarly, studies of mobile-money savings products not linked to formal banks find similarly modest results. Batista and Vincente (2016) conduct a field experiment introducing mobile money alone in Mozambique. Consistent with earlier findings of Jack and Suri (2014) in Kenya, they find that mobile money increased consumption smoothing through remittances, but not through increased savings.[8] In each of these products studied, deposits are free and withdrawals incur a fee, highlighting the prevalence of mobile-linked services primarily reducing deposit transaction costs.

Batista and Vicente (2017) and Bastian et al. (2018) identify the marginal demand for formal banking features and savings, relative to existing mobile money. The mirroring studies by Batista and Vincente (2016) and Jack and Suri (2014) identify the effect of eliminating deposit transaction costs for a saving device that is absent many of the features of formal savings (e.g., mobile money). We add to the literature by estimating an intervention that combines these two components. The combination is key to identifying the barrier of deposit transaction costs in facilitating formal savings, a particularly relevant question given the focus financial inclusion initiatives place on "banking" individuals due to concerns that informal savings

[7]For example, Bastian et al. (2018) measures the marginal effect of connecting a formal saving option to the mobile platform in a context of existing mobile money users, and Batista and Vicente (2017) measures the marginal effect of providing a remunerated savings account through mobile money relative to mobile money alone.

[8]In Jack and Suri (2016)'s follow up work, they do find that savings was higher in places with mobile money, but are unable to identify whether this is a direct effect of mobile money or an indirect downstream effect from intermediary outcomes (e.g., reduced vulnerability to shocks may also yield increased savings in the long run).

are higher risk, higher cost, and less convenient. The marginal effects identified in previous studies identify each component separately and therefore provide lower bounds to an intervention like ours which estimates a combined effect that captures potential complementarities. Our results are consistent with their modest impacts and suggests that the marginal gain from the interaction is small.

More broadly, our results contribute to understanding the role of deposit costs as a barrier to efficient savings mobilization. Studies eliminating the pecuniary costs of opening bank accounts have found mixed results, with the largest and most representative (Dupas et al., 2018) finding modest effects (Dupas et al., 2016; Dupas and Robinson, 2013; Prina, 2015; Cole, Sampson and Zia, 2011).[9] The heterogeneity in this literature may arise because some of these interventions also introduce features that address salience or commitment concerns or are implemented in contexts where the benefit of formal savings is low (e.g., respondents in Dupas et al. (2016) list risk of embezzlement and high withdrawal costs as explanations for their lack of demand). Our results support what we see as the growing consensus in this literature: that deposit transaction costs determine where a person saves, but are unlikely to be a primary barrier responsible for inefficiently low overall savings.

The remainder of the paper is organized as follows: Section 2 presents the study context and design, Section 3 analyzes the impact of the product at the individual level, Section 4 presents demand and implications on targeting for the mobile-linked savings product, and Section 5 concludes.

## 2   Study Context and Details

The Sri Lankan setting is particularly well suited for estimating the effect and price elasticity for mobile-linked financial savings. First, Sri Lanka is typical of most low- and lower-middle income countries with respect to mobile money and financial inclusion: mobile phones are ubiquitous but electronic financial services (e.g., ATMs) are more limited, mobile money was absent at the time of the intervention and continues to have

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[9]Dupas et al. (2016) found low demand for bank accounts in Kenya even after waiving account fees. But Cole, Sampson and Zia (2011) found that subsidized accounts in Indonesia led to greater opening and use of the account; Prina (2015) similarly finds high demand for subsidized accounts in Nepal with little support for increases in downstream effects; and Dupas and Robinson (2013) found significant effects on business investment and expenditure from free accounts, but for only a subset of their sample. Studies that have directly focused on reducing transaction costs for savings deposits have also generally found modest results, but have also not measured impact on total savings mobilization (Flory, 2011; Ashraf, Karlan and Yin, 2006). An exception is Callen et al. (2019) who introduce a weekly door-to-door deposit collection service in Sri Lanka and do find significant gains in total savings.

very low penetration, and a large proportion of savings continues to be held in informal saving devices (The World Bank, 2013). For example, at baseline, only 23 percent of our sample had made a deposit into a formal bank account in the previous month. Second, there is high trust in the banking system in Sri Lanka, helping to overcome market imperfections related to informational asymmetry and institutional uncertainty that may dampen the benefit of reducing transaction costs in other contexts.[10] And finally, previous research in Sri Lanka confirmed significant latent demand for formal banking services and provided compelling reasons to suspect transaction costs were an important market imperfection resulting in undersaving: Callen et al. (2019) find that a weekly door-to-door deposit collection service increased total savings by over 15%.[11] In general, however, Sri Lanka has decent access to formal savings, a variety of heavily used informal savings vehicles, and relatively good transportation infrastructure, indicating that financial exclusion may be less severe in our context than in the poorest parts of the developing world.

## 2.1 Product Description

In 2009, we began working with a large mobile operator in Sri Lanka to develop a savings product that would allow deposits to be made directly through a mobile phone to a savings account in a large, government-owned bank (referred to as the partner bank). Customers could deposit funds into the bank account with scratch cards using the standard procedure for adding airtime minutes to their mobile phone.[12] The product allowed the user to dial a number, enter the scratch card serial number, deposit the amount on the card into an m-purse account linked to the phone, and move the money from the m-purse account to a linked savings account by entering a PIN. The scratch cards were available in multiple denominations, from 50 LKR to 1,000 LKR (0.45 USD to 9.09 USD).[13] In our baseline survey, 66 percent of our primary sample (described in the following section) reported that their typical deposit into any formal saving devices was 1,000 LKR or less, suggesting that the scratch card denominations available would not have been unduly burdensome.[14] In addition, mobile agents are numerous, and the transaction is identical to adding minutes to one's mobile

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[10] For example, Mehotra, Somville and Vandewalle (forthcoming) provide experimental evidence on the association between trust and savings in India.

[11] Our results are robust to limiting our sample to be similar to the sample selection process used in this earlier work.

[12] 58 percent of our sample added minutes to their phone at least once a week. In contrast, only 23 percent had made a bank deposit in the previous month at baseline.

[13] The median exchange rate in 2011 was 110 LKR to the US dollar.

[14] The PIN offers protection for the account in the event the phone is lost or stolen. It also allowed for other members of the household to use the phone without having access to the account, a feature which may be important in some households.

phone, allowing a person to shroud their savings behavior from any given agent to protect privacy around saving deposits. This was the first product of this type offered in Sri Lanka.

While loading airtime through scratch cards is becoming less common, the time and effort costs of scratch cards are not materially different from newer methods, which continue to require interacting with a local agent. Most importantly, at the time of this study, scratch cards were very common, ensuring that the mobile-deposit service mimicked a process very familiar to the sample. In addition, in places that currently have connectivity between mobile money and linked saving accounts, a PIN is a common method for transferring mobile money into an account. Finally, at the time of the experiment, the majority of our sample were adding minutes to their mobile phone at least once a week, suggesting that the marginal time and effort costs associated with the process were small.

The mobile operator with whom we partnered agreed not to market the product in the region where we were conducting the research during the term of the project, ensuring perfect compliance with the randomized controlled trial. This unusual degree of control over access to the product is a major advantage for estimating causal effects relative to other studies of mobile banking products.

We took a series of steps to stimulate use of the product and overcome any barriers to realizing the service's benefits. First, we worked with the mobile operator to inform and train customer service representatives so that someone knowledgeable of the product was always available at the service call center. Second, we offered participants a free basic phone and SIM card. Third, we helped them open the savings account linked to the phone, including providing the 500 LKR (4.55 USD) minimum balance required to open a savings account at the bank.[15] Forth, we arranged a demonstration of how to use the service, which included making two deposits of 50 LKR (0.45 USD) each into the individual's account. And finally, for two months in each municipality, we conducted a lottery among users to encourage use of the service.[16] We provided these incentives to all treated individuals to eliminate constraints to account usage arising from pecuniary costs (e.g., bank fees), material costs (e.g., phone costs), or lack of experience using the service (e.g., generating

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[15]The bank account provided 4 percent interest annually which is comparable to saving accounts at banks in general at this time.

[16]Each mobile deposit into the account generated one chance of winning a deposit of 5,000 LKR (45.5 USD) for the account holder. This incentive was offered in one municipality, Kandy, in August and September 2012, and the remaining municipalities in April and May 2013. Our primary results are robust to excluding these months in our analysis. In Kandy, we observe a statistically significant increase in the use of the service (.5 more transactions, significant at the 5 percent level). In the other municipalities, we observe a statistically insignificant increase of .04 transactions.

experience with the service though the demonstration and lottery incentives).

## 2.2   Distribution Timeline

The introduction of the product was subject to several delays. The first offer letters were delivered in December 2011, one year after our baseline survey. The delays mean that we have an additional year of baseline savings data prior to households being aware of the intervention. Demonstrations began by February 2012 in one municipality, by April 2012 in four more municipalities, and by September 2012 in the remaining municipality. In all cases, participation in the demonstration implies that the account was opened and the mobile conduit was functional for the individual. By September 2012, 86% had accepted the offer (i.e., opened an account and received the phone and SIM card). Figure 1 provides a summary of the timeline for the roll out of the mobile-deposit service intervention and the data collection.

## 2.3   Sample Selection and Randomization

To select the sample for the study, we conducted a listing exercise in August 2010 in six municipalities[17] in central Sri Lanka. The household listing identified 13,435 economically active adults from 10,300 households. This initial listing was stratified by distance to the nearest town (i.e., to a bank branch): urban (under 2km), semi-urban (2km to 5km), and rural (over 5km).[18] We then narrowed this sample based on characteristics predicted to have high demand for the mobile-deposit service: households with members paid on a daily or weekly basis (and therefore having higher value for frequent deposits) and stated willingness to have an interest-bearing savings account. Imposing these restrictions narrowed the potential sample to 3,102 individuals (2,372 households), from which we selected 2,006 individuals from unique households as our final sample. This final selection oversampled individuals with characteristics that would arguably have a greater likelihood of adopting the savings service (those who lived within .5 km of the nearest mobile phone agent, who used their phones to send SMS messages regularly, who had previously changed a SIM card, and who were under 50 years of age) or were of particular interest (female).[19] However, given that we select

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[17]Kandy (KN), Katugastota (KT), Pelimathalawa (PL), Matale (MT), Kurunegala (KR), and Kegalle (KG).

[18]A primary purpose in including those over 5km away was to compare the intervention's results with those found in Callen et al. (2019), in which a weekly door-to-door deposit collector significantly increased savings.

[19]This oversampling is generally slight and relative to the population from which the sample is drawn, not relative to the overall population.

an individual from 85 percent of the households (2,006 out of 2,372), these oversampling criteria mostly determined which individual in the household (rather than which households) we selected.

The mobile-deposit service (along with the bundled activities described in the previous section) was randomly offered to 1,625 individuals from the baseline sample of 2,006 individuals. Within this treatment group, individuals were randomly assigned a fee to be deducted from each deposit made through the mobile channel: free (683 individuals), 2% fee (316 individuals), 4% fee (310 individuals), and 8% fee (316 individuals). Those in the free service were further randomized to be surveyed annually (227 individuals) or monthly (435 individuals), as described in further detail in the following section. The control sample received no offer, nor the promotional activities surrounding the offer, but were surveyed monthly. The treatment randomization was stratified on quartiles of baseline saving balances and terciles of a test score based on the ability to read a text message. Figure 2 provides an overview of the sample selection.

## 2.4 Data

We conducted an initial baseline survey in November and December 2010 (see Figure 1). From 2011 to 2013, three detailed annual surveys were conducted each November. To improve the precision of our estimates, we surveyed the control sample and 456 randomly selected individuals from the free mobile-deposit service treatment arm every month from January 2011 to December 2012 and in January and May of 2013 (i.e., 25 waves of the survey). We refer to this as the monthly surveyed sample. This high-frequency panel has the advantage of increasing statistical power for detecting the causal effect of the free mobile-deposit service offer. Due to the unforeseen delay on rolling out the service, our baseline data covers more than a year of monthly surveys and two annual surveys. These surveys provide rich detail on savings behavior prior to the intervention, with detailed information on individual savings deposits using a monthly recall period.

We also observe deposits made through the mobile-deposit service from the start of the intervention until May 2013. We do not observe institutional data from the bank on account balances and withdrawals, and thus rely on the self-reported savings behavior from surveys for our primary outcomes of interest, similar to Callen et al. (2019).[20] Given our design, the core analysis focuses on the comparison of the free treatment

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[20]While self-reported savings may be prone to measurement error or over-reporting, this will affect our estimates only if reporting errors differs by treatment status. In addition, for errors driven by self-reported data to explain our results, it must be that treated households were consistently over-reporting formal savings, but *under-reporting* savings in other devices. Such

to the control using the monthly surveyed sample, and the estimation of price elasticities uses the annually surveyed sample within which the service fee was randomized.

## 2.5    Validity: Attrition and Balance

Given the length of time between the initial baseline survey and the roll-out of the intervention, there is some attrition in the sample. Since participants were unaware of their treatment status until they received an offer letter in December 2011, we take this attrition as random with respect to treatment. We define a Panel Sample of individuals surveyed at least once after the treatment offer letters were delivered, and use this sample for our analysis. Online Appendix Table A.1 tests for differential attrition into the Panel Sample and differential response rates to the multiple surveys by treatment status. We find attrition is low and balanced across treatment status among those surveyed monthly, even among sub-groups of interest for heterogeneity. Although there are some statistically significant differences in attrition across treatment arms in the annual sample, the response rate in the period after the mobile-deposit service is offered relative to the months before differs only for the 8 percent fee group. The remainder of the paper limits analysis to the observations to the Panel Sample to be consistent with the sample used in the key impact regressions.

The Panel Sample is balanced on baseline characteristics (Online Appendix Table A.2) and on baseline savings outcomes of interest[21] as measured in the monthly surveys prior to the intervention roll-out (Online Appendix Table A.3). We confirm balance for both: 1) the monthly sample (used to estimate the causal effect of the mobile-deposit service), comparing those who received the mobile-deposit service for free with those in the control group; and 2) the annual sample (used to estimate the price elasticity for the mobile-deposit service), comparing those randomly assigned to different mobile transaction fees.

a pattern is unlikely and inconsistent with standard concerns raised for self-reported data.

[21]The survey questions are as follows: "After deducting the total amount of money given to others from the total amount of money received, you had Rs _____ remaining for saving or spending in the past month of _____. Can you tell me how much money you saved using the following methods – Saving in an institution such as a bank? Total?" Beginning in September 2012, the first question was replaced with the following two: "Money saved in [the partner bank] ? Money saved in bank accounts in your name at banks other than [the partner bank]?". We use the inverse hyperbolic sine transformation of savings amounts to account for the skewed non-normal distribution of savings deposits (Burbidge, Magee and Robb, 1988). The same balance test using outcomes without the inverse hyperbolic sine transformations confirms the validity of the research design (not shown).

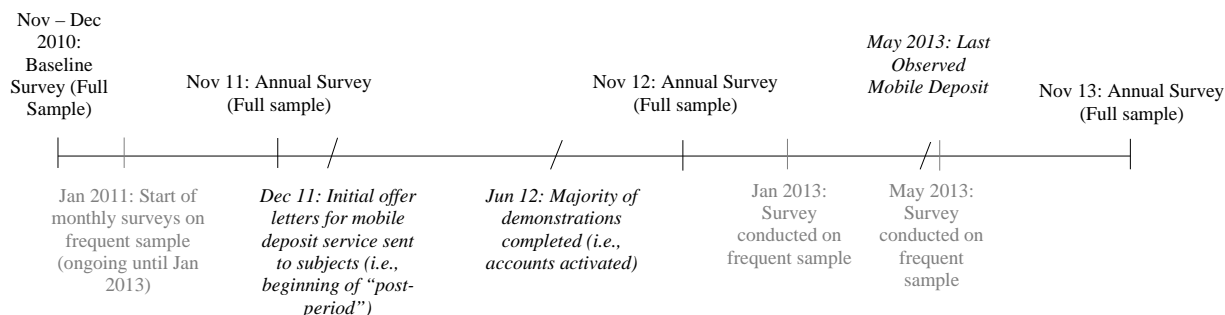Figure 1: Study Timeline (Not drawn to scale)



Nov – Dec 2010: Baseline Survey (Full Sample)

Nov 11: Annual Survey (Full sample)

Nov 12: Annual Survey (Full sample)

*May 2013: Last Observed Mobile Deposit*

Nov 13: Annual Survey (Full sample)

Jan 2011: Start of monthly surveys on frequent sample (ongoing until Jan 2013)

*Dec 11: Initial offer letters for mobile deposit service sent to subjects (i.e., beginning of "post-period")*

*Jun 12: Majority of demonstrations completed (i.e., accounts activated)*

Jan 2013: Survey conducted on frequent sample

May 2013: Survey conducted on frequent sample

Figure 2: Sample Selection

| Original Listing: |
| --- |
| *13,435 Economically Active Individuals (from 10,300 Households).* This listing was stratified by distance to the nearest bank: under 2km, between 2km - 5km, and greater than 5km. |
| **Determining Eligible Sample for Study:** |
| Imposing Study Eligibility Requirements:  1) Households with members paid on a daily or weekly basis. 2) Stated willingness to have an interest-bearing savings account. |
| *3,012 Individuals (from 2,372 Households)* |

**Treatment Assignment at Individual Level from Unique Households (2,006 Individuals):**

Stratified on quartiles of baseline saving balances and terciles of ability to read a text message. Oversampled those who lived within .5 km of the nearest mobile phone agent, who used their phones to send SMS messages regularly, who previously changed a SIM card, under 50 years of age, and females.

| *Surveyed Monthly* | | *Surveyed Annually* | | | |
| --- | --- | --- | --- | --- | --- |
| *Control (No Offer)* | *Free Service* | *Free Service* | *2% Fee* | *4% Fee* | *8% Fee* |
| *381* | *456* | *227* | *316* | *310* | *316* |

**Attrition: Individuals observed at least once in the post-intervention period (1,908 Individuals):**

| *Surveyed Monthly* | | *Surveyed Annually* | | | |
| --- | --- | --- | --- | --- | --- |
| *Control (No Offer)* | Free Service | Free Service | 2% Fee | 4% Fee | 8 Percent Fee |
| *368* | *435* | *221* | *300* | *292* | *292* |

## 2.6 Sample Characteristics: Banking and Mobile Phones

Our sample selection is stratified on distance to the nearest town, a proxy for banking services: 44 percent live within two kilometers of a bank, another 40 percent live 2 and 5 kilometers from a bank, and the remaining 16.5 percent live more than 5 km away. The average time to make a deposit at the closest bank is 53 minutes: 32 minutes for round trip travel and 21 minutes at the bank for making the deposit. The accompanying travel costs are 9 LKR (0.08 USD). In contrast, 72 percent of our sample is able to top up their phone within 200 meters, and the average time for adding airtime to their mobile phone, including travel time, is 10 minutes.

A significant proportion of our sample is not actively using formal bank accounts, despite having an account in their name: only 12 percent report using a formal savings account more frequently than once a month. Among those who made any saving deposits in a given month, only 11 percent of the savings were deposited into a formal account. During the baseline period, total monthly saving deposits were 5,989 LKR (54.84 USD). Average monthly formal bank saving deposits were 1,533 LKR (14.04 USD), with the remainder deposited in informal savings: 2,330 LKR (21.18 USD) per month in cash, 1,355 LKR (12.32 USD) per month in ROSCA (i.e., seetu), and 770 LKR (7 USD) per month in other informal devices. These average amounts hide a very skewed distribution – over 75 percent of subjects in a given month report no formal deposits and the median monthly total savings is 2,075 LKR (19.00 USD). In our baseline questionnaire, 69 percent report having a formal account balance of less than 10,000 LKR (92 USD), just 42 percent of their reported mean monthly household consumption.[22] Consistent with the focus on deposit transaction costs, we observe that deposits into saving products are more frequent than withdrawals among our sample: 36 percent per month make a saving deposits at a financial institution, whereas only 19 percent per month make withdrawals.[23] Given our sampling rules, we observe a high penetration of mobile phones (89 percent), though capacity to use various functions on a mobile phone is more limited. See Online Appendix Table A.2 for additional descriptive summary statistics.

Our selective sample reflects the broader Sri Lankan context: despite significant penetration of formal

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[22]See Appendix for more details on variable definitions and balance tests.

[23]This question asked about deposits and withdrawals in the previous month into the following types of financial institutions: private banks, government banks, microfinance organizations, development banks, National Savings Bank, Samrurdhi Bank, Sanasa Bank, Development project, Farmer's organization, other. It was asked to only the monthly sample in eight survey rounds during the baseline period.

bank accounts, informal savings methods remain common and frequent usage of formal banks for saving deposits is low. In general, 83 percent of Sri Lankans have a bank account, but only 31 percent save at a financial institution and only 45 percent report "[having personally] saved or set aside money for any reason" in the previous year (The World Bank, 2013). Among our control sample in the baseline period, 21 percent per month report making formal savings deposits, though 89 percent per month report accumulating some savings (see Appendix Table A.3). The majority of savings were held as cash: 73 percent per month report a saving deposit as cash holdings, 38 percent per month report making a deposit into a seetu, and 24 percent per month report making a deposit into another informal saving device. While we do not have information on how many times a respondent saves within the month, 73 percent are self-employed and 25 percent are engaged in employment that is paid either daily or weekly, suggesting that they may save more than once a month. The low use of financial institutions suggests a potentially substantial unmet demand for formal bank accounts.

## 2.7   Implementation of the mobile-deposit service

We analyze each of the steps of product adoption in turn. First, treated participants were offered the service at the randomly designated price by letter (Letter Delivered). The participant then decided whether or not to accept the offer by coming to the partner bank branch during a designated time window to open and account and receive the phone and SIM card (Account Accepted). Finally conditional on opening the account, the project team arranged a demonstration at the participant's house in which 100 LKR (0.91 USD) was deposited in the account using the mobile-deposit service (Demonstration Completed). Table 1 provides summary statistics on take up for each stage of this process. Because these events happen in succession, a later stage can only occur if the previous stage was completed. All treated participants could make deposits on their own into their account.

Subjects were unaware of the product until the first offer letters were sent in December 2011, a year after the initial baseline survey. We were able to reach 98 percent of the Panel Sample to make the initial offer (Row 1). Among those provided the service for free, 91 percent accepted the offer and 80 percent completed the demonstration. The service was used at least once by 26 percent of those who received the mobile-deposit

Table 1: Mobile Deposit Service Adoption by Fees Charged

|  | (1) 0% | (2) 2% | (3) 4% | (4) 8% |
|---|---|---|---|---|
| Letter Delivered | 0.979 | 0.990 | 0.990 | 0.969 |
| Account Accepted | 0.910 | 0.903 | 0.921 | 0.873 |
| Demonstration completed | 0.800 | 0.733** | 0.760 | 0.702*** |
| Used Service | 0.258 | 0.203* | 0.226 | 0.178*** |
| Frequent User | 0.070 | 0.050 | 0.045* | 0.024*** |
| Amount Deposited, LKR | 389.027 | 305.597 | 354.507 | 125.712** |
| Observations | 656 | 300 | 292 | 292 |

Letter Delivered and Account Accepted are based on enumerator reports. Demonstration completed, Used service, Frequent user, Amount Deposited are based on institutional data provided by Ceylon Bank. Demonstration completed indicates that the individual is observed in the partner bank's dataset as having used the service. Frequent user is an indicator of individuals who used the service 10 times or more. Amount Deposited refers to the total amount deposited through the mobile-deposit system. The 0% sample combines those surveyed annually and monthly. Statistical significance is based on regressions which include variables upon which the random assignment were stratified and uses robust standard errors. Observations are limited to individuals in the panel sample. Comparisons to the free mobile service offer are indicated by * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

service for free (Used service); 7 percent made 10 or more mobile deposits. We consider this usage rate to be low, but similar to take up rates of savings products in several other studies (e.g., Dupas et al., 2018; Flory, 2011; Ashraf, Karlan and Yin, 2006).[24] On average, the total amount deposited per person from the start of the intervention until May 2013 through the free mobile-deposit service was 389 LKR (USD 3.53). We observe similar deposit rates among those charged 2 and 4 percent fees, but deposits drop to LKR 126 (USD 1.15) at the 8% fee level. Appendix Figure A.1 provides a histogram of the total mobile deposits made over the period of the project for those offered the service for free and made at least one deposit (i.e., Used Service), highlighting that the majority of users deposited very small amounts.

In November 2013, almost two years after the product was first launched, we asked treated respondents questions about their experience with the service. When asked an open-ended question on what they liked about the service, the most common responses, by far, were the ability to save at any time of day and the ability to save even a small amount. This suggests that individuals were well aware and understood the direct benefits of a mobile-deposit service. Of the 1,156 respondents who were surveyed, 62 percent said they had "high" or "somewhat high" confidence in their ability to use the service. However, 53 percent also agreed at least "to some extent" that the mobile bank saving service was complicated/difficult. This suggests that despite the high levels of self-reported confidence, learning how to use the service imposed a cognitive cost. However, 26 percent of those who used the service frequently (10 or more times) also said that it was complicated/difficult (compared with 57 percent of the non-users), suggesting this was not a primary barrier to adoption. When asked why they hadn't used the service more, the two leading responses were that the respondent forgot to save or didn't have time to save (48 percent) and lack of interest in the method of saving (39 percent). 33 percent did agree, at least to some extent, that they disliked the service for technical problems/issues. We expect that this comment on technical problems likely combines a person's own difficulty in using the service with system wide service issues that occurred shortly after the launch of the service. No respondent voiced a lack of trust in the banking system or mobile phone companies as an explanation for lack of use, and only 9 percent agreed, at least to some extent, with the statement "I do not trust this mobile phone bank saving service". Consistent with our finding that respondents continue to use

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[24]99 percent recalled receiving a demonstration in subsequent surveys, allowing us to rule out lack of awareness of the service as a potential explanation for low demand.

the traditional channel to make deposits, 32 percent said at least "to some extent" they preferred to deposit directly at the bank rather than using the mobile channel. This preference was only slightly greater among those who did not use the service at all versus those who used it frequently (34 percent versus 21 percent). Overall, our survey responses suggest that individuals understood well that the service reduced transaction costs for saving deposits, but that this benefit may not have been appealing enough to overcome the learning costs of a service that closely mimicked a well-known process.

# 3    The Savings Effects of a Mobile-Deposit Service

## 3.1    Primary Estimating Equations

Our primary question of interest is whether the intervention resulted in an increase in total savings, a reallocation towards formal savings, or at a minimum, a diversion of formal savings to the partner institution. We estimate the standard experimental intention to treat using the random assignment to treatment with the following linear regression specification:

$$SavingsDeposits_{si} = \beta_0 + \beta_1 MobileOfferFree_{si} + \mu_s + \epsilon_{si} \tag{1}$$

where *SavingsDeposits* are the monthly mean of the following: an indicator for making a deposit at the partner bank, the amount of total savings deposits at the partner bank, an indicator for making a formal saving deposit, the amount of formal savings deposits, an indicator for having any saving deposit, and the amount of total savings deposits. These dependent variables have a monthly recall. We collapse the data at the individual level, using the mean response over all surveys conducted in months after the baseline period (i.e., December 2011 onward). *MobileOfferFree* is an indicator for whether the individual was assigned to the free mobile-deposit service offer, and $\mu_s$ reflect fixed effects for the randomization stratification variables; $s$ represents the strata used in the randomization and $i$ represents individual. For the impact estimation we use only observations in the monthly survey sample, meaning that individuals are either in the control arm or in the free treatment arm. Robust standard errors are used.

Additionally, we estimate a difference-in-difference model using the monthly responses and including

individual fixed effects, $\alpha$. These regressions include the one year of data prior to the initial offer letters:

$$SavingsDeposits_{sit} = \beta_1 MobileOfferFree * Post_{sit} + w_t + \alpha_i + \epsilon_{sit} \qquad (2)$$

where $Post$ is an indicator for the period after the initial letters introducing the mobile deposit service were delivered (December 2011); $w$ are fixed effects for each survey wave; $t$ reflects the monthly recall period of the survey. Standard errors are clustered at the individual level. Table A.3 confirms that savings deposits are statistically similar across treatment status prior to the offer letters being sent. We use probability weights to ensure that each individual is given equal weight in our estimates regardless of differential response rates by individuals to a given survey wave.[25] In earlier survey waves, we did not specifically ask for savings in the partner bank, and so we do not include this outcome in the individual fixed-effects specification. Eq (2) is our preferred estimating model due to the increased precision from controlling for average individual behavior, but we include Eq (1) primarily to estimate effects on savings with the partner institution, which we do not observe in initial pre-treatment months.

We focus on the free mobile-deposit service for the core impact analysis because the free service removes all financial frictions levied on the consumer, and therefore provides an upper bound of the effect of a mobile-deposit service. Moreover, the control sample and a randomly-selected subset of the free-treatment sample were surveyed monthly, while the fee-treatment samples were interviewed only annually. Because the survey frequency may affect responses, we focus our treatment-control comparison on the samples surveyed monthly. The increased survey frequency also provides a high-powered estimate of a frictionless mobile-deposit service offer.[26] Section 3.4 uses the annual survey sample to estimate price elasticities.

## 3.2 Variable Transformations and Robustness Statistics

Given that savings deposits follow a highly skewed non-normal distribution, we follow the recent financial services impact literature in analyzing our primary outcomes of interest using the inverse hyperbolic sine

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[25]Results from Eq(2) are robust to using unweighted data.

[26]Results from Eq(1) and Eq (2) are relatively robust to including subjects surveyed annually and comparing those who received the free service to the control, and comparing those who received the service at any fee to the control. When we include those surveyed annually, we observe slightly larger increases in deposits to the partner bank and formal banking more generally, but continue to find no support for increased total savings deposits.

transformation (Burbidge, Magee and Robb, 1988). This transformation retains the interpretation of a log (i.e., impacts are in percent changes), but can handle zero values. Because absolute savings deposits are still the relevant measure for bank profits and purchasing power, we also report effects on non-transformed total amounts in the text of the paper (with the complete tables presented in the Appendix).

To overcome this sensitivity to scale, we augment our results by testing whether the distribution of savings is significantly different in the control and treatment groups. We use average monthly saving deposits at the individual level[27] to test for differences in the distribution with the Kolmorogov-Smirnov (KS) statistic. Change in saving deposits is measured by calculating an individual's average monthly saving deposits during the pre-period and post-period and taking the difference between the two, akin to our individual fixed-effects difference-in-difference approach in the regression framework (i.e., Eq 2). Because savings deposits with the partner bank were not measured in the pre-period, we instead use the average monthly savings deposited with the partner bank in the post-period for the months in which this question was asked. The benefit of the KS statistic is it is non-parametric, insensitive to scale, and robust to non-normal distributions.

We also illustrate the impact on saving deposits across the distribution by plotting the cumulative distribution function by treatment status of average monthly deposits with the partner bank and the change after the intervention in average monthly formal deposits and total saving deposits.[28] This provides a transparent and graphical representation of how saving deposits are changing along the distribution.

Given the relatively low take up of the mobile deposit service, the large number of zero deposits, and the large variance in savings deposits, we do not expect that the distribution of changes in savings deposits in the treated group to first-order dominate the distribution of those in the control group. Instead, we test whether, for those offered the service, the probability of observing a higher amount of saving deposits with the partner bank, or a more positive change in formal and total average monthly saving deposits, is greater than one would expect by chance.[29] We estimate this probability by randomly drawing an observation from

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[27]We calculate the mean monthly savings for each individual to abstract away from the issue of frequency of deposits versus total amount of savings. Either of these may be affected by the mobile deposit service. For example, if the mobile-deposit service offer led to more frequent but smaller deposits, then using data at the person-month level might result in left-shifted CDF in the treatment sample, even if the treatment increased total amount of savings.

[28]Specifically, an individual's monthly saving deposit is transformed using the inverse hyperbolic sine transformation. We then calculate the average in the months prior to the intervention and the average after the start of the intervention, and take the difference between the two.

[29]This test is analogous to the Mann-Whitney test (Mann and Whitney, 1947). However, to account for the large number of "ties" due to zero deposits, we test whether the probability is higher than it would be by chance rather than testing whether the probability of a random draw from the treated distribution is greater than the control is higher than 50 percent.

the control sample and the treatment sample and comparing which of the two experienced the higher gain in average formal and total monthly saving deposits from the baseline period to the post-treatment period; for the partner bank deposits, we observe which is higher in the post-treatment period. We repeat this 1,000 times, with replacement, to estimate the probability of observing a larger change in savings among the treatment relative to the control (*Savings Probability, SP, Statistic*). We bootstrap standard errors for the SP statistic by arbitrarily reassigning treatment status and estimating the SP statistic for 1,000 different pairs with this arbitrary treatment assignment.[30] We then compare the SP statistic given the true treatment assignment to the distribution of simulated SP statistics, providing us with the likelihood, or p-value, of observing our SP statistic by chance.

The KS statistic, CDF, and SP statistic are all methods that are scale-invariant and identify distributional shifts that may not be detected when simply comparing means.

## 3.3 Estimated Impacts on Savings

Table 2 provides the intent-to-treat estimates on the causal effect of the free mobile-deposit service offer estimated by Eq (1), Panel A, and Eq (2), Panel B. We observe a significant increase in monthly savings deposits with the partner bank (44 percent) and formal banks more generally (13 to 29 percent). However, we find no increase in total saving flows.[31] Appendix Table A.5 estimates the effect on the free mobile-deposit service offer on other saving devices and finds no statistically significant reductions, though point estimates suggest reductions in all other saving sources: cash, seetus, and other informal devices. This suggests that increases in formal savings are too small to cause meaningful percentage reductions in savings in other forms. Table 3 further shows that there are also no effects on consumption or labor earnings.[32]

Less than half of the 44 percent increase in savings with the partner bank is deposited through the mobile-deposit channel. We observe gains in partner savings even among treated individuals who never used the mobile-deposit service. Moreover, the share of deposits attributable to the mobile-deposit channel increases as a function of frequency of use. These patterns provide some reassurance that the traditional

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[30]We estimate the SP statistic using 100 draws for each arbitrary treatment assignment when estimating the bootstrapped standard errors.

[31]Appendix Table A.4 shows that results are robust to an ANCOVA specification.

[32]Consumption is a measure of total monthly expenditure by the household and individual, and labor earnings is total monthly income earned from economic activity by the household and individual.

Table 2: Effect of Free Mobile Deposit Offer

| | (1)<br>1[Partner<br>deposit] | (2)<br>Partner<br>savings | (3)<br>1[Formal<br>deposit] | (4)<br>Formal<br>savings | (5)<br>1[Any<br>deposit] | (6)<br>Total<br>savings |
|---|---|---|---|---|---|---|
| | Panel A: Post period (December 2011 - November 2013) | | | | | |
| Free Mobile Deposit Offer | 0.0651*** | 0.442*** | 0.0249* | 0.131 | -0.00539 | -0.0248 |
| | (0.00925) | (0.0758) | (0.0145) | (0.135) | (0.00760) | (0.0952) |
| Observations (Ind) | 790 | 790 | 803 | 803 | 803 | 803 |
| | Panel B: All months with individual fixed effects | | | | | |
| Free Mobile Deposit Offer*Post | | | 0.0382*** | 0.287** | -0.00521 | -0.0282 |
| | | | (0.0138) | (0.120) | (0.0113) | (0.106) |
| Observations | | | 20028 | 20028 | 20027 | 20027 |
| Control Mean | 0.0367 | 0.329 | 0.189 | 1.703 | 0.933 | 8.138 |
| KS Statistic | .207 | .207 | .097 | .0929 | .037 | .051 |
| p-value | 0.00 | 0.00 | .042 | .059 | .940 | .664 |
| SP Statistic | .356 | .358 | .544 | .535 | .376 | .464 |
| p-value | .007 | .013 | .126 | .174 | .790 | .740 |

Estimates are conducted on the monthly panel sample. Saving variables are analyzed using the Inverse Hyperbolic Sine, so the interpretation is as a log (percent impact). Outcomes are monthly flows over the month prior to the survey wave, and the unit of observation is individual in Panel A and individual-month in Panel B. All regressions control for the stratification variables used in the randomization protocol. Panel A conducts a cross sectional comparison of treatment and control outcomes using all post-treatment survey waves and uses robust standard errors. Panel B uses the full set of monthly surveys, includes individual and survey wave fixed effects, uses inverse propensity weights for the attrition across survey waves to retain representation of the overall panel sample, and clusters standard errors at the individual. The Control Mean is the mean of control individuals' means across post-treatment survey waves for the given outcome variable. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

channel for depositing savings is concentrated among those who chose not to use the mobile-deposit channel. In addition, among both infrequent and frequent users of the mobile-deposit service, a significant proportion expressed a preference for the traditional channel.

That the increase in partner savings is driven largely by the use of the traditional method of depositing savings suggests that a main effect of the intervention was to increase access to formal saving accounts by facilitating the opening the bank accounts. These findings are consistent with Dupas et al. (2018), who estimate the effect of simply opening bank accounts. Also consistent with Dupas et al. (2018), we find small changes in the use of the account with the partner bank (a 6.5 percentage point increase), and no increase in total savings. Thus, even if deposit transaction costs were not a primary barrier, the opening of the

Table 3: Effect of Free Mobile Deposit Offer on Consumption and Labor Earnings

|  | (1) Household Consumption | (2) Individual Consumption | (3) Household Earnings | (4) Individual Earnings |
|---|---|---|---|---|
| Free Mobile Deposit Offer*Post | -0.000467 | -0.0573 | 0.00832 | 0.115 |
|  | (0.0214) | (0.0431) | (0.0442) | (0.0858) |
| Observations | 20028 | 20028 | 20028 | 20028 |
| Control Mean | 10.67 | 9.870 | 10.84 | 10.04 |

Estimates are conducted on the monthly panel sample. Consumption and earnings are analyzed using the Inverse Hyperbolic Sine, so the interpretation is as a log (percent impact). Outcomes are monthly flows over the month prior to the survey wave, and the unit of observation is individual-month. All regressions control for the stratification variables used in the randomization protocol, includes individual and survey wave fixed effects, uses inverse propensity weights for the attrition across survey waves to retain representation of the overall panel sample, and clusters standard errors at the individual. The Control Mean is the mean of control individuals' means across post-treatment survey waves for the given outcome variable. Clustered standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

account itself is likely to increase formal savings. Our December 2011 survey reveals that despite low use of formal savings, respondents have a strong preference for bank savings; respondents overwhelmingly report that banks are the most secure (82 percent) and easiest (48 percent) vehicle for savings. The continued use of the traditional deposit channel suggests that participants were willing to incur deposit transaction costs despite having an alternative option to avoid these costs.[33]

In regressions using levels rather than IHS transformations, we find no significant increase in savings, even with the partner bank. The magnitude of increased savings in the partner bank is small (95 LKR/month, 0.86 USD/month), and even the sign of formal bank savings and total savings changes across the two specifications (see Appendix Table A.6). The differences between the IHS and level results reflect the influence of outliers. Windsorizing at the 99th percentile of deposits is enough to produce a statistically significant increase in deposits with the partner bank of 94 LKR, and a statistically significant reduction in non-partner formal deposits of 277 LKR. However, we continue to observe no significant difference in the other saving devices or in total savings (see Appendix Table A.7).[34]

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[33]Note that a treatment effect on the treated cannot be estimated based on identifying subjects who used the mobile service. This is because we observe treated individuals using the savings accounts, but not using the mobile service, thereby violating the exclusion restriction required when estimating the treatment effect on the treated.

[34]Appendix Table A.7 finds a statistically insignificant positive estimate for total savings, suggesting that the negative point estimate observed in Table 2 is most likely a reflection of random chance and the large variance of savings.

Figure 3 shows the CDF of the mean in monthly saving deposits with the partner bank and change in mean monthly formal and total savings deposits, by treatment status. We find strong evidence of increased savings with the partner bank – Figure 3a highlights significant movement along the extensive margin into saving with the partner bank. Averaging at each percentile ranking, the CDF of the treatment sample first order stochastically dominates the control group's savings in the partner bank. This is corroborated by both the KS statistic of .207 and the SP statistic of .369, both of which are statistically significant.

We find less robust support for an increase in formal savings: the KS statistic is statistically significant at the 10 percent level, but the SP statistic is not. Figure 3b shows that formal savings of those offered the free mobile deposit service lie primarily to the right of the control. We find the expected increase in formal savings along the extensive margin and small savers, but this difference is small and easily dominated by behavior of larger savers. In contrast, we find no support for increased total savings, and the distributions lie virtually on top of one another at almost every savings amount (Figure 3c).

These results suggest that the intervention was effective in diverting savings towards the partner bank. However, this did not result in a meaningful increases in total savings. Although the intervention yielded no significant increase in partner savings deposits on average, there were shifts along the distribution, particularly by small and marginal savers with the partner institution. Given subjects' preference for bank savings, the shift towards saving in the formal sector may have welfare benefits that are not captured in outcomes such as household consumption.

Of course, an alternate explanation for these muted results is that the interface was difficult to use. To address this concern, we note several facts. First, the interface mimicked the ubiquitous method of adding airtime to a mobile phone. Second, we provided training to every willing individual, successfully making a demonstration deposit to three-quarters of the treatment. Suggestive evidence that learning was not the main cause of low usage is that even the majority of those who successfully used the service once on their own (and thus overcame the initial learning costs) did not become frequent users of the mobile channel. We also find no heterogeneity of usage along characteristics that we expect would be associated with lower learning costs – the ability to change a sim or read text messages, or measures of mobile phone usage for calls and texts, or more general ability measures and education. Thus, while learning may have decreased

usage of the product, the data do not indicate that learning costs are the primary reason for the low level of mobile deposits.

## 3.4   Sensitivity to Price

Table 4 tests for differences in savings behavior as a function of the fees levied on the service. We run regressions equivalent to Equations (1) and (2), but replace the dummy for treatment with the inverse hyperbolic sine of the deposit fee assigned to that individual. We limit our observations to those offered the service and surveyed annually, meaning that we compare across randomized fee amounts among those offered the treatment.[35] We include the outcome variables *Mobile Savings*, the amount deposited through the mobile platform, and *Mobile Proportion*, the ratio of saving deposits observed through the mobile platform to the total saving deposits reported to the partner bank.[36] We use the inverse hyperbolic sine transformation for both the fee and the savings deposits to provide an elasticity interpretation to $\gamma_1$.

We observe a price elasticity not statistically different from zero.[37] We do not observe any statistically significant differences in monthly deposits in the partner bank (even when limited to just mobile deposits), in formal savings, or in total savings when using saving deposit level amounts (see Appendix Table A.12).

Combined with Table 2, this suggests that the mobile-deposit offer resulted in increased partner savings and formal savings deposits regardless of the price charged. The lack of price sensitivity we observe is largely driven by the low fees; at 2 and 4 percent fees we do not observe a consistent decrease or statistically significant difference in use of the mobile service. However, we do observe that the total amount deposited through the mobile channel is significantly lower for those charged 8 percent (see Table 1), though total deposits in the partner bank is not. This suggests that those in the 8 percent group were still interested in the partner bank account, but sidestepped the mobile-deposit service. Coupled with the mobile-deposits being a relatively small percent of total reported deposits with the partner bank, these results suggest that

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[35]Unlike the previous analysis that used high frequency (primarily monthly) survey data, these estimations have two observations for the baseline period (i.e., prior to the offer letters) and two observations after the mobile deposit service was introduced (i.e., after the offer letters).

[36]For those who do not report any deposits to the partner bank, we record *Mobile Proportion* as zero. Assuming that the fee deterred use of the partner bank, this will bias our estimates in favor of finding a significant price elasticity for the service.

[37]Appendix Table A.10 confirms no consistent or meaningful differences in savings deposits with the partner bank, bank savings deposits, or total savings deposits as a function of the percentage point increase in the fee, and Online Appendix Table A.11 finds these results are robust to the use of probability weights based on the predicted likelihood of being in the panel sample as a function of baseline characteristics, confirming that our results are unlikely to be driven by differential attrition.

## Figure 3: All individuals frequently surveyed

(a) Left: Mean Monthly Partner Deposits; (b) Center: Change in Mean Monthly Formal Deposits; (c) Right: Change in Mean Monthly Total Deposits
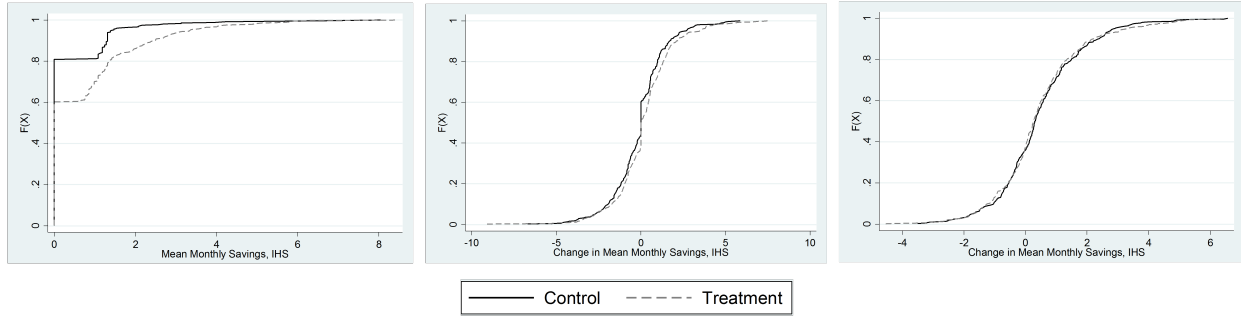


## Table 4: Price Sensitivity to Fees Offered

| | (1) Mobile savings | (2) Mobile proportion | (3) Partner deposit] | (4) 1[Partner] savings | (5) 1[Formal deposit] | (6) Formal savings | (7) 1[Any deposit] | (8) Total savings |
|---|---|---|---|---|---|---|---|---|
| | Panel A: Post period (December 2011 - November 2013) | | | | | | | |
| Fee (IHS) | -0.0196 | -0.000630 | -0.00117 | -0.0124 | -0.000604 | -0.0435 | -0.00505 | -0.0978 |
| | (0.223) | (0.768) | (0.886) | (0.845) | (0.954) | (0.635) | (0.400) | (0.110) |
| Obs (Ind) | 1104 | 1104 | 1104 | 1104 | 1104 | 1104 | 1104 | 1104 |
| | Panel B: All months with individual fixed effects | | | | | | | |
| Fee (IHS) *Post | | | | | 0.00725 | 0.0396 | 0.000400 | -0.0558 |
| | | | | | (0.632) | (0.759) | (0.972) | (0.584) |
| Obs (Ind-month) | | | | | 4317 | 4317 | 4317 | 4317 |
| Free Mean | .19 | .01 | .16 | 1.18 | .27 | 2.35 | .94 | 8.26 |

Estimation conducted on the annual sample within which mobile transfer fees were randomized. Saving variables and fees are analyzed using Inverse Hyperbolic Sine, so the interpretation is as an elasticity (percent impacts). Outcomes are monthly flows over the month prior to the survey wave, and the unit of observation is individual in Panel A and individual-month in Panel B. Mobile proportion is recorded as 0 for those who did not deposit any partner savings. All regressions control for the stratification variables used in the randomization protocol. Panel A conducts a cross sectional comparison of the different treatment arms' outcomes in the post period and uses robust standard errors. Panel B uses the full set of monthly surveys, includes individual and survey wave fixed effects, uses inverse propensity weights for the attrition across survey waves to retain representation of the overall panel sample, and clusters standard errors at the individual. Free Mean is the mean of the individuals' mean of those in the annual sample who received the deposit-service for free across post-treatment survey waves. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

deposit costs are not driving overall savings behavior.

# 4    Examining heterogeneity in demand

Given the relatively low average adoption rates and moderate impacts on savings, we explore whether targeting the baseline characteristics that predicted demand would have yielded a greater impact on savings. Table 5 explores a number of theoretically motivated baseline characteristics on demand for the service.[38] We limit the sample to those who were successfully delivered the offer letter, to ensure that the results are driven by demand for the service rather than an inability to offer the service. These covariates were not pre-specified, and are instead motivated by our review of the theoretical literature and our own priors as reflected in the sampling design. We therefore consider these correlations to be exploratory in providing potential direction in targeting subgroups who may have higher demand and greater marginal benefits from mobile-linked financial services. Appendix Table A.13 estimates a model predicting adoption of the service with additional covariates.

In general, we find women, those living at intermediate distances from a bank branch, and those owning a mobile phone at baseline were significantly more likely to use the service. This suggests that those who were most likely to benefit from a reduction in deposit transaction costs (e.g., women, who save smaller amounts more frequently relative to men, and those living further from the bank), and those already familiar with the technology's interface, were most likely to use the service. But we fail to find support for other characteristics predicting demand, including those supported by our sampling hypothesis (e.g., a reported willingness to pay for the service) or theoretically motivated: phone capacity (reduced effort costs), present-biasedness (asymmetric costs for depositing versus withdrawing), bank familiarity (trust related information asymmetry), baseline savings (higher value for the service).[39]

Those living 2 to 5 km from a bank branch are 11 percentage points more likely to try the service and deposited 70 percent more through the service. This suggests that those living closer may not value the

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[38]Table 5 includes the frequency of being surveyed and treatment status as additional covariates. All variables have been demeaned for the analysis.

[39]We see similar patterns in demand if we replace the indicator for living 2km to 5km from the bank with self-reported time to bank, with the only difference being no significant increase in the amount deposited when measured in LKR. We prefer to use the indicator variable for bank distance, rather than a continuous variable, to allow for graphical representations of the distribution conditional on distance. These distance ranges (under 2km, 2 to 5 km, and over 5km) were defined prior to the intervention and were used to stratify the original listing for the study's sample.

Table 5: Determinants of Takeup of the Mobile Deposit Service

| | (1) Accepted Account | (2) Demonstration Completed | (3) Used Service | (4) Amount deposited, IHS | (5) Amount deposited, LKR | (6) Deposited in Partner Bank self-reported |
|---|---|---|---|---|---|---|
| Female | 0.0377** | 0.0917*** | 0.0740** | 0.396** | -23.67 | 0.00541 |
| | (0.0173) | (0.0267) | (0.0303) | (0.191) | (141.1) | (0.0302) |
| Married | 0.0263 | 0.0690** | -0.0333 | -0.206 | -236.0 | 0.0353 |
| | (0.0214) | (0.0332) | (0.0335) | (0.217) | (301.6) | (0.0335) |
| Owns mobile phone | 0.0100 | 0.0489 | 0.0713** | 0.523** | 180.6 | 0.0439 |
| | (0.0262) | (0.0403) | (0.0360) | (0.220) | (109.8) | (0.0365) |
| Phone savvy | 0.00547 | 0.00377 | -0.000104 | -0.00657 | 9.246 | 0.00651 |
| | (0.00338) | (0.00476) | (0.00442) | (0.0283) | (26.07) | (0.00473) |
| Minutes to mobile agent | 0.00117 | 0.00150 | 0.0000573 | -0.00218 | -12.42** | -0.00143 |
| | (0.000854) | (0.00138) | (0.00149) | (0.00979) | (6.234) | (0.00142) |
| 2 to 5 km from bank | 0.00731 | 0.0517** | 0.0950*** | 0.649*** | 302.2** | 0.0800*** |
| | (0.0153) | (0.0234) | (0.0244) | (0.157) | (149.9) | (0.0248) |
| More than 5km from bank | -0.00336 | -0.0409 | -0.0401 | -0.190 | 68.23 | 0.0487 |
| | (0.0208) | (0.0328) | (0.0285) | (0.184) | (141.1) | (0.0330) |
| Bank experience | 0.0170** | 0.000851 | -0.0112 | -0.0273 | 94.57 | 0.00952 |
| | (0.00724) | (0.0109) | (0.0108) | (0.0705) | (61.61) | (0.0113) |
| Present-biased | 0.0299** | 0.00464 | -0.0201 | -0.126 | -11.42 | -0.0144 |
| | (0.0152) | (0.0242) | (0.0239) | (0.153) | (124.9) | (0.0253) |
| Discount rate | -0.0509 | -0.0212 | 0.0675 | 0.684 | 523.4 | 0.0106 |
| | (0.0679) | (0.0971) | (0.103) | (0.677) | (501.0) | (0.105) |
| Willingness to take risks | -0.00109 | -0.00383 | -0.00865** | -0.0542** | 2.165 | -0.00908** |
| | (0.00264) | (0.00401) | (0.00410) | (0.0260) | (11.37) | (0.00415) |
| Formal savings | 0.00117 | 0.0000613 | 0.00444 | 0.0368 | 26.82 | 0.00900** |
| | (0.00210) | (0.00335) | (0.00349) | (0.0231) | (20.25) | (0.00374) |
| Total savings | -0.00147 | 0.00112 | 0.00166 | 0.00146 | -26.61 | 0.00163 |
| | (0.00211) | (0.00330) | (0.00319) | (0.0204) | (23.12) | (0.00334) |
| Household consumption | -0.0405*** | -0.0541*** | -0.00181 | -0.0280 | -123.0 | 0.00943 |
| | (0.0149) | (0.0209) | (0.0197) | (0.125) | (144.8) | (0.0203) |
| Observations | 1503 | 1503 | 1503 | 1503 | 1503 | 1497 |

Account Accepted is based on enumerator reports. Demonstration completed, Used service, Amount Deposited are based on institutional data provided by the partner bank. Deposited in Partner Bank is an indicator of whether the respondent self-reported depositing savings to the partner bank in the previous month on one of the two annual surveys conducted after the roll out of the mobile-deposit service. IHS refers to amounts transformed using the inverse hyperbolic sine function. Demonstration completed indicates that the individual is observed in the partner bank's dataset as having used the service. Regressions pool monthly and annual samples and all variables are demeaned. Regressions are conditional upon the letter being delivered and being in the Panel Sample, include treatment status and frequency of being surveyed as additional covariates, and use robust standard errors.

reduction in distance costs as much, and that this benefit tapers off at greater distances, perhaps due to the transaction costs of withdrawals. Hence, this intermediate distance appears to be the 'sweet spot' for mobile saving; too close and deposit costs were already negligible, too far and withdrawals are too difficult to make.

Among women, we observe an 8 percentage point greater likelihood of trying the service, and a 40 percent increase in the amount deposited through the mobile-deposit service relative to men. The lack of a difference in total amount deposited is due to the non-normal distribution of savings deposits and is consistent with gender patterns at baseline – women are more likely than men to save some amount, but conditional on saving, men save larger amounts. This baseline difference suggests women may value the service more as smaller and more frequent savers, with arguably higher mobility costs and other-control concerns.

Finally, the 89 percent of the sample who owned a mobile phone at baseline were no more likely to go through the steps of learning the service, but were more likely to use the service (7 percentage points) and deposited 58 percent more through the service, an increased amount of 190 LKR (1.73 USD). This suggests that despite the simplicity of the product, the learning costs did dampen demand for the service for those who were not previously exposed to the underlying technology.

Given the significant number of non-adopters and evidence of a distributional shift even in the absence of large difference in means, we explore whether targeting the intervention among women and those living at intermediate distances would have been more effective. We do this by expanding Eq (1) and Eq (2) to be a difference-in-difference, Eq (3), and a triple-difference, Eq (4), with respect to the baseline characteristic of interest:

$$SavingsDeposits_{si} = \beta_0 + \beta_1 MobileOfferFree_{si} + \beta_2 Target_{si} + \beta_3 MobileOfferFree * Target_{si} + \mu_s + \epsilon_s i$$

$$(3)$$

$$SavingsDeposits_{sit} = \beta_0 + \beta_1 MobileOfferFree * Post_{sit} + \beta_2 Target * Post_{sit} + \beta_3 MobileOfferFree * Target$$

$$Post_{sit} + w_t + \alpha_i + \epsilon_{sit}$$

$$(4)$$

where *Target* is the characteristic of interest. $\beta_3$ signifies the additional marginal effect of the intervention of belonging to the subgroup of interest relative to the average effect of those not belonging ($\beta_1$). Our primary

hypothesis of interest is $H_0 : \beta_1 + \beta_3 = 0$, testing for the total effect of the intervention on the potentially targeted sub-group.[40]

Table 6, Column 1 and 2 show that the likelihood of depositing and the amount deposited into the partner bank are both significantly higher among women offered the mobile-deposit service. The mean increase among women is twice as large as that of men. Though not statistically different from men, we do observe that women offered the free mobile-deposit service are more likely to make a monthly deposit into formal savings (6 percentage point increase), and have higher formal savings (53 percent). We observe no statistically significant change in total savings, though the point estimates are positive. The magnitudes suggest that women, relative to men, were more likely to generate saving deposits to the partner bank from sources other than alternative savings vehicles. In fact, the negative point estimate suggests a potential of men substituting at a rate greater than 1 to 1 such that there is a net decline in total savings when offered the mobile-deposit service. Overall, our results suggest that the mobile-deposit service was more useful to women, who on average save small amounts more frequently. Nonetheless, we find no support for increased total savings even among women.

Similarly, Table 7 shows that among those at the intermediate distance (2km to 5km from a bank), we observe higher partner bank and formal savings deposits, with no robust corresponding increase in total savings. Though Panel A finds an increase in total savings, this is not robust to controlling for savings deposited in the period prior to the intervention. Our results by distance suggest that, though substitution from formal savings may be comparatively less than those living closer and further, it is still the case that the increased deposits in the partner bank is being sourced from alternative savings. The lack of effect among those living 5km or further from the bank reiterates the concern that withdrawal transaction costs may inhibit the use of services that reduce only deposit transaction costs.

Though we do not observe present-biasedness as being correlated with demand for the service, we still explore heterogeneous effects given the strong theoretical foundation of commitment devices and present-biasedness in saving decision. Appendix Table A.15 shows that those who were present-biased were no more

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[40]We do not show heterogeneity in the main text by those who owned a mobile phone at baseline, as this is a significant portion of the sample and is unlikely to be a characteristic that would be used for targeting to improve financial inclusion. Heterogeneity by mobile ownership is reported in Appendix Table A.14. We observe no differences in the marginal effect of baseline mobile ownership on reported saving deposits with the partner bank, in formal saving devices, or in total. This lack of heterogeneity highlights that subjects with higher learning costs may have used a different deposit method, but made similar deposit amounts.

Table 6: Differential Impacts, by Gender

| | (1) 1[Partner deposit] | (2) Partner savings | (3) 1[Formal deposit] | (4) Formal savings | (5) 1[Any deposit] | (6) Total savings |
|---|---|---|---|---|---|---|
| | Panel A: Post period (December 2011 - November 2013) | | | | | |
| Free Mobile Deposit Offer ($\beta_1$) | 0.0539*** (0.0103) | 0.352*** (0.0859) | 0.0182 (0.0157) | 0.0715 (0.151) | -0.00929 (0.00854) | -0.104 (0.108) |
| Free Mobile Deposit Offer * Female($\beta_3$) | 0.0603** (0.0247) | 0.482** (0.194) | 0.0465 (0.0397) | 0.387 (0.339) | 0.0225 (0.0189) | 0.411* (0.227) |
| Observations | 790 | 790 | 803 | 803 | 803 | 803 |
| $\beta_1 + \beta_3$ | 0.114 | 0.834 | 0.0647 | 0.459 | 0.0132 | 0.307 |
| Prob > F-statistic | 0.000 | 0.000 | 0.0754 | 0.130 | 0.432 | 0.121 |
| | Panel B: All months with individual fixed effects | | | | | |
| Free Mobile Deposit Offer * Post ($\beta_1$) | | | 0.0316** (0.0150) | 0.221* (0.133) | -0.00957 (0.0128) | -0.102 (0.119) |
| Free Mobile Deposit Offer * Post * Female ($\beta_3$) | | | 0.0293 (0.0368) | 0.308 (0.304) | 0.0194 (0.0272) | 0.347 (0.263) |
| Observations | | | 20028 | 20028 | 20027 | 20027 |
| $\beta_1 + \beta_3$ | | | 0.0609 | 0.528 | 0.00986 | 0.245 |
| Prob > F-statistic | | | 0.0708 | 0.0536 | 0.682 | 0.295 |
| KS Statistic | .375 | .375 | .184 | .237 | .079 | .118 |
| p-value | .000 | .000 | .152 | .028 | .973 | .664 |
| SP Statistic | .455 | .477 | .552 | .579 | .377 | .530 |
| p-value | .000 | .002 | .159 | .118 | .614 | .346 |

Savings variables are analyzed using the Inverse Hyperbolic Sine, so the interpretation is as a log (percent impact). Outcomes are monthly flows over the month prior to the survey wave, and the unit of observation is individual in Panel A and individual-month in Panel B. All regressions control for gender and the stratification variables used in the randomization protocol, and use robust standard errors. Panel A conducts a cross sectional comparison of treatment and control outcomes using all post-treatment survey waves and uses robust standard errors. Panel B uses the full set of monthly surveys, includes individual and survey wave fixed effects, uses inverse propensity weights for the attrition across survey waves to retain representation of the overall panel sample, and clusters standard errors at the individual. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Differential Impacts, by Distance to the Bank

| | (1) 1[Partner deposit] | (2) Partner savings | (3) 1[Formal deposit] | (4) Formal savings | (5) 1[Any deposit] | (6) Total savings |
|---|---|---|---|---|---|---|
| | Panel A: Post period (December 2011 - November 2013) | | | | | |
| Free Mobile Deposit Offer ($\beta_1$) | 0.0371*** (0.0140) | 0.208* (0.117) | 0.00371 (0.0222) | -0.0790 (0.205) | -0.0301*** (0.0115) | -0.223 (0.147) |
| Free Mobile Deposit Offer * Intermediate Distance ($\beta_3$) | 0.0684*** (0.0206) | 0.577*** (0.168) | 0.0528 (0.0326) | 0.512* (0.303) | 0.0546*** (0.0165) | 0.514** (0.209) |
| Free Mobile Deposit Offer * Far Distance | 0.0111 (0.0255) | 0.0762 (0.213) | 0.00588 (0.0393) | 0.0801 (0.358) | 0.0236 (0.0213) | 0.0421 (0.262) |
| Observations (Ind) | 790 | 790 | 803 | 803 | 803 | 803 |
| $\beta_1 + \beta_3$ | 0.106 | 0.785 | 0.0565 | 0.433 | 0.0245 | 0.291 |
| Prob > F-statistic | 7.12e-12 | 1.22e-10 | 0.0176 | 0.0527 | 0.0363 | 0.0499 |
| | Panel B: All months with individual fixed effects | | | | | |
| Free*Post ($\beta_1$) | | | 0.0348* (0.0197) | 0.290* (0.170) | -0.0157 (0.0158) | -0.0934 (0.151) |
| Free*Post*Intermediate ($\beta_3$) | | | 0.00255 (0.0296) | -0.0305 (0.258) | 0.0331 (0.0250) | 0.266 (0.237) |
| Free*Post*Far | | | 0.0160 (0.0448) | 0.0521 (0.385) | -0.00619 (0.0310) | -0.167 (0.285) |
| Observations (Ind-month) | | | 20028 | 20028 | 20027 | 20027 |
| $\beta_1 + \beta_3$ | | | 0.0373 | 0.259 | 0.0174 | 0.173 |
| Prob > F-statistic | | | 0.0914 | 0.180 | 0.371 | 0.346 |
| KS Statistic | .320 | .320 | .155 | .142 | .074 | .118 |
| p-value | .000 | .000 | .042 | .079 | .748 | .206 |
| SP Statistic | .448 | .454 | .557 | .544 | .455 | .487 |
| p-value | .001 | .000 | .103 | .163 | .236 | .600 |

Intermediate distance refers to households 2-5 km from the nearest bank, Far Distance refers to households located greater than 5 km from the nearest bank. Estimations are conducted on the monthly panel sample. Savings variables are analyzed using the Inverse Hyperbolic Sine, so the interpretation is as a log (percent impact). Outcomes are monthly flows over the month prior to the survey wave, and the unit of observation is individual in Panel A and individual-month in Panel B. All regressions control for Intermediate and Far Distance and the stratification variables used in the randomization protocol and use robust standard errors. Panel A conducts a cross sectional comparison of treatment and control outcomes using all post-treatment survey waves and uses robust standard errors. Panel B uses the full set of monthly surveys, includes individual and survey wave fixed effects, uses inverse propensity weights for the attrition across survey waves to retain representation of the overall panel sample, and clusters standard errors at the individual. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

likely to deposit with the partner bank. However, we do observe that they were marginally more likely to increase their formal saving deposits overall. This suggests that those who were present biased were less likely to be substituting savings from other formal saving devices. Nonetheless, we continue to see no support for increased total saving deposits.

These differences by gender, distance, and present-biasedness are echoed in our measures for changes in the distribution of savings.[41] The Appendix Figures illustrate some support for increased savings in formal banking among these subgroups more generally, with corresponding KS statistics and SP statistics that have relatively low p-values. However, the figures suggest no difference in the distribution of total savings among the subgroups. Similar to the total sample, when estimating impact on deposit *amounts*, as opposed to percent changes, results are generally statistically insignificant. Windsorizing at the 99th percentile of deposits, females experience a marginally greater increase of 177 LKR (1.61 USD) in monthly saving deposits with the partner bank, statistically significant at the 10 percent level. Similarly, those living at intermediate distances deposit 280 LKR (2.55 USD) more with the partner bank, significant at the 1 percent level. In contrast, we observe no marginal difference in saving with the partner bank among those that are present biased. For females and those living at the intermediate distance, we observe no statistically significant marginal difference, or overall increase, in formal or total saving deposits. Among the present-biased, we do estimate a significant increase in formal savings deposits (671 LKR, 6.10 USD, statistically significant at the five percent level), but see no corresponding increase in total savings.[42]

Appendix Tables A.8 and A.9 similarly finds no significant effect on consumption and labor supply by gender, distance, or present-biasedness.

## 5   Conclusion

Our experiment is one of the first to examine the potential for using mobile phone-linked bank accounts to encourage savings. We find that the introduction of a mobile-deposit service with zero deposit transaction

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[41]Appendix Figure 2, 3, and 4 depicts the CDF of savings in the partner bank and changes in formal and total savings by gender, intermediate distance, and present-bias respectively. They show an increase to the partner bank in both the extensive and intensive margin. These effects are corroborated by the KS statistics and the SP statistics, all of which are statistically significant with $p-value < .03$.

[42]The estimates for saving amounts with the partner bank use the estimating equation in Panel A, and estimates for formal and total savings amount use the estimating equation in Panel B. Estimates for formal and total savings are not meaningfully different between the two estimating equations. Results available upon request.

fees significantly increased the share of savings deposited with the partner institution and in the formal banking sector more generally. However, we observe no increase in total savings or in downstream welfare measures, such as consumption or labor earnings. Moreover, while the effect on partner bank deposits is large as a proportion of prior balances, the increases were driven by small savers and hence aggregate deposits do not increase meaningfully from the bank's perspective. We find that the groups we expected to benefit most from the reduced deposit transaction costs (such as women and those living at intermediate distances from banks) did indeed have higher demand for and a greater impact from the service. However, even for these subgroups, we find no evidence that the service increased total savings.

Overall, we do not find a transformative effect on total savings from providing a mobile-deposit service. This is despite a concentrated effort to reduce barriers to a minimum (e.g., by removing bank account fees and offering demonstrations of the service), and the intervention being a combined effect of mobile money and formal saving benefits. Our results suggest limited effects from increasing convenience and reducing deposit transaction costs for savings deposits. This is further supported by the lack of responsiveness to the price of using the service and the large share of deposits made to accounts via traditional channels.

The recent work by Dupas et al. (2018) finds similarly modest effects from increasing bank access by eliminating pecuniary costs for opening bank accounts. Our results suggest it is unlikely that the additional reduction in deposit transaction costs gained from introducing mobile savings will transform saving rates. This is consistent with studies in contexts more integrated with mobile money that focus on the impact of savings from mobile money or connecting formal accounts to existing mobile-money users, which also typically have the feature of reducing deposit transaction costs and levying fees on withdrawals (Batista and Vicente, 2017; Bastian et al., 2018; Jack and Suri, 2016; Batista and Vincente, 2016). While it still may be the case that the impact on savings would be greater in places that are more familiar and integrated with mobile money or where banks are more remote, our findings highlight that a "build it and they will come" solution is not enough for people to internalize the benefits of reduced deposit transaction costs related to formal saving devices.

Our results highlight two potential explanations for why reducing transaction costs for formal deposits may generate modest marginal gains in increasing savings. First, though removing transaction costs is

critical for savings efficiency, the marginal gain from reduced transaction costs may be relatively small due to the presence of easily accessed informal saving methods. While we do not find support for heterogeneous effects with respect to informal savings access (e.g., seetu membership), this may reflect lack of variation in our limited measures of informal finance and that Sri Lanka has greater financial access than other contexts. In general, an area of future research is to consider the marginal benefits to formal savings products relative to the status quo provided by informal saving devices. This may also explain heterogeneity observed in the savings mobilization literature - perhaps interventions that address behavioral constraints are especially promising as they may not be solved by *either* formal or informal saving methods.

Consistent with the importance of behavioral constraints, while we do not find that reductions in deposit transaction costs resulted in increased saving deposits, Callen et al. (2019) find that a door-to-door deposit collection increased formal savings in a similar context. This differential finding suggests that salience and habit formation were more important than reductions in deposit transaction costs. Indeed, Callen et al. (2019) find results similar to ours when the door-to-door collection is replaced by a lock box collected at the same frequency. The lock box, missing the personal feature of a face-to-face collection, increased saving deposits with the institution, but had no effect on total savings. Further progress in generating financial inclusion by 'banking the unbanked' will depend on improving our understanding of behavioral constraints that inhibit savings and the ways that formal financial services differ from and can improve upon informal financial options.

Second, the gains from reducing transaction costs in saving may be mediated by other constraints. Specifically, our paper, along with others on mobile money, focuses on reducing the transaction costs of deposits. But it may be that withdrawal costs are an important transaction cost that inhibits greater use of savings accounts (consistent with the fact that those far from banks are less likely to save using our mobile product than those at intermediate distances). For example, Schaner (2016) finds that providing ATM cards which reduced withdrawal fees by 50 percent increased account use. Indeed, the empirical pattern of greater frequency of deposits relative to withdrawals we observe may be a reflection of the high cost of withdrawal that is present in mobile money and many informal devices (e.g., ROSCAs and Seetus). This is a characteristic missing in most saving devices and warrants further research, especially given its natural trade-

off with addressing behavioral constraints. In general, our modest results suggest that a better understanding of technology's role in altering substitutability across saving mechanisms is important in understanding the promise and limitations of digital finance.

# References

**Ashraf, Nava.** 2009. "Spousal control and intra-household decision making: An experimental study in the Philippines." *American Economic Review*, 99(4): 1245–77.

**Ashraf, Nava, Dean Karlan, and Wesley Yin.** 2006. "Deposit Collectors." *The B.E. Journal of Economic Analysis & Policy*, 5(2): 1–24.

**Bastian, Gautam, Iacopo Bianchi, Markus Goldstein, and Joao Montalvao.** 2018. "Improving Access to Savings Through Mobile Money, with and without Business Training: Experimental Evidence from Tanzania." *Working Paper*.

**Batista, Catia, and Pedro C. Vicente.** 2017. "Improving Access to Savings Through Mobile Money: Experimental Evidence from Smallholder Farmers in Mozambique." *Working Paper*.

**Batista, Catia, and Pedro C. Vincente.** 2016. "Introducing Mobile Money in Rural Mozambique: Evidence from a Randomized Field Experiment." *Working Paper*.

**Burbidge, John B., Lonnie Magee, and A. Leslie Robb.** 1988. "Alternative Transformations to Handle Extreme Values of the Dependent Variable." *Journal of the American Statistical Association*, 83(401): 123–127.

**Callen, Michael, Suresh De Mel, Craig McIntosh, and Christopher Woodruff.** 2019. "What are the headwaters of formal savings? Experimental evidence from Sri Lanka." *Review of Economic Studies*, 86(6): 2491–2529.

**Cole, Shawn, Thomas Sampson, and Bilal Zia.** 2011. "Prices or Knowledge? What Drives Demand for Financial Services in Emerging Markets?" *Journal of Finance*, 66(6): 1933–1967.

**Dupas, Pascaline, and Jonathan Robinson.** 2013. "Savings Constraints and Microenterprise Development: Evidence from a Field Experiment in Kenya." *American Economic Journal: Applied Economics*, 5(1): 163–92.

**Dupas, Pascaline, Dean Karlan, Jonathan Robinson, and Diego Ubfal.** 2018. "Banking the Unbanked? Evidence from Three Countries." *American Economic Journal: Applied Economics*, 10(2): 257–97.

**Dupas, Pascaline, Sarah Green, Anthony Keats, and Jonathan Robinson.** 2016. "Challenges in Banking the Rural Poor: Evidence from Kenya's Western Province." In *African Successes, Volume III: Modernization and Development.* , ed. Sebastian Edwards, Simon Johnson and David N. Weil, 63–101. University of Chicago Press.

**Flory, Jeffrey A.** 2011. "Micro-Savings and Informal Insurance in Villages: How Financial Deepening Affects Safety Nets of the Poor, A Natural Field Experiment." *Working Papers 2011-008, Becker Friendman Institute for Research in Economics.*

**Goss, Salah, Ignacio Mas, Dan Radcliffe, and Evelyn Stark.** 2011. "The Next Challenge: Channeling Savings Through Mobile Money Schemes." *Discussion Paper, Bill and Melinda Gates Foundation.*

**Jack, William, and Tavneet Suri.** 2014. "Risk Sharing and Transactions Costs: Evidence from Kenya's Mobile Money Revolution." *American Economic Review*, 104(1): 183–223.

**Jack, William, and Tavneet Suri.** 2016. "The Long-run Poverty and Gender Impacts of Mobile Money." *Science*, 354(6317): 1288–1292.

**Mann, H. B., and D. R. Whitney.** 1947. "On a Test of Whether one of Two Random Variables is Stochastically Larger than the Other." *Ann. Math. Statist.*, 18(1): 50–60.

**Mehotra, Rahul, Vincent Somville, and Lore Vandewalle.** forthcoming. "Increasing Trust in Bankers to Enhance Savings: Experimental Evidence from India." *Economic Development and Cultural Change.*

**Prina, Silvia.** 2015. "Banking the poor via savings accounts: Evidence from a field experiment." *Journal of Development Economics*, 115: 16–31.

**Schaner, Simon.** 2018. "The Persistent Power of Behavioral Change: Long-Run Impacts of Temporary Savings Subsidies for the Poor." *American Economic Journal: Applied Economics*, 10(3): 67–100.

**Schaner, Simone.** 2016. "The Cost of Convenience? Transaction Costs, Bargaining Power, and Savings Account Use in Kenya." *Journal of Human Resources*, 52(4): 919–945.

**Suri, Tavneet.** 2017. "Mobile Money." *Annual Review of Economics*, 9(1): 497–520.

**The World Bank.** 2013. "Financial Inclusion Data." *http://datatopics.worldbank.org/ financialinclusion/country/sri-lanka*.

# A   Variable Appendix

**Variable Name**: Definition

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**1[Partner Savings]; Deposited in Partner Bank, self-reported**: Indicator for Partner Savings being greater than 0 in the given month.

**1[Formal Savings]**: Indicator for Formal Savings being greater than 0 in the given month.

**1[Any Deposit]**: Indicator for Total Savings being greater than 0 in the given month.

**Account Accepted**: An indicator for whether enumerators reported the offer was accepted by the subject (e.g., accepted phone).

**Age < 40**: Indicator for being less than 40 years of age.

**Amount Deposited (through mobile deposit service)**: The total amount deposited by the subject through the mobile deposit service as reported by the partner bank (transformed through the inverse hyperbolic sine transformation, unless otherwise noted).

**Annual Sample**: Indicator for subjects surveyed only once per year (as opposed to Monthly Survey Sample).

**15-25 year old in HH**: Indicator for any household member being between the age of 15 and 25.

**Bank Experience**: First component of principle component analysis of the following: Trust Banks, Has Bank Account, Used ATM (Yearly Recall).

  **Has Bank Account**: Please tell me about the formal savings product that you use. Do you have an account with this bank or institution: Private bank, government bank, microfinance organizations, development banks, national savings banks, samrudhi bank, sanasa bank, development project such as IDRP/REAP/ABG, Farmers Organization, other (specify).

  **Trusts Banks**: I am going to name a number of organizations. For each one, could you tell me how much confidence you have in them: is it a great deal of confidence, quite a lot of confidence, not very much confidence, or none at all? Banks/Financial Institution. Indicator for "a great deal".

  **Used ATM (Yearly Recall)**: How often do you use an ATM card to withdraw money from a bank? Indicator for at least once a year.

**Cash (Savings)**: After deducting the total amount of money given to others from the total amount of

money received, you had Rs (mention total amount from previous question) remaining for saving or spending in the past month of . Can you tell me how much money you saved using the following methods – Retain as cash in hand?

**Discount Rate**: Suppose someone was going to pay you Rs. 1500 1 month from now. He/she offers to pay you a lower amount today. What amount today would make you just as happy as receiving Rs. 1500 in 1 month? The discount rate is equal to $(1500 - response)/1500$.

**Demonstration Completed**: An indicator for whether enumerators reported completing the demonstration for the subject.

**Deposits more than monthly**: Responded either daily, weekly, or every other week when asked about how frequently they use any of the following types of formal savings accounts - private bank, government bank, microfinance organization, development banks, national savings bank, samurdhi bank, sanasa bank, development project, farmers organization, other.

**Education**: What is the highest level of education that you have completed? Ranges from 0 to 17.

**Female**: Indicator for responding female to gender.

**Formal Savings**: After deducting the total amount of money given to others from the total amount of money received, you had Rs (mention total amount from previous question) remaining for saving or spending in the past month of . Can you tell me how much money you saved using the following methods – Saving in an institution such as a bank? After September 2012, this was replaced by the sum of two questions "Money saved in [partner bank]?" and "Money saved in bank accounts in your name at banks other than [partner bank]?"

**Frequent User**: An indicator for whether the subject made ten or more deposits through the mobile-deposit service as reported by the partner bank.

**HH head**: Indicator for head of household.

**Household consumption**: Total household expenditures for the last month.

**Letter Delivered**: An indicator for whether enumerators reported providing the offer to the subject.

**Married**: Indicator for responding married to marital status.

**Minutes to mobile agent**: Assume that you needed to purchase topup card or reload for your mobile

phone. How much time would it take for you to go from your home to the agent, complete the transaction, and return back to your home?

**Mobile proportion**: The observed amount deposited through the mobile-deposit service divided by the self-reported total amount deposited into the partner bank. If no amount was deposited into the partner bank, this is reported as 0.

**Mobile savings**: The amount deposited into the partner bank through the mobile-deposit service.

**More than 5km from bank; Far Distance**:Indicator for the nearest bank (i.e., distance from the nearest town) is over five km away.

**Nearest Bank Btwn 2 and 5 km; Intermediate Distance**: Indicator for nearest bank (i.e., distance from the nearest town) between two and five km.

**Non-formal savings**: The sum of savings not attributed to formal savings (i.e., the sum of cash, seetu, and other).

**Owns Mobile Phone**: Does anyone (including you) living in the household have a cellular phone? Indicator for yes.

**Other (Savings)**: After deducting the total amount of money given to others from the total amount of money received, you had Rs (mention total amount from previous question) remaining for saving or spending in the past month of . Can you tell me how much money you saved using the following methods – saving in another form (specify)?

**Partner Savings**: After deducting the total amount of money given to others from the total amount of money received, you had Rs (mention total amount from previous question) remaining for saving or spending in the past month of . Can you tell me how much money you saved using the following methods – Saving in an institution such as a bank? Money saved in [partner bank]?

**Phone Savviness**: First component of principle component analysis of the following: How often do you add money to your phone network (indicator for weekly or daily)? What is the approximate distance from your home to the nearest mobile phone topup card/reload agent (Indicator for 200m or less)? What is the assessment of the quality of cellular reception (signals) in the place you live (Indicator for excellent or good)? How often do you use a mobile phone to receive or make calls? How often do you use a mobile phone to send

or receive text messages? Have you ever added or changed a SIM card in a phone? How many SIM cards do you have in your current phone? What is your assessment of the quality of cellular reception (signals) in the place you live (On any network)? How often do you add money to your phone network? What is the approximate distance from your home to the nearest mobile phone topup card/reload agent? Assume that you needed to purchase topup card or reload from your mobile phone. How much time would it take for you to go from your home to your agent, complete the transaction, and return back to your home (minutes)? If you had a technical problem with your cell phone, who would you mainly ask for help? How often do you change your ringtone? What are other services that you, yourself, obtain via your mobile phone: Phone camera, Internet access, Phone games, Phone video, listen to phone radio, phone tv, phone mp3/mp4/3gp (songs), phone calculator, phone alarm/reminder, multimedia message services, data exchange services (e.g., Bluetooth), Phone torch, phone dictionary, phone clock, phone calendar, other (specify).

**Post**: Indicator for December 2011 and onward, after the letters introducing the mobile-deposit service offer were delivered.

**Present-Biased**: Suppose someone was going to pay you Rs. 1500, 6 months from now. He/she offers to pay you a lower amount in 5 months time. What amount received in 5 months time would make you just as happy as receiving Rs. 1500 in 6 months time? Indicator for whether reported discount rate in this question is greater than when asked about the present (above question).

**Seetu (Savings)**: After deducting the total amount of money given to others from the total amount of money received, you had Rs (mention total amount from previous question) remaining for saving or spending in the past month of . Can you tell me how much money you saved using the following methods – deposit in a seetu?

**Seetu Member**: Indicator for participating in any seetus.

**Total Savings**: After deducting the total amount of money given to others from the total amount of money received, you had Rs (mention total amount in previous question) remaining for saving or spending in the past month of . Can you tell me how much money you saved using the following methods – total?

**Used Service**: An indicator for whether the subject made a deposit through the mobile-deposit service as reported by the partner bank.

**Willingness to Pay**: In many countries a fee is charged for the use of this service. So in order to deposit Rs 100, one might have to incur a fee of about Rs 5-20. Despite the fee, customers are still willing to use this service due to saving in time and cost and the convenience of being able to deposit money at any time. If you were being charged a fee for this service, what is the maximum fee that you would be willing to bear in order to deposit Rs 100? (Missing responses were coded as 0. Results are robust to excluding missing values.)

**Willingness to Take Risks**: Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks? Please tick a box on the scale, where the value 0 means:"unwilling to take risks"-a very careful person and the value 10 means: "fully prepared to take risks"- a careless person. Which point describes you the best?

# B   Online Appendix Figures and Tables

Figure A.1: Histogram of total mobile deposits ($>0$) by participant, free treatment
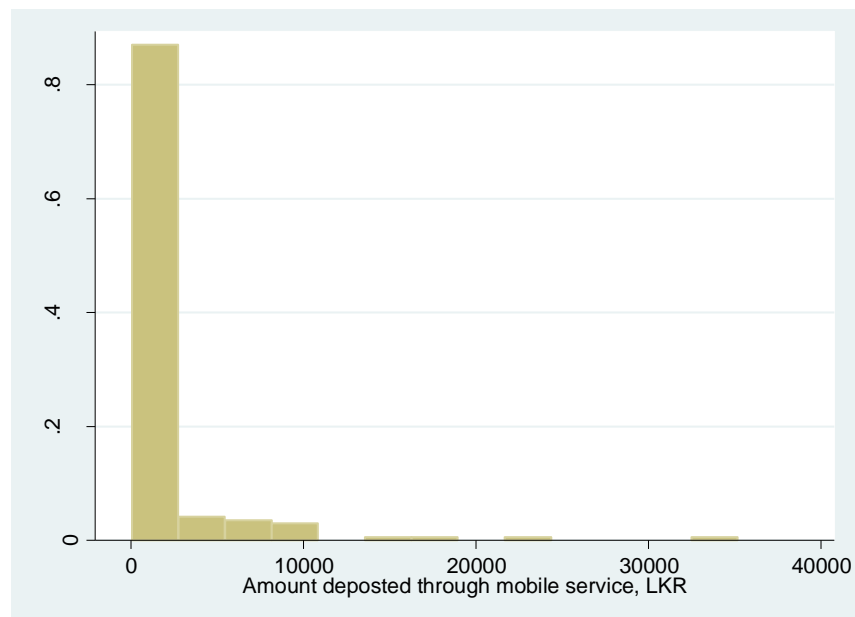


The sample is conditional on the subject depositing at least once using the mobile deposit service, being in the free treatment arm, and being in the panel sample. Amounts are reported in LKR and are not trimmed.
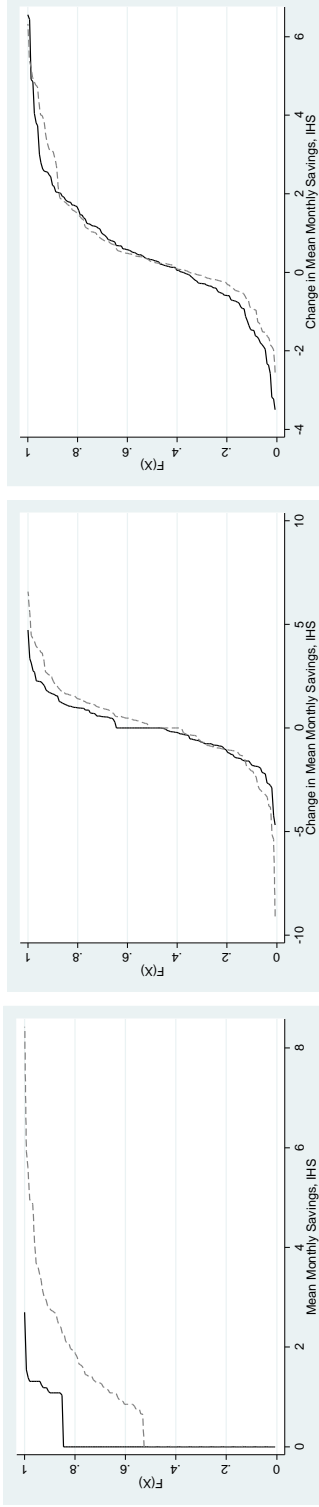
Appendix Figure 2: Females
(a) Left: Mean Monthly Partner Bank Deposits; (b) Center: Change in Mean Monthly Formal Deposits; (c) Right: Change in Mean Monthly Total Deposits
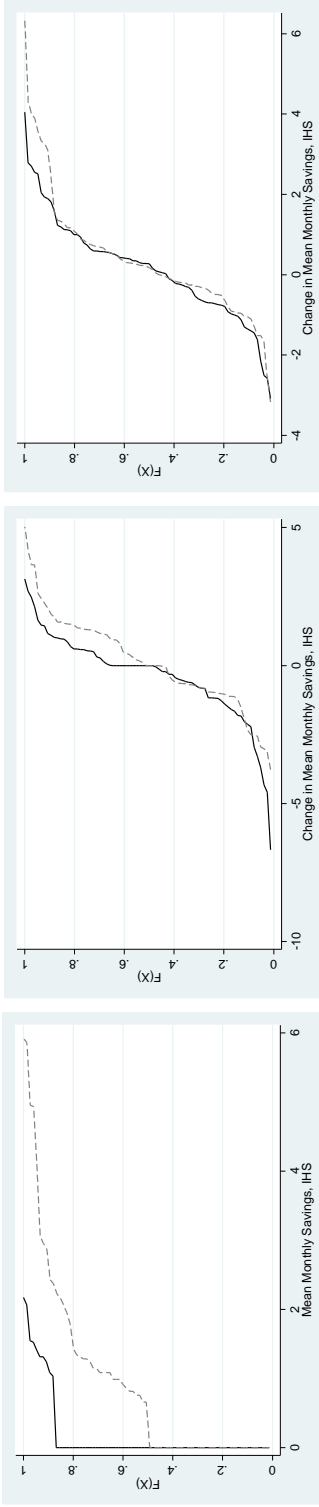


Appendix Figure 3: Intermediate Distance, 2 to 5 km from nearest bank
(a) Left: Mean Monthly Partner Bank Deposits; (b) Center: Change in Mean Monthly Formal Deposits; (c) Right: Change in Mean Monthly Total Deposits



Appendix Figure 4: Present-Biased
(a) Left: Mean Monthly Partner Bank Deposits; (b) Center: Change in Mean Monthly Formal Deposits; (c) Right: Change in Mean Monthly Total Deposits
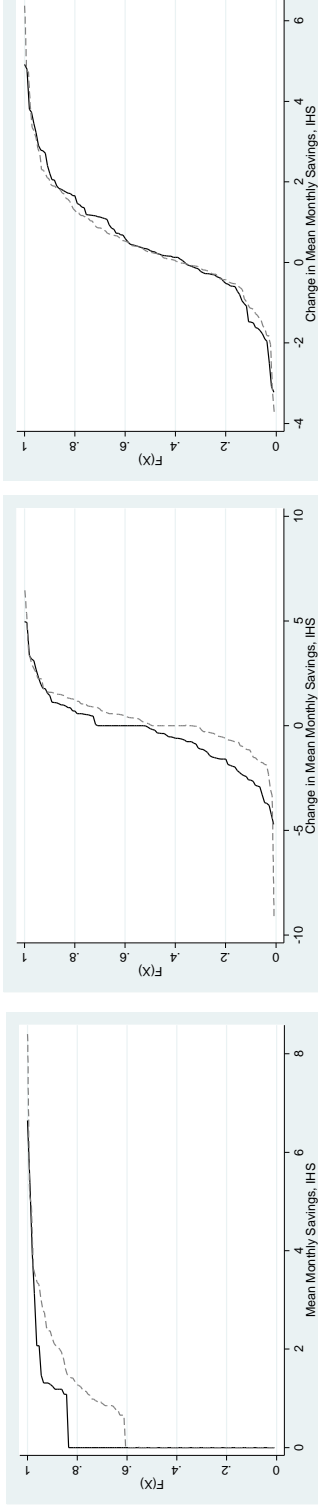


Control          Treatment

# C Online Appendix Tables

Table A.1: Attrition

| Dependent Variable: | Panel Sample | Responds to Survey Wave | Panel Sample | Responds to Survey Wave | Panel Sample | Responds to Survey Wave | Panel Sample | Responds to Survey Wave |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | Panel A: Monthly Survey Sample | | | | | | | |
| Free Mobile Deposit Offer | 0.00227 | -0.0124 | -0.0138 | -0.0116 | 0.00362 | -0.0179 | -0.0240 | -0.0121 |
| | (0.0134) | (0.0117) | (0.0354) | (0.0246) | (0.0231) | (0.0189) | (0.0211) | (0.0217) |
| Free Mobile t Deposit Offer*Post | | -0.00373 | | -0.0183 | | -0.0133 | | -0.0130 |
| | | (0.0116) | | (0.0258) | | (0.0188) | | (0.0192) |
| Observations | 837 | 21762 | 161 | 4186 | 325 | 8450 | 251 | 6526 |
| Control Mean | .97 | .93 | .95 | .93 | .96 | .92 | .98 | .93 |
| Sample | All | All | Female | Female | Intermediate Distance | Intermediate Distance | Present-Biased | Present-Biased |
| | Panel B: Annual Survey Sample | | | | | | | |
| 2% Mobile Deposit Offer | -0.0240 | -0.00639 | | | | | | |
| | (0.0164) | (0.00953) | | | | | | |
| 2% Mobile Deposit Offer*Post | | -0.0126 | | | | | | |
| | | (0.0171) | | | | | | |
| 4% Mobile Deposit Offer | -0.0314* | -0.0167 | | | | | | |
| | (0.0171) | (0.0102) | | | | | | |
| 4% Mobile Deposit Offer*Post | | -0.0165 | | | | | | |
| | | (0.0179) | | | | | | |
| 8% Mobile Deposit Offer | -0.0492*** | -0.0220** | | | | | | |
| | (0.0184) | (0.0106) | | | | | | |
| 8% Mobile Deposit Offer*Post | | -0.0347* | | | | | | |
| | | (0.0183) | | | | | | |
| Observations | 1168 | 4672 | | | | | | |
| Free Offer Mean | .97 | .95 | | | | | | |

Panel is an indicator for whether the individual is observed in the panel sample, defined as having at least one survey response in the period after the mobile deposit offer if rolled out (i.e., after the delivery of initial letters). Responded is an indicator for whether the individual responded to the survey in the given month (or year for the annual sample) of the survey and is not conditional upon being observed in the Panel Sample. Panel A is restricted to the monthly surveyed sample and Panel B is restricted to the annually surveyed sample. Post is an indicator variable for survey rounds after the initial offer letters for the service were delivered (i.e., December 2011 and onward). Mid-range distance refers to whether the individual lived two to five km from the closest bank. Regressions include variables upon which the random assignment were stratified. Robust standard errors are used in regressions with Panel as the dependent variable, and standard errors are clustered at the individual level in regressions with Responded as the dependent variable. Control and Free Offer Mean report the mean of the sub-group in the post period. *p<.10, **p<.05, ***p<.01.

Table A.2: Summary Means

| | Total Sample | Monthly Sample | | Annual Sample | | | |
|---|---|---|---|---|---|---|---|
| | (1) | (2) Control | (3) 0% | (4) 0% | (5) 2% | (6) 4% | (7) 8% |
| Female | 0.192 | 0.207 | 0.175 | 0.186 | 0.183 | 0.195 | 0.209 |
| Married | 0.848 | 0.813 | 0.851 | 0.882 | 0.867 | 0.894 | 0.798 |
| Present-biased | 0.302 | 0.299 | 0.308 | 0.317 | 0.313 | 0.253 | 0.322 |
| Discount rate | 0.084 | 0.074 | 0.090 | 0.082 | 0.089 | 0.075 | 0.094 |
| Willingness to take risks | 5.573 | 5.418 | 5.552 | 5.688 | 5.613 | 5.575 | 5.671 |
| Owns mobile phone | 0.892 | 0.905 | 0.890 | 0.896 | 0.900 | 0.873 | 0.884 |
| Phone savvy | 0.003 | 0.214 | 0.340 | -0.096 | -0.161 | -0.470 | -0.048 |
| Minutes to mobile agent | 10.246 | 10.016 | 10.402 | 10.232 | 10.167 | 10.575 | 10.062 |
| 2 to 5 km from bank | 0.397 | 0.413 | 0.361 | 0.412 | 0.407 | 0.401 | 0.404 |
| More than 5km from bank | 0.165 | 0.163 | 0.184 | 0.140 | 0.170 | 0.147 | 0.168 |
| Bank experience | 0.011 | -0.048 | 0.020 | 0.106 | 0.017 | 0.046 | -0.037 |
| Formal savings LKR | 1130.073 | 984.918 | 1040.782 | 1388.235 | 1412.300 | 1406.336 | 684.418 |
| Total savings LKR | 4014.412 | 3771.715 | 4273.876 | 4294.796 | 4342.333 | 4145.805 | 3253.243 |
| Observations | 1908 | 368 | 435 | 221 | 300 | 292 | 292 |

Variable definitions are provided in Appendix. For any given variable, at most two observations in a given category were missing a response. Sample is conditional on being in the Panel Sample. Comparisons are made to the 0% fee of the same survey frequency: Column 2 is compared to Column 3, and Column 5 to 7 is compared with Column 4. Comparisons across sub-samples include variables upon which the random assignment were stratified and uses robust standard errors. *p<.10, **p<.05, ***p<.01.

Table A.3: Pre-Treatment Balance

|  | (1)<br>1[Formal deposit] | (2)<br>Formal savings | (3)<br>1[Any deposit] | (4)<br>Total savings |
|---|---|---|---|---|
|  | Panel A: All Subjects Surveyed Monthly | | | |
| Free Mobile Deposit Offer | -0.0111 | -0.139 | -0.00149 | 0.00529 |
|  | (0.0151) | (0.134) | (0.0110) | (0.118) |
| Observations | 8030 | 8030 | 8030 | 8030 |
| Control Mean | .21 | 1.78 | .89 | 7.67 |
|  | Panel B: Annual Sample | | | |
| 2% Fee | 0.0309 | 0.248 | 0.00316 | 0.0404 |
|  | (0.0256) | (0.224) | (0.0234) | (0.215) |
| 4% Fee | -0.0102 | -0.0974 | -0.0205 | -0.149 |
|  | (0.0255) | (0.221) | (0.0241) | (0.217) |
| 8% Fee | -0.0144 | -0.187 | -0.0101 | -0.0780 |
|  | (0.0256) | (0.220) | (0.0235) | (0.212) |
| Observations | 2208 | 2208 | 2208 | 2208 |
| Free Mean | .20 | 1.67 | .85 | 7.25 |

Panel A are estimated on the monthly sample and Panel B is estimated on the annual sample. All regressions use the panel sample, defined as having at least one observation in the post-treatment. Outcomes are monthly flows over the month prior to the survey wave, and the unit of observation is the individual month. Savings variables are analyzed using the Inverse Hyperbolic Sine, so the interpretation is as a log (percent impacts). Control (Free) Mean are the mean of all individual-monthly flows in the pre-intervention months for those in the control (free treatment and annual sample). All regressions control for the stratification variables used in the randomization protocol and cluster the standard errors at the individual level. *p<.10, **p<.05, ***p<.01.

Table A.4: Effect of Free Mobile Deposit Offer, ANCOVA specification

|  | (1)<br>1[Formal deposit] | (2)<br>Formal savings | (3)<br>1[Any deposit] | (4)<br>Total savings |
|---|---|---|---|---|
| Free Mobile Deposit Offer | 0.0309*** | 0.215** | -0.00499 | -0.0273 |
|  | (0.0118) | (0.107) | (0.00704) | (0.0780) |
| Observations | 803 | 803 | 803 | 803 |
| Control Mean | 0.189 | 1.703 | 0.933 | 8.138 |

Estimates are conducted on the monthly panel sample. Saving variables are analyzed using the Inverse Hyperbolic Sine, so the interpretation is as a log (percent impact). Outcomes are monthly flows over the month prior to the survey wave, and the unit of observation is individual. All regressions control for the stratification variables used in the randomization protocol. Regressions are a cross sectional comparison of treatment and control outcomes using all post-treatment survey waves, include the mean savings variable in the pre-period (i.e., prior to the intervention) as an explanatory variable, and use robust standard errors. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.5: Effect of Free Mobile Deposit Offer on All Saving Devices

|  | (1) Partner | (2) Non-Partner | (3) All Formal | (4) Cash | (5) Seetu | (6) Other | (7) Total |
|---|---|---|---|---|---|---|---|
|  | Panel A: Post period (December 2011 - November 2013) | | | | | | |
| Free Mobile Deposit Offer | 0.442*** | -0.236* | 0.131 | -0.156 | 0.432* | -0.0485 | -0.0248 |
|  | (0.0758) | (0.134) | (0.135) | (0.102) | (0.234) | (0.115) | (0.0952) |
| Observations | 790 | 790 | 803 | 803 | 803 | 803 | 803 |
| Control Mean | 0.329 | 1.410 | 1.703 | 6.544 | 3.281 | 1.656 | 8.138 |
|  | Panel B: All months with individual fixed effects | | | | | | |
| Free Mobile Deposit Offer*Post |  |  | 0.287** | -0.0992 | -0.0214 | -0.0416 | -0.0282 |
|  |  |  | (0.120) | (0.138) | (0.179) | (0.0988) | (0.106) |
| Observations |  |  | 20028 | 20027 | 20027 | 20027 | 20027 |
| Control Mean | 0.329 | 1.410 | 1.703 | 6.544 | 3.281 | 1.656 | 8.138 |

Estimates are conducted on the monthly panel sample. Saving variables are analyzed using the Inverse Hyperbolic Sine, so the interpretation is as a log (percent impact). Outcomes are monthly flows over the month prior to the survey wave, and the unit of observation is individual in Panel A and individual-month in Panel B. All regressions control for the stratification variables used in the randomization protocol. Panel A conducts a cross sectional comparison of treatment and control outcomes using all post-treatment survey waves and uses robust standard errors. Panel B uses the full set of monthly surveys, includes individual and survey wave fixed effects, uses inverse propensity weights for the attrition across survey waves to retain representation of the overall panel sample, and clusters standard errors at the individual. The Control Mean is the mean of control individuals' means across post-treatment survey waves for the given outcome variable. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.6: Effect of Free Mobile Deposit Offer, LKR

|  | (1) Partner | (2) Non-Partner | (3) All Formal | (4) Cash | (5) Seetu | (6) Other | (7) Total |
|---|---|---|---|---|---|---|---|
|  | Panel A: Post period (December 2011 - November 2013) | | | | | | |
| Free Mobile Deposit Offer | 95.14 | -2543.1 | -801.4 | -1080.8 | 76.97 | 273.4 | -1533.2 |
|  | (107.1) | (1612.2) | (903.6) | (1005.5) | (228.6) | (381.4) | (1571.8) |
| Observations | 790 | 790 | 803 | 803 | 803 | 803 | 803 |
|  | Panel B: All months with individual fixed effects | | | | | | |
| Free Mobile Deposit Offer*Post |  |  | -505.3 | -781.9 | -122.4 | -498.6 | -1909.6 |
|  |  |  | (789.2) | (1032.4) | (132.6) | (380.0) | (1282.7) |
| Observations |  |  | 20028 | 20027 | 20027 | 20027 | 20027 |
| Control Mean | 280.7 | 3609.1 | 2832.4 | 3870.4 | 1580.2 | 449.7 | 8732.7 |

Estimates are conducted on the monthly panel sample. Saving variables are analyzed in levels of Sri Lankan (LKR) currency. Outcomes are monthly flows over the month prior to the survey wave, and the unit of observation is individual in Panel A and individual-month in Panel B. All regressions control for the stratification variables used in the randomization protocol. Panel A conducts a cross sectional comparison of treatment and control outcomes using all post-treatment survey waves and uses robust standard errors. Panel B uses the full set of monthly surveys, includes individual and survey wave fixed effects, uses inverse propensity weights for the attrition across survey waves to retain representation of the overall panel sample, and clusters standard errors at the individual. The Control Mean is the mean of control individuals' means across post-treatment survey waves for the given outcome variable. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.7: Effect of Free Mobile Deposit Offer, LKR, Windsorized

|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
|  | Partner | Non-Partner | All Formal | Cash | Seetu | Other | Total |
|  | Panel A: Post period (December 2011 - November 2013) | | | | | | |
| Free Mobile Deposit Offer | 94.24** | -276.9** | -76.93 | -155.1 | 174.6 | -7.508 | -217.6 |
|  | (44.53) | (139.1) | (177.2) | (141.6) | (158.4) | (24.71) | (451.5) |
| Observations | 790 | 790 | 803 | 803 | 803 | 803 | 803 |
|  | Panel B: All months with individual fixed effects | | | | | | |
| Free Mobile Deposit Offer*Post |  |  | 195.6 | -87.66 | -103.2 | 9.008 | 49.24 |
|  |  |  | (143.8) | (138.4) | (102.7) | (29.67) | (308.4) |
| Observations |  |  | 20028 | 20027 | 20027 | 20027 | 20027 |
| Control Mean | 169.9 | 1026.6 | 1354.3 | 2590.4 | 1395.2 | 191.1 | 6172.9 |

Estimates are conducted on the monthly panel sample. Saving deposits above the 99th percentile have been replaced by the 99th percentile. Saving variables are analyzed in levels of Sri Lankan (LKR) currency. Outcomes are monthly flows over the month prior to the survey wave, and the unit of observation is individual in Panel A and individual-month in Panel B. All regressions control for the stratification variables used in the randomization protocol. Panel A conducts a cross sectional comparison of treatment and control outcomes using all post-treatment survey waves and uses robust standard errors. Panel B uses the full set of monthly surveys, includes individual and survey wave fixed effects, uses inverse propensity weights for the attrition across survey waves to retain representation of the overall panel sample, and clusters standard errors at the individual. The Control Mean is the mean of control individuals' means across post-treatment survey waves for the given outcome variable. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.8: Consumption IHS

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Household Consumption | | | Individual Consumption | | |
| Free Mobile | 0.0162 | -0.00579 | 0.0209 | -0.0640 | -0.0478 | -0.0450 |
| Deposit Offer *Post ($\beta_1$) | (0.0332) | (0.0239) | (0.0253) | (0.0540) | (0.0456) | (0.0509) |
| | | | | | | |
| Free Offer*Post* | -0.0133 | | | 0.0245 | | |
| Intermediate Distance ($\beta_3$) | (0.0475) | | | (0.0898) | | |
| | | | | | | |
| Free Offer* | -0.0663 | | | -0.0163 | | |
| Post * Far Distance | (0.0569) | | | (0.139) | | |
| | | | | | | |
| Free Offer* | | 0.0251 | | | -0.0582 | |
| Post * Female ($\beta_3$) | | (0.0528) | | | (0.124) | |
| | | | | | | |
| Free Offer* | | | -0.0710 | | | -0.0394 |
| Post * Present-Biased ($\beta_3$) | | | (0.0471) | | | (0.0952) |
| Observations | 20028 | 20028 | 20028 | 20028 | 20028 | 20028 |
| Control Mean | 10.67 | 10.67 | 10.67 | 9.870 | 9.870 | 9.870 |
| $\beta_1 + \beta_3$ | 0.00287 | 0.0193 | -0.0501 | -0.0395 | -0.106 | -0.0844 |
| Prob > F-statistic | 0.933 | 0.681 | 0.208 | 0.582 | 0.357 | 0.295 |

Estimates are conducted on the monthly panel sample. Consumption is analyzed using the Inverse Hyperbolic Sine, so the interpretation is as a log (percent impact). Outcomes are monthly flows over the month prior to the survey wave, and the unit of observation is individual-month. All regressions control for the stratification variables used in the randomization protocol, includes individual and survey wave fixed effects, uses inverse propensity weights for the attrition across survey waves to retain representation of the overall panel sample, and clusters standard errors at the individual. The Control Mean is the mean of control individuals' means across post-treatment survey waves for the given outcome variable. Clustered standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.9: Labor Earnings

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Household Earnings | | | Individual Earnings | | |
| Free Mobile | 0.0473 | -0.0181 | 0.0458 | -0.0452 | 0.0142 | 0.187** |
| Deposit Offer *Post ($\beta_1$) | (0.0724) | (0.0487) | (0.0496) | (0.118) | (0.0819) | (0.0935) |
| | | | | | | |
| Free Offer*Post* | -0.0458 | | | 0.236 | | |
| Intermediate Distance ($\beta_3$) | (0.0998) | | | (0.180) | | |
| | | | | | | |
| Free Offer* | -0.124 | | | 0.410 | | |
| Post * Far Distance | (0.115) | | | (0.272) | | |
| | | | | | | |
| Free Offer* | | 0.143 | | | 0.505* | |
| Post * Female ($\beta_3$) | | (0.113) | | | (0.288) | |
| | | | | | | |
| Free Offer* | | | -0.123 | | | -0.241 |
| Post * Present-Biased ($\beta_3$) | | | (0.103) | | | (0.206) |
| Observations | 20028 | 20028 | 20028 | 20028 | 20028 | 20028 |
| Control Mean | 10.84 | 10.84 | 10.84 | 10.04 | 10.04 | 10.04 |
| $\beta_1 + \beta_3$ | 0.00149 | 0.125 | -0.0777 | 0.191 | 0.519 | -0.0543 |
| Prob > F-statistic | 0.983 | 0.221 | 0.391 | 0.163 | 0.0607 | 0.767 |

Estimates are conducted on the monthly panel sample. Earnings is analyzed using the Inverse Hyperbolic Sine, so the interpretation is as a log (percent impact). Outcomes are monthly flows over the month prior to the survey wave, and the unit of observation is individual-month. All regressions control for the stratification variables used in the randomization protocol, includes individual and survey wave fixed effects, uses inverse propensity weights for the attrition across survey waves to retain representation of the overall panel sample, and clusters standard errors at the individual. The Control Mean is the mean of control individuals' means across post-treatment survey waves for the given outcome variable. Clustered standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.10: Price Sensitivity by Percentage Point Increase in Fee

| | (1) Mobile savings | (2) Mobile proportion | (3) 1[Partner deposit] | (4) Partner savings | (5) 1[Formal deposit] | (6) Formal savings | (7) 1[Any deposit] | (8) Total savings |
|---|---|---|---|---|---|---|---|---|
| | Panel A: Post period (December 2011 - November 2013) | | | | | | | |
| Fee | -0.00839 | -0.000388 | 0.00158 | 0.00945 | 0.00332 | 0.0150 | -0.00228 | -0.0301 |
| | (0.106) | (0.528) | (0.568) | (0.661) | (0.346) | (0.620) | (0.272) | (0.147) |
| Obs (Ind) | 1104 | 1104 | 1104 | 1104 | 1104 | 1104 | 1104 | 1104 |
| | Panel B: All months with individual fixed effects | | | | | | | |
| Fee *Post | | | | | 0.00707 | 0.0536 | -0.000554 | -0.0162 |
| | | | | | (0.160) | (0.202) | (0.886) | (0.641) |
| Obs (Ind-month) | | | | | 4317 | 4317 | 4317 | 4317 |

Estimation conducted on the annual sample within which mobile transfer fees were randomized. Saving variables are analyzed using Inverse Hyperbolic Sine, so the interpretation the impact of a percentage increase in the fee on the percent impact on savings. Outcomes are monthly flows over the month prior to the survey wave, and the unit of observation is individual in Panel A and individual-month in Panel B. Mobile proportion is recorded as 0 for those who did not deposit any partner savings. All regressions control for the stratification variables used in the randomization protocol. Panel A conducts a cross sectional comparison of the different treatment arms' outcomes in the post period and uses robust standard errors. Panel B uses the full set of monthly surveys, includes individual and survey wave fixed effects, uses inverse propensity weights for the attrition across survey waves to retain representation of the overall panel sample, and clusters standard errors at the individual. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.11: Price Sensitivity Weighted by Survey Non-response

| | (1) Mobile savings | (2) Mobile proportion | (3) 1[Partner deposit] | (4) Partner savings | (5) 1[Formal deposit] | (6) Formal savings | (7) 1[Any deposit] | (8) Total savings |
|---|---|---|---|---|---|---|---|---|
| | Panel A: Post period (December 2011 - November 2013) | | | | | | | |
| IHS Fee | -0.0199 | -0.000691 | -0.00203 | -0.0171 | -0.00102 | -0.0440 | -0.00544 | -0.100 |
| | (0.216) | (0.751) | (0.804) | (0.790) | (0.923) | (0.635) | (0.362) | (0.101) |
| Obs (Ind) | 1100 | 1100 | 1100 | 1100 | 1100 | 1100 | 1100 | 1100 |
| | Panel B: All months with individual fixed effects | | | | | | | |
| IHS Fee*Post | | | | | 0.00730 | 0.0429 | -0.000491 | -0.0644 |
| | | | | | (0.630) | (0.738) | (0.965) | (0.522) |
| Obs (Ind-month) | | | | | 4301 | 4301 | 4301 | 4301 |

Estimation conducted on the annual sample within which mobile transfer fees were randomized. Saving variables and fees are analyzed using Inverse Hyperbolic Sine, so the interpretation is as an elasticity (percent impacts). Outcomes are monthly flows over the month prior to the survey wave, and the unit of observation is individual in Panel A and individual-month in Panel B. Mobile proportion is recorded as 0 for those who did not deposit any partner savings. All regressions control for the stratification variables used in the randomization protocol and weight observations based on predicted likelihood of being observed in the Panel Sample as a function of baseline characteristics. Panel A conducts a cross sectional comparison of the different treatment arms' outcomes in the post period and uses robust standard errors. Panel B uses the full set of monthly surveys, includes individual and survey wave fixed effects, uses inverse propensity weights for the attrition across survey waves to retain representation of the overall panel sample, and clusters standard errors at the individual. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.12: Price Sensitivity by Percentage Point Increase in Fee, LKR

|  | (1) Mobile savings | (2) Partner savings | (3) Formal savings | (4) Total savings |
|---|---|---|---|---|
| **Panel A: Post period (December 2011 - November 2013)** | | | | |
| Fee | -1.676* | 16.56 | -262.2* | -368.6* |
|  | (0.060) | (0.683) | (0.079) | (0.064) |
| Observations (Ind) | 1104 | 1104 | 1104 | 1104 |
| **Panel B: All months with individual fixed effects** | | | | |
| Fee *Post |  |  | -166.4 | -263.2 |
|  |  |  | (0.360) | (0.258) |
| Observations (Ind-month) |  |  | 4317 | 4317 |
| Free Mean | 21 | 578 | 4,200 | 9,338 |

Estimation conducted on the annual sample within which mobile transfer fees were randomized. Saving variables are in LKR and fees are in percent charged. Outcomes are monthly flows over the month prior to the survey wave, and the unit of observation is individual in Panel A and individual-month in Panel B. Mobile proportion is recorded as 0 for those who did not deposit any partner savings. All regressions control for the stratification variables used in the randomization protocol. Panel A conducts a cross sectional comparison of the different treatment arms' outcomes in the post period and uses robust standard errors. Panel B uses the full set of monthly surveys, includes individual and survey wave fixed effects, uses inverse propensity weights for the attrition across survey waves to retain representation of the overall panel sample, and clusters standard errors at the individual. Free Mean is the mean of the mean of those in the annual sample who received the deposit-service for free across post-treatment survey waves. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.13: Determinants of Takeup of the Mobile Deposit Service, Extended

| | (1) Accepted Account | (2) Demonstration Completed | (3) Used Service | (4) Amount deposited, IHS | (5) Amount deposited, LKR | (6) Deposited in Partner Bank self-reported |
|---|---|---|---|---|---|---|
| Female | 0.0381* | 0.0742** | 0.0859** | 0.448** | -60.89 | -0.00350 |
| | (0.0202) | (0.0328) | (0.0360) | (0.226) | (167.0) | (0.0376) |
| Married | 0.0246 | 0.0683* | -0.0463 | -0.262 | -174.9 | 0.0290 |
| | (0.0224) | (0.0353) | (0.0354) | (0.222) | (272.4) | (0.0352) |
| Owns mobile phone | 0.0123 | 0.0464 | 0.0651* | 0.483** | 159.7 | 0.0478 |
| | (0.0268) | (0.0413) | (0.0367) | (0.225) | (104.6) | (0.0377) |
| Phone savvy | 0.00505 | 0.00433 | 0.00169 | 0.000489 | -4.652 | 0.00483 |
| | (0.00364) | (0.00530) | (0.00481) | (0.0308) | (23.78) | (0.00538) |
| Minutes to mobile agent | 0.00108 | 0.00146 | 0.0000693 | -0.00170 | -10.95* | -0.00136 |
| | (0.000860) | (0.00140) | (0.00150) | (0.00982) | (5.879) | (0.00144) |
| 2 to 5 km from bank | 0.00873 | 0.0530** | 0.0945*** | 0.655*** | 315.0** | 0.0820*** |
| | (0.0154) | (0.0235) | (0.0246) | (0.159) | (151.3) | (0.0250) |
| More than 5km from bank | -0.00343 | -0.0407 | -0.0416 | -0.205 | 36.17 | 0.0509 |
| | (0.0207) | (0.0331) | (0.0289) | (0.185) | (146.2) | (0.0336) |
| Bank experience | 0.0173** | 0.0000796 | -0.0120 | -0.0331 | 86.20 | 0.00386 |
| | (0.00741) | (0.0112) | (0.0113) | (0.0741) | (65.88) | (0.0116) |
| Present-biased | 0.0312** | 0.00617 | -0.0177 | -0.106 | -9.139 | -0.0132 |
| | (0.0155) | (0.0244) | (0.0239) | (0.153) | (127.4) | (0.0255) |
| Discount rate | -0.0602 | -0.0336 | 0.0753 | 0.747 | 537.6 | 0.00294 |
| | (0.0691) | (0.0989) | (0.103) | (0.680) | (545.9) | (0.107) |
| Willingness to take risks | -0.00138 | -0.00435 | -0.00841** | -0.0526** | -2.235 | -0.00940** |
| | (0.00265) | (0.00405) | (0.00416) | (0.0264) | (12.76) | (0.00421) |
| Formal savings | 0.00171 | -0.00000487 | 0.00191 | 0.0118 | 5.294 | 0.0102** |
| | (0.00244) | (0.00389) | (0.00402) | (0.0259) | (19.24) | (0.00442) |
| Non-formal savings | -0.0000816 | -0.00216 | -0.0140 | -0.131** | -108.6 | 0.00676 |
| | (0.00501) | (0.00833) | (0.00900) | (0.0655) | (97.86) | (0.00873) |
| Seetu savings | 0.00242 | -0.000321 | 0.00480 | 0.0529 | 50.68** | 0.0138* |
| | (0.00663) | (0.00892) | (0.00750) | (0.0435) | (24.47) | (0.00811) |
| Total savings | -0.00192 | 0.00250 | 0.0136 | 0.119* | 82.09 | -0.00652 |
| | (0.00539) | (0.00905) | (0.00955) | (0.0683) | (99.55) | (0.00932) |
| Household consumption | -0.0396*** | -0.0580*** | -0.00646 | -0.0652 | -158.6 | 0.00251 |
| | (0.0152) | (0.0213) | (0.0202) | (0.129) | (172.6) | (0.0209) |
| HH Head | 0.000931 | -0.0222 | 0.0329 | 0.170 | -22.74 | 0.000166 |
| | (0.0169) | (0.0288) | (0.0307) | (0.192) | (135.1) | (0.0329) |
| Education | -0.00174 | 0.000308 | 0.00622 | 0.0439* | 41.38* | 0.00664 |
| | (0.00270) | (0.00431) | (0.00387) | (0.0244) | (23.37) | (0.00408) |
| Seetu Member | -0.0119 | 0.0248 | 0.00484 | -0.153 | -422.3** | -0.107* |
| | (0.0518) | (0.0703) | (0.0597) | (0.342) | (171.3) | (0.0629) |
| Deposits savings more than once a month | -0.0108 | -0.00772 | -0.0361 | -0.265 | -306.8** | 0.0152 |
| | (0.0243) | (0.0361) | (0.0362) | (0.230) | (133.3) | (0.0401) |
| 15-25 year old in hh | -0.00643 | -0.00179 | 0.0145 | 0.103 | 90.02 | -0.0101 |
| | (0.0150) | (0.0234) | (0.0231) | (0.146) | (131.7) | (0.0241) |
| Age< 40 | 0.00276 | -0.0285 | -0.0197 | -0.110 | 44.95 | -0.0164 |
| | (0.0171) | (0.0280) | (0.0282) | (0.181) | (136.3) | (0.0300) |
| Willingness to Pay | 0.00229 | 0.00363 | -0.00162 | -0.00149 | 39.14 | 0.00483 |
| | (0.00174) | (0.00277) | (0.00318) | (0.0221) | (28.69) | (0.00335) |
| Constant | -4.92e-09 | 2.69e-09 | 3.49e-09 | 6.32e-08 | 0.0000182 | -5.39e-09 |
| | (0.00691) | (0.0107) | (0.0107) | (0.0690) | (61.10) | (0.0112) |
| Observations | 1503 | 1503 | 1503 | 1503 | 1503 | 1497 |

Account Accepted is based on enumerator reports. Demonstration completed, Used service, Amount Deposited are based on institutional data provided by the partner bank. Deposited in Partner Bank is an indicator of whether the respondent self-reported depositing savings to the partner bank in the previous month on one of the two annual surveys conducted after the roll out of the mobile-deposit service. IHS refers to amounts transformed using the inverse hyperbolic sine function. Demonstration completed indicates that the individual is observed in the partner bank's dataset as having used the service. Regressions pool monthly and annual samples and all variables are demeaned. Regressions are conditional upon the letter being delivered and being in the Panel Sample, include treatment status and frequency of being surveyed as additional covariates, and use robust standard errors.

Table A.14: Differential Impacts, by Mobile Ownership

| | (1) 1[Partner deposit] | (2) Partner savings | (3) 1[Formal deposit] | (4) Formal savings | (5) 1[Any deposit] | (6) Total savings |
|---|---|---|---|---|---|---|
| | Panel A: Post period (December 2011 - November 2013) | | | | | |
| Free Mobile Deposit Offer ($\beta_1$) | 0.0505*** (0.0155) | 0.354*** (0.115) | 0.0202 (0.0328) | 0.148 (0.288) | -0.00197 (0.0300) | -0.0786 (0.319) |
| Free Mobile Deposit Offer * Owns Mobile ($\beta_3$) | 0.0170 (0.0184) | 0.104 (0.141) | 0.00553 (0.0365) | -0.0158 (0.324) | -0.00339 (0.0311) | 0.0668 (0.335) |
| Observations | 790 | 790 | 803 | 803 | 803 | 803 |
| $\beta_1 + \beta_3$ | 0.0675 | 0.458 | 0.0257 | 0.132 | -0.00536 | -0.0118 |
| Prob > F-statistic | 4.66e-11 | 4.55e-08 | 0.103 | 0.369 | 0.491 | 0.906 |
| | Panel B: All months with individual fixed effects | | | | | |
| Free Mobile Deposit Offer * Post ($\beta_1$) | | | 0.0534 (0.0405) | 0.393 (0.325) | 0.0588 (0.0413) | 0.326 (0.344) |
| Free Mobile Deposit Offer * Post * Owns Mobile ($\beta_3$) | | | -0.0171 (0.0431) | -0.121 (0.350) | -0.0716* (0.0429) | -0.399 (0.361) |
| Observations | | | 20028 | 20028 | 20027 | 20027 |
| $\beta_1 + \beta_3$ | | | 0.0363 | 0.273 | -0.0128 | -0.0730 |
| Prob > F-statistic | | | 0.0137 | 0.0342 | 0.273 | 0.512 |

Savings variables are analyzed using the Inverse Hyperbolic Sine, so the interpretation is as a log (percent impact). Outcomes are monthly flows over the month prior to the survey wave, and the unit of observation is individual in Panel A and individual-month in Panel B. All regressions control for mobile ownership and the stratification variables used in the randomization protocol and use robust standard errors. Panel A conducts a cross sectional comparison of treatment and control outcomes using all post-treatment survey waves and uses robust standard errors. Panel B uses the full set of monthly surveys, includes individual and survey wave fixed effects, uses inverse propensity weights for the attrition across survey waves to retain representation of the overall panel sample, and clusters standard errors at the individual. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.15: Differential Impacts, by Present Bias

| | (1)<br>1[Partner<br>deposit] | (2)<br>Partner<br>savings | (3)<br>1[Formal<br>deposit] | (4)<br>Formal<br>savings | (5)<br>1[Any<br>deposit] | (6)<br>Total<br>savings |
|---|---|---|---|---|---|---|
| | Panel A: Post period (December 2011 - November 2013) | | | | | |
| Free Mobile | 0.0671*** | 0.455*** | 0.0105 | -0.0224 | -0.00623 | -0.0636 |
| Deposit Offer ($\beta_1$) | (0.0112) | (0.0898) | (0.0174) | (0.162) | (0.00868) | (0.110) |
| | | | | | | |
| Free Mobile | -0.00636 | -0.0412 | 0.0477 | 0.509* | 0.00276 | 0.127 |
| Deposit Offer * Present-Bias ($\beta_3$) | (0.0202) | (0.169) | (0.0319) | (0.295) | (0.0172) | (0.215) |
| | | | | | | |
| Observations | 790 | 790 | 803 | 803 | 803 | 803 |
| $\beta_1 + \beta_3$ | 0.0607 | 0.414 | 0.0583 | 0.486 | -0.00346 | 0.0635 |
| Prob > F-statistic | 0.000293 | 0.00379 | 0.0284 | 0.0483 | 0.817 | 0.731 |
| | Panel B: All months with individual fixed effects | | | | | |
| Free Mobile Deposit | | | 0.0239 | 0.137 | -0.00379 | -0.0328 |
| Offer * Post ($\beta_1$) | | | (0.0168) | (0.145) | (0.0136) | (0.128) |
| | | | | | | |
| Free Mobile Deposit | | | 0.0479 | 0.496* | -0.00451 | 0.0146 |
| Offer * Post * Present-Bias ($\beta_3$) | | | (0.0294) | (0.256) | (0.0245) | (0.229) |
| | | | | | | |
| Observations | | | 20028 | 20028 | 20027 | 20027 |
| $\beta_1 + \beta_3$ | | | 0.0718 | 0.634 | -0.00830 | -0.0182 |
| Prob > F-statistic | | | 0.00306 | 0.00278 | 0.684 | 0.924 |

Savings variables are analyzed using the Inverse Hyperbolic Sine, so the interpretation is as a log (percent impact). Outcomes are monthly flows over the month prior to the survey wave, and the unit of observation is individual in Panel A and individual-month in Panel B. All regressions control for present-bias and the stratification variables used in the randomization protocol and use robust standard errors. Panel A conducts a cross sectional comparison of treatment and control outcomes using all post-treatment survey waves and uses robust standard errors. Panel B uses the full set of monthly surveys, includes individual and survey wave fixed effects, uses inverse propensity weights for the attrition across survey waves to retain representation of the overall panel sample, and clusters standard errors at the individual. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.16: Differential Impacts, by Education

| | (1) 1[Partner deposit] | (2) Partner savings | (3) 1[Formal deposit] | (4) Formal savings | (5) 1[Any deposit] | (6) Total savings |
|---|---|---|---|---|---|---|
| | Panel A: Post period (December 2011 - November 2013) | | | | | |
| Free Mobile Deposit Offer ($\beta_1$) | 0.0307 (0.0358) | 0.0824 (0.267) | -0.0186 (0.0473) | -0.253 (0.407) | -0.0289 (0.0309) | -0.0908 (0.348) |
| Free Mobile Deposit Offer * Education ($\beta_3$) | 0.00346 (0.00357) | 0.0362 (0.0275) | 0.00446 (0.00485) | 0.0396 (0.0434) | 0.00236 (0.00283) | 0.00710 (0.0332) |
| Observations | 790 | 790 | 803 | 803 | 803 | 803 |
| $\beta_1 + \beta_3$ | 0.0342 | 0.119 | -0.0141 | -0.214 | -0.0265 | -0.0837 |
| Prob > F-statistic | 0.292 | 0.622 | 0.741 | 0.559 | 0.346 | 0.792 |
| | Panel B: All months with individual fixed effects | | | | | |
| Free Mobile Deposit Offer * Post ($\beta_1$) | | | 0.00835 (0.0392) | -0.124 (0.333) | -0.0526 (0.0390) | -0.447 (0.372) |
| Free Mobile Deposit Offer * Post * Education ($\beta_3$) | | | 0.00293 (0.00420) | 0.0409 (0.0366) | 0.00471 (0.00365) | 0.0416 (0.0356) |
| Observations | | | 20028 | 20028 | 20027 | 20027 |
| $\beta_1 + \beta_3$ | | | 0.0113 | -0.0835 | -0.0479 | -0.405 |
| Prob > F-statistic | | | 0.749 | 0.780 | 0.178 | 0.230 |

Savings variables are analyzed using the Inverse Hyperbolic Sine, so the interpretation is as a log (percent impact). Outcomes are monthly flows over the month prior to the survey wave, and the unit of observation is individual in Panel A and individual-month in Panel B. All regressions control for education and the stratification variables used in the randomization protocol and use robust standard errors. Panel A conducts a cross sectional comparison of treatment and control outcomes using all post-treatment survey waves and uses robust standard errors. Panel B uses the full set of monthly surveys, includes individual and survey wave fixed effects, uses inverse propensity weights for the attrition across survey waves to retain representation of the overall panel sample, and clusters standard errors at the individual. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$