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Banking with Agents

Experimental Evidence from Senegal

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Abstract

This paper uses a randomized controlled trial to study the effects of access to agent banking. Individuals were encouraged to open an account and transact at a banking agent or a branch of a financial institution. Compared with individuals who were sent to the branch, individuals sent to an agent increased the number of transactions and incurred lower transaction costs with the agent. These transactions are, however, only half as large as those made at the branch because branch tellers are less likely to share information about clients with others. Banking with agents thus entails a trade-off between lower transaction costs and lack of privacy.

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Banking with Agents: Experimental Evidence from Senegal[*]

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1. Introduction

Can agent banking bring large numbers of poor, unbanked individuals and households into the formal financial system? Agents are local retailers that double as lower-cost alternatives to bank branches and enable customers to more conveniently make deposits, withdrawals, money transfers, and payments of loans (Lyman et al., 2006; Siedek, 2008; Mas and Kumar, 2008; Flaming et al., 2011). In Senegal and the world over, agents are small shops, supermarkets, petrol stations or agents of other existing money transfer service providers. Because of the convenience associated with their closer physical and social proximity to underserved market segments, agents may find it easier to reach poorer customers living farther from formal bank branches, and thus may deepen financial inclusion more cost effectively than the traditional banking model.

According to the Global Findex Database (Demirguc-Kunt et al. 2015), 38 percent of adults worldwide are unbanked. Among these individuals without a bank account, 22 percent cited costs, 21 percent reported that the bank is too far away, and 12 percent reported lack of trust in banks as a reason for being unbanked. Similarly, Beck et al. (2008) use data from over 200 banks in 62 countries to show that affordability of deposit services and physical distance deter financial access.

The goal of this paper is to estimate the effects of access to agent banking on opening and usage of a savings account. Since the decision to bank with an agent or a branch is typically endogenous, we use a randomized controlled trial (RCT) to identify the causal effects of agent banking in urban and peri-urban areas in Senegal. Using a 2x2 encouragement design, a randomly selected group of individuals was given information about a savings account. Half of the individuals were encouraged to open the account at the nearest agent, while the other half were encouraged to do so at the closest branch. In addition, half of the individuals in each of these two groups were also given a monetary incentive to open the account. Individuals thus fall into one of five groups: (i) offered information about the account (Info), given monetary incentives to open it (Incentives), and told to open it at the branch (Branch); ii) Info, Incentives and told to open it with an agent (Agent), (iii) Info, No Incentives and Branch (iv) Info, No Incentives and Agent and (v) No Info.

As documented in the literature, banking with an agent may be different from banking at a branch along several dimensions, including transactions costs such as transport costs, account opening fees and fees per transaction; trust; restrictions on the use of the account;

and social constraints (see, for example Agarwal and Klapper, 2013 and Karlan et al. 2014 for reviews of interventions using different channels to encourage savings mobilization).

All individuals in the study were offered the same account irrespective of the location where they were encouraged to open it, and neither location (agent or branch) had deposit or withdrawal fees during the study period.[1] In addition, unlike much of the literature that has focused on how physical proximity to agents can promote usage of savings accounts (see, e.g., Ashraf et al. 2006 and Brune et al. 2016), the selected study areas are close to, and equidistant from, agents and branches alike.

Despite being equidistant, we find that visits to the agent (including transport, waiting and face to face time with the agent) were around 10 minutes shorter than visits to branches, mostly due to a shorter waiting time. Transactions costs are thus lower when banking with agents.

In addition, providing account information and financial incentives increases the probability of opening the account by 11.2 and 5 percentage points, respectively. These rates do not vary by the location at which individuals were encouraged to open the account. They are however on the low side of the wide variation in account take-up found in the literature. This variation is perhaps explained by differences in the availability of reliable savings alternatives. Take-up rates range from about 10 percent in Indonesia where multiple providers coexist (Cole, Sampson, and Zia, 2011) to around 80 percent among female household heads living in Nepalese slums (Prina, 2015). While many households in the areas we study are poor, they are better off than those studied in Nepal. Moreover, half of our subjects already had an account with another financial provider prior to the experiment, suggesting that the relatively low take-up rate in our study may be driven by the existence of other providers.

Because of the lower transactions cost of banking with the agent, the optimal cash management model of Miller and Orr (1966) is an adequate benchmark to assess the impacts on account usage. According to the model, individuals encouraged to open the account with the agent should visit agents more often and have higher savings balances than those encouraged to open an account at a branch. The results broadly support the theory. Individuals directed to the agent made 1.4 more deposits and 1.5 more withdrawals than those directed to the branch (who had an average of 2.5 deposits and 3.2 withdrawals, respectively)

[1] While deposits and withdrawals were always free at the branch, all deposits and the first three withdrawals per month were free at the agent. Clients making four or more withdrawals at an agent had to pay a fee. Usage of the accounts during the study period was such that only 3 percent of individuals that opened the account paid withdrawal fees. The modal number of withdrawals per month was zero.

during the 12 months after the opening of the account. Among the 35 percent of clients who made at least one transaction (so-called active clients), individuals directed to the agents made 2.8 more deposits and 3.2 more withdrawals during the 12 months after the opening of the account than those directed to a branch. In addition, average balances after 12 and 24 months of account opening across all individuals directed to the agent were 18 and 34 percent higher than those directed to a branch (who had an average balance of 38 (30) USD 12 (24) months after opening the account). For active clients, the increase in balances after 12 and 24 months is 48 and 110 percent higher than averages for active clients who were sent to a branch.

The model of Miller and Orr (1966) assumes that individuals will choose the location that minimizes transactions costs because they trust both locations equally and are unconstrained by the transaction amount at either location.

Yet, study participants sent to the agent did not bank exclusively with the agent but rather visited the branch as often as those encouraged to open the account at the branch. In fact, the overall increase in the number of transactions came from visiting the agent more often. In addition, when visiting the branch, they made transactions of roughly 219 USD (median is 74 USD) compared to transactions of around 96.50 USD (median is 31 USD) when visiting the agent. Individuals sent to the agent therefore visited agents more often and chose the location depending on the size of the transaction they planned to make. In contrast, individuals sent to the branch visited the agent less often and did not choose the location based on the size of the transaction.[2]

So why did clients not bank exclusively with agents, thus minimizing transaction costs? There are three possible reasons. First, clients might trust branch tellers more than agents, at least in the beginning (Bachas et al. 2017; Mehrotra et al. 2016; IFC, 2017). Trust in the financial provider is particularly important when describing savings behavior because the client needs to believe that the financial institution will honor its promise to make the account balance available whenever required. Microcred Senegal, our partner institution, is well-established in Senegal but until recently had relied only on its branch network and thus individuals may not be familiar with Microcred banking agents. In this case, clients may start by making small transactions with the Microcred agent and as trust develops over time, they may increase the size of transactions and rely more on them. We find however, no positive trend in the number or size of transactions with the agent (relative to transactions at the

[2] Among individuals encouraged to open the account at the branch, the average transactions at the branch and an agent were 108 USD and 119 USD, respectively, a difference that is not statistically significant.

branch). In addition, while 91 percent of respondents at endline trust the staff of a Microcred branch completely, trust in Microcred agents is actually higher at 96 percent. We thus conclude that an explanation based on trust cannot account for the simultaneous visits to both agents and branches.

Second, the agent may refuse large withdrawals due to lack of liquidity, or large deposits for fears of a robbery.[3] While these concerns may be valid in other contexts, based on interviews with Microcred agents neither security concerns nor liquidity and technological constraints (e.g., lack of internet connectivity) are binding.[4] Similarly, clients (rather than agents) may feel unsafe when depositing or withdrawing large amounts from the agent. While agents are not required to have a security guard, interviews with clients suggest that security was not a concern.

Finally, clients may be reluctant to make a large transaction with the agent because of privacy concerns as the agent may talk to friends and relatives of the client about the transaction making it harder for the client to fend off future cash demands. At the branch, in contrast, the transaction is kept secret. In this case, individuals encouraged to open the account with an agent would choose the branch for large transactions and the agent for smaller ones. Focus groups with clients confirm this hypothesis. When asked about visits to both branches and agents, clients mentioned that a branch teller would never tell anyone else how much he or she had deposited or withdrawn from the account. This privacy concern is also consistent with evidence from a lab-in-the-field experiment conducted in Senegal, in areas similar to ours. Boltz et al. (2016) find that 65 percent of subjects prefer to receive the gains from the experiment in private rather than public. In addition, they are willing to forgo 14 percent of the winnings to keep them secret. In a similar experiment in Kenya, Jakiela and Ozier (2016) find that making public returns to investment reduces the willingness to take riskier but more profitable investments, especially among women with relatives who also participated in the experiment.

Therefore, while it is remarkable that individuals are willing to trust agents with their money, they face a trade-off: agents involve lower transactions costs but also less privacy. Individuals encouraged to open the account with an agent seem to be better off because they

[3] Agents may also refuse deposits when their accounts do not have enough float. Mechanically, an agent receiving a deposit in cash will keep the cash and make a transfer from his or her MC account to the account of the client, and if the balance (float) in his or her account cannot cover the transfer, the agent will not be able to complete the transaction. To alleviate this problem, MC offered an overdraft facility that allowed agents to complete the transaction even when the balance was lower than the required transfer.

[4] Some mobile money agents in study areas had refused transactions and the main reason reported was lack of internet connectivity at the time of the transaction, rather than lack of liquidity or security concerns.

use the account more often and have the option to transact at the branch when planning a large transaction. As a result, they expressed greater willingness to pay for the savings account compared to those encouraged to open the account at the branch.

This work is related to two emerging strands in the literature. The first introduces ordinary savings accounts to poor households (for example, Cole, Sampson, and Zia, 2011; Dupas and Robinson, 2013; Dupas et al. 2016; Schaner, 2016; Prina, 2015 and Brune et al. 2016). Most of these studies subsidize the account opening and maintenance fees (if they exist) and show significant impacts on welfare. The second strand in the literature focuses on how poor households use agents to send and receive money within social networks to improve their financial management. Jack and Suri (2014) show that mobile telephony reduces the costs of such within-network transfers in Kenya and find that proximity to 'mobile money' agents has helped households to smooth consumption in the face of economic shocks.[5,6]

Because we examine the effects of proximity to banking outlets (branches and agents), our work is also related to the non-experimental literature showing how expansion of bank branch networks is associated with increased account usage among the poor, resulting in increases in their incomes and reduced poverty levels (Bruhn and Love, 2014; Allen et al. 2013; Burgess and Pande, 2005).[7] What distinguishes our work from both the experimental and non-experimental literature is that we provide a direct test of how banking agents affect the take-up and usage of ordinary savings accounts relative to bank branch staff. To our knowledge, this is the first such test in the literature.

The rest of the paper is organized as follows. Section 2 describes the experimental design and data sources. Section 3 describes the model of Miller and Orr (1966) and its key predictions. Section 4 explains the empirical framework and presents the results. Section 5 concludes.

[5] Similarly, Yang and Choi (2007) find that shocks to the incomes of Philippine households are associated with significant increases in the international remittances that they receive, an indication that those remittances could be used to smooth consumption.

[6] Jack et al. (2013) also find that the purposes of remittances differ between users and non-users of M-PESA. Users are more likely to receive remittances for credit or in response to an emergency, while the fraction of total M-PESA transactions for regular support declines. The patterns suggest that M-PESA enables households to more easily draw on their social networks for support in trying circumstances. Relatedly, Blumenstock et al. (2016) show that Rwandan households affected by earthquake received increased amounts of cellular "airtime" (a simple precursor to mobile money) from members of their social network, especially those with whom they had already established reciprocal relationships.

[7] Burgess and Pande (2005) and Bruhn and Love (2014) find significant increases in income, output and employment as a consequence of bank branch expansion in India and Mexico, respectively.

2. Experimental Design and Data

The experiment was a collaborative effort among Microcred Senegal (Microcred), MasterCard Foundation, the World Bank and the International Finance Corporation (IFC). Microcred is a microfinance institution that offers microcredit as well as savings products. After entering the Senegalese market in 2007, Microcred quickly became one of the four largest microfinance institutions in Senegal. Having focused on lending to micro, small and medium entrepreneurs in the past, Microcred has shifted focus over time to cater to low income individuals, the illiterate, women, youth and rural residents. The institution's agent network was launched in 2014 and is growing rapidly to support this vision. More than 500 agents currently complement a network of 37 branches serving clients all over Senegal in all large cities and several smaller ones as well as increasingly also in rural areas.

Despite the arrival of Microcred, Senegal remains below the average for Sub-Saharan Africa in terms of financial inclusion. According to the Global Findex Database (Demirguc-Kunt et al. 2015) only 11.9 percent of the adult Senegalese population have a bank account and only 6.6 percent of adults report saving at a financial institution.[8] Saving informally using savings clubs or non-relatives is more common and done by 29 percent. These numbers are lower than those reported in a census we conducted in the study of peri-urban areas with closer proximity to financial institutions. According to this census, 46 percent of households reported having a savings account (see Panel A of Table 1).

Our study sample consists of 2,200 individuals from nine different survey areas located in the suburbs of the capital Dakar (6 areas), in Thies, the third most populous city (2 areas), and in a village outside of Thies (1 rural area).

These areas were chosen because Microcred was planning the rollout of its agent network there. Once agents were selected by Microcred, we identified suitable populated areas that were equidistant to Microcred branches and agents. Figure 1 shows an example of the two survey areas in Thies. Each survey area is located between the Microcred branch and a Microcred agent and is typically 1-1.5 square kilometers in size.

2.1 Census and Baseline Data

Between September and October 2014 basic socio-demographic and financial data were collected from every household in the study areas. The enumerators revisited the household up to four times at different hours during the day in case the household was unavailable.

[8] The regional averages for Sub-Saharan Africa are higher at 28.9 percent and 15.9 percent, respectively.

From each household in this census, a member was selected at random using a Kish grid. Households with existing Microcred clients were excluded from the census but those that were clients of other financial institutions were included. In total, 8,002 individuals were interviewed in the census. The timeline of the experiment is presented in Figure 2.

We used data from a pilot in which a small sample from the census were offered the possibility to open a savings account to identify respondents with a high propensity for take-up.[9] The 2,500 individuals with the highest probability were selected and randomly allocated into a control and four different treatment groups of 500 each. Individuals in the treatment groups were offered monetary incentives to open a savings account and were encouraged to open the account at a Microcred agent or branch using the 2x2 design described above.

Household visits took place between January and March 2015. During the visit, tablets were used to collect baseline data about respondents' demographics, household characteristics, and financial assets, and their credit and saving behavior, use of money transfer services and bill payment methods, as well as their awareness and use of mobile money services. A total of 2,201 respondents were successfully interviewed, 374 respondents in the control group and 1,827 respondents from the four different treatment groups.

Table 1 reports summary statistics from the census data for the whole sample (Panel A) and the one selected for the study (Panel B). The full census sample is comparable to the Global Findex Database because both use a Kish grid to select the sample among household members. Study participants, however, were selected because they had a high propensity to open a savings account, and thus, the baseline sample and the census differ. Panel B reports that 53 percent of respondents are female, less than in the full census sample in Panel A. Forty-one percent of baseline respondents are heads of households, who are typically the managers of household finances. While that could have contributed to a high propensity to open an account, the proportion of household heads in Panel B is actually similar to that of the full census in Panel A. The average and median proportion of self-employed respondents, respondents with credit, as well as respondents with a savings account, are higher in the baseline sample than in the census sample. The same holds for respondents' average and median age and individual monthly income.

Baseline respondents in Panel B are on average about 38 years old, obtained 7 years of schooling and have an average monthly income of about 184 USD. The average monthly

[9] The pilot had a sample of 53 individuals and the statistical model to predict take-up of the account turned out to be underpowered and inaccurate. In the full sample of individuals offered to open the savings account, there was no difference in the propensity to actually open the account between those with high and low propensity to open one.

income of all census respondents is comparatively lower at 124 USD. Literacy among baseline respondents in Panel B is 64 percent, more than 10 percentage points higher than in the census. Further, 80 percent of baseline respondents report being self-employed, compared to only 32 percent in the census. The use of financial services is again higher among baseline respondents with 52 percent already having a savings account and virtually everyone reporting to save informally. In contrast, only 46 percent of census respondents have another savings account. The baseline sample in Panel B is thus richer on average, more educated, and more actively engaged with financial services than the full census sample in Panel A.

2.2 Treatments

After the baseline data were collected, individuals in the treatment groups were offered the opportunity to open a Sukaliku account, which has a number of features designed to appeal to the poor: no opening or account maintenance fees, no minimum balance, and no limit to the number of deposits and withdrawals to and from the account (although there is a 500 CFA or 83 US cents minimum amount for deposits and withdrawals). Account balances earn interest at 4 percent per year and, importantly, there are no fees on deposits at either location or withdrawals at the branch. During the study period, a holder of a Sukaliku account could make up to 3 free withdrawals per month at an agent, and for additional withdrawals, they were charged a fee to withdraw money that depended on the amount of the withdrawal. Online Appendix OA1 provides more details about the fee structure that clients face during the study period.[10]

All four treatment groups received information about the Sukaliku account features. The monetary incentive of 1,500 CFA (2.8 USD) that individuals in two of the four treatment groups were offered was only received if the savings account was opened before a certain date and was transferred as balance to the newly opened account. This monetary incentive was covered by Microcred. All individuals in the treatment groups were encouraged to open the Sukaliku account at an agreed day and time, but they had two weeks from the day of the visit to do it. They were handed a card with the address of the agent or branch, date, time and necessary documentation to open the account.[11] Online Appendix OA2 provides examples of

[10] Account opening and minimum balance fees were also waived in Dupas and Robinson (2013), Dupas et al. (2016), Schaner (2016), Prina (2015) and Brune et al. (2016). Only Prina (2015) also waived withdrawal fees. In Dupas et al. (2016, 2018) or Banerjee and Duflo (2011), for example, transaction fees, and in particular those associated with withdrawals, have hindered the use of savings accounts.

[11] The documentation required to open a Sukaliku account in both locations is the national ID card and a telephone number.

the cards handed out. At that time, however, agents did not have the authority to open Sukaliku accounts on behalf of Microcred, and as a result, a Microcred representative was present with the agent during the account opening days. His or her role was to collect the paperwork needed to open the account, while any information about the account was provided by the agent who also answered all the clients' questions. The different treatment conditions are summarized in Table 2.

Table 3 shows that experimental groups are balanced. Columns 2 – 6 report the mean for each of group while Column 7 reports the p-value of an F-test that all treatment dummies are jointly zero in a regression where each household or individual characteristic is the dependent variable. Panel A reports characteristics from the census data and Panel B from the baseline data. We do not observe systematic differences between the different treatment and control groups with respect to demographic characteristics, education level, monthly income or the proportion of respondents with financial products. Similarly, there are no significant differences in the distance to the closest Microcred agent and branch. The number of observations drops to 2,089 because GPS data were incomplete for 112 households. We find significant differences between the different treatment and control groups at the 10 percent level for the proportion of self-employed individuals and age. Following Bruhn and McKenzie (2009) we control for these variables in the analysis of Section 5. An F-test of the null hypothesis that all of these variables are jointly insignificant in predicting whether an individual is in a particular experimental group cannot be rejected (all p-values are higher than 0.128).

2.3 Account Opening, Neighborhood and Endline Survey

Among individuals in the four treatment groups, a sample that opened the Sukaliku account were surveyed immediately afterwards and asked about their experience opening the account. Online Appendix Table OA1 shows that the 274 individuals surveyed are comparable to the 227 individuals not surveyed for 12 of 14 characteristics. There are statistical differences in a dummy for whether the individual saves informally and the Raven's test and these are included in the analysis of Panel A, Table 4 which compares the total time in opening the account, including waiting time and face to face meeting time for individuals sent to an agent compared to those sent to the branch. Column 1 of Panel A shows that the account opening visit for individuals sent to the agent was 9.8 minutes shorter than that of individuals sent to the branch, which lasted around one hour. Most of this time reduction comes from shorter waiting time at the agent. The actual face to face meeting with

the agent or teller to present the documentation and open the account was not different by location and lasted 26.6 minutes.

At the time of the baseline survey and intervention, we also implemented a neighborhood survey to identify all bank and microfinance branches and banking and mobile money agents in the study areas. By design, a study area contained one Microcred branch and one Microcred agent. Combining all study areas, the neighborhood survey identified a total of 391 establishments, including 57 bank branches, 44 microfinance branches, 6 Microcred banking agents and 251 mobile money agents, so the density of financial providers was high. Branches are from all major banks, savings cooperatives and microfinance institutions, including CBAO, Banque Atlantique, PAMECAS, SGBS and our partner Microcred, among others. In contrast, only Microcred had banking agents at the time of the study, so all banking agents are from Microcred.

A Microcred banking agent can collect deposits into and make withdrawals from the Sukaliku savings account and other Microcred accounts. Both branches and banking agents also provide various mobile money and money transfer services simultaneously, including Wari, Joni Joni, Orange Money, Western Union, MoneyExpress and MoneyGram among others. Microcred branches and agents typically work with 2-3 mobile money providers, while the median mobile money agent in our sample works with 4 mobile money providers. Microcred branches are open from 8:30 am to 7 pm from Monday to Friday, 8:30 am to 5:30 pm on Saturdays and are closed on Sundays. Microcred agents are typically open for longer hours (until 9pm or 10pm) and they also operate on Sundays. Most agents are retail shops (typically electronics), although some work exclusively as banking and mobile money agents. Banking agents receive a commission per transaction from the bank. Online Appendix OA1 provides more details about the commission that agents receive per transaction.

The neighborhood survey also included a module that collected basic individual characteristics for a sample of Microcred agents and Microcred branch tellers. Online Appendix Table OA2 compares the characteristics of respondents, Microcred agents, other agents and branch tellers. Respondents and Microcred branch tellers are older than Microcred agents (38 and 32 years old, respectively versus 24.5 years old) and more likely to be married (66 and 69 percent versus 33 percent), but Microcred agents and bank tellers are far more educated than respondents (14 and 16 years of education, respectively versus 6.5 years) and perhaps as a result, they enjoy higher monthly household income. It thus appears that both Microcred agents and branch tellers belong to a different socio-economic group from that of

respondents. Microcred agents also appear to be better off than mobile money agents in terms of education (14 versus 11.7 years) and income (767.5 USD versus 487.4 USD, respectively).

The endline survey was conducted in March 2016, one year after the baseline, with the same respondents. The endline included a module in which individuals were asked to recall the last transaction with an agent and / or at a branch. There are 269 visits to a branch teller and 85 to an agent made by treated individuals. This module recorded the total time involved in the visit, including time for transport, waiting to be served, and face to face with the agent or teller. The average waiting time is about 22 minutes at the branch but only 15 minutes at the agent, while the face to face time with the agent was 9.5 minutes compared to 10 minutes at the branch.[12] These averages mask, however, important heterogeneity by the location where individuals was encouraged to open the account. In order to assess whether these differences are statistically significant, columns 2 to 5 of Table 4 regress the different reported times against a dummy for whether the visit was to an agent, a dummy for whether the respondent was encouraged to open the account with an agent, the interaction of these two dummies and the distance from the respondent's house to the branch.[13] By construction, the coefficient on the dummy "Visit to Agent" shows the difference between a visit to the agent and the branch among individuals encouraged to open the account at the branch. The bottom of Panel B of Table 4 reports the difference in the outcome among visits to the agent between individuals sent to the agent and the branch and the difference between visits to the agent and the branch among individuals sent to the agent, which is the counterpart to the difference reflected in the coefficient on "Visit to Agent", along with the p-value for the test that each difference is zero. Column 1 of Panel B of Table 4, for example, shows that among individuals sent to the branch, visits to the Microcred agent are 6.9 USD cents cheaper on average than visits to the branch. Similarly, among individuals sent to the agent, visits to the

[12] Waiting times can be much longer at the branch than at the agent, especially when long queues form at the beginning of the month. The 90th percentile waiting time at the branch is 60 minutes but only 30 minutes at the agent. In contrast, the 10th percentile waiting time is 5 minutes at the branch and 2.5 minutes at the agent. In addition, as part of the neighborhood survey, we asked that enumerators record the time they had to wait for the agent or a bank teller to answer the actual survey. The average waiting times reported by enumerators are similar to the 10th percentile waiting times reported by study participants that opened an account. Enumerators report a wait time of 5.6 minutes with tellers at the branch versus only 2.7 minutes with agents. Some enumerators told us that they announced themselves as they entered the establishment and so waiting times may have been shorter than for an average client waiting to make a transaction.

[13] In particular, we run the following regression:

$$Y_i = \alpha + \beta_1 \, Visit\ to\ agent_{ij} + \beta_2 \, Agent_i + \beta_3 VisitAgent_{ij} * Agent_i + \beta_4 Dist\_branch_i + \varepsilon_i.$$

Each observation corresponds to an individual *i* in a visit *j*. The variable *Visit to agent* is a dummy that takes value of one for a visit to an agent, while the dummy *Agent* takes value one if the individual was encouraged to open the Sukaliku account with an agent. We note that the same respondent may report visiting a branch only, an agent only or both. As a result, standard errors are clustered at the respondent level.

agent are 9.9 cents cheaper than visits to the branch. While statistically significant, these differences are not economically large and are driven by outliers. In fact, the median visit by individuals sent to the agent or the branch to either location does not involve a transport cost. Column 3 shows that individuals encouraged to open the account with the agent spend 3 fewer minutes in transport time when visiting the agent, even though both locations are equidistant from where they live.[14] Individuals sent to the branch however do not spend significantly less time commuting when visiting the agent. Column 2 of Table 4 confirms that the total visit time to an agent by an individual sent to an agent is significantly shorter, by 11.07 minutes. The bulk of the time reduction is waiting time as reported in column 4. Individuals sent to the branch spend 5.39 fewer minutes waiting (column 4) but their transaction time is 1.80 minutes longer (column 5), and they spend 3.58 fewer minutes overall when visiting an agent (column 2). None of these differences are statistically significant.

Interestingly, when we compare visits at the agent, individuals sent to the agent wait 6.02 minutes less waiting to be served, perhaps because they choose times when the agent is less busy, and they spend 4.76 minutes less with the agent, perhaps because they are more familiar with how transactions are made, relative to individuals sent to the branch. Using individuals that report the waiting time during the account opening visit and the last visit made a year later at the same location, we find that 70 percent of individuals lower the waiting time. More interestingly, this percentage increases to 77 for individuals that made more than 2 transactions by the endline at the location where they opened the account. In contrast, only 55 percent of individuals who made 2 or fewer transactions reported a decline in the waiting time. The actual waiting times were 2 minutes higher for individuals that made 2 or fewer transactions at the location where they opened the account and 23 minutes lower for individuals that made more than 2 transactions. These numbers support to the idea that individuals reduce the overall transactions costs of a visit as they engage in more visits.

As we will see in Section 4.2, the transactions costs of visiting the agent are lower for individuals sent to the agent than for those sent to the branch because the encouragement to open the account with the agent induces more transactions with the agent. Individuals sent to the branch do not experience different transactions costs as they make roughly the same (low) number of transactions at the branch as individuals sent to the agent.

[14] In a radius of 1 km from the branch and the agent there are the same number of other branches and mobile money operators. But perhaps individuals sent to the agent are able to combine trips when visiting the agent as they are located closer to other shopping or working destinations.

In the visit module of the endline survey, we also asked respondents about their level of trust in Microcred agents and branches. Column 6 of Table 4 suggests that 91 percent of respondents fully trust the branch tellers and that this trust increases by 4.7 percent for agents. This result is notable as it suggests that Microcred agents have been quite successful in gaining the trust of their clients, thus likely contributing to deeper financial inclusion.[15]

The overall attrition rate between baseline and endline was 25 percent and, as reported in Online Appendix Table OA3, it is almost identical and thus not statistically different across experimental arms. This suggests that attrition bias is not a concern when examining the impact of banking with an agent or a branch on the outcomes measured in the endline survey.

2.4 Administrative Data

Administrative data on account opening and the location and size of transactions were obtained from the start of the intervention until roughly one year later in March 2016.[16] These administrative data are used to compare account opening across treatment groups (take-up) and to measure account activity, that is, whether a transaction is a deposit or a withdrawal and the location where it occurred (branch or agent). We also have data on money transfers, but virtually no client in our sample used the account to transfer money. Data on savings balances were also obtained from Microcred through April 2017, allowing us to compute balances 12 and 24 months after the intervention.

3. Theory

The model of Miller and Orr (1966) is an excellent benchmark to understand the decision of a Microcred account holder receiving an uncertain cash flow about how often to visit the bank to deposit or withdraw money.

The decision will depend on the transaction cost τ of visiting the bank, the variability of daily cash flows σ^2 and the opportunity cost in forgone interest r, which includes the interest rate earned by the account as well as the probability that the cash may be lost or stolen if kept at home.

Assuming that daily cash inflows minus outflows follow a symmetric Bernoullian random walk, the optimal cash balance Z is given by the following formula:

[15] We assess whether the increase in trust is concentrated among individuals encouraged to open the account with the agent but we find that this is not the case.

[16] As reported in Online Appendix OA1, the number of free withdrawals per month at an agent was reduced from three to two in February 2016. The results using data until January 2016, before the change in the number of free withdrawals, are qualitatively very similar to those reported in Section 4 and hence not shown.

$$Z = \sqrt[3]{\frac{3\tau\sigma^2}{4r}}$$

This formula suggests that when cashflows reach zero, the individual will visit the bank and withdraw the optimal cash balance Z.

In addition, when the cash balance reaches H $=$ 3Z, the individual will visit the bank to deposit any cash in excess of the optimal balance Z. Figure 3 shows the optimal behavior for a given path of daily cash flows. Over time, cash balances increase or decrease depending on whether inflows are larger or smaller than outflows. When cash balances hit zero (lower limit), then the individual goes to the bank, pays transaction cost τ and withdraws the optimal cash balance Z. In contrast, when the cash balance reaches the upper limit H, the individual again pays the transaction cost τ and deposits 2Z in the bank. The model thus predicts that when cash flows have no drift, the individual will make more withdrawals than deposits, and that deposits will be twice as large as withdrawals.[17]

In addition, the model predicts that optimal cash balances will increase with transaction cost τ and the volatility of daily cashflow σ^2 and will decrease with opportunity cost of cash r.

In the previous section, we showed that for individuals encouraged to open the account with the agent, visits to the agent entailed shorter waiting times and thus a reduction in the transaction cost τ. The model thus suggests that the optimal cash holdings Z for individuals sent to the agent should decrease, and that they should make more trips to the agent to make smaller transactions. As a result, balances in their accounts should be larger. We test these predictions in Section 4 below.

4. Empirical Framework and Results

By virtue of the design, the effect of the different treatments on savings account opening, usage, balances and other outcomes, can be estimated with the following equation:

$$Y_i = \alpha + \beta_1\, Agent_i + \beta_2\, Information_i + \beta_3\, Incentive_i + \beta_4\, Dist\_branch_i + X_i + \varepsilon_i \quad (1)$$

or including as control the value of the outcome Y_i at baseline Y_{0i} when available:

[17] The reason why there will be more withdrawals (of amount Z) than deposits of size $2Z$ is the fact that while the transaction cost is the same between a deposit or a withdrawal, the cost of forgone interest is increasing in the cash balance and therefore the optimal withdrawal balance Z will tend to be lower than the optimal deposit.

$$Y_i = \alpha + \beta_1 Agent_i + \beta_2 Information_i + \beta_3 Incentive_i + \beta_4 Dist\_branch_i + X_i + Y_{0i} + \varepsilon_i \quad (2)$$

The variable Y_i denotes the dependent variable for individual i, namely whether the Sukaliku account was opened, variables related to account usage such as the number of deposits and withdrawals as well as the transacted amounts and other measures of savings behavior. The treatment dummy $Agent_i$ takes value one if respondent i was sent to an agent to open the account, $Information_i$ takes value one if respondent i was provided information about the Sukaliku account during the household visit and $Incentive_i$ takes value one if respondent i was offered a monetary incentive to open the account. Given the definition of the treatment dummies, the dummy $Information_i$ captures the impact of being sent to the branch to open the account without a monetary incentive, $Agent_i$ captures the difference between being sent to the agent and being sent to the branch and $Incentive_i$ captures the difference between being offered the monetary incentive or not. Table 2 describes the different experimental arms and the value that the treatment dummies take. In addition, $Dist\_branch_i$ denotes the distance from the respondent's house to the closest Microcred branch in kilometers. We do not include both the distance to the branch and to the agent because individuals are equidistant between the branch and the agent by design, and so the distance to either location is highly positively correlated (correlation coefficient is 0.96).[18] Finally, we include variables that were unbalanced across treatment arms at baseline, namely age and a dummy for self-employment in vector X_i. Each observation corresponds to one individual or household and the standard errors are robust to heteroskedasticity.

When we study the size of transactions we run the following specification:

$$\begin{aligned} S_{ij} = \alpha + \beta_1 Visit\ to\ agent_{ij} + \beta_2 Agent_i + \beta_3 Agent\ x\ Visit\ to\ Agent_{ij} + \\ \beta_4 Deposit_{ij} + \beta_5 Deposit\ x\ Agent + \beta_6 Deposit\ x\ Visit\ to\ Agent_{ij} + \\ \beta_7 Deposit\ x\ Agent\ x\ Visit\ to\ Agent_{ij} + X_i + \varepsilon_{ij} \end{aligned} \quad (3)$$

where S_{ij} denotes the size of transaction j for individual i, $Visit\ to\ agent_{ij}$ is a dummy that takes value 1 if individual i made transaction j with the Microcred agent and $Deposit_{ij}$ is another dummy that takes value 1 if transaction j made by individual i is a deposit instead of a withdrawal. In this specification, the standard errors are clustered at the level of individual i.

[18] By virtue of the randomization, the point estimates on the treatment dummies do not vary if we instead include both distance variables or the difference in distances.

4.1 Account Take-Up

Table 5 presents the intent-to-treat effects on account take-up and the number of transactions with the Sukaliku account. In column 1 of Panel A the dependent variable is whether a Sukaliku account was opened. Only 11.7 percent of individuals who were not provided information about the account (control group) managed to open an account. Providing information about the account and being encouraged to open the account at the branch increases the probability of opening it by 11.2 percent, a relative increase of almost 100 percent. In addition, providing the monetary incentive increases the probability by an additional 5.5 percent or 50 percent relative to the take-up rate among individuals in the control group. Interestingly, take-up is not affected by the location where the individual is encouraged to open the Sukaliku account.

Among the 501 individuals who opened a Sukaliku account, column 2 of Panel A examines who used it actively, that is, who made at least one transaction during the 12 months since the opening date. We find that none of the treatment conditions significantly affects activity and therefore Panel B restricts attention to the 175 active clients. Online Appendix Table OA4 reports the results of a probit regression to understand which individual characteristics are correlated with being active. We find that among individuals who opened a Sukaliku account, those that report saving informally are more likely to be active. Being married and the head of household, in contrast, is negatively correlated with being active with the Sukaliku account, perhaps because these individuals are more likely to already have an account.

Column 3 reports the take-up of other Microcred savings accounts opened outside of the study but during the study period, among the individuals who opened a Sukaliku account. In Panel A, the prevalence of opening another Microcred account among individuals in the control group is 12 percent. None of the treatments, however, affected the probability that individuals opened another Microcred account. In contrast, among the 175 clients who actively used the Sukaliku account, being sent to the Microcred agent to open the Sukaliku account increased the probability of opening another Microcred account during the study period by 13 percent, representing an increase of 65 percent relative to the 20 percent of individuals in the control group who opened another Microcred account.

4.2 Number and Size of Transactions

The model of Miller and Orr (1966) of Section 3 predicts that individuals encouraged to open an account with a Microcred agent will perceive lower transaction costs and thus make

more transactions. In addition, because deposits are predicted to be twice as large as withdrawals (under the assumption of no drift in cashflows), individuals will make more withdrawals than deposits.

Columns 4-6 (7-9) of Table 5 report the total number of deposits (withdrawals), and those made at the branch or with a Microcred agent, respectively, from account opening until March 2016. In column 4 of Panel A, individuals in the control group make 2.54 deposits. Individuals directed to the branch do not make significantly more deposits relative to those in the control group, but individuals directed to a Microcred agent make 1.37 more deposits. Similarly, in column 7 of Panel A, individuals in the control group (and those directed to the branch) make 3.24 withdrawals on average while individuals directed to the agent make 1.48 more withdrawals. Columns 4 and 7 of Table 5 therefore seem to confirm that individuals sent to the agent make more transactions and that the number of withdrawals is larger than the number of deposits.

Columns 5 and 6 show convincingly that the increase in the overall number of deposits among individuals encouraged to open the Sukaliku account with a Microcred agent come from an increase in deposits with the agent (column 6) rather than at the branch (column 5). We find a similar result when comparing withdrawals in columns 8 and 9. These results suggest that our treatment of encouraging individuals to open an account with a Microcred agent provided an impetus to make more deposits and withdrawals with an agent. Column 10 confirms the increased use of agents by individuals encouraged to open the account with an agent. Individuals in the control group use a Microcred agent for 9.8 percent of their transactions. Similarly, individuals sent to the branch use the Microcred agent for 3.9 percent of the transactions, although the difference in percentages with individuals in the control is not statistically significant. In contrast, individuals directed to the agent increase the share of transactions with the Microcred agent by 13 percent, an increase of almost 133 percent.

Panel B of Table 5 strengthens the results from Panel A by focusing on active clients. Those directed to a Microcred agent make 2.8 more deposits and 3.2 more withdrawals with an agent than those in the control group. Those sent to the branch do not make a significantly different number of withdrawals or deposits than those in the control group. Again, the number of deposits and withdrawals at the branch does not vary by whether individuals were encouraged to open the account with an agent or at a branch. We previously showed that transaction costs (waiting time) decline as the number of transactions increases. Since individuals encouraged to open the account with an agent end up making more transactions, they experience, on average, lower transactions costs.

The model in Section 3 assumes that all transactions take place at the location that minimizes transactions costs. Once individuals learn about the convenience of using agents, they should only bank with them. The data, however, do not support this assumption as individuals visit both locations.

While data described in Section 2 suggest that individuals trusted branch tellers and Microcred agents by the endline, in the beginning individuals may have been unfamiliar with the agents, and thus needed to gain trust before they fully engaged with them. In this case, individuals would make few transactions with the Microcred agent in the beginning, going to the branch for the rest of transactions, until they gained enough trust to bank exclusively with the agent. Similarly, transactions with a Microcred agent would be small in the beginning (and large at the branch) until they were comfortable transacting the optimal amount with the agent. Figures 4 and 5 plot the average number of deposits and withdrawals, respectively, per customer and quarter with a Microcred agent (dots) and at the branch (triangles). Figure 4 shows the number of deposits slightly declining over time at the branch but constant with a Microcred agent. Figure 5 shows that the number of withdrawals at either location is very similar and roughly constant. Figures 6 and 7 plot the size of deposits and withdrawals, respectively, and neither show a clear trend over time at either location. Thus there is no clear trend over time in the number or size of transactions. In particular, after one year there are still transactions undertaken at the branch, even when individuals report trusting the Microcred agent completely. The data do not support the explanation for the simultaneous use of agents and branches based on an initial lack of trust in agents.

So why do individuals visit both agents and branches? Table 6 explores whether the location is chosen based on the size of the transaction using the specification in Equation 3 and the sample of individuals that were encouraged to open the account either at an agent or the branch.[19] In column 1, the average size of withdrawals made at the branch by individuals encouraged to open the account at the branch is 99.5 USD while the average size of their deposits at the branch is 12 USD higher. Including individuals sent to the agent to open the account, average deposits at both locations are 144 USD while average withdrawals are 127 USD. This represents a 13 percent increase, but the difference is not statistically significant, and certainly not double the size as predicted by the model in Section 3.[20]

[19] The results including the transactions made by individuals in the control group that opened a Sukaliku account are very similar to those in Table 6 and thus not reported.
[20] These figures are averages that cannot be derived from the coefficients in Table 6.

The model also predicts that lower transaction costs should result in more frequent and smaller transactions. We have shown in Table 5 that individuals encouraged to open an account with a Microcred agent engage in more transactions with Microcred agents. Table 6, however, shows that these individuals do not necessarily transact smaller amounts. The coefficient on the dummy variable Agent is positive and significant, suggesting that withdrawals at the branch are larger for individuals encouraged to open the account with the agent rather than at the branch. Using data from all transactions, the average transactions for individuals sent to the branch versus an agent are 112 USD and 147 USD, respectively.[21] Transactions are, on average, larger among individuals sent to a Microcred agent, and that difference is statistically significant.

It is also clear from columns 1 and 3 of Table 6 that individuals encouraged to open the Sukaliku account with a Microcred agent, choose to make deposits and withdrawals with the agent that are significantly smaller than those made at the branch. Column 3 focuses on individuals sent to the agent. For this group, the average transaction at the branch is 219 USD compared to 96.50 USD for transactions with a Microcred agent.[22]

There are at least three possible reasons for this behavior. First, agents may be unable to accommodate requests for large withdrawals due to lack of liquidity and may refuse large deposits due to concerns about security and fears of theft. According to the endline survey, however, none of the respondents who had visited a Microcred agent reported that the agent had ever refused a transaction. The agent module in the neighborhood survey also asked agents (both those of Microcred and others) if they had been unable to complete a transaction during the last week. About 25 percent of all agents in the area report having refused at least one transaction. Of those, about one-third of the transactions were refused due to liquidity concerns while the remaining two-thirds had to do with internet connectivity problems. None of the 6 Microcred agents, however, reported problems completing transactions during the last week. As Appendix Table OA2 shows, Microcred agents are better off financially than other banking and mobile money agents and thus they may run larger businesses with more reliable internet and fewer liquidity problems. Alternatively, clients, rather than the agents, may feel unsecure depositing or withdrawing large amounts with the agents for fear of theft. While each branch has a security guard, some Microcred agents do not have one. However, the selection process to become a Microcred agent ensures that the establishment has brick walls and concrete ceilings. In fact, none of the clients in the study ever complained about

[21] See Footnote 20.
[22] See Footnote 20.

lack of security with agents. Finally, clients may be reluctant to make large transactions with the agent due to privacy concerns. Transactions with an agent happen "in the open," in plain view of other customers who are present at the agent's shop. At the branch, in contrast, only the teller and the client witness the transaction. In addition, the client may be concerned that the agent will spread information about the transaction to his or her family and friends, while transactions at the branch are kept confidential. Focus groups conducted with Microcred account holders living in the study areas, but who did not participate in this study, reveal a concern with making large transactions (both deposits and withdrawals) with a Microcred agent due to lack of privacy. Those individuals feared that the agent would tell relatives and friends about the large transaction and this may prompt pressure from them to share cash holdings. We note that the only information that the agent has access to during a transaction through its internet portal is the name of the client, the account number and the amount of the transaction. The agent never sees the balance on the account and as a result, the amount of the transaction is the only information that he or she can disseminate. This concern for privacy from the focus groups is consistent with a growing literature based on lab-in-the-field experiments from Africa that document the willingness to pay to keep income gains private. Jakiela and Ozier (2016), for example, find that making returns to investment public lowers the willingness to take riskier but more profitable investments, especially among women with relatives who also participated in the experiment. In the same study areas as ours, Boltz et al. (2016) find that 65 percent of subjects prefer to receive the gains from the experiment in private rather than publicly and that they are willing to forgo 14 percent of the winnings to keep them secret.

We conclude that individuals encouraged to open the Sukaliku account with an agent use it more because they incur lower transactions costs. Panel A of Table 7 shows that the sum of deposits in column 1 and withdrawals in column 2 increase by 96 and 78 percent, respectively from a base of 270.6 USD of accumulated deposits and 305.8 USD of accumulated withdrawals for individuals in the control group. Panel B of Table 7 provides similar results for active clients. In addition, individuals sent to the agent transact both with agents and at the branch because the two channels are not perfect substitutes. Agents entail lower transaction costs but lack privacy. Transactions at the branch, on the other hand, have higher transaction costs but are private. This element of privacy is not captured by the Miller and Orr (1966) model and can explain why individuals still use the branch after learning about the lower transactions costs of Microcred agents.

We note that after the third monthly withdrawal clients transacting with the agent face a fee for additional withdrawals, and as a result, the decision of how much to withdraw and where to do it could be influenced by the fee. Put differently, individuals sent to the agent could be withdrawing lower amounts to avoid paying large sums in fees rather than due to privacy concerns. This alternative explanation is however easily dismissed. First, given the usage of the accounts described, only 3 percent Sukaliku holders ever pay withdrawal fees. Second, *both* deposits and withdrawals are lower compared to transactions at the branch, and yet, there are no deposit fees. Finally, individuals do not seem to avoid paying the fee since the third withdrawal in a month is similar in size to the fourth withdrawal that same month, even though the fourth withdrawal requires a fee. Online Appendix Figures OA1 and OA2 show the average size of withdrawals at an agent and branch, respectively, while Online Appendix Figures OA3 and OA4 show the average size of deposits for comparison. In fact, the probability that the third (fourth) withdrawal is made at an agent among individuals making at least three (four) withdrawals in a given month is 63.4 percent (66 percent), indicating that there is no significant decline in the probability that individuals will go to the branch when they face a fee at the agent.

4.3 Balances

The model of Miller and Orr (1966) in Section 3 predicts that a reduction in transaction costs τ leads to a reduction in optimal cash balances Z and, as a result, savings balances in the account should increase because individuals carry less cash around, on average. Columns 3-6 of Table 7 report the balance in the Sukaliku account (columns 3 and 5) and in all Microcred accounts (including Sukaliku, in columns 4 and 6), 12 and 24 months after the intervention. Columns 3 and 4 in Panel A, suggest that the increase in balances for individuals sent to the agent 12 months after the intervention is about 3.25 USD in the Sukaliku account and 6.94 USD across all Microcred accounts, representing an increase of 23 percent and 18 percent, respectively, although neither increase is significant. After 24 months, only the increase in balances across all the Microcred accounts is significant at the 10 percent level by 10.14 USD, representing an increase of 33 percent from a balance of 30.16 USD among individuals in the control group. Panel B uses data on active users and shows more precise estimates of the increase in balances among individuals who were encouraged to open the account with the agent. Twelve months after the intervention, the balance across all Microcred accounts is 25.84 USD higher, representing an increase of 48 percent from a balance of 53.89 USD in the control group. After 24 months, balances across all Microcred accounts increase by 35.19 USD for individuals sent to the agent, representing an increase of 110 percent from a balance

of 32.05 USD in the control group. Balances for individuals encouraged to open the account at the branch are not statistically different from those in the control group in either panel.

We thus confirm the prediction of the model that balances increase among individuals that perceive that the transactions costs are lower.

4.4 Savings and Other Outcomes

Table 8 and Online Appendix Table OA5 report the impact of the different treatments on various savings and welfare outcomes. In column 1 of Table 8 we report the willingness to pay elicited at endline for a Sukaliku account with a balance of 1,500 CFA (2.8 USD at the time). Interestingly, individuals encouraged to open a Sukaliku account with an agent are willing to pay 585 CFA more (1.08 USD) for the account, an increase of 13 percent relative to those sent to the branch. In contrast, individuals encouraged to open the account at the branch are not willing to pay more for it than individuals in the control group, consistent with the similar usage of the account in both groups. Column 2 reports whether the individual saves formally, either with Microcred or any other financial institution. The prevalence of saving formally in the control group is 37 percent. The provision of information increases the probability that the individual saves formally by 8.8 percent and being offered a monetary incentive to open a Microcred account increases the probability a further 8.2 percent. In addition, the farther away from the branch (and the agent, as distances are correlated) the individual lives, the lower is the probability that the individual saves formally. While treatments were assigned randomly and as a result we interpret the coefficients associated with treatment dummies as causal impacts, distance to the branch is not randomly assigned and so there may be other factors correlated with distance that may directly contribute to the lack of formal savings. For example, individuals that are farther away may be poorer and have less disposable income than those that live near the branch. We conclude that similar to the take-up of the Sukaliku account, our intervention succeeded in increasing access to finance through formal savings. In column 3 we study whether access to savings enables individuals to respond more easily to unexpected shocks in income. We find that individuals provided with information about the Sukaliku account report being more likely to use savings to deal with a negative income shock. Relatedly, the farther away the individual lives from the branch, the less likely he or she is to use savings to cope with shocks.

Online Appendix Table OA5 reports the impact of opening a Sukaliku account on outcomes such as whether the individual is self-employed, had a business that failed, opened a business, their total monthly expenses and an index of happiness based on questions about

positive feelings and thoughts during the month prior to the endline. While information about the Sukaliku account does not affect the probability that the individual reports being self-employed (column 1), among individuals with a business it reduces the probability that it will fail by 21.4 percent from a base of 60 percent (column 2). Similarly, in column 3, information about the Sukaliku account increases the probability of opening a business by 6.8 percent from a base of 15.5 percent. Column 4 reports that our intervention did not affect total household monthly expenditures. Therefore, while we uncover interesting positive impacts on business outcomes of account take-up induced by the provision of information about the Sukaliku account, this greater financial inclusion does not translate into gains in household consumption. In this case, the farther away an individual lives from a branch the lower are his/her monthly expenditures, lending some support to the hypothesis that individuals that live farther away from the branch are perhaps poorer than those that live closer to it. Finally, column 5 reports the impacts on a happiness index. In this case, individuals encouraged to open the Sukaliku account with an agent report an increase in the level of happiness of 0.28 standard deviations. To conclude, encouraging individuals to open the Sukaliku account through the provision of information has some positive impacts on savings behavior and welfare, but the precise location where individuals open the account, while it affects usage, does not impact welfare (Dupas et al., 2018).

5. Conclusion

During the last decade there has been a proliferation of alternative channels to the traditional banking model to deliver financial services. This paper implements a randomized controlled trial to study the impacts of one such alternative channel, agent banking, in a context where prospective clients are equidistant from a branch and an agent of the partner financial institution. Naturally, the findings come from one institution serving peri-urban customers, in one country. As with all empirical research, questions persist as to whether the findings would be different in rural areas, where individuals would typically be far closer to agents than to branches, and to other countries, cultures or financial institutions.

With these caveats in mind, the results suggest that individuals directed to an agent to open a no-cost savings account increase their overall number of deposits and withdrawals compared to individuals directed instead to the branch. Since the number of transactions at the branch are the same for both groups of individuals, this increase in the overall number of transactions comes from more visits to the agent.

Visits to agents are around 10 minutes shorter than visits to branches thus reducing transactions costs. By the end of the study, agents had fully gained the trust of clients. These patterns are consistent with the notion that social proximity to agents can contribute to deeper financial inclusion among groups that are typically underserved by the providers of formal financial services.

Individuals however did not transact exclusively with agents thus minimizing transaction costs, as predicted by standard optimal cash management models. Instead, individuals who were encouraged to open the account with an agent chose to transact with either the agent or the branch depending on the size of the transaction. We present evidence that this effect is not due to Microcred agents refusing certain transactions due to liquidity constraints or lack of security. Instead, clients were unwilling to make large transactions with an agent because friends and family could more readily find out about their finances from an agent than from tellers at branches. We therefore uncover a trade-off when banking with agents. Agents entail lower transaction costs (time, travel) but also less privacy as transactions are made "in the open."

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Figure 1: Example of survey areas (Thies)

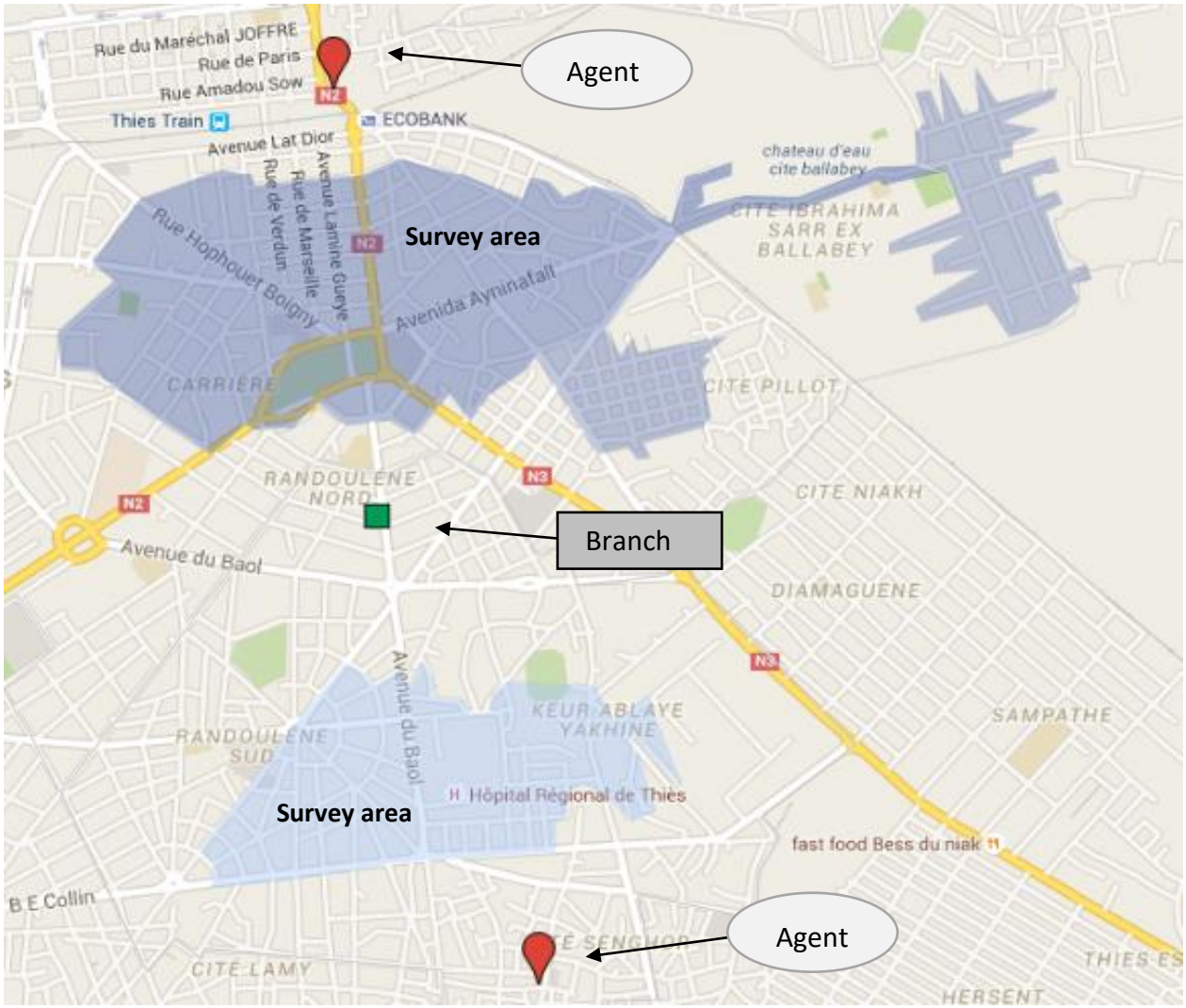


Figure 2: Timeline

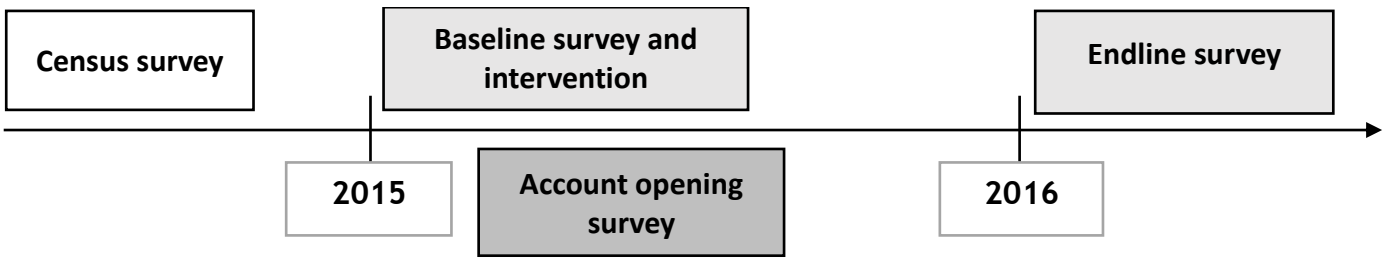


Figure 3: Miller and Orr (1966) Model

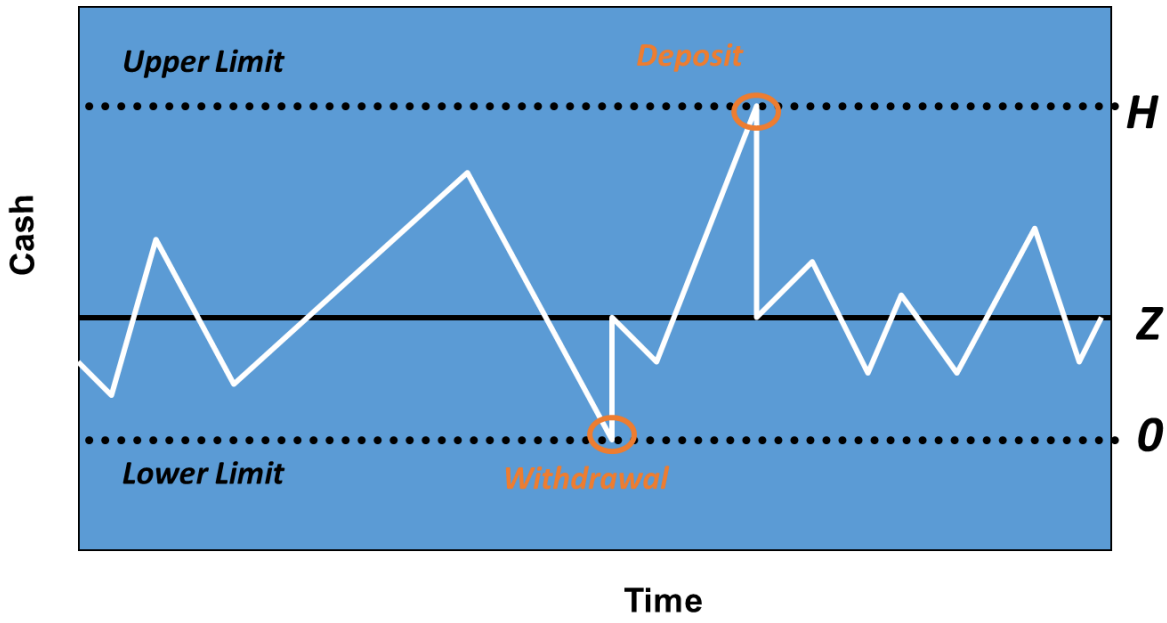
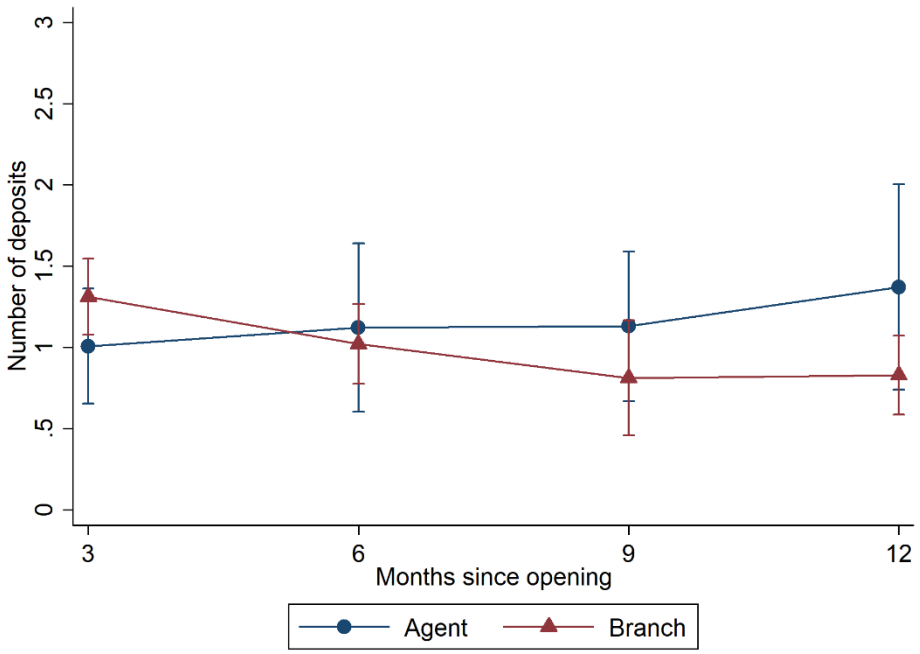
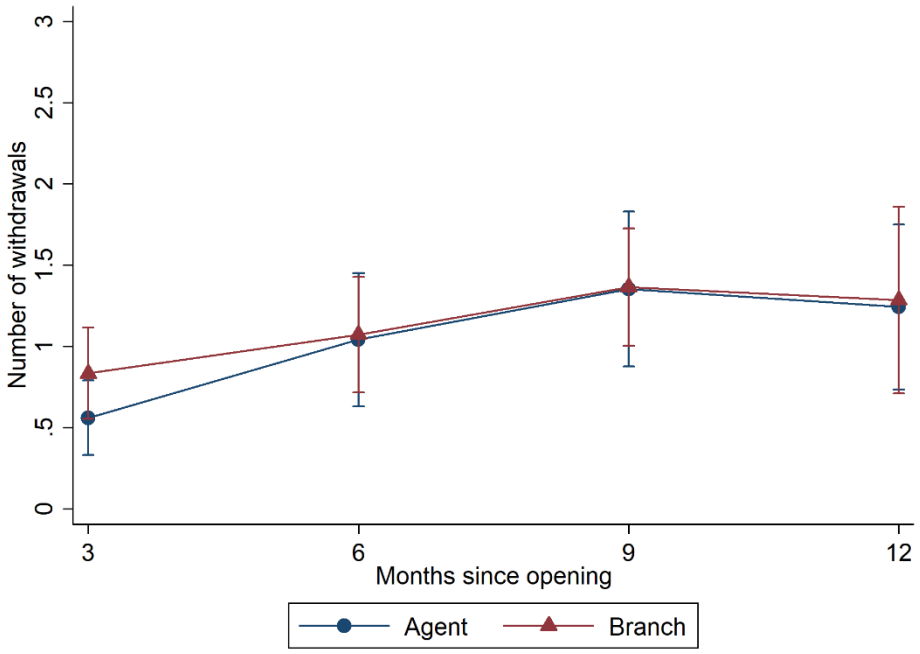


Figure 4. Number of deposits over time



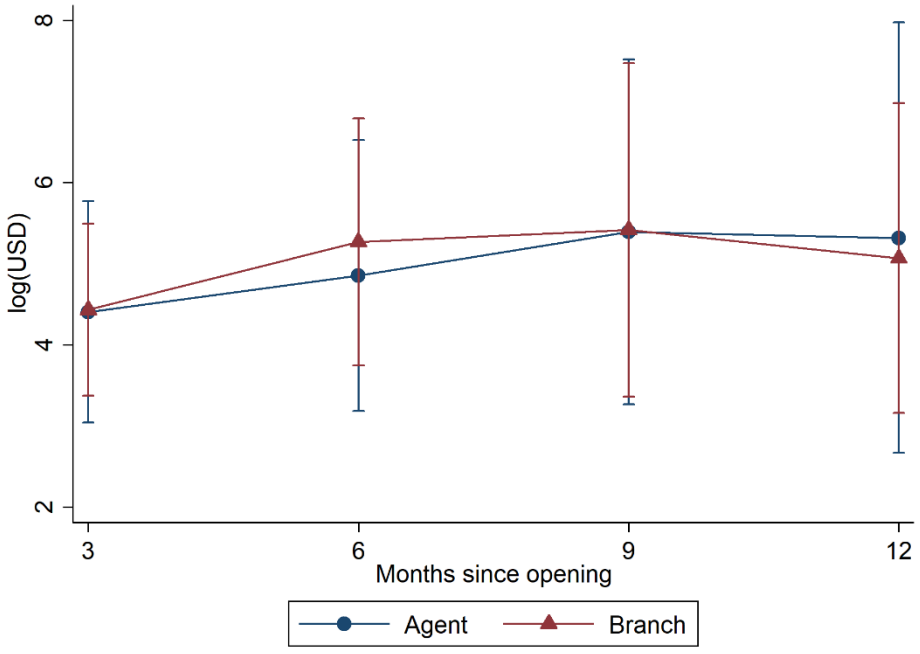
Notes: Figure 4 plots the average number of deposits per quarter made by active customers at the branch (triangles) and with a Microcred agent (circles) after opening the account. Confidence intervals are also reported.

Figure 5. Number of withdrawals over time



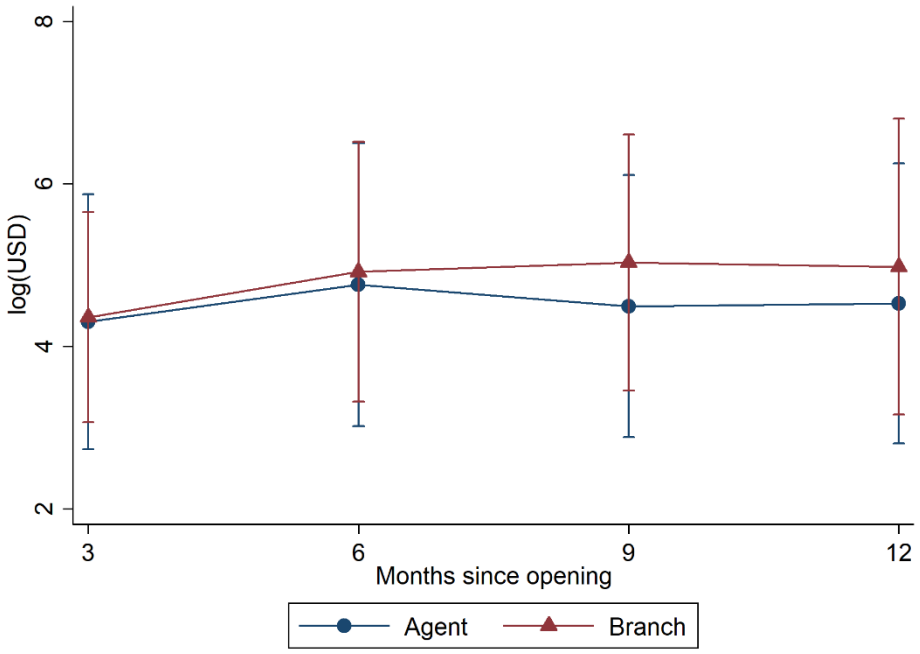
Notes: Figure 5 plots the average size of withdrawals (in log USD) per quarter made by active customers at the branch (triangles) and with a Microcred agent (circles) after opening the account. Confidence intervals are also reported.

Figure 6. Size of deposits over time



Notes: Figure 6 plots the average number of withdrawals per quarter made by active customers at the branch (triangles) and with a Microcred agent (circles) after opening the account. Confidence intervals are also reported.

Figure 7. Size of withdrawals over time



Notes: Figure 7 plots the average size of deposits (in log USD) per quarter made by active customers at the branch (triangles) and with a Microcred agent (circles) after opening the account. Confidence intervals are also reported.

Table 1: Summary Statistics

	N	Mean	Std. Dev.	Min	Median	Max
Panel A: Census Sample						
Gender (1=Female)	8,002	0.587	0.492	0	1	1
Household head (1=Yes)	8,002	0.398	0.489	0	0	1
Years of schooling	8,002	6.682	5.764	0	6	17
Literacy (1=Yes)	8,002	0.531	0.499	0	1	1
Age	8,002	36.33	12.78	16	34	88
Self-employed (1=Yes)	8,002	0.321	0.467	0	0	1
Individual monthly income (USD)	6,894	$123.59	$153.18	$0	$55	$1,107
Has credit (1=Yes)	8,002	0.343	0.475	0	0	1
Has savings account (1=Yes)	8,002	0.460	0.498	0	0	1
Panel B: Baseline Sample						
Gender (1=Female)	2,201	0.528	0.499	0	1	1
Household head (1=Yes)	2,201	0.409	0.492	0	0	1
Years of schooling	2,201	6.867	5.296	0	6	17
Literacy (1=Yes)	2,201	0.644	0.479	0	1	1
Age	2,201	37.83	12.02	16	36	84
Self-employed (1=Yes)	2,201	0.801	0.399	0	1	1
Individual monthly income (USD)	2,201	$184.47	$182.16	$18	$111	$1,107
Has credit (1=Yes)	2,201	0.579	0.494	0	1	1
Has savings account (1=Yes)	2,201	0.517	0.500	0	1	1

Notes: This table presents summary statistics of census respondents. Panel A reports statistics of all census respondents, except for existing MC clients. Panel B reports stastistics of the individuals selected among those in Panel A to be the sample of our experiment, based on the predicted propensity to open a savings account. Data come from filter survey and was collected in September and October of 2014. Individual income is reported in US dollars of January 2015. Has credit (1=Yes) is a dummy variable that takes value of 1 if a HH member has ever obtained a loan. Has savings account (1=Yes) is a dummy variable that takes value of 1 if a HH member reports having a savings account.

Table 2: Experimental Design

Group	Description	Treatment dummies
Control Group	Individuals do not receive any information about the savings account nor a monetary incentive to open an account.	Information = 0
Treatment Group		
Branch	Individuals receive information about the savings account and are given the address of the closest **branch** to open an account.	Information = 1 & Agent = 0 & Incentive = 0
Agent	Individuals receive information about the savings account and are given the address of the closest **agent** to open an account.	Information = 1 & Agent = 1 & Incentive = 0
Incentive & Branch	Individuals receive information about the savings account, are given the address of the closest **branch** and also receive a monetary **incentive** to open the account (1,500 CFA ≈ $2.6 conditional on account opening).	Information = 1 & Agent = 0 & Incentive = 1
Incentive & Agent	Individuals receive information about the savings account, are given the address of the closest **agent** and also receive a monetary **incentive** to open the account (1,500 CFA ≈ $2.6 conditional on account opening).	Information = 1 & Agent = 1 & Incentive = 1

Table 3: Randomization check

	N	Means					p-value of F-test
		Control	Branch	Agent	Incentive & Branch	Incentive & Agent	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Filter survey data							
Gender (1=Female)	2,201	0.532	0.553	0.492	0.547	0.511	0.298
Household head (1=Yes)	2,201	0.438	0.369	0.381	0.413	0.417	0.109
Years of schooling	2,201	6.75	7.05	7.02	6.62	7.03	0.643
Literacy (1=Yes)	2,201	0.654	0.650	0.624	0.619	0.663	0.879
Age	2,201	37.97	36.97	37.03	39.02	37.92	0.083*
Self-employed (1=Yes)	2,201	0.406	0.344	0.346	0.408	0.356	0.076*
Individual monthly income (USD)	2,201	$194.90	$167.80	$193.80	$178.70	$178.10	0.163
Has savings account (1=Yes)	2,201	0.507	0.464	0.527	0.562	0.527	0.236
p-value of F-test that all characteristics are jointly zero	2,201	0.414	0.128	0.162	0.161	0.904	
Panel B: HH survey data (baseline)							
Obtained a loan during the past 6 months (1=Yes)	2,201	0.043	0.067	0.073	0.061	0.066	0.325
Saves informally (1=Yes)	2,201	0.428	0.427	0.482	0.406	0.399	0.201
Risk aversion (0-10)	2,201	4.13	3.68	3.62	3.85	3.70	0.157
Raven's test score (0-3)	2,201	2.00	2.04	2.01	2.10	1.99	0.344
Distance to branch (in km)	2,089	2.09	2.07	1.72	1.59	1.72	0.339
Distance to agent (in km)	2,089	2.31	2.26	1.93	1.74	1.92	0.527
p-value of F-test that all characteristics are jointly zero	2,089	0.143	0.885	0.132	0.400	0.622	

Notes: This table reports means of treatment and control groups to check if the randomization was successful. The means reported here are calculated for the individuals in the experiment sample. Panel A reports data from filter survey. Panel B complements the analysis using variables collected at baseline, using HH survey. Column 1 reports the number of observations. Columns 2-6 report means for the control group and for the different treatment groups. Column 7 reports the p-value of an F-test that, in a regression of the variable against treatment indicators, all coefficients associated to treatment indicators are jointly zero. The last line of each panel reports the p-value of the F-test that in a regression of a treatment arm indicator against all filter survey or HH survey variables, all coefficients associated to the filter survey or HH survey variables are jointly zero. Has savings account (1=Yes) is a dummy variable that takes value of 1 if a HH member reports having a savings account. Risk aversion (0-10) is an index of self-reported risk behavior that varies from 0 to 10, where 0 means "I always try to avoid taking risk" and 10 means "I am fully prepared to take risks." Raven's test score (0-3) varies from 0 to 3 and is equal to the number of correct answers given by a survey respondent in a Raven's test. Distance to branch (in km) and Distance to agent (in km) are the distances in kilometers from the HH to the closest branch and to the closest agent, respectively. Levels of significance * p<0.10 ** p<0.05 *** p<0.01.

Table 4: Visit characteristics

Panel A: Account opening	Overall time (mins)	Waiting time (mins)	Meeting time (mins)
	(1)	(2)	(3)
Agent (1=Yes)	-9.737***	-9.179***	-0.558
	(3.685)	(3.271)	(1.795)
Distance to branch (Km)	-1.543**	-1.715***	0.172
	(0.780)	(0.482)	(0.458)
Observations	274	274	274
R-squared	0.031	0.041	0.009
Mean of dependent variable sent to branch, no incentive	61.14	34.48	26.66

Panel B: Last visit	Transport cost (USD)	Overall time (mins)	Transport time (mins)	Waiting time (mins)	Transaction time (mins)	Trust staff (1=Yes)
	(1)	(2)	(3)	(4)	(5)	(6)
Visit to agent (1=Yes)	-0.0691**	-3.586	-1.582	-5.388	1.802	0.0669*
	(0.0316)	(4.478)	(1.523)	(3.558)	(1.862)	(0.0360)
Agent (1=Yes)	-0.00849	-3.290	-1.156	-2.046	-1.244	0.0176
	(0.0433)	(3.362)	(1.195)	(2.510)	(1.813)	(0.0348)
Visit to agent*Agent	-0.0296	-7.485	-1.429	-3.971	-3.514	-0.0520
	(0.0519)	(5.193)	(1.741)	(4.173)	(2.348)	(0.0560)
Distance to branch (km)	0.0654***	-1.885***	1.430**	-1.477***	-0.408***	0.00741***
	(0.00784)	(0.280)	(0.682)	(0.198)	(0.138)	(0.00234)
Observations	354	354	354	354	354	354
R-squared	0.122	0.041	0.077	0.048	0.011	0.007
Mean of dependent variable when at branch, sent to branch	0.215	33.1	14.6	22.9	10.2	0.908
Visit to agent: Sent to agent - Sent to branch	-0.038	-10.78	-2.58	-6.02	-4.76	-0.034
*P-value of test that Agent + Visit to agent*Agent = 0*	0.406	0.011	0.085	0.087	0.009	0.438
Sent to agent: Visit to agent - Visit to branch	-0.099	-11.07	-3.01	-9.36	-1.71	0.015
*P-value of test that Visit to agent + Visit to agent*Agent = 0*	0.017	0.000	0.000	0.000	0.230	0.729

Notes: This table compares the experience of MC customers at the branch and at the agent. Panel A uses uses data collected for treated individuals (Information=1) about the visit to either location they made to open the MC account. The specificiation is estimated by OLS: $y_i = \alpha + \beta_1 Agent_i + \beta_2 DistBranch_i + \varepsilon_i$. Each observation corresponds to an individual i. $Agent_i$ takes value 1 if the individual is encouraged to open the account with an agent. $DistBranch_i$ is the distance between the HH of the respondent and the closest branch in kilometers. We control for a dummy that takes value of 1 if the individual reported saving informally at baseline and also for the individual Raven's test score at baseline due to sample imbalance. In Column 2, the dependent variable is the time (in minutes) he or she waited in the queue. In Column 3, the dependent variable is the time it took for him or her to open the account. The dependent variable in Column 1 is the sum of columns 2 and 3. Panel B uses data collected at endline, also excluding the control group. The sample includes respondents who self-reported having a MC account at endline and also show up in the administrative data as having an account. The specificiation is estimated by OLS: $y_{ij} = \alpha + \beta_1 VisitAgent_{ij} + \beta_2 Agent_i + \beta_3 Visit\ Agent_{ij} * Agent_i + \beta_4 DistBranch_i + \varepsilon_{ij}$. Each observation corresponds to visit j by respondent i to either the branch or an agent. If respondents report having visited both locations, there are 2 observations for those individuals. Dummy $VisitAgent_{ij}$ takes value 1 if individual visited an agent. $Information_i$ takes value 1 if the individual is given information about the Sukaliku account. Again, $Agent_i$ takes value 1 if the individual is encouraged to open the account with an agent. $DistBranch_i$ is the distance between the HH of the respondent and the closest branch in kilometers. In Column 1, the dependent variable is the self-reported cost of getting to the branch or agent, in US dollars of January 2015. In Columns 3-5, the dependent variables are the time (in minutes) the individual reports taking to get to the branch or agent, the time he or she waited in the queue and how long it took for him or her to make their transaction. The dependent variable in Column 2 is the sum of columns 3 to 5. In Column 6, the dependent variable is a dummy that takes value of 1 if the respondent reports he or she trusts the agent or the branch staff. Sample was trimmed to exclude outliers (top 2%) in columns 3-5. Differences and p-values are reported for treated individuals ($Info$ =1). Standard errors are clustered at the individual level. Levels of significance * p<0.10 ** p<0.05 *** p<0.01.

Table 5: Account take-up and number of transactions

	Opened Sukaliku account (1=yes)	Active with Sukaliku (1=yes)	Opened other account (1=yes)	Number of deposits into Sukaliku account			Number of withdrawals from Sukaliku account			Share of transactions with agent
				Total	At branch	At agent	Total	At branch	At agent	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: Full Sample										
Agent (1=Yes)	0.00710	0.00186	0.0312	1.367***	0.0952	1.272***	1.480***	0.350	1.130***	0.130***
	(0.0209)	(0.0457)	(0.0313)	(0.473)	(0.213)	(0.368)	(0.439)	(0.234)	(0.315)	(0.0268)
Information (1=Yes)	0.112***	-0.0293	-0.0419	-1.553	-0.236	-1.317	-2.155	-1.344	-0.811	-0.0588
	(0.0246)	(0.0868)	(0.0581)	(1.313)	(0.416)	(1.180)	(1.434)	(1.054)	(0.904)	(0.0453)
Incentive (1=Yes)	0.0552***	0.0138	0.0200	0.0898	-0.112	0.201	-0.147	-0.143	-0.00409	0.0380
	(0.0209)	(0.0457)	(0.0309)	(0.420)	(0.217)	(0.321)	(0.437)	(0.248)	(0.305)	(0.0273)
Distance to branch (km)	-0.0157***	0.00110	0.0112	0.578	0.151	0.427	0.249	0.0818	0.168	0.0123*
	(0.00206)	(0.0135)	(0.0122)	(0.412)	(0.148)	(0.290)	(0.221)	(0.115)	(0.113)	(0.00699)
Mean of dependent variable, control group	0.117	0.366	0.122	2.537	1.098	1.439	3.24	2.10	1.15	0.098
Observations	2089	501	501	501	501	501	501	501	501	501
R-squared	0.04	0.002	0.018	0.057	0.015	0.059	0.055	0.025	0.051	0.052
Panel B: Sample of Active accounts										
Agent (1=Yes)			0.129**	2.840***	0.113	2.728***	3.223***	0.675	2.547***	0.348***
			(0.0626)	(0.900)	(0.469)	(0.790)	(0.910)	(0.581)	(0.695)	(0.0588)
Information (1=Yes)			-0.0853	-2.802	-0.308	-2.494	-4.520	-3.146	-1.374	-0.125
			(0.119)	(3.161)	(0.900)	(3.015)	(3.420)	(2.628)	(2.321)	(0.107)
Incentive (1=Yes)			0.0384	-0.479	-0.538	0.0595	-0.905	-0.610	-0.295	0.0856
			(0.0635)	(0.908)	(0.484)	(0.816)	(0.984)	(0.604)	(0.776)	(0.0577)
Distance to branch (km)			0.00186	1.599***	0.440*	1.160**	0.652*	0.232	0.420**	0.0197
			(0.0213)	(0.591)	(0.251)	(0.501)	(0.356)	(0.214)	(0.190)	(0.0142)
Mean of dependent variable, control group			0.200	6.93	3.00	3.93	8.87	5.73	3.13	0.268
Observations			175	175	175	175	175	175	175	175
R-squared			0.040	0.185	0.063	0.154	0.156	0.068	0.128	0.198

Notes: This table presents results on account usage. Data on individual transactions come from MC administrative records. The specification we use is the following, estimated by OLS: $y_i = \alpha + \beta_1 Agent_i + \beta_2 Information_i + \beta_3 Incentive_i + \beta_4 DistBranch_i + X_i + \varepsilon_i$. Each observation corresponds to an individual i. $Incentive_i$ is a dummy that takes value 1 if the individual received an incentive to open the account, while $Agent_i$ and $Information_i$ are treatment dummies defined in Table 4. $DistBranch_i$ is the distance between the HH of the respondent and the closest branch measured in kilometers. X_i are controls evaluated at baseline, namely age and a dummy for self-employment status. The dependent variable in Column 1 is a dummy variable that takes value of 1 if the individual opened a Sukaliku savings account within a year after the intervention. In Column 2, the dependent variable is a dummy that takes value of 1 if the account is active within a year after the intervention, which means the individual made at least one transaction since he or she opened the account. In Column 3, we use as dependent variable an indicator of opening any other MC account within the relevant period. In Panel A we use the whole sample, whereas in Panel B we only use the sample of individuals who have active accounts. In Columns 4-6, the dependent variables are the total number of deposits and the number of deposits made at the branch and with an agent, respectively, within a year after the intervention. In Columns 7-9, the dependent variables are the total number of withdrawals and the number of withdrawals made at the branch and with an agent, respectively, within a year after the intervention. In Column 10 we use as the dependent variable the share of all transactions within a year after the intervention that were made at the agent. Levels of significance * p<0.10 ** p<0.05 *** p<0.01.

Table 6: Size of transactions, Pooled sample

	(1) All	(2) Sent to branch	(3) Sent to agent
Visit to agent (1=Yes)	11.31	14.22	-119.0***
	(30.32)	(30.70)	(40.29)
Agent (1=Yes)	112.9**		
	(52.01)		
Agent*Visit to agent	-129.1**		
	(50.05)		
Deposit (1=Yes)	12.12	8.263	14.13
	(17.57)	(16.59)	(36.31)
Deposit*Visit to agent	1.871	2.554	1.718
	(24.31)	(23.90)	(33.89)
Deposit*Agent	1.195		
	(41.33)		
Deposit*Agent*Visit to agent	1.296		
	(42.64)		
Distance to branch (km)	3.203	1.308	3.772
	(10.87)	(5.168)	(11.65)
Number of observations			
Transactions	1,692	532	1,160
Individuals	160	78	82
R-squared	0.034	0.018	0.036
Mean of dependent variable sent to branch, at the branch	99.5	99.5	208.8
For withdrawals, p-value of t-test that			
*Agent + Agent*Visit to agent = 0*	0.649		
*Visit to agent + Agent*Visit to agent = 0*	0.005		
For deposits, p-value of t-test that			
*Agent + Agent*Visit to agent + Deposit*Agent + Deposit*Agent*Visit to agent = 0*	0.711		
*Visit to agent + Agent*Visit to agent + Deposit*Visit to agent + Deposit*Agent*Visit to agent= 0*	0.013		

Notes: This table presents results on the size of the transactions for invidiuals sent to the agent or the branch (*Information* = 1). Data on individual transactions come from MC administrative records. The specification we use is the following, estimated by OLS: $y_{ij} = \alpha + \beta_1 VisitAgent_{ij} + \beta_2 Agent_i + \beta_3 Agent_i * VisitAgent_{ij} + \beta_4 Deposit_{ij} + \beta_5 Deposit_{ij} * VisitAgent_{ij} + \beta_6 Deposit_{ij} * Agent_i + \beta_7 Deposit_{ij} * Agent_i * VisitAgent_{ij} + \beta_8 DistBranch_i + X_i + \varepsilon_i$. Each observation corresponds to a transaction j by an individual i. $VisitAgent_{ij}$ is a variable that takes value 1 if individual i makes the transaction with an agent. $Agent_i$ is a treatment dummy defined in Table 4. $Deposit_{ij}$ equals to one if the transaction j is a deposit. $DistBranch_i$ is the distance between the respondent's residence and the closest MC branch, measured in kilometers. X_i are controls evaluated at baseline, namely age and a dummy for self-employment status. In column 1, we use as the dependent variable the size of transactions evaluated in US dollars of January 2015, pooling deposits and withdrawals. In Column 2 we use only transaction data of individuals who were given the bank branch address to open an account. In Column 3 we use only transaction data of individuals sent to the agent to open an account (*Agent* treatment arm in our experiment). Levels of significance * p<0.10 ** p<0.05 *** p<0.01.

Table 7: Usage and account balance

	Sum of deposits (USD)	Sum of withdrawals (USD)	At 12 months (USD)		At 24 months (USD)	
			Sukaliku	Total	Sukaliku	Total
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Full Sample						
Agent (1=Yes)	260.4**	238.8***	3.254	6.938	5.196	10.139*
	(112.5)	(91.87)	(5.204)	(6.291)	(4.355)	(5.523)
Information (1=Yes)	-190.0	-259.6	-6.121	-19.960	3.331	-22.026
	(179.5)	(207.6)	(10.653)	(16.972)	(3.099)	(16.773)
Incentive (1=Yes)	48.65	20.29	9.574*	-1.125	6.059	3.463
	(110.0)	(89.58)	(5.060)	(6.807)	(4.086)	(5.636)
Distance to branch (km)	87.71	80.00	-0.333	1.454	-0.544	0.950
	(91.97)	(86.09)	(1.359)	(2.528)	(0.708)	(1.472)
Mean of dependent variable, control group	270.6	305.8	14.11	37.62	1.941	30.16
Observations	501	501	495	496	464	464
R-squared	0.029	0.037	0.009	0.008	0.011	0.015
Panel B: Sample of Active accounts						
Agent (1=Yes)	621.8**	554.7***	17.327	25.843*	21.982*	35.178**
	(258.2)	(193.0)	(14.190)	(15.508)	(11.581)	(14.327)
Information (1=Yes)	-358.9	-551.9	-7.112	-20.946	10.515	-17.743
	(434.7)	(512.7)	(22.818)	(34.229)	(8.577)	(29.941)
Incentive (1=Yes)	35.80	-34.99	14.672	-0.116	8.040	3.912
	(267.0)	(209.1)	(13.079)	(15.533)	(11.293)	(13.946)
Distance to branch (km)	230.3	213.4	-1.303	-2.657	-2.043	1.446
	(231.7)	(223.9)	(4.367)	(4.792)	(2.123)	(3.369)
Mean of dependent variable, control group	739.7	835.7	27.96	53.89	3.397	32.05
Observations	175	175	167	167	157	157
R-squared	0.079	0.100	0.020	0.020	0.042	0.043

Notes: This table presents results on account balance using administrative data at the individual level. The specification we use is the following, estimated by OLS: $y_i = \alpha + \beta_1 Agent_i + \beta_2 Information_i + \beta_3 Incentive_i + \beta_4 DistBranch_i + X_i + \varepsilon_i$. Each observation corresponds to an individual i. $Agent_i$, $Information_i$ and $Incentive_i$ are the treatment dummies defined in tables 4 and 5. $DistBranch_i$ is the distance between the HH of the respondent and the closest branch, measured in kilometers. X_i are controls evaluated at baseline, namely age and a dummy for self-employment status. In Panel A we use the whole sample, whereas in Panel B we only use the sample of individuals who have active accounts, i.e. those who made at least one transaction after opening the account. In Columns 1 and 2, we use as dependent variables the sum of all deposits and withdrawals, respectively, made within a year after the intervention, evaluated in US dollars of January 2015. In Columns 3 and 5, the dependent variables are, respectively, the total balance in the Sukaliku account 12 and 24 months after the individual opened it, evaluated in US dollars of January 2015. In columns 4 and 6, the dependent variables are, respectively, the total balance in all MC accounts 12 and 24 months after the individual opened the Sukaliku account, also evaluated in US dollars of January 2015. Levels of significance * p<0.10 ** p<0.05 *** p<0.01.

Table 8: Savings outcomes

	WTP for account with 1500 FCFA	Saves in a financial institution (1=Yes)	Used savings to deal with unexpected income shock
	(1)	(2)	(3)
Agent (1=Yes)	585.1*	-0.00656	-0.00736
	(311.0)	(0.0263)	(0.00966)
Information (1=Yes)	-38.39	0.0888**	0.0301***
	(368.5)	(0.0370)	(0.0110)
Incentive (1=Yes)	-385.8	0.0822***	-0.0137
	(304.9)	(0.0263)	(0.00970)
Distance to branch (km)	-80.75***	-0.0169***	-0.00259***
	(30.92)	(0.00362)	(0.000519)
Mean of dependent variable, control group	4350	0.369	0.0115
Observations	1,552	1,552	1,552
R-squared	0.025	0.109	0.008

Notes: This table presents results on savings outcomes using data at the HH level collected at endline. The specification we use is the following, estimated by OLS: $y_i = \alpha + \beta_1 Agent_i + \beta_2 Information_i + \beta_3 Incentive_i + \beta_4 DistBranch_i + X_i + Y_{0i} + \varepsilon_i$. Each observation corresponds to an individual in a HH i. $Agent_i$, $Information_i$ and $Incentive_i$ are the treatment dummies defined in tables 4 and 5. $DistBranch_i$ is the distance between the HH of the respondent and the closest branch, measured in kilometers. X_i are controls evaluated at baseline, namely age and a dummy for self-employment status. We also include the dependent variable collected at baseline, Y_{0i}. In Column 1, the dependent variable is the individual's willingness to pay (WTP) for a savings account with 1500 FCFA. In Column 2, the dependent variable is a dummy variable that takes value of 1 if the respondent reports saving money with a financial institution. For those individuals who reported not saving with a financial institution at endline, but who opened a Sukaliku account according to administrative records, we input a value of one. In Column 3, the dependent variable is a dummy that takes value of 1 if the respondent reported spending his or her savings to manage the reduction of income caused by a shock within the past year. Levels of significance * p<0.10 ** p<0.05 *** p<0.01.

Online Appendix for
Banking with Agents: Experimental Evidence from Senegal

by Sinja Buri, Robert Cull, Xavier Giné, Sven Harten and Soren Heitmann

NOT FOR PRINT PUBLICATION

Contents:

Section OA1. MicroCred commission and fee structure

Pricing: Transaction fees at the agent

In June 2015, MicroCred changed the value of fees paid by clients when making withdrawals at the agent. Below is the fee structure before and after this policy change. Fees were basically lowered by half. Moreover, clients were allowed to make 3 free withdrawals at the agent per month. Over time, however, the number of free withdrawals were lowered. In February 2016, only 2 free withdrawals were allowed. Deposits at the agent are always free of charge, as well as both deposits an withdrawals with a bank teller.

Client fees for withdrawals at the agent

Withdrawal amount (FCFA)		Fee (FCFA)	
Min	Max	Before June 2015	Starting June 2015
500	5,000	225	112.50
5,001	10,000	275	137.50
10,001	20,000	425	212.50
20,001	40,000	800	400
40,001	75,000	1,125	562.50
75,001	100,000	1,500	750
100,001	150,000	2,250	1,125
150,001	200,000	3,000	1,500
200,001	350,000	5,250	2,625
350,001	500,000	7,500	3,750
500,001	750,000	11,250	5,625
750,001	1,000,000	15,000	7,500
1,000,001	1,500,000	22,500	11,250
1,500,001	2,000,000	30,000	15,000

Agent commissions

Along with the changes in the fee structure, MicroCred also altered how agents were paid. Similarly to the fee structure, agents were paid based on each transaction made by a client, depending on its value and type (cash in or cash out). Starting June 2015, commissions were increased and agents were paid not only based on the value of each individual transaction, but also base on the total number or total value of transactions. Below is the commission structure before and after June 2015.

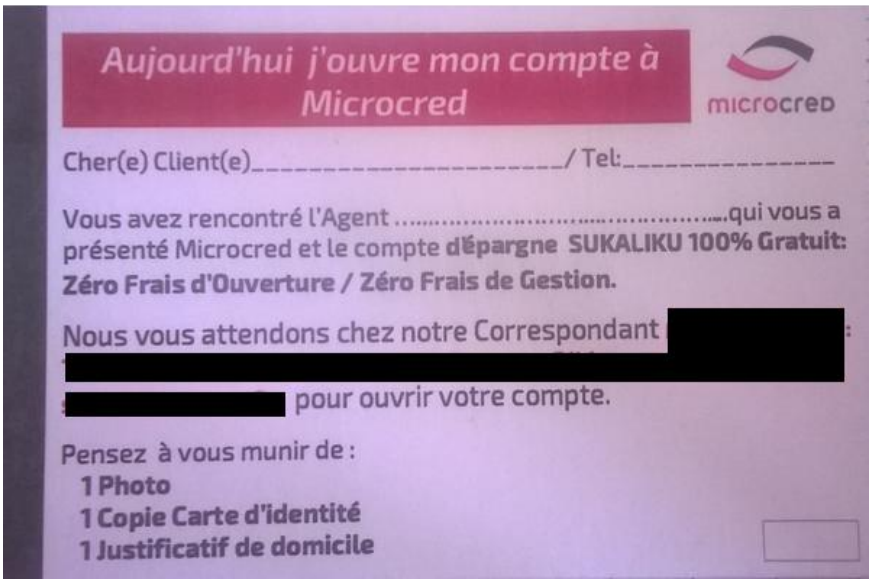
Agent commissions

Transaction amount (FCFA)		Before June 2015		Starting June 2015 (until June 2016)		
Min	Max	Cash out	Cash in	1 to 100 transactions OR 1 to 20,000,000 CFA	101 to 200 transactions OR 20,000,001 to 40,000,000 CFA	More than 200 transactions OR more than 40,000,000 CFA
500	5,000	110	90	90	77	61
5,001	10,000	160	155	155	132	105
10,001	20,000	315	315	315	268	214
20,001	40,000	400	400	400	340	272
40,001	75,000	660	660	660	561	449
75,001	100,000	980	890	890	757	605
100,001	150,000	1,215	1,095	1,000	850	680
150,001	200,000	1,575	1,535	1,075	913	731
200,001	350,000	2,550	2,480	1,736	1,476	1,180
350,001	500,000	4,250	3,985	2,790	2,371	1,897
500,001	750,000	5,025	4,785	3,350	2,847	2,278
750,001	1,000,000	6,640	6,350	4,445	3,778	3,023
1,000,001	1,500,000	7,300	7,300	6,110	5,194	4,155
1,500,001	2,000,000	9,300	9,300	7,510	6,384	5,107

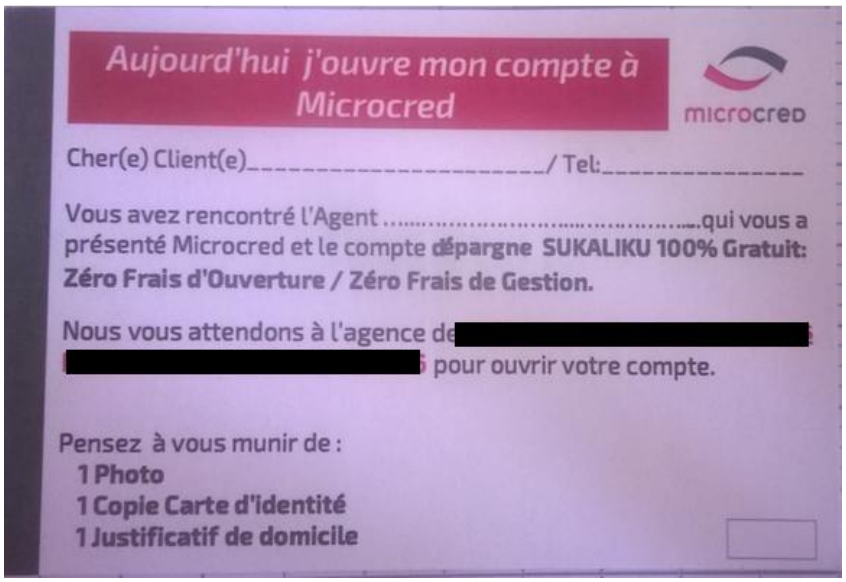
Section OA2. Experimental design: cards sent to respondents

In this section we present samples of cards handed to respondents sent to an agent and sent to a branch. Each card has the MicroCred logo, the respondent's name and the name and address of the agent or branch where the individual should go to open the Sukaliku account. The card also has a list of documents needed to open the account.

A) Card for respondent sent to Agent ("Correspondant")



B) Card for respondent sent to Branch (“Agence”)



Section OA3. Online Appendix Tables

Appendix Table OA1: Balance test, account opening survey

	Account opening survey respondent?		p-value
	No	Yes	
Filter survey data			
Gender (1=Female)	0.512	0.533	0.647
	(0.034)	(0.030)	
Household head (1=Yes)	0.412	0.445	0.469
	(0.034)	(0.030)	
Years of schooling	6.720	7.131	0.390
	(0.356)	(0.318)	
Literacy (1=Yes)	0.668	0.653	0.731
	(0.032)	(0.029)	
Age	40.137	39.318	0.452
	(0.757)	(0.758)	
Self-employed (1=Yes)	0.551	0.536	0.752
	(0.033)	(0.030)	
Individual monthly income (USD)	1.076.777	957.299	0.138
	(6288.882)	(5128.237)	
Has savings account (1=Yes)	0.559	0.573	0.762
	(0.034)	(0.030)	
HH survey data (baseline)			
Obtained a loan during the past 6 months (1=Yes)	0.062	0.069	0.731
	(0.016)	(0.015)	
Saves informally (1=Yes)	0.511	0.361	0.001***
	(0.033)	(0.029)	
Risk aversion (0-10)	4.405	3.912	0.143
	(0.251)	(0.224)	
Raven's test score (0-3)	1.930	2.142	0.010***
	(0.064)	(0.053)	
Distance to branch (in km)	1.101	1.032	0.626
	(0.115)	(0.088)	
Distance to agent (in km)	1.119	1.057	0.720
	(0.131)	(0.114)	
Observations	227	274	

Notes: This table presents summary statistics of individuals who opened the Sukaliku account following our intervention, comparing those who did and did not responded the account opening survey. Individual income is reported in US dollars of January 2015. Columns 1 and 2 show summary statistics at baseline or during filter survey for non-respondents and respondents, respectively. Column 2 reports the p-value of a mean difference test. The last line reports the p-value of the F-test that in a regression of an indicator of account opening survey respondent against all filter survey or HH survey variables, all coefficients associated to the filter survey or HH survey variables are jointly zero. Has savings account (1=Yes) is a dummy variable that takes value of 1 if a HH member reports having a savings account. Risk aversion (0-10) is an index of self-reported risk behavior that varies from 0 to 10, where 0 means "I always try to avoid taking risk" and 10 means "I am fully prepared to take risks." Raven's test score (0-3) varies from 0 to 3 and is equal to the number of correct answers given by a survey respondent in a Raven's test. Distance to branch (in km) and Distance to agent (in km) are the distances in kilometers from the HH to the closest branch and to the closest agent, respectively. Levels of significance * p<0.10 ** p<0.05 *** p<0.01.

Appendix Table OA2: Agents and bank staff characteristics

	Baseline respondents (N=2201)		MC Agents (N=6)		Other Agents (N=251)		MC Bank staff (N=13)	
	mean	sd	mean	sd	mean	sd	mean	sd
Male (1=Yes)	0,47	0,50	0,83	0,41	0,61	0,49	0,00	0,00
Age	38,00	12,04	24,50	6,83	31,60	7,22	31,92	5,60
Married (1=Yes)	0,66	0,47	0,33	0,52	0,45	0,50	0,69	0,48
Household size	9,49	5,63	7,50	4,23	8,36	3,94	5,83	3,04
Years of education	6,47	4,85	14,00	3,29	11,68	4,44	16,38	1,26
Monthly household income (USD)	343,84	315,27	767,53	315,71	487,44	250,06	837,95	300,75
Financial knowledge index (self-reported, 0-3)			1,83	0,75	1,37	1,05	2,38	0,87
Financial knowledge index (questionnaire, 0-3)			1,33	1,03	1,69	0,92	1,85	0,55

Notes: This table compares HH survey respondents to MC bank staff, MC agents and non-MC agents. Data on respondents come from baseline HH survey. Data on agents and bank staff come from the staff module of neighborhood survey. Monthly household income is evaluated in US dollars of January 2015. Household size corresponds to number o people living in the HH where the respondent lives. Self-reported financial knowledge index takes value 0 for no knowledge, 1 for basic knowledge, 2 for medium knowledge and 3 for advanced knowledge. The financial knowledge index based on a questionnaire corresponds to the number of correct answers given by the respondent and varies from 0 to 3. These two last variables are only available for agents and bank staff.

Appendix Table OA3: Attrition

	(1) Endline respondent (1=Yes)
Agent (1=Yes)	-0.000456
	(0.0202)
Information (1=Yes)	0.00994
	(0.0282)
Incentive (1=Yes)	-0.0294
	(0.0201)
Distance to branch (km)	-0.00105
	(0.00324)
Observations	2,201
R-squared	0.001
Retention rate	0.755
Mean of dependent variable, control group	0.759

Notes: This tables presents the results of testing differential attrition across treatment arms using the following OLS specification: $y_i = \alpha + \beta_1 Agent_i + \beta_2 Information_i + \beta_3 Incentive_i + \beta_4 DistBranch_i + X_i + \varepsilon_i$. Each observation corresponds to an individual i. $Agent_i$, $Information_i$ and $Incentive_i$ are the treatment dummies defined in tables 4 and 5. $DistBranch_i$ is the distance between the HH of the respondent and the closest branch, measured in kilometers. The dependent variable is a dummy that takes value of 1 if the individual was found at endline. Levels of significance * p<0.10 ** p<0.05 *** p<0.01.

Appendix Table OA4: Characteristics of active users (probit)

	Active (1=Yes)
Gender (1=Male)	0.141
	(0.131)
Age	0.006
	(0.006)
Married (1=Yes)	-0.269**
	(0.136)
Household head (1=Yes)	-0.338**
	(0.147)
Years of education	-0.004
	(0.014)
Self-emlpoyed (1=Yes)	0.023
	(0.129)
Household income (USD)	-0.000
	(0.000)
Obtained a loan during the past 6 months (1=Yes)	-0.118
	(0.245)
Saves formally (1=Yes)	0.138
	(0.136)
Saves informally (1=Yes)	0.221*
	(0.123)
Understanding of mobile money (1=Yes)	0.239
	(0.198)
Risk aversion (0-10)	0.026
	(0.016)
Raven's test score (0-3)	0.069
	(0.067)
Observations	501
Mean of dependent variable	0,349

Notes: This table reports the probit estimates of the determinants of being an active user of a Sukaliku savings account. Data on baseline characteristics come from HH survey. The dependent variable is a dummy that takes the value 1 if the individual has made at least one transaction since he or she opened the Sukaliku savings account. Has credit (1=Yes) is a dummy variable that takes value of 1 if a HH member has ever obtained a loan. Has savings account (1=Yes) is a dummy variable that takes value of 1 if a HH member reports having a savings account. Saves informally (1=Yes) is a dummy variable that takes value of 1 if the respondent reports using any informal means of savings, such as mattress, susu collector, with family and/or friends, tontine etc. Understanding of mobile money (1=Yes) is a dummy that takes value of 1 if the respondent reports having used a mobile money service in the past. Risk aversion (0-10) is index of self-reported risk behavior that varies from 0 to 10, where 0 means "I always try to avoid taking risk" and 10 means "I am fully prepared to take risks." Raven's test score (0-3) varies from 0 to 3 and is equal to the number of correct answers given by a survey respondent in a Raven's test. Levels of significance * p<0.10 ** p<0.05 *** p<0.01.

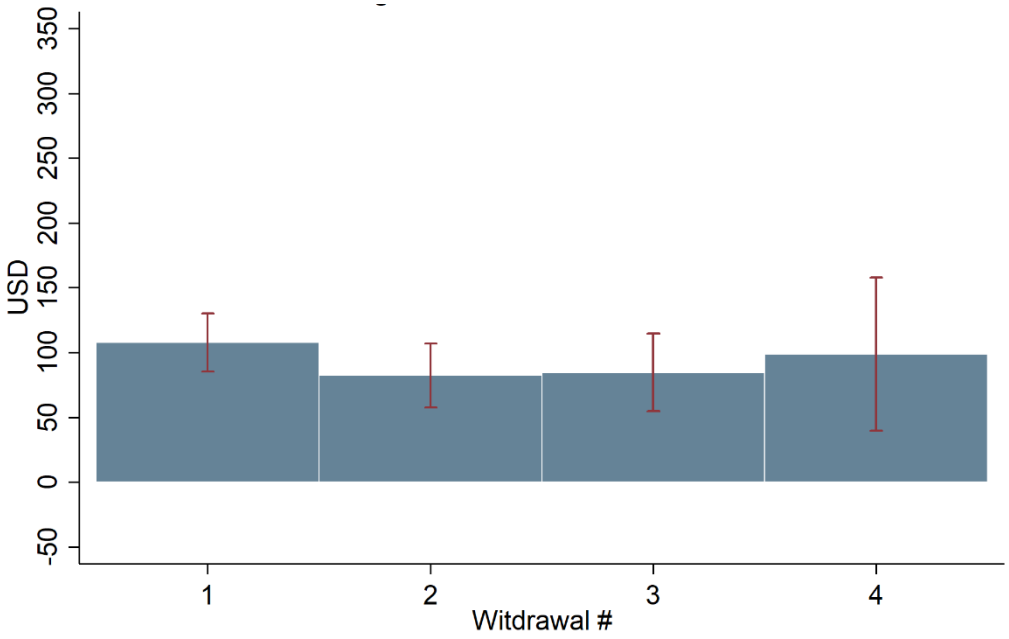
Appendix Table OA5: Other outcomes

	Self-employment	Business failure	Business opening	Total monthly expenditures	Happiness index
	OLS	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)	(5)
Agent (1=Yes)	0.0370	0.0858	-0.0218	-5.969	0.275*
	(0.0248)	(0.0877)	(0.0227)	(14.98)	(0.149)
Information (1=Yes)	0.0232	-0.214*	0.0676**	-19.10	-0.0519
	(0.0354)	(0.126)	(0.0311)	(21.42)	(0.209)
Incentive (1=Yes)	-0.0663***	0.0532	-0.0429*	1.230	-0.172
	(0.0248)	(0.0850)	(0.0227)	(14.84)	(0.149)
Distance to branch (km)	0.00680*	-0.193*	-0.0155***	-4.740***	0.114***
	(0.00364)	(0.104)	(0.00206)	(1.513)	(0.0249)
Mean of dependent variable, control group	0.504	0.593	0.155	542.9	2.87
Observations	1,552	161	1,391	1,383	1,552
R-squared	0.504	0.593	0.155	542.9	2.87

Notes: This table presents results on other outcomes using data at the HH level collected at endline. The specification we use is the following, estimated by OLS: $y_i = \alpha + \beta_1 Agent_i + \beta_2 Information_i + \beta_3 Incentive_i + \beta_4 DistBranch_i + X_i + Y_{0i} + \varepsilon_i$. Each observation corresponds to an individual in a HH *i* . $Agent_i$, $Information_i$ and $Incentive_i$ are the treatment dummies defined in tables 4 and 5. $DistBranch_i$ is the distance between the HH of the respondent and the closest branch, measured in kilometers. X_i are controls evaluated at baseline, namely age and a dummy for self-employment status. We also include the dependent variable collected at baseline, Y_{0i}. In Column 1, we use a dummy for self-employment status at endline as dependent variable. In Column 2, the dependent variable is a dummy that takes value of 1 if respondent reported business expenses at baseline but not at endline. We construct the analogous variable for business opening in column 3. In Column 4, the dependent variable corresponds to the total amount of monthly HH expenses, evaluated in US dollars of January 2015. In Column 5, the dependent variable is a happiness index that varies from -10 to 10. Higher values correspond to more frequent positive feelings and thoughts on the last month, self-reported at endline. Levels of significance * p<0.10 ** p<0.05 *** p<0.01.

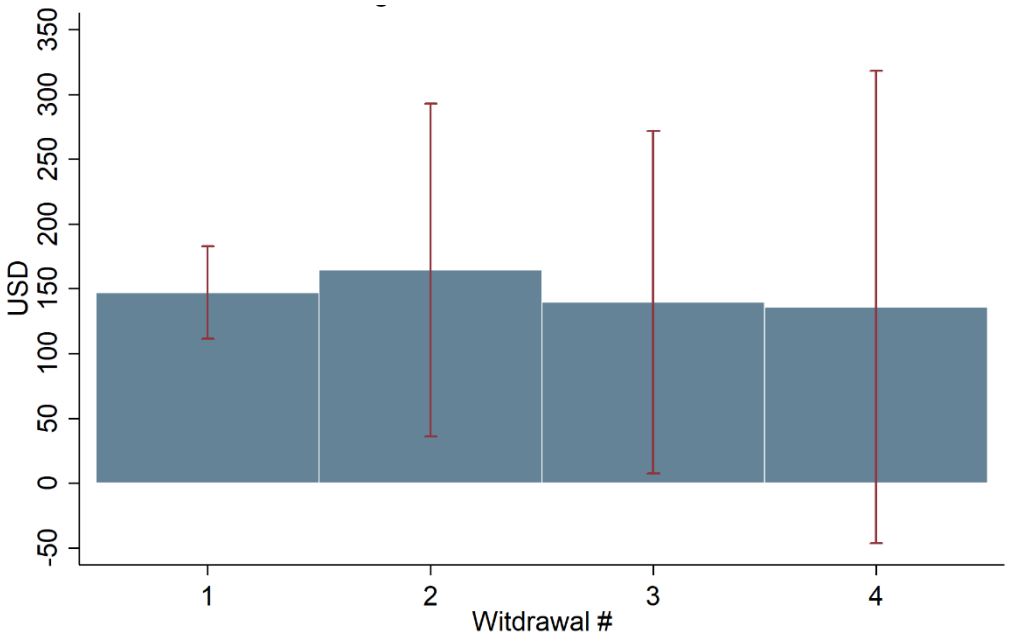
Section OA4. Online Appendix Figures

Appendix Figure OA1: Average withdrawals at the agent, by timing of withdrawals within a month



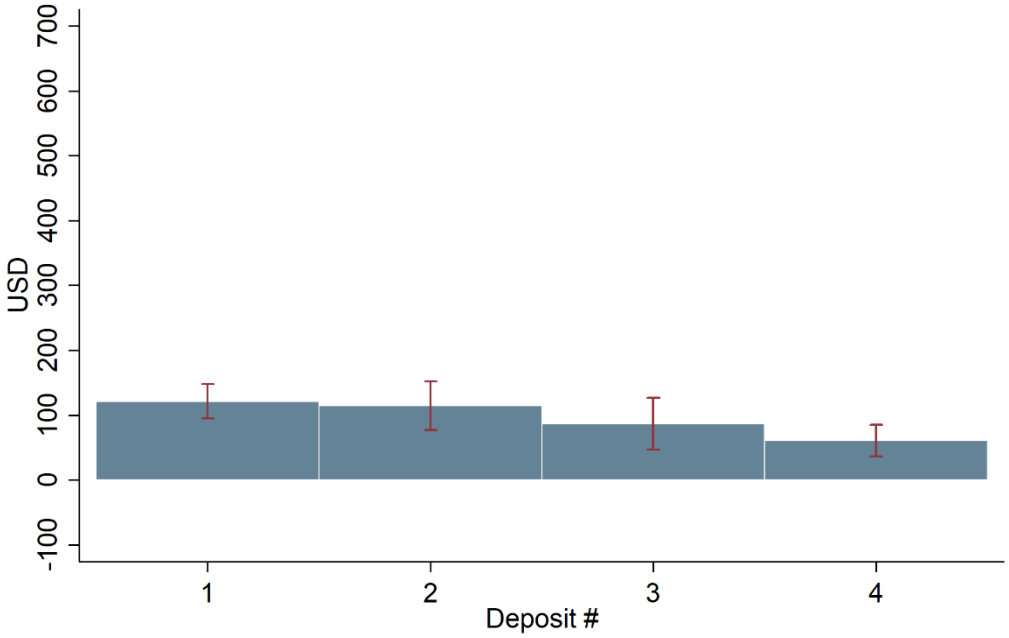
Note: This figure plots the average amount of the first, second, etc withdrawal at the agent, in a given month. Data are restricted to transactions made before February 2016.

Appendix Figure OA2: Average withdrawals at the branch, by timing of withdrawals within a month



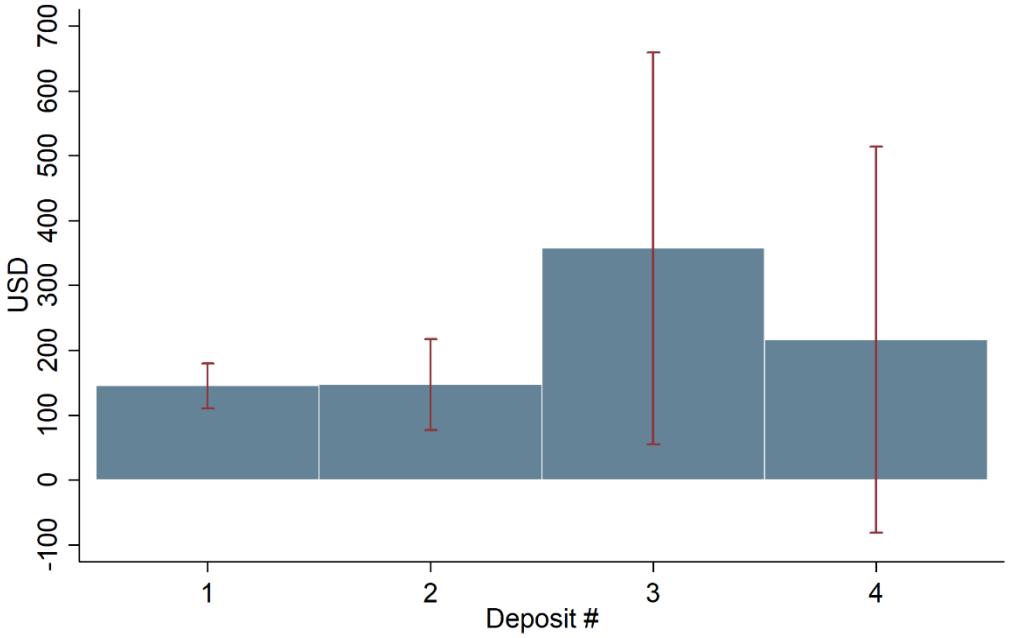
Note: This figure plots the average amount of the first, second, etc withdrawal at the branch, in a given month. Data are restricted to transactions made before February 2016.

Appendix Figure OA3: Average deposits at the agent, by timing of deposits within a month



Note: This figure plots the average amount of the first, second, etc deposit at the agent, in a given month. Data are restricted to transactions made before February 2016.

Appendix Figure OA4: Average deposits at the branch, by timing of deposits within a month



Note: This figure plots the average amount of the first, second, etc deposit at the branch, in a given month. Data are restricted to transactions made before February 2016.