Supply-Side Innovations to Increase Equitable Access to Digital Financial Services: Experimental Evidence from Mozambique

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April 13, 2022

Abstract

Access to digital financial services (DFS) has expanded in sub-Saharan Africa, but this expansion has not always been equitable across populations. More equitable access may require increased engagement by mobile network operators with under-served populations, particularly women. In collaboration with M-Pesa in Mozambique, we developed supply-side innovations to improve outreach by Telephonic Sales Representatives (TSRs) and evaluated their impact on enrolling under-served populations to mobile money accounts. We randomized the market that male or female TSR teams were sent to each day to assess the role of TSR gender on DFS take-up. Although female TSR teams registered fewer clients to SIM cards per market-day relative to male TSR teams, they were more successful at converting clients to M-Pesa, resulting in similar overall enrollments. Introducing incentives to engage with clients in remote areas also increased enrollment. Taken together, we find supply-side innovations to be effective in increasing DFS access and utilization.

Keywords: mobile money; digital financial services; M-Pesa; gender; financial inclusion; Mozambique

JEL Codes: J13, J16, O15, O33, I15, Z13.

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1 Introduction

In 2019, the number of mobile money accounts (MMAs) in the world surpassed one billion (GSM Association, 2019). Sub Saharan Africa remains the global epicenter in the use and expansion of mobile money. In 2018, the region was host to almost half (396 million) of all globally registered MMAs and added almost 50 million new MMAs from the previous year alone (GSM Association, 2017, 2019).

The rapid expansion of mobile money and digital financial services (DFS) in Sub-Saharan Africa has generated significant benefits to the region, particularly for low-income households without access to formal banking (Aker et al., 2016; Aker and Mbiti, 2010; Aron, 2018; Jack and Suri, 2011; Mbiti and Weil, 2015). A number of studies have documented the potential of M-Pesa to increase remittances as well as individual and household savings (Dupas et al., 2018; Morawczynski, 2009; Morawczynski and Pickens, 2009; Suri and Jack, 2016), while other studies have identified the role of mobile money as a means to insure against risk and negative shocks (Alinaghi, 2019; Jack and Suri, 2011; Riley, 2018; Suri et al., 2012). Mobile money and DFS in Sub-Saharan Africa have significant implications for poverty reduction, especially for female-headed households (Suri and Jack, 2016). A number of studies have identified the potential of mobile money to shift household decision making power to women by allowing women to exercise greater control over household finances and resources (Aker et al., 2016; Gichuki and Mulu-Mutuku, 2018), and recent studies have also shown how mobile money may provide low-income women with the means to improve their financial literacy (Batista and Vicente, 2020; Tiwari et al., 2019).

In spite of the remarkable progress that has been made over the past two decades, significant gaps in mobile money access and use persist in Sub-Saharan Africa, particularly for women. In low- and middle-income countries, women are 13 percent less likely to own a mobile phone and are 37 percent less likely to have access to mobile internet services, both of which impede women's access to mobile money (GSM Association, 2020). Analyses of the mobile money market have identified several key barriers that prevent women from adopting digital financial services, including: 1) a lack of awareness among women of mobile money options and the benefits associated with DFS; 2) a lack of access to mobile money agents (or other role models) who are available and whom women can trust; 3) a lack of confidence among women in their ability to use mobile money services; 4) low levels of mobile phone ownership by women; 5) low levels of control by women over household finances and decision making, and 6) low levels of financial literacy among women (Penicaud-Scharwatt and Minischetti, 2014; Schaner, 2018).

The expansion of mobile money services into more rural and remote areas has been similarly slow, with pronounced impacts on women's mobile money adoption. A first order barrier is the low rates of mobile phone ownership, which is especially problematic in Mozambique. Of seven African countries surveyed in the 2019 GSMA's Mobile Gender Gap Report, the gender gap in ownership of a mobile phone was the highest in Mozambique at 24 percent (Association, 2020). A closer examination of this data finds that the rural/urban divide is driving this gap: the gender gap in mobile phone ownership in rural Mozambique is 33 percent, compared to only 8 percent in urban Mozambique. These gender differences do not reflect lower demand for mobile money access. According to a 2016 USAID study

in Mozambique, when respondents were asked what features they desired in their phones, slightly more women than men named mobile money as a desired feature (17 percent of women compared to 14 percent of men) (USAID, 2016).

In this study, we evaluate a suite of supply-side interventions aimed to increase MM uptake and use of DFS among women and in remote, hard to reach areas in rural Mozambique. The interventions were designed to expand women's access to M-Pesa, a leading MM service in Sub-Saharan Africa, by 1) increasing client awareness and knowledge of M-Pesa upon registration, 2) expanding women's representation in MM by increasing the number of female mobile money agents, known as Telephonic Sales Representatives (TSRs) in Mozambique, to interact with potential M-Pesa clients and 3) introducing incentives to encourage TSRs to more intensively engage with potential female clients and in harder to reach areas.

The interventions were implemented in two parts across 10 rural markets in Nampula province. The first part consisted of: 1) a modified SIM card purchasing process and mobile money registration process that included additional training and guidance for all potential clients; 2) the hiring of additional female TSRs to facilitate recruitment and registration of new clients to M-Pesa, with the aim of making MM more accessible to female clients. On each day, gendered (male only or female only) TSR teams were randomly assigned to visit different markets. The second part was introduced after 12 weeks and consisted of a 11-week incentive scheme to encourage TSRs to more effectively engage with and register women and clients in more rural markets to M-Pesa. The incentive introduced TSRs to a raffle lottery with prizes, where "raffle tickets" were assigned to TSRs based on the number of new female clients whom the TSR was successfully able to register to M-Pesa and the number of female clients enrolled from hard to reach markets. Specifically, TSRs received one raffle ticket (their name entered once into the prize drawing) for every woman they registered on M-Pesa. TSRs received two raffle tickets (their names entered twice) for every woman in a hard to reach market that they registered on M-Pesa. Hard to reach markets were defined as markets in our sample that were 40 minutes or more by bus on an unpaved road from Nampula's city center. Taken together, the interventions sought to address both the lack of female visibility and representation in DFS as well as relatively low engagement with and utilization of MM services for women and in remote areas within Mozambique.

We find that female TSR teams registered fewer clients to SIM cards per market-day compared to male TSR teams. Among clients who were registered, however, female TSR teams were more successful at converting clients to M-Pesa, to the extent that there was no significant difference in the overall number of M-Pesa clients registered per market day between female and male TSR teams nor was there any difference in M-Pesa account use by clients by TSR gender. While the number of new SIM and M-Pesa clients enrolled decreased over time, the introduction of the incentive had a strong and positive effect on client enrollment to both SIM cards as well as M-Pesa. This effect was particularly pronounced for new female clients and new female clients living in remote markets.

Our study contributes to a growing body of evidence on the impact of interventions that seek to promote financial inclusion through improved access to MM and DFS in resource-poor settings. To date, efforts to increase access to DFS have relied on client-centered, demand-side interventions

(Jack and Suri, 2014; Suri and Jack, 2016). However, further expansion of access, particularly for women and geographically hard-to-reach populations, may require increased engagement on the part of mobile network operators and providers. Proposals for supply-side interventions have noted that mobile money operators need not design a new service, marketing campaign, or distribution model to attract more female customers to their services; rather, reorienting the marketing and distribution of existing products and services and altering the incentives of TSRs may be enough to ensure greater uptake of DFS by women as well as by men (Aker and Mbiti, 2010; Suri and Jack, 2016).

Given the importance of mobile money agents to client recruitment and engagement, the study of agent gender, and agent characteristics more generally, is critical to the understanding of client adoption and use of DFS. A number of observational studies have examined how the gender and characteristics of agents and other financial service providers may impact both agent-level and client-level outcomes (Beck et al., 2013; Cull et al., 2018; Hartarska et al., 2014). More recently, an impact evaluation of a microfinance institution (MFI) in the Democratic Republic of the Congo (DRC) documented evidence of assortative matching between MFI agents and clients by gender, where female clients were more likely to engage and transact with female MFI agents than male clients (Chamboko et al., 2021). These and other studies have noted that the hiring of female mobile money agents may serve to attract a larger female client base, particularly in contexts where social and cultural norms make it challenging for women to interact with men (Melnyk et al., 2009; Penicaud-Scharwatt and Minischetti, 2014). Our experimental findings demonstrate that client recruitment and transaction behavior was no different between clients who were engaged with female TSRs compared to clients who were registered to male TSRs. However, we find the study of agent gender to be meaningful to explain agent behavior, whereby we observe higher client conversion to M-Pesa by female TSR teams relative to male TSR teams. Taken together, our findings highlight the role of gender in promoting agent-client engagement and add to a literature that investigates the nature of the agent-client relationship in mobile banking (Beck et al., 2013; Chamboko et al., 2021; Cull et al., 2018; Rusu and Harten, 2015; Suri and Jack, 2016). More broadly, our study relates to a larger evidence base on interventions that aim to reduce gender gaps in the private sector, where the incentives to test, promote, and integrate such policies are weak (Chatterji et al., 2011; Rindfleish, 2002; Tansel, 2005).

The rest of the paper proceeds as follows. Section 2 presents the TSR recruitment and hiring process, the incentive program, randomization of TSR teams to markets, and the empirical analysis. We present and discuss the main results as well as findings from the sub-group analysis in Section 3, and we discuss the implications and conclusions of our study in Section 4.

2 Study Design

2.1 Study Setting: Nampula

Our study is situated in Nampula province, Mozambique. With an estimated 5.7 million people, Nampula province is the most populous province in Mozambique, and its capital city of Nampula has a metro area population of 877,000 as of 2020 (MacroTrends, 2021). The average monthly household income per capita in the province is 389 Mozambican Meticals (6.09 USD) per month,

and the province has one of the highest poverty incidences in the country, with over 65 percent of the province living below the global poverty line (Baez et al., 2018; Global Data Lab, 2020). With an M-Pesa penetration rate of 37 percent, mobile money uptake in urban Nampula is one of the lowest relative to the rest of Mozambique, where most urban areas have penetration rates of over 50 percent. On average, mobile money users in Nampula province have less than 228 Meticals (4 USD) in their accounts, less than the national average, and findings from a recent evaluation of mobile money use in Mozambique show a significant gender gap in M-Pesa use in Nampula, with men making up a large majority (almost 70 percent) of users in the province (Financial Sector Deepening Mozambique, 2018).

2.2 Experimental Design

Client registration and transaction data was collected over a 22 week period, from December 15, 2017 to May 15, 2018. Our field experiment consists of two intervention components, a primary intervention with TSRs that was implemented over a 20 week period, starting in week 2, across 10 markets[1] in Nampula province, and an additional incentive program that was introduced in the second half of the intervention period, starting in week 12 (day 83 from the start of data collection). The markets were chosen within Nampula province according to their potential demand for SIM / M-Pesa services and their viability to roll out the intervention.

2.2.1 SIM Card and M-Pesa Sales

Mobile sales agents, known as "TSRs" (Telephonic Sales Representatives), are the primary vendors for SIM cards throughout Mozambique. TSRs sell Vodafone products (SIM cards and mobile minute "top-ups") in local marketplaces, usually focusing on the more urban or peri-urban markets due to convenience and high volume, among other reasons. TSRs sell SIM cards for mobile phones, and customers who purchase a SIM card have the option to register for M-Pesa. Under the standard practice, TSRs are not trained or required to introduce or register SIM customers to M-Pesa, and they typically do not provide customers with extensive support or instruction in getting set up with or using M-Pesa.

2.2.2 TSR Selection and Training

As part of Vodafone's hiring practice, TSR candidates are usually initially found and screened through a subcontractor. After the screening process, M-Pesa requires that candidates participate in a one week paid training program, during which time they learn about how to sell to and register customers to Vodafone SIMs. As part of this intervention, TSRs were also trained on registering clients onto M-Pesa as well as providing a brief overview of how to use M-Pesa. After completing the training, the TSR candidates are tested on the material covered throughout the week, and the highest scorers are offered a position as a TSR. Lower scorers are offered spots as alternates or "back-ups."

[1] Only eight markets were part of the study at any one time; two of the original eight markets became inaccessible after a cyclone caused a bridge to break in week 4 of the study. As a result, the intervention was reassigned to two other markets.

Twelve TSRs were hired to work across 10 markets as part of the study, which was implemented in partnership with the NGO, Mobiles4All (M4A), and M-Pesa. While an estimated 90 percent of hired M-Pesa TSRs in Mozambique are male, these interventions hired an even number of male and female TSRs to examine the effects of hiring a higher proportion of female TSRs on sales and M-Pesa use. A total of 20 TSR candidates passed the screening process and participated in the week-long training. Potential candidates were given an assessment, which included a written test, to assess their capacity to perform their roles as promoters and marketers. The top six scoring male and the top six scoring female TSRs[2] were subsequently offered positions. TSRs were hired using the standard hiring processes and criteria set by Vodacom and M-Pesa, with a focus on hiring an equal number of male and female TSRs. Each hired TSR was assigned to a team of three members by gender, with two groups of female TSRs and two groups of male TSRs.

All twelve TSRs (male and female) were trained in the M4A SIM sales and M-Pesa registration protocols, which guides TSRs on the process to guide a client who purchases a new SIM to register for M-Pesa. As part of the process, clients registering for a SIM card were to be automatically defaulted into the M-Pesa sign up process, which differs from the existing practice of M-Pesa in Mozambique. For clients who complete the M-Pesa registration process, TSRs were instructed on how to review M-Pesa use with each client, including how to deposit, withdraw, and send funds, and how to find their nearest M-Pesa MM agent. TSRs were also trained to actively offer SIM customers the option to register for M-Pesa and make the process as easy as possible by providing instruction and assistance with setup and usage for customers who were unfamiliar with mobile money and/or who had trouble navigating the interface. These protocols aimed to promote a more in-depth introduction to and discussion of M-Pesa than the typical registration process in Mozambique. Table A1 and Table A2 in the Appendix present the differences in the hiring and sales protocols between the M4A TSR approach and standard Vodacom TSR approach, respectively.

2.2.3 Randomization

Using a Python randomization script, TSR teams were randomly assigned to a different market each day from Mondays to Saturdays to sell new SIM cards and to register SIM customers to M-Pesa. Randomization of market assignments was implemented at the TSR team level, and teams were informed of their assigned, randomly selected markets a week in advance. Each day, TSR teams sold SIM cards and registered customers for M-Pesa in their assigned market.

2.2.4 Incentive Program

From weeks 3 to 12 of the data collection period, TSR teams were randomly assigned to markets by team gender. From weeks 13 through 22, TSRs teams were introduced to an incentive program that aimed to reward them for registering female clients to M-Pesa, with extra incentives for selling SIMs and registering female clients who resided in more rural markets. Prior to the intervention, M-Pesa's

[2]Female TSRs were hired even if they did not score in the top 12. The average score on the post-training exam was higher for men. As part of our analysis, we explore heterogeneity in the impact of the interventions by TSR performance on this screening assessment; results from this analysis are presented from Table A13 to Table A18 in the Appendix.

standard practice was to provide monetary bonuses to TSRs for exceeding SIM registration goals. The prior incentive system did not reward for M-Pesa registration or for registering harder to reach clients. The intervention incentive program was introduced in addition to the primary intervention. As part of the incentive structure, TSRs received one "raffle ticket" (their name entered once in the raffle) for every woman who was registered to M-Pesa and two tickets (their name entered twice) for each woman who was registered in one of three most rural markets in Nampula province. Winners were drawn every two weeks, and two winners were announced for each lottery draw. Winners won 300 Meticals (approximately $5.00 USD). Every three weeks, an additional winner was drawn to win a low-end smartphone, valued approximately at $25.00 USD. This monetary amount was chosen in consultation with M-Pesa to approximate incentives the company could sustain overtime.

2.2.5 Data Collection

Figure A1 in the Appendix presents the interventions and data collection timeline. Assigned market locations, SIM card sales, and M-Pesa registrations for each TSR team were tracked throughout the 22 week data collection period across all 10 markets. For completed transactions and sales, data was collected through the M-Pesa client database for a period of 17 weeks to assess client M-Pesa use over time. By matching transaction-level outcomes with data on TSR team outreach by market, we are able to assess the extent to which exposure to female TSR teams impacts SIM and M-Pesa registration and use over time, particularly by female clients as well as clients in more rural markets.

Data on SIM card sales and M-Pesa registrations was also collected to track the effectiveness of each TSR in being able to register new clients to M-Pesa. Additional data was collected through M-Pesa on client activity after initial registration, to view how their activity on the platform progressed over time and to understand how the profile of client changed under different supply-side conditions. All client data was anonymized, and clients provided consent at the time of registration to have their anonymized registration and transaction data used for the study. Transaction data included the frequency and currency amount of each transaction that was executed from the time the customer was registered up to two months after the intervention concluded.

Demographic data on TSRs was also collected at the time of hiring. Additional data was collected on the market location and sales of each TSR each day, and communication between TSRs and study coordinators was maintained to document TSR turnover and any issues that were observed or reported at various markets.

2.3 Key Outcomes

Our analyses are conducted at the market-day level for outcomes related to enrollment of new clients. Outcomes at the market-day level are generated by aggregating data for each day in each market. Key outcomes include the number of new SIM cards registered, the number of new M-Pesa accounts created and the number of new M-Pesa accounts that are ever used in the market on that day. We also present the "conversion rate" of new M-Pesa accounts which is the share of new SIM cards that also open an M-Pesa account. We also aggregate these market day level outcomes to day-level averages of outcomes for our interrupted time series analysis.

2.4 Analysis

2.4.1 Interrupted Time Series Analysis

Our first set of analyses assesses the extent to which the introduction of the financial incentive was successful in motivating TSRs, and particularly female TSRs, to introduce clients, particularly female and more rural clients, to M-Pesa. We use an interrupted time series analysis to estimate the effects of the incentive as follows:

$$\begin{aligned} Y_d = \beta_0 + \beta_1 FTSR_d + \beta_2 I_d + \beta_3 d + \beta_4 (FTSR_d \cdot I_d) \\ +\beta_5 (FTSR_d \cdot d) + \beta_6 (I_d \cdot d) + \beta_7 (FTSR_d \cdot I_d \cdot d) + \varepsilon_d \end{aligned} \tag{1}$$

Here, Y_d is the outcome averaged at day d across the TSR teams by gender, $FTSR_d$ is a binary indicator for the female TSR team gender, and I_d is a binary indicator for the implementation of the incentive in that day.

2.4.2 Market Day Level Analysis

In order to identify the causal impact of female TSRs relative to male TSRs, we exploit the experimental variation that was induced among the sub-sample of clients who were contacted by male or female M4A TSR teams in the ten markets. Given that TSR teams were randomly assigned to different markets each day, we conduct adjusted analyses for our key outcomes at the market-day level, which is the unit of randomization. We estimate the following:

$$Y_{md} = \beta_0 + \beta_1 FTSR_{md} + \mathbf{X}_{md}\gamma + \delta_m + \varepsilon_{md} \tag{2}$$

where Y_{md} is the average outcome for market m on day of the week d. The vector $\mathbf{X}_{md}$ includes market-day-level covariates such as client year of birth, the proportion of female clients per market-day. In addition, we include an indicator for market days when the incentive program was implemented as well as market-level and day of the week fixed effects (δ_m and δ_d, respectively), and we present heteroskedastic-robust standard errors in our specifications. The main coefficient of interest, β_1, describes the adjusted mean differences in client outcomes for clients who are contacted by female TSR teams relative to clients who are contacted by male TSR teams.

2.5 Sub-Group Analyses

We conduct a range of sub-group analyses to identify potential heterogeneity in the impacts of being contacted by female TSRs relative to male TSRs. We particularly explore the impacts of gendered TSR teams on female clients and clients who are approached in more rural (far) markets, both of which were part of the incentive program. Using the TSR test scores from the hiring assessment, we calculate average test scores for each TSR team and conduct sub-group analyses to compare differences in outcomes between teams, both by gender (male versus female teams) and by relative test performance (higher-scoring teams versus lower-scoring teams). Findings from these analyses are presented in the Appendix.

3 Results

3.1 Sample Description and Balance

Over a 22-week period between December 15, 2017 and May 15, 2018, 12 TSR teams engaged with a total of 6,564 clients across 10 markets and: 1) registered clients with new Vodafone SIM cards; and 2) enrolled clients into M-Pesa. Of these new clients, 52 percent (3,465) registered for (were converted to) M-Pesa. Among converted clients, the time from registering for a new SIM card to conversion to M-Pesa was relatively short, with 40 percent of M-Pesa clients converting to M-Pesa on the same day when they registered for a new SIM card, while 80 percent of clients converted to M-Pesa within a week of registering for their SIM card. The average client who was registered for a new SIM card was 30.2 years old, 98.9 percent of clients were under the age of 50, and 36.2 percent of newly registered clients were women. Of the 17 total weeks that clients were tracked, transactions were made on 41.4 percent of the days. Clients made an average of 1.79 transactions valued at an average of 474.61 Meticals per week. Table A3 in the Appendix presents a balance table of random assignment of TSR teams to each of the 10 different markets over the study period. On average, markets were equally likely to be visited by male and female TSR teams, although male TSR teams were marginally more likely to visit the three rural markets that were more remotely located (Murriase, Chiequele, and Marratane). In addition, TSR teams were equally likely to be working in these markets on any given day of the week. Taken together, the findings from the balance table provide evidence to support the randomized assignment of TSR teams to each of the markets over the study period.

Table 1 presents mean outcome comparisons between clients who were registered by male TSR or female TSR teams. On average, male TSR teams reached an average of 4.8 more clients per market day relative to female TSR teams. However, the M-Pesa conversion rate for female TSR teams is significantly higher (7.8 p.p.) than the conversion rate for male TSR teams. Moreover, male and female teams were equally likely to create a new M-Pesa account that was actually used; however, we find that clients who registered with female TSRs had 0.72 fewer M-Pesa transactions over the past 4 weeks relative to clients who registered with male TSRs. We observe no significant differences in transaction frequency or transaction amount between clients who were registered for M-Pesa by female TSR teams and clients who were registered by male TSR teams; in fact, clients who were registered by female TSR teams were found to conduct transactions of marginally higher value (by 267 Meticals, or 4.18 USD) compared to clients registered by male TSR teams. We also find that female clients were equally likely to be registered for SIM cards and to M-Pesa by female TSR teams compared to male TSR teams.

3.2 Market-Day Analysis Results

Findings from a regression-adjusted market-day level analysis are presented in Table 2. We find that female TSR teams registered 4.47 fewer clients, including 1.29 fewer female clients and 1.64 fewer rural clients, to SIM cards per market-day compared to male TSR teams (column 1). Among clients who were registered, however, female TSR teams were 7.4 percentage points (14.5 percent) more likely to be successful at converting clients to M-Pesa than male TSR teams (column 4). Moreover, there was no significant difference in the number of M-Pesa clients registered per market day between

Table 1: Comparison of Outcomes by M4A Male TSR Group and M4A Female TSR Group, Market-Day Level

Variable	(1) Male TSR	(2) Female TSR	(3) Difference (F - M)
Total No. of Clients, Mkt. Day	19.917	15.148	-4.769***
Total No. of M-Pesa Clients, Mkt. Day	9.710	8.824	-0.886
Total M-Pesa use, Mkt. Day	8.527	7.795	-0.731
Tot. M-Pesa use in last 4 Wks, Mkt. Day	3.405	2.682	-0.723**
M-Pesa Conversion Rate	0.506	0.584	0.078***
Convert within 1 Wk	0.741	0.818	0.078***
Avg. Number of Transactions	2.115	2.038	-0.078
Avg. Value of Transactions	472.946	740.711	267.765
Client Sex	0.353	0.329	-0.024
Observations	340	176	668

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
The unit of observation is the market-day.

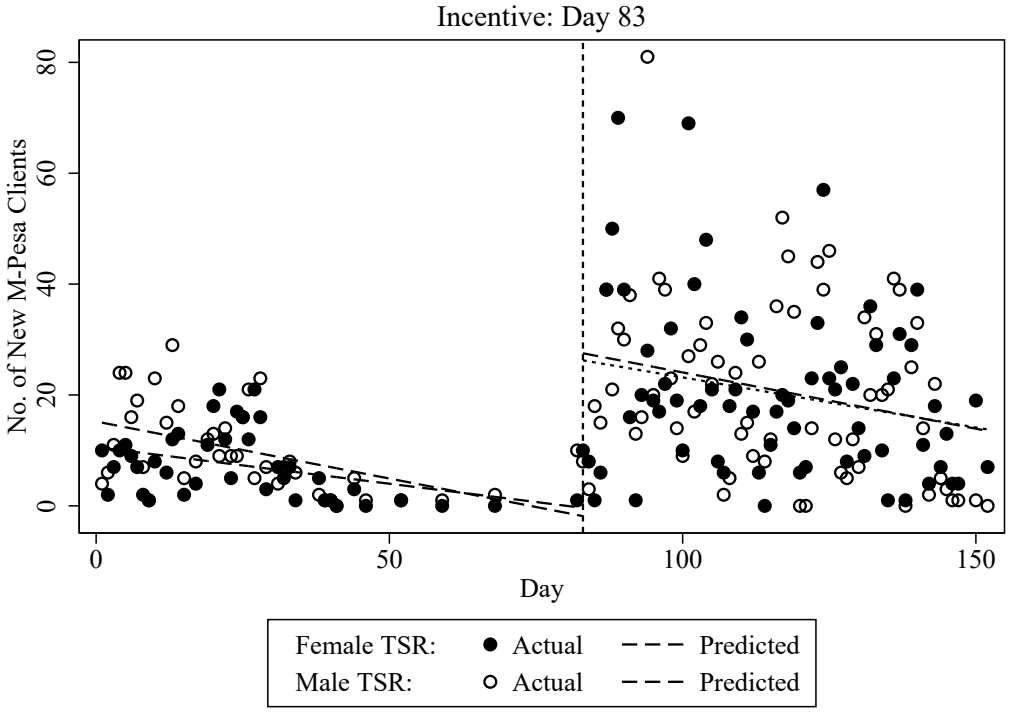
female and male TSR teams (column 2), nor was there any difference in M-Pesa account use by clients by TSR gender (column 3).

3.3 Interrupted Time Series Results

Figure 1 present results from the interrupted time series (ITS) analysis on the average number of new M-Pesa clients enrolled by TSR team gender over the study period[3]. Table 3 and Table 4 present ITS results for a range of client-level outcomes by TSR team gender. These results show that while the number of new SIM and M-Pesa clients enrolled by TSR teams, including female and rural clients, decreased over time, the introduction of the incentive had a generally strong and positive effect on client enrollment to both SIM cards as well as M-Pesa. Similarly to the market-day analysis, we find that while female TSR teams registered fewer clients than male TSR teams, they were 24.4 percentage points (51.8 percent) more successful in converting clients whom they did register to M-Pesa relative to male TSR teams. Moreover, the M-Pesa conversion rate for female TSR teams increased at a higher rate following the introduction of the incentive (Table 4).

[3]The ITS results for the average number of new female M-Pesa clients, rural M-Pesa clients, and rural female M-Pesa clients enrolled by TSR team gender are presented in Figure A2, Figure A3, and Figure A4 in the Appendix, respectively.

Figure 1: Number of New M-Pesa Clients per Week by TSR Gender



To confirm our findings, we conduct a supplementary ITS analysis on transaction-level outcomes, the results for which are presented in Table A4 in the Appendix. Both the number and value of transactions among registered M-Pesa clients increased over the 22 week period. In terms of transaction behavior, we find small and insignificant differences in transaction frequency and positive, but insignificant, differences in the average transaction value among clients who were registered by female TSR teams relative to clients who were registered by male TSR teams. Transaction activity, both in terms of the number and value of transactions, declined among clients following the introduction of the incentive. Across our ITS analyses, we find no significant differences in transaction outcomes between male TSR and female TSR teams after the introduction of the incentive.

3.4 Sub-Group Analyses

We run a series of stratified analyses to infer potential channels of interest. We first stratify by the introduction of the incentive and present these analyses in Table A5 and Table A6. Findings from these models show that prior to the introduction of the incentive, female TSR teams, on average, registered fewer clients to SIM accounts and M-Pesa accounts per market-day and were no more successful at converting clients to M-Pesa relative to male TSR teams. Following the introduction of the incentive, female TSR teams continued to register fewer SIM clients; however, they were 12.6 percentage points (24.7 percent) more likely than male TSRs to convert any registered SIM clients to M-Pesa; as a result, female TSR teams were, on average, able to enroll as many M-Pesa clients per market-day as male TSR teams.

In Table A13 to Table A18, we present results from our comparisons of higher-scoring TSR teams against lower-scoring TSR teams by gender using the average test scores of each team as the benchmark for performance potential. We find little significant difference in outcomes when comparing higher-scoring teams against lower-scoring teams within gender; that is, we find no difference in TSR performance on SIM and M-Pesa registration between lower-scoring (fe)male teams and higher-scoring (fe)male teams. When comparing across gendered teams, we find that higher-scoring male TSR teams were not more likely to outperform lower-scoring female TSR teams. Lower-scoring female TSR teams did outperform lower-scoring male TSR teams in M-Pesa conversion, but not in daily SIM account registration. In concordance with our main findings, we see that higher-scoring female TSR teams seem to outperform both higher-scoring as well as lower-scoring male TSR teams in converting clients to M-Pesa.

Table 2: Male TSR vs. Female TSR - Market-Day Level

	New SIM Accounts per Market Day	New M-Pesa Accounts per Market Day	M-Pesa Used per Market Day	M-Pesa Conversion Rate per Market Day
A: All Clients				
Female TSR	-4.473***	-0.775	-0.579	0.074**
	[-7.332, -1.614]	[-2.527, 0.976]	[-2.182, 1.025]	[0.014, 0.133]
Observations	345	345	345	345
Control Mean	19.92	9.71	8.53	0.51
B: Female Clients				
Female TSR	-1.290**	0.096	0.145	0.008
	[-2.558, -0.022]	[-0.854, 1.045]	[-0.745, 1.035]	[-0.038, 0.053]
Observations	345	283	283	345
Control Mean	7.01	4.01	3.56	0.19
C: Rural Clients				
Female TSR	-1.644*	-0.336	0.091	0.018
	[-3.369, 0.081]	[-3.357, 2.685]	[-2.692, 2.875]	[-0.012, 0.049]
Observations	345	116	116	345
Control Mean	7.59	9.03	7.75	0.19
D: Rural Female Clients				
Female TSR	-0.653	0.488	0.585	-0.005
	[-1.433, 0.128]	[-0.744, 1.719]	[-0.556, 1.727]	[-0.034, 0.024]
Observations	345	104	104	345
Control Mean	2.76	3.21	2.77	0.08
Controls	✓	✓	✓	✓
Market FE	✓	✓	✓	✓
Day of Week FE	✓	✓	✓	✓

The unit of analysis is the market day. All models are estimated using ordinary least squares models, with 95 percent confidence intervals presented in brackets. Covariates in adjusted models include whether the incentive was implemented, market and day of the week fixed effects. Heteroskedastic-robust standard errors are presented. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3: ITS Analysis of M4A Incentive - Day

	No. of New M-Pesa Clients per Day	No. of New Female M-Pesa Clients per Day	No. of New Rural M-Pesa Clients per Day	No. of New Rural Female M-Pesa Clients per Day
Time (Week)	-0.206***	-0.006	-0.203**	-0.063**
	[-0.343, -0.068]	[-0.070, 0.058]	[-0.363, -0.043]	[-0.118, -0.009]
Female TSR	-4.544*	0.132	-9.491***	-2.868***
	[-9.639, 0.551]	[-1.755, 2.020]	[-15.697, -3.286]	[-4.578, -1.157]
Female TSR × Incentive	0.074	-0.031	0.302**	0.142***
	[-0.076, 0.223]	[-0.104, 0.042]	[0.021, 0.582]	[0.045, 0.240]
Incentive	29.373***	8.882***	18.484***	6.060***
	[18.421, 40.325]	[3.737, 14.028]	[7.469, 29.499]	[2.171, 9.949]
Time × Incentive	0.002	-0.082	0.112	0.057
	[-0.232, 0.237]	[-0.185, 0.022]	[-0.119, 0.343]	[-0.023, 0.137]
Female TSR × Incentive	-2.768	2.717	-14.802	-5.430
	[-17.231, 11.696]	[-4.421, 9.856]	[-35.754, 6.151]	[-14.411, 3.550]
Female TSR × Time × Incentive	-0.051	0.025	-0.309	-0.208**
	[-0.366, 0.264]	[-0.123, 0.174]	[-0.692, 0.075]	[-0.378, -0.037]
Constant	15.008***	3.013***	12.570***	2.975***
	[10.639, 19.377]	[1.508, 4.519]	[7.416, 17.724]	[1.426, 4.523]
Observations	214	192	99	90

Notes: The unit of analysis is the day by TSR gender, where average outcomes are calculated for each day by TSR gender. All models are estimated using interrupted time series specifications to identify the impact of the introduction of the M4A incentive, with 95 percent confidence intervals presented in brackets. The variable Female TSR is a binary indicator for TSR gender, the variable Time indicates the day (days 1-152), and the variable Incentive is a binary indicator for the introduction of the incentive. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4: ITS Analysis of M4A Incentive - Day

	New SIM Accounts per Day	M-Pesa Accounts Used per Day	M-Pesa Conversion Rate per Week
Time (Week)	-0.444***	-0.133**	0.007***
	[-0.664, -0.224]	[-0.241, -0.025]	[0.004, 0.010]
Female TSR	-11.762***	-4.013**	0.244***
	[-19.986, -3.538]	[-7.598, -0.427]	[0.069, 0.419]
Female TSR × Incentive	0.255**	0.058	-0.013***
	[0.014, 0.496]	[-0.057, 0.173]	[-0.021, -0.004]
Incentive	62.694***	26.359***	-0.522***
	[43.227, 82.160]	[16.638, 36.079]	[-0.734, -0.309]
Time × Incentive	0.129	-0.078	-0.008***
	[-0.324, 0.582]	[-0.283, 0.128]	[-0.012, -0.004]
Female TSR × Incentive	-19.415	-2.226	0.866***
	[-43.604, 4.774]	[-15.282, 10.830]	[0.330, 1.402]
Female TSR × Time × Incentive	-0.224	-0.019	0.014***
	[-0.781, 0.334]	[-0.302, 0.264]	[0.005, 0.023]
Constant	28.473***	10.609***	0.471***
	[21.399, 35.547]	[7.488, 13.729]	[0.396, 0.545]
Observations	214	214	214

Notes: The unit of analysis is the day by TSR gender, where average outcomes are calculated for each day by TSR gender. All models are estimated using interrupted time series specifications to identify the impact of the introduction of the M4A incentive, with 95 percent confidence intervals presented in brackets. The variable Female TSR is a binary indicator for TSR gender, the variable Time indicates the day (days 1-152), and the variable Incentive is a binary indicator for the introduction of the incentive. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

4 Discussion and Conclusions

In this study, we analyze the impact of supply-side innovations to improve the penetration of mobile money access and use among women, particularly those living in rural and remote areas. We find that recruiting a higher rate of female mobile money agents, even amongst lower-scoring applicants, had no impact on the number of new M-Pesa accounts registered. We found that female teams sold fewer new SIM cards overall but were more effective in converting new SIM clients to mobile money accounts. These patterns suggest that female agents may be giving more time and attention to each client relative to male agents, although more evidence and research is needed to unpack this potential explanation. In general, our results imply that male and female agents may have different comparative advantages in engaging with and registering clients to mobile money and that having a more diverse profile of mobile money agents can be achieved without changing the overall rate of new clients.

Because we rely exclusively on administrative records, our study is not able to assess how clients felt about their enrollment experiences. While we are able to document intervention impact on transaction frequency and amount, we do not have more information about the types of transactions that our clients are undertaking, which would have allowed us to identify how transaction behavior and access to credit may differ by gender. The lack of granularity in our administrative data also limits our ability to match specific TSRs with clients whom they served, which would allowed us to more precisely infer variation in TSR performance within a team (e.g. whether there were some high-performing TSRs within a team) and whether the variation in individual TSR performance differed by gender. Finally, we note that the evidence on outcomes by TSR team "quality", as measured by the average team test scores, is mixed, suggesting that test scores may be a poor indicator of TSR performance and may, in fact, act as a barrier to identifying, hiring, and recruiting qualified TSRs and female TSRs, in particular.

Our results also suggest that relatively low-cost incentives can substantially increase the enrollment of women overall and women living in remote areas in particular. Incentives were effective in encouraging enrollment of women for both male and female TSR teams. It is possible that incentives to TSRs may be a feasible policy proposal for expanding outreach efforts to populations that are typically underserved by mobile money. Our supply-side variations are embedded within a suite of interventions that seek to improve and enhance the overall effectiveness of TSR agents in enrolling clients to mobile money. Future research is needed to assess whether similar interventions could work in settings with less intensive training and team composition protocols.

Ample evidence suggests that the expansion of mobile money has lifted many households out of poverty, particularly female headed households. Nonetheless, many female households, particularly those in remote areas, have not benefited from this expansion. Evidence from our study suggests that attempts to expand access should consider how to engage mobile network operators in order to expand mobile money services to populations that are less well served by current efforts.

5 Acknowledgments

We are grateful to Jonathan Greenacre, Fatima Zahra, Nishith Prakash, and seminar participants at the 2021 NEUDC Conference for their comments and feedback. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. Declarations of interest: none.

6 Funding Statement

This study was supported by a Grand Challenge Grant (Grant No. OPP1140348) from the Bill and Melinda Gates Foundation and a DFID-supported grant from the Financial Sector Deepening Moçambique (FSDMoç). The study funders had no role in study design, data collection, analysis, interpretation, or writing of the results.

7 Author Contributions

MK, MH, CB, and MM designed the study. MH and CB led the field implementation, data collection, and monitored the study implementation. MK and MM developed the analysis plan, and MH and CB contributed to data management and analysis. MK wrote the first draft of the manuscript with the contributions of MH, CB, and MM. All authors contributed toward data analysis, drafting, and revising the paper and agreed to be accountable for all aspects of the work. All authors had full access to the study data and have accessed and verified the data over the course of the study period.

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8 Appendix

Figure A1: Data Collection Timeline

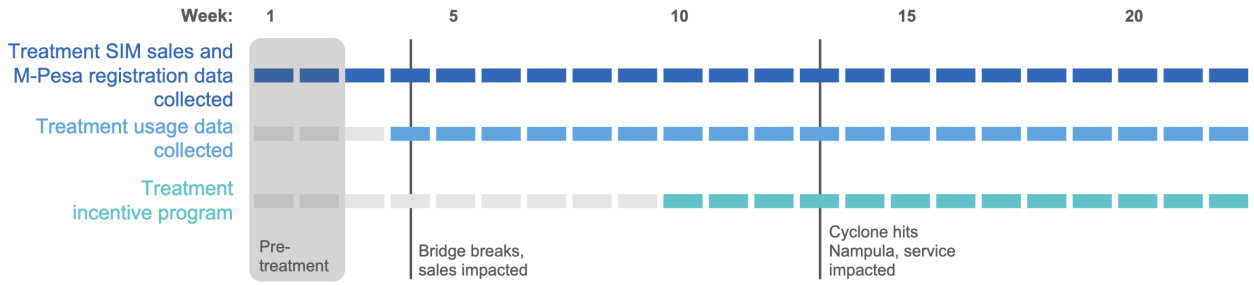

Figure A2: Number of New Female M-Pesa Clients per Week by TSR Gender

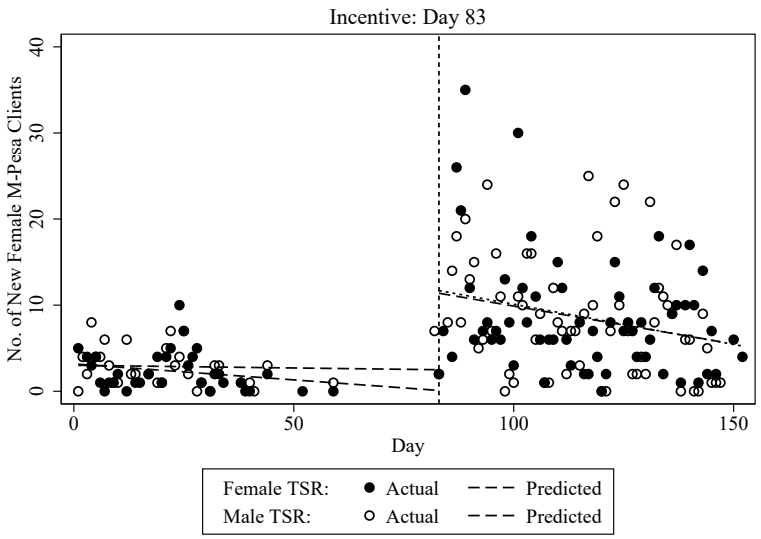

Figure A3: Number of New Rural M-Pesa Clients per Week by TSR Gender

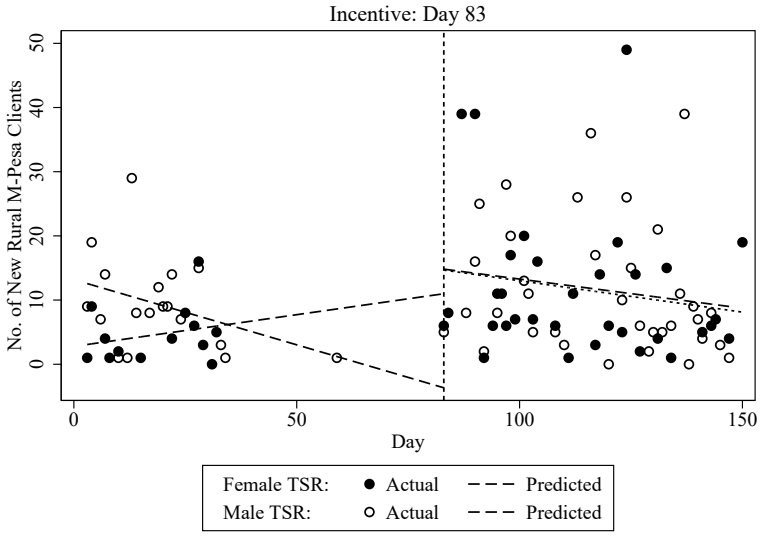

Figure A4: Number of New Rural Female M-Pesa Clients per Week by TSR Gender

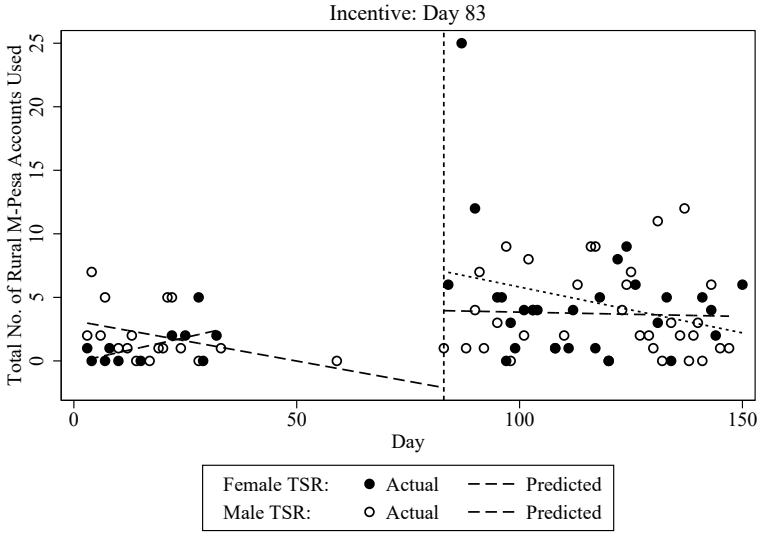

Figure A5: Number of New SIM Clients per Week by TSR Gender

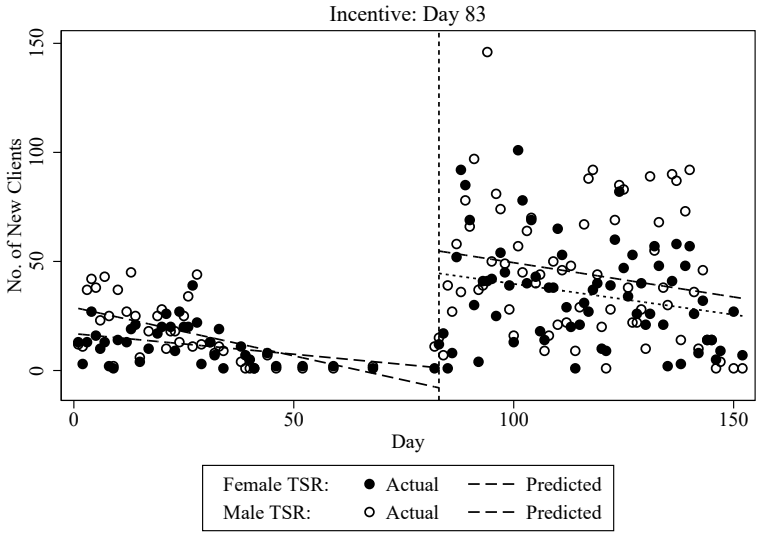

Figure A6: Number of New Female SIM Clients per Week by TSR Gender

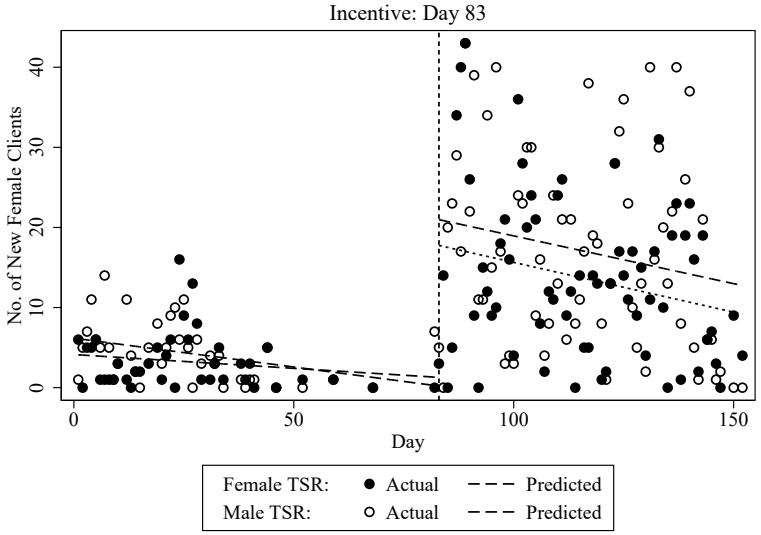

Figure A7: Number of New Rural SIM Clients per Week by TSR Gender

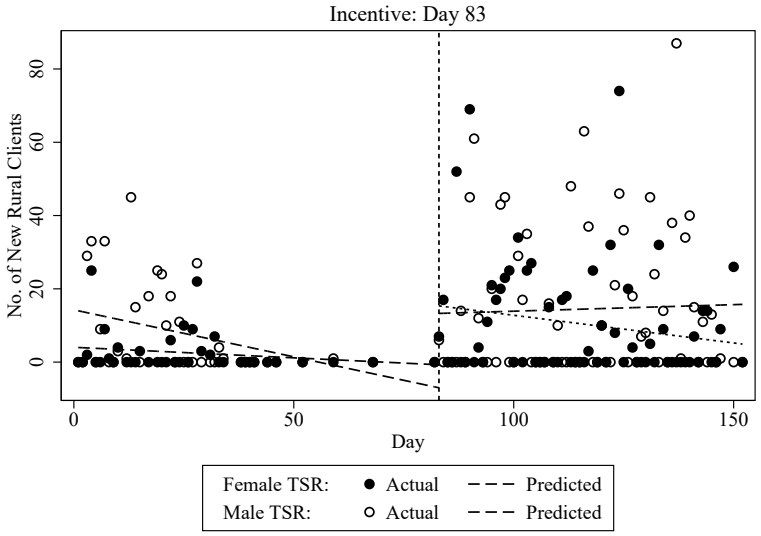

Figure A8: Number of New Female Rural SIM Clients per Week by TSR Gender

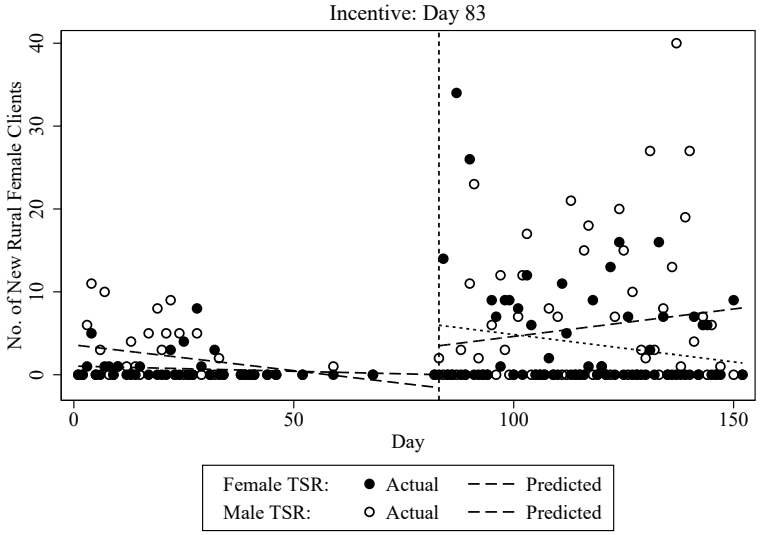

Table A1: TSR Hiring Process

	Standard Vodacom TSRs	**M4A TSRs**
Identification and Screening Process	Subcontractor	Subcontractor
Training Length/Content	One week	One week
Qualification Process	Exam, top scorers hired	Exam, equal number of top female and male scorers hired
Gender Breakdown of Hires	10 percent female	50 percent female

Table A2: TSR Selling Procedure

	Standard Vodacom TSRs	**M4A TSRs**
Location	No assigned markets, skewed urban	Assigned markets, rural and peri-urban
TSR Demographics	10 percent female	50 percent female
Selling process	SIM card sale, no active registration of M-Pesa	SIM card sale, active push to register M-Pesa
Instruction on M-Pesa setup/use?	No	Yes
Support with first M-Pesa transaction?	No	Yes

Table A3: Balance Table by M4A Male and M4A Female Gender

Variable	(1) TSR Male	(2) TSR Female	(3) Difference (F - M)
Anchilo	0.136	0.125	-0.011
Chiequele	0.109	0.094	-0.015
Elipisse	0.016	0.027	0.012
Marratane	0.117	0.094	-0.023
Moacoanvela	0.125	0.133	0.008
Murriase	0.132	0.086	-0.046*
Murrupula	0.113	0.148	0.036
Nameteca	0.109	0.113	0.004
Namiepe	0.097	0.109	0.012
Rapale	0.012	0.039	0.027**
Far Market	0.358	0.273	-0.085**
Sunday	0.019	0.016	-0.004
Monday	0.163	0.164	0.001
Tuesday	0.163	0.164	0.001
Wednesday	0.167	0.172	0.005
Thursday	0.163	0.164	0.001
Friday	0.156	0.156	0.001
Saturday	0.167	0.164	-0.003
Observations	257	256	513

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
The unit of observation is the group-day (for example, Female TSR Group A on December 15, 2018 or Male TSR Group B on January 3, 2019).

Table A4: ITS Analysis of M4A Incentive - Week Enrolled

	No. of Transactions per Week	Value of Transactions per Week
Time (Week)	0.110**	20.457***
	[0.010, 0.210]	[6.319, 34.595]
Female TSR	-0.085	45.504
	[-0.619, 0.448]	[-94.046, 185.053]
Female TSR × Time	-0.004	-20.034*
	[-0.156, 0.149]	[-40.758, 0.691]
Incentive	2.044*	476.713
	[-0.317, 4.404]	[-140.807, 1094.232]
Time × Incentive	-0.674**	-155.066*
	[-1.248, -0.099]	[-320.081, 9.948]
Female TSR × Incentive	1.491	-200.940
	[-4.744, 7.726]	[-915.972, 514.092]
Female TSR × Time × Incentive	0.222	260.428
	[-1.807, 2.251]	[-100.586, 621.442]
Constant	0.166	72.085*
	[-0.201, 0.532]	[-13.010, 157.181]
Observations	34	34

Notes: The unit of analysis is the week enrolled by TSR gender, where average outcomes are calculated for each week by TSR gender. All models are estimated using interrupted time series specifications to identify the impact of the introduction of the M4A incentive, with 95 percent confidence intervals presented in brackets. The variable Female TSR is a binary indicator for TSR gender, the variable Time indicates the week (weeks 1-17), and the variable Incentive is a binary indicator for the introduction of the incentive. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A5: Stratified Analysis of Male TSR vs. Female TSR, Pre-Incentive Period - Market-Day Level

	New SIM Accounts per Market Day	New M-Pesa Accounts per Market Day	M-Pesa Used per Market Day	M-Pesa Conversion Rate per Market Day
Female TSR	-3.471**	-1.801**	-1.633**	-0.008
	[-6.311, -0.631]	[-3.561, -0.042]	[-2.915, -0.351]	[-0.137, 0.121]
Observations	125	125	125	125
Control Mean	19.92	9.71	8.53	0.51
Controls	✓	✓	✓	✓
Market FE	✓	✓	✓	✓
Day of Week FE	✓	✓	✓	✓

The unit of analysis is the market day. All models are estimated using ordinary least squares models, with 95 percent confidence intervals presented in brackets. Covariates in adjusted models include market and day of the week fixed effects. Heteroskedastic-robust standard errors are presented. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A6: Stratified Analysis of Male TSR vs. Female TSR, Post-Incentive Period - Market-Day Level

	New SIM Accounts per Market Day	New M-Pesa Accounts per Market Day	M-Pesa Used per Market Day	M-Pesa Conversion Rate per Market Day
Female TSR	-4.730**	-0.051	0.076	0.126***
	[-8.997, -0.462]	[-2.613, 2.512]	[-2.337, 2.488]	[0.061, 0.191]
Observations	220	220	220	220
Control Mean	19.92	9.71	8.53	0.51
Controls	✓	✓	✓	✓
Market FE	✓	✓	✓	✓
Day of Week FE	✓	✓	✓	✓

The unit of analysis is the market day. All models are estimated using ordinary least squares models, with 95 percent confidence intervals presented in brackets. Covariates in adjusted models include market and day of the week fixed effects. Heteroskedastic-robust standard errors are presented. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A7: Comparison of Outcomes within Female TSR Group Pre- and Post-Incentive, Market-Day Level

Variable	(1) Female TSR Before Incentive	(2) Female TSR After Incentive	(3) Difference (After - Before)
Total No. of Clients, Mkt. Day	6.803	20.155	13.352***
Total No. of M-Pesa Clients, Mkt. Day	4.061	11.682	7.621***
Total M-Pesa use, Mkt. Day	2.636	10.891	8.255***
Tot. M-Pesa use in last 4 Wks, Mkt. Day	1.589	3.487	1.898***
M-Pesa Conversion Rate	0.592	0.579	-0.013
Convert within 1 Wk	0.782	0.838	0.056
Avg. Number of Transactions	1.817	2.153	0.337
Avg. Value of Transactions	330.189	955.564	625.375
Client Sex	0.258	0.371	0.112***
Observations	66	110	176

*** p < 0.01, ** p < 0.05, * p < 0.1.
The unit of observation is the market-day.

Table A8: Comparison of Outcomes within Male TSR Group Pre- and Post-Incentive, Market-Day Level

Variable	(1) Male TSR Before Incentive	(2) Male TSR After Incentive	(3) Difference (After - Before)
Total No. of Clients, Mkt. Day	10.678	24.873	14.195***
Total No. of M-Pesa Clients, Mkt. Day	5.983	11.709	5.726***
Total M-Pesa use, Mkt. Day	4.356	10.764	6.408***
Tot. M-Pesa use in last 4 Wks, Mkt. Day	2.132	4.329	2.197***
M-Pesa Conversion Rate	0.601	0.455	-0.146***
Convert within 1 Wk	0.676	0.774	0.099**
Avg. Number of Transactions	1.912	2.221	0.309
Avg. Value of Transactions	287.811	569.143	281.331
Client Sex	0.265	0.400	0.136***
Observations	59	281	340

*** p < 0.01, ** p < 0.05, * p < 0.1.
The unit of observation is the market-day.

Table A9: Interaction Analysis, Male TSR vs. Female TSR - Market-Day Level

	New SIM Accounts per Market Day	New M-Pesa Accounts per Market Day	M-Pesa Used per Market Day	M-Pesa Conversion Rate per Market Day
Female TSR	-6.662***	-2.690*	-2.505*	0.140*
	[-11.685, -1.639]	[-5.614, 0.234]	[-5.078, 0.068]	[-0.012, 0.291]
Client Sex	-3.903	-2.234	-1.864	0.076
	[-15.367, 7.561]	[-8.215, 3.748]	[-7.187, 3.459]	[-0.230, 0.382]
Female TSR × Client Sex	7.376	5.368	4.985	-0.183
	[-6.445, 21.198]	[-2.704, 13.440]	[-2.271, 12.242]	[-0.577, 0.212]
Market is far (1 = Yes)	4.265	0.777	-0.045	-0.080
	[-4.509, 13.038]	[-4.115, 5.669]	[-4.359, 4.269]	[-0.266, 0.106]
Female TSR × Market is far (1 = Yes)	-6.207	-1.970	-1.127	-0.020
	[-15.548, 3.134]	[-7.288, 3.349]	[-5.909, 3.655]	[-0.234, 0.195]
Market is far (1 = Yes) × Client Sex	-11.379	-5.795	-4.576	0.196
	[-27.669, 4.911]	[-13.990, 2.400]	[-11.877, 2.724]	[-0.220, 0.612]
Female TSR × Market is far (1 = Yes) × Client Sex	13.261	5.483	4.503	0.069
	[-7.628, 34.150]	[-6.322, 17.288]	[-6.301, 15.306]	[-0.497, 0.634]
Observations	345	345	345	345
Control Mean	19.92	9.71	8.53	0.51
Controls	✓	✓	✓	✓
Market FE	✓	✓	✓	✓
Day of Week FE	✓	✓	✓	✓

The unit of analysis is the market day. All models are estimated using ordinary least squares models, with 95 percent confidence intervals presented in brackets. Covariates in adjusted models include whether the incentive was implemented, market and day of the week fixed effects. Heteroskedastic-robust standard errors are presented. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A10: Analysis of Treatment Male TSR versus Treatment Female TSR, Interaction with Client Sex and Rural Client

	Total No. of Transactions in First 8 Wks.	Total Value of Transactions in First 8 Wks.	No. of Transactions in Last 4 Wks.	Value of Transactions in Last 4 Wks.
Female TSR	-0.286	-383.728	-2.614**	-391.838**
	[-8.934, 8.361]	[-3813.922, 3046.465]	[-4.773, -0.456]	[-759.684, -23.992]
Client Sex (1 = Female)	-4.251	-2254.942	-1.574	-282.135
	[-10.766, 2.264]	[-5675.598, 1165.714]	[-3.631, 0.483]	[-630.358, 66.087]
Female TSR × Client Sex (1 = Female)	-1.261	630.793	1.683	300.020
	[-11.865, 9.343]	[-3977.696, 5239.281]	[-0.602, 3.968]	[-79.147, 679.187]
Market is far (1 = Yes)	-1.968	-208.498	-2.137*	-281.024*
	[-8.580, 4.644]	[-3143.181, 2726.186]	[-4.624, 0.350]	[-567.128, 5.079]
Female TSR × Market is far (1 = Yes)	-1.781	-457.490	3.415**	412.272**
	[-12.311, 8.749]	[-4205.424, 3290.444]	[0.793, 6.038]	[45.772, 778.773]
Female TSR × Client Sex (1 = Female) × Market is far (1 = Yes)	-4.777	-3364.086	-2.261	-271.145
	[-18.068, 8.514]	[-9338.829, 2610.658]	[-5.467, 0.946]	[-670.889, 128.599]
Observations	267	267	195	195
Control Mean	1.08	313.47	0.17	36.88
p-value: Male TSR = Female TSR for Male Clients - Over Last 8 Weeks	0.95	0.83	0.02	0.04
p-value: Male TSR = Female TSR for Female Clients	0.81	0.79	0.15	0.12
Controls	✓	✓	✓	✓
Market FE	✓	✓	✓	✓
Day of Week FE	✓	✓	✓	✓

Notes: The unit of analysis is the client. All models are estimated using ordinary least squares, with 95 percent confidence intervals presented in brackets. Covariates include: age (in four age groups), whether the incentive was implemented, and market and day of the week fixed effects. Standard errors are clustered at the market-day level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A11: Analysis of Treatment Male TSR versus Treatment Female TSR, Interaction with Client Sex and Rural Client

	No. of Transactions per Market Day in First 8 Wks.	Value of Transactions per Market Day in First 8 Wks.	No. of Transactions per Market Day in Last 4 Wks.	Value of Transactions per Market Day in Last 4 Wks.
Female TSR	-0.181	-129.938	-0.368	-98.592
	[-0.989, 0.626]	[-448.054, 188.178]	[-1.110, 0.375]	[-391.934, 194.751]
Client Sex (1 = Female)	-0.539*	-266.868	-0.610*	-148.830
	[-1.175, 0.096]	[-701.121, 167.385]	[-1.230, 0.010]	[-520.597, 222.937]
Female TSR × Client Sex (1 = Female)	-0.284	47.025	-0.022	-38.234
	[-1.301, 0.733]	[-446.690, 540.739]	[-0.947, 0.902]	[-503.729, 427.261]
Market is far (1 = Yes)	-0.113	-97.856	-0.345	13.208
	[-1.064, 0.837]	[-413.467, 217.754]	[-1.311, 0.620]	[-329.211, 355.627]
Female TSR × Market is far (1 = Yes)	0.090	5.035	0.403	3.891
	[-0.934, 1.113]	[-355.850, 365.921]	[-0.613, 1.419]	[-354.230, 362.012]
Female TSR × Client Sex (1 = Female) × Market is far (1 = Yes)	0.238	162.260	-0.101	178.075
	[-1.392, 1.868]	[-587.386, 911.907]	[-1.780, 1.579]	[-628.898, 985.048]
Observations	12752	12752	6376	6376
Control Mean	0.51	143.84	0.51	143.84
p-value: Male TSR = Female TSR for Male Clients - Over Last 8 Weeks	0.66	0.42	0.33	0.51
p-value: Male TSR = Female TSR for Female Clients	0.58	0.85	0.96	0.87
Controls	✓	✓	✓	✓
Market FE	✓	✓	✓	✓
Day of Week FE	✓	✓	✓	✓

Notes: The unit of analysis is the transaction. All models are estimated using ordinary least squares, with 95 percent confidence intervals presented in brackets. Covariates include: age (in four age groups), whether the incentive was implemented, and market and day of the week fixed effects. Standard errors are clustered at the market-day level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A12: Analysis of TSR Sex Treatment - Over Last 8 Weeks

	Total No. of Transactions per Market Day	Total Value of Transactions per Market Day	No. of Transactions in Last 4 Wks. per Market Day	Value of Transactions in Last 4 Wks. per Market Day
A: All Clients				
TSR Sex (1 = Female)	-1.902	-693.201	-0.974**	-159.340**
	[-5.330, 1.526]	[-2157.043, 770.640]	[-1.923, -0.024]	[-317.032, -1.647]
Observations	267	267	195	195
Control Mean	1.65	466.40	0.36	92.31
B: Female Clients				
TSR Sex (1 = Female)	-2.092	-501.214	-0.246	-14.881
	[-4.819, 0.635]	[-1401.611, 399.183]	[-0.873, 0.382]	[-63.551, 33.789]
Observations	100	100	68	68
Control Mean	0.45	115.02	0.09	24.62
C: Rural Clients				
TSR Sex (1 = Female)	-0.160	-27.989	0.594	46.237
	[-4.227, 3.908]	[-689.785, 633.808]	[-0.417, 1.606]	[-54.462, 146.937]
Observations	88	88	70	70
Control Mean	0.56	100.91	0.12	25.63
Controls	✓	✓	✓	✓
Market FE	✓	✓	✓	✓
Day of Week FE	✓	✓	✓	✓

Notes: The unit of analysis is the client. All models are estimated using ordinary least squares, with 95 percent confidence intervals presented in brackets. Covariates include: age (in four age groups), client sex, whether the incentive was implemented, and market and day of the week fixed effects. Standard errors are clustered at the market-day level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A13: Sub-Group Analysis: Male TSR Group B (High) vs. Female TSR Group A (High) - Market-Day Level

	New SIM Accounts per Market Day	New M-Pesa Accounts per Market Day	M-Pesa Used per Market Day	M-Pesa Conversion Rate per Market Day
Female TSR	-3.113	0.198	0.160	0.084*
	[-7.365, 1.138]	[-2.329, 2.725]	[-2.174, 2.494]	[-0.007, 0.175]
Observations	167	167	167	167
Control Mean	19.92	9.71	8.53	0.51
Controls	✓	✓	✓	✓
Market FE	✓	✓	✓	✓
Day of Week FE	✓	✓	✓	✓

The unit of analysis is the market day. All models are estimated using ordinary least squares models, with 95 percent confidence intervals presented in brackets. Covariates in adjusted models include whether the incentive was implemented, market and day of the week fixed effects. Heteroskedastic-robust standard errors are presented. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A14: Sub-Group Analysis: Male TSR Group B (High) vs. Female TSR Group B (Low) - Market-Day Level

	New SIM Accounts per Market Day	New M-Pesa Accounts per Market Day	M-Pesa Used per Market Day	M-Pesa Conversion Rate per Market Day
Female TSR	-3.671	-0.980	-0.983	0.058
	[-8.369, 1.026]	[-3.761, 1.802]	[-3.554, 1.588]	[-0.037, 0.153]
Observations	152	152	152	152
Control Mean	19.92	9.71	8.53	0.51
Controls	✓	✓	✓	✓
Market FE	✓	✓	✓	✓
Day of Week FE	✓	✓	✓	✓

The unit of analysis is the market day. All models are estimated using ordinary least squares models, with 95 percent confidence intervals presented in brackets. Covariates in adjusted models include whether the incentive was implemented, market and day of the week fixed effects. Heteroskedastic-robust standard errors are presented. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A15: Sub-Group Analysis: Male TSR Group A (Low) vs. Female TSR Group A (High) - Market-Day Level

	New SIM Accounts per Market Day	New M-Pesa Accounts per Market Day	M-Pesa Used per Market Day	M-Pesa Conversion Rate per Market Day
Female TSR	-4.378**	0.028	0.177	0.101**
	[-8.258, -0.499]	[-2.412, 2.469]	[-2.081, 2.436]	[0.023, 0.178]
Observations	178	178	178	178
Control Mean	19.92	9.71	8.53	0.51
Controls	✓	✓	✓	✓
Market FE	✓	✓	✓	✓
Day of Week FE	✓	✓	✓	✓

The unit of analysis is the market day. All models are estimated using ordinary least squares models, with 95 percent confidence intervals presented in brackets. Covariates in adjusted models include whether the incentive was implemented, market and day of the week fixed effects. Heteroskedastic-robust standard errors are presented. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A16: Sub-Group Analysis: Male TSR Group B (Low) vs. Female TSR Group B (Low) - Market-Day Level

	New SIM Accounts per Market Day	New M-Pesa Accounts per Market Day	M-Pesa Used per Market Day	M-Pesa Conversion Rate per Market Day
Female TSR	-5.333**	-1.103	-0.969	0.080*
	[-9.706, -0.961]	[-3.675, 1.469]	[-3.294, 1.357]	[-0.011, 0.170]
Observations	163	163	163	163
Control Mean	19.92	9.71	8.53	0.51
Controls	✓	✓	✓	✓
Market FE	✓	✓	✓	✓
Day of Week FE	✓	✓	✓	✓

The unit of analysis is the market day. All models are estimated using ordinary least squares models, with 95 percent confidence intervals presented in brackets. Covariates in adjusted models include whether the incentive was implemented, market and day of the week fixed effects. Heteroskedastic-robust standard errors are presented. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A17: Sub-Group Analysis: Female TSR Group A (High) vs. Female TSR Group B (Low) - Market-Day Level

	New SIM Accounts per Market Day	New M-Pesa Accounts per Market Day	M-Pesa Used per Market Day	M-Pesa Conversion Rate per Market Day
Female Group B	-1.345	-1.845	-1.829	-0.036
	[-5.101, 2.411]	[-4.291, 0.600]	[-4.096, 0.439]	[-0.122, 0.050]
Observations	169	169	169	169
Control Mean	15.45	9.41	8.38	0.59
Controls	✓	✓	✓	✓
Market FE	✓	✓	✓	✓
Day of Week FE	✓	✓	✓	✓

The unit of analysis is the market day. All models are estimated using ordinary least squares models, with 95 percent confidence intervals presented in brackets. Covariates in adjusted models include whether the incentive was implemented, market and day of the week fixed effects. Heteroskedastic-robust standard errors are presented. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A18: Sub-Group Analysis: Male TSR Group A (Low) vs. Male TSR Group B (High) - Market-Day Level

	New SIM Accounts per Market Day	New M-Pesa Accounts per Market Day	M-Pesa Used per Market Day	M-Pesa Conversion Rate per Market Day
Male Group B	-0.455	0.709	0.764	0.035
	[-5.358, 4.448]	[-1.941, 3.358]	[-1.655, 3.184]	[-0.058, 0.127]
Observations	161	161	161	161
Control Mean	20.57	9.86	8.58	0.50
Controls	✓	✓	✓	✓
Market FE	✓	✓	✓	✓
Day of Week FE	✓	✓	✓	✓

The unit of analysis is the market day. All models are estimated using ordinary least squares models, with 95 percent confidence intervals presented in brackets. Covariates in adjusted models include whether the incentive was implemented, market and day of the week fixed effects. Heteroskedastic-robust standard errors are presented. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.