

# Serving the Underserved: Microcredit as a Pathway to Commercial Banks\*

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## Abstract

We examine the impact of a large-scale microcredit expansion program on financial access and the transition of previously-unbanked borrowers to commercial banks. Using administrative data on the universe of loans from a credit register accessible to all lenders, we show that the program improved access to credit, especially in underdeveloped areas, and reduced poverty. The program also generated positive spillovers to the commercial banking sector: a sizable share of first-time borrowers switched to banks, which cream-skim less risky borrowers and grant them larger, cheaper, and longer maturity loans. Switchers have lower default risk than non-switchers and are not riskier than other bank borrowers. Switchers also obtain better loan terms from banks compared to first-time bank borrowers without a credit history. Overall, our results suggest that the microfinance sector—in the presence of a credit reference bureau accessible to all lenders—can play a critical role in screening unbanked borrowers, allowing them to build a credit history and facilitating their transition to commercial banks.

**JEL Codes:** G21, O12, O55

**Keywords:** Access to credit, microfinance, unbanked, credit bureau, bank loans

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# 1 Introduction

Much of the progress towards financial inclusion in developing countries, where weak institutions and scarce collateral make information frictions in credit markets particularly costly (Morduch, 1999; Kaboski and Townsend, 2012), is attributed to the microfinance sector. A key but understudied question is to what extent and under which conditions microfinance facilitates access to credit from commercial banks. In this paper, we examine the effects of a large-scale microcredit expansion program on financial access and on the transition of unbanked borrowers to commercial banks. We show that the microfinance institutions (MFIs) created by the program—in the presence of a credit bureau that monitors individual borrowing activities and is accessible to all lenders—enable first-time borrowers to build credit history and signal their quality to other lenders, mitigating information frictions. Commercial banks cream-skim the less risky borrowers, offering them better loan terms. Thus, for unbanked borrowers, microfinance can serve as a pathway to commercial banks.

We analyze the impact of a nationwide government-subsidized microcredit expansion program that created an extensive network of community-focused savings and credit cooperatives (Umurenge SACCOs, henceforth U-SACCOs) across the 416 municipalities in Rwanda. The program resulted in more than 90% of Rwandans residing within 3 miles of a U-SACCO (AFI, 2014). Despite an official launch in 2009, U-SACCOs initiated lending operations in different months starting in late 2011, giving rise to a staggered implementation of the program. Our identification strategy exploits time-series variation in the opening of U-SACCOs across municipalities, coupled with administrative microdata on the lending activities of all financial institutions. Specifically, we use a comprehensive credit register with detailed information on the universe of loans to individuals in the entire country for a total of 9 years around the implementation of the program (2008–2016).

Our empirical strategy hinges on the identifying assumption that the program rollout is orthogonal to local unobserved factors, including credit demand. In fact, our results could

be spurious if U-SACCOs were more likely to start lending operations in more dynamic and economically developed areas. To mitigate potential concerns about nonrandom variation in program rollout, we first show that timing of U-SACCO openings is not predicted by a wide range of *ex-ante* municipality characteristics. These include proxies for economic development (e.g., nightlights and nightlight growth, poverty rate, conflicts, population size), the size and financial positions of U-SACCOs before being licensed to lend, and distance to capital to capture the cost of reaching U-SACCOs for training and inspections.

We find that the program significantly raised the probability of access to credit for unbanked individuals, particularly in less developed areas. While this effect is mostly driven by U-SACCOs, we also find a positive—albeit delayed—spillover effect on bank lending about one year after the program rollout. We then trace first-time U-SACCO borrowers over time and identify those who subsequently obtain loans from commercial banks. The number of these switchers grows rapidly after the program and, overall, represents 8% of all first-time U-SACCO borrowers and 5% of new bank borrowers. U-SACCOs are unable to keep these borrowers in part due to tight regulatory and balance sheet constraints.

To examine the link between switching to banks and financial outcomes, we compare switchers with other borrowers using a nearest-neighbor matching estimator that accounts for numerous loan, borrower, and municipality characteristics (Abadie and Imbens, 2011). In all tests, we compare loans granted in the same month and also control for borrowers' *ex-ante* risk by matching loans on payment history, credit capacity, and length of credit history. We find that switchers obtain larger, lower interest rate, and longer-maturity loans than non-switchers. Controlling for credit history and loan contract terms, switchers also have lower *ex-post* default risk—both before and after they switch—compared to non-switchers. Furthermore, they are no riskier than existing bank borrowers. Together, these results suggest that banks cream-skim the less risky borrowers from the U-SACCO borrower pool. Using data on banks' geographic footprint across municipalities during 2011–2016, we also show that banks increase their branch presence more in initially less developed areas, suggesting

that banks' lending activities in those areas may be spurred by the opening of U-SACCOs.

The transition of U-SACCO borrowers to banks is possible not only due to U-SACCOs' screening, but also because of the availability of a credit information sharing mechanism that allows borrowers to signal their quality to other lenders. When unbanked individuals take their first loan at a U-SACCO, their information is submitted to the credit register, which tracks all lending activities and is available to all lenders.<sup>1</sup> We present evidence suggesting that credit history at U-SACCOs is indeed valuable to banks. Comparing loan contract terms offered by banks to switchers with those offered by banks to first-time borrowers with no credit history, we find that banks systematically offer lower interest rates and longer maturity loans to borrowers whose first lending relationship was at a U-SACCO.

Finally, we show improved access to credit through the program translates into better economic outcomes. Poverty rates in municipalities where U-SACCOs start granting loans decline, especially in initially less developed areas, and in areas with more switching activity from U-SACCOs to banks. Furthermore, the program rollout is associated with an increase in small firm creation and employment. Overall, our results suggest MFIs play a key, and thus far under-documented, role in alleviating information frictions in thin credit markets where commercial banks find it difficult to serve the unbanked population through traditional lending technologies ([Castellanos \*et al.\*, 2020](#))

Our paper builds on an influential literature analyzing the effects of bank expansion programs on financial inclusion and economic development. [Burgess and Pande \(2005\)](#) and [Burgess \*et al.\* \(2005\)](#) show that a large state-led banking expansion program in India significantly reduced rural poverty through increased savings mobilization and credit provision. [Agarwal \*et al.\* \(2017\)](#) analyze the largest financial inclusion program in India (Jan Dhan Yo-

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<sup>1</sup>The credit register is maintained by a private credit reference bureau that supplies borrower information on payment history and defaults—that is, both positive and negative information—against a fee. According to the World Bank's 2013 Global Financial Development Report, 77% of countries in sub-Saharan Africa have a public credit register or private credit bureau, with almost two-thirds of these collecting both positive and negative borrower information. However, where credit reporting for microfinance clients exists, bank and microfinance credit registries are often separate ([CGAP, 2011](#)).

jana) and find that regions more exposed to the program saw an increase in credit availability, with households substituting informal loans for less expensive bank credit. Focusing on the branch network expansion by Banco Azteca in Mexico, [Bruhn and Love \(2014\)](#) show that access to finance boosts labor market activity and incomes, particularly among the poor and in areas with lower bank presence. [Brown et al. \(2016\)](#) show that the expansion of an East European commercial microfinance bank to low-income areas increased the share of banked households. Finally, [Allen et al. \(2021\)](#) examine the branch expansion of Equity Bank in Kenya to low-income and underserved regions and show that it increased the likelihood of households having bank accounts and obtaining loans.<sup>2</sup>

A common feature of previous studies is their reliance on survey data to measure access to and usage of financial services, and economic outcomes. The data are often aggregated at the district or state level, inviting questions on whether the outcomes are being driven by a particular financial institution or its competitors. Notable exceptions include [Azevedo et al. \(2019\)](#), who exploit a novel screening technology that identifies loan-eligible individuals in Paraguay, [Castellanos et al. \(2020\)](#) who study the credit card market in Mexico, and [Arraiz et al. \(2020\)](#) who analyze free-riding in screening efforts in the context of SME lending in Peru. Our credit register data covers the lending activities of *all* microfinance institutions and commercial banks in a country, overcoming challenges related to aggregation and potential reporting biases. In addition, the data enable us to gauge which credit institutions are driving gains in access to credit, track individuals' borrowing activities over time and across lenders, and characterize borrowers' credit risk profile based on credit history and past loan performance. Finally, the data extend several years into the program so we can examine not

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<sup>2</sup>Problems of financial inclusion are not exclusive to developing countries. According to the most recent estimates, 5.4% of U.S. households—or 7.1 million households—do not have access to basic banking services such as a checking or savings account. In addition, 23% of households do not have any credit product, although one in every five of such households seeks access ([FDIC, 2020](#)). Furthermore, several studies document positive effects of increased bank branch density on financial inclusion and economic outcomes in advanced economies (e.g., [Gilje et al., 2016](#); [Brown et al., 2019](#); [Nguyen, 2019](#)). In particular, [Célerier and Matray \(2019\)](#) show that the U.S. interstate bank branching deregulation increased financial inclusion and improved economic conditions for low-income households through asset accumulation and financial security.

only short-term, but also medium-term effects of the program on financial access.<sup>3</sup>

Our paper also relates more broadly to a long-standing literature on banks and financial development as key drivers of economic growth (e.g., [King and Levine, 1993](#); [Jayaratne and Strahan, 1996](#); [Beck et al., 2000](#)). Despite broad agreement that access to credit is critical for economic development, the evidence on the size of the impact is mixed. Randomized control trials (RCTs) generally reveal “a consistent pattern of modestly positive, but not transformative effects” ([Banerjee et al., 2015](#); [Meager, 2019](#)), while studies of aggregated household survey data show somewhat larger impacts ([Bruhn and Love, 2014](#); [Brown et al., 2016](#); [Allen et al., 2021](#)). A potential explanation for these mixed results is that the RCT literature has only “scratched the surface of identifying spillover and general equilibrium effects” ([Banerjee et al., 2015](#)). From this perspective, our analysis with administrative microdata on *all* loans in a country complements the RCT literature, as we are able to document the positive spillovers of a microcredit expansion program on bank lending, and emphasize the role of microfinance as a pathway for previously-unbanked borrowers to commercial banks.

In a related paper, [Breza and Kinnan \(2021\)](#) examine the real effects of a contraction in the supply of microcredit in India using district-level variation in exposure to a negative financial shock, and show that microcredit reduces labor earnings and consumption in more exposed areas. Contrary to that paper, we examine the effects of a *positive* shock—an expansion of the microfinance sector—on access to credit from both newly set up credit cooperatives as well as commercial banks. Our results suggest that the expansion of U-SACCOs can foster local development not only directly through the provision of financial services, but also indirectly by allowing lower risk unbanked individuals to build a credit history and to obtain, in time, more attractive loan terms from banks.

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<sup>3</sup>It is important to note that our data do not cover informal credit. While a large share of the population has access to informal credit (61% in 2016 according to the [FinScope \(2016\)](#) survey compared to only 17% with access to formal credit), informal credit typically bears sizable interest rates and transaction costs ([Giné, 2011](#)). Therefore, the presence of a first-time borrower in the credit register indicates the first time that individual takes a loan from a *formal* creditor—whether or not they had access to informal credit before. In addition, our analysis of the FinScope survey data does not show that access to formal finance crowds out informal lenders (Appendix A).

Our analysis of switchers relates to an influential paper by [Ioannidou and Ongena \(2010\)](#). Using data from the Bolivian credit register, the authors show that firms that switch across lenders initially obtain lower loan rates, but these rates subsequently increase, suggesting adverse selection and a hold-up problem ([Sharpe, 1990](#); [Rajan, 1992](#); [von Thadden, 2004](#)). We extend this line of research by documenting the transition of individual borrowers from credit cooperatives to commercial banks and hence emphasizing the screening role of MFIs. In addition, we analyze the terms of consumer loans (as opposed to business loans), and compare the default risk of switchers with non-switchers. Our analysis highlights potential risks and benefits associated with the transition of individuals from MFIs to banks. Given that switchers are on average less risky than non-switchers, U-SACCOs face the challenge of an increasingly riskier pool of borrowers over the medium run. At the same time, access to better loan contracts at commercial banks can spur entrepreneurship and income growth.

Finally, our paper contributes to the literature on the positive effects of mandatory sharing of borrower information among financial institutions.<sup>4</sup> [Liberti \*et al.\* \(2016\)](#) show that the expansion of the credit register in Argentina improved the efficiency of bank credit allocation by easing lending standards for previously-excluded high-quality borrowers. [Bos \*et al.\* \(2021\)](#) find that the introduction of a credit register in Bosnia and Herzegovina reduced loan defaults, particularly among first-time borrowers, and that repeated borrowers receive better loan terms due to their ability to signal quality to competing lenders. Our results support the view that credit bureaus mitigate information frictions, with positive effects on financial inclusion and credit supply ([Pagano and Jappelli, 1993](#); [Padilla and Pagano, 1997](#)).

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<sup>4</sup>Cross-country evidence indicates that information sharing is associated with improved availability and lower cost of credit ([Djankov \*et al.\*, 2007](#); [Jappelli and Pagano, 2002](#); [Brown \*et al.\*, 2009](#)), as well as lower bank risk-taking ([Houston \*et al.\*, 2010](#)). [Bruhn \*et al.\* \(2013\)](#) show that countries with higher entry barriers into the banking market are more likely to have a credit bureau and emphasize the importance of bank incentives in designing policies for credit information sharing systems.

## 2 Background

**Rwandan Economy and Financial Sector.** Rwanda is a landlocked country in East Africa with a population of around 13 million, largely in rural areas, and few natural resources. Following business-friendly reforms in the early 2000s, Rwanda experienced competitiveness gains, strong economic growth, and poverty reduction. Annual GDP growth averaged 7.8% and per capita income doubled between 2008 and 2016 (IMF, 2017a,b), and the 2020 World Bank’s Doing Business survey ranks Rwanda 2nd in Africa and 38th in the world according to the ease of doing business.

Rwanda’s commercial banking sector has developed rapidly in recent years. Total bank assets grew from 22% to 39% of GDP between 2008 and 2016, while bank credit to the private sector grew at an annual average of 13% in real terms over the same period (IMF, 2017a). Commercial banks represent about two-thirds of total banking sector assets. The banking sector is relatively concentrated, with the three largest commercial banks (out of 17) accounting for more than half of total bank assets, loans, and deposits.<sup>5</sup> Most banks are foreign-owned, but the majority of bank funding comes from local deposits, limiting the banking system’s exposure to external shocks. There are also 521 microfinance institutions (MFIs), including the 416 municipal credit cooperatives (U-SACCOs) set up through the microcredit expansion program examined in this paper (i.e., one U-SACCO in each municipality). Taken together, MFIs account for about 10% of total banking sector assets.

Over the past decade, Rwanda also made notable strides towards financial inclusion. The share of individuals with access to formal financial services, defined as those who have or use products or services from regulated financial institutions (bank or non-bank), increased from 21% to 68% of the adult population between 2008 and 2016, and access to formal credit from

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<sup>5</sup>There are 17 banks in total: 11 commercial banks (one of which only obtained regulatory approval in December 2016), 1 development bank, 1 cooperative bank, and 4 microfinance banks. As we have data until December 2016, we observe the lending activities of 16 active banks. In this paper we refer to all banks as “commercial banks.” We include microfinance banks in this list since, in contrast to microfinance institutions, microfinance banks have similar legal status to commercial banks and are also supervised by the National Bank of Rwanda.

5% to 17% over the same period (FinScope, 2012, 2016). According to statistics across 26 developing countries, primarily in Africa, where FinScope surveys measure financial access and use of financial products, Rwanda is ranked 2nd in terms of the share of adult population with access to formal financial services.<sup>6</sup> These developments are partly the result of policies and regulations aimed at expanding financial access for the unbanked population, such as the nationwide microcredit program we analyze in this paper.

**Microcredit Expansion (U-SACCO) Program.** We examine the effects of the U-SACCO program, which set up one “savings and credit cooperative” (SACCO) in each of Rwanda’s 416 municipalities.<sup>7</sup> The program aimed to provide financial services at a low cost to all individuals, but in practice targeted the unbanked population prevalent in rural communities. The program was launched in March 2009 and initially focused on providing access to savings accounts, with U-SACCOs starting granting their first loans in late 2011 upon licensing by the National Bank of Rwanda (NBR). In 2008, before the launch of U-SACCOs, there were no formal lending institutions in more than half of the 416 municipalities. The program significantly improved the availability of financial services across the country, with 1.6 million new customers and more than 90% of Rwandans residing within 3 miles of a U-SACCO branch (AFI, 2014), a larger share than in countries such as Kenya (86%) or Uganda (77%).

U-SACCOs are owned by their members. They are legally set up as microfinance institutions that provide credit and savings facilities exclusively to members, and are financed mainly from their own resources. U-SACCOs operate according to the Finance and Cooper-

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<sup>6</sup>In terms of financial inclusion, Rwanda fares well compared to its regional peers. The share of adult population with access to formal financial services (68% in 2016) places Rwanda above its East African peers such as Kenya (67% in 2013), Tanzania (57% in 2013), Uganda (54% in 2013), and Mozambique (24% in 2014). The Economist Intelligence Unit’s Global Microscope, which ranks countries based on policies for financial inclusion, ranked Rwanda 8th among 55 countries in 2016.

<sup>7</sup>Municipalities (translated in Kinyarwanda as “Umurenge”) are administrative subdivisions of the 30 districts that make up 5 provinces. In Rwanda there are also several non-Umurenge SACCOs that already existed prior to the Umurenge program and where members come from the same profession. In the analysis, non-Umurenge SACCOs are therefore part of “other MFIs”.

ative laws and are supervised by the Rwanda Cooperative Agency and the NBR. They are located in both rural and urban areas, with each U-SACCO having one branch with membership drawn from the local community. Although set up as private cooperatives, U-SACCOs received public subsidies before reaching the break-even point. By the end of 2013, 85% of U-SACCOs were profitable and stopped receiving external funds (AFI, 2014).

It is generally believed that the U-SACCO program significantly raised the share of the population with access to bank accounts, increasing financial inclusion especially in economically underprivileged areas. The FinScope surveys show that the fraction of adults who were granted loans increased from 4.6% in 2012 to 8.1% in 2016 (Table A1). Data from the credit register we use portray a similar picture, as the share of adults with an outstanding loan increased substantially across the country. By end-2010, before the program was rolled out, 54% of loans were granted by commercial banks and the rest by other MFIs. When the program started, the number of loans granted by U-SACCOs increased dramatically, accounting to 34% of total loans in the credit register at end-2016 (Figure C1). These statistics suggest that the program coincided with significant gains in financial inclusion and are consistent with government and news reports (e.g., Randall, 2014).

In this paper, we examine whether the microcredit expansion program had effects beyond increasing access to basic financial services. Specifically, we are not only interested in the program's impact on unbanked individuals' ability to take up loans from U-SACCOs and in the terms of those loans, but also in borrowers' ability to build credit history at U-SACCOs and to transition to commercial banks.

### 3 Data

Our study employs detailed loan-level data from all credit institutions operating in Rwanda. The country has a detailed credit register maintained by TransUnion Credit Reference Bu-

reau, a private provider with global operations, supervised by the NBR. The credit register collects data on the loans granted by deposit-taking institutions (i.e., commercial banks, U-SACCOs, and other MFIs) on a monthly basis with no threshold for loan size—a crucial element when examining microloans—and is highly representative of total banking sector loans, as shown in Figure C2.<sup>8</sup> Our period of analysis is January 2008 to December 2016.

The credit bureau data set covers 190,138 unique borrowers with active loans in any given month across 337 municipalities, corresponding to 4.9 millions observations at the borrower-lender-month level. We augment this credit register with a separate data set with information on individuals who never received a loan from any financial institution during our sample period. Specifically, we add to our sample 127,143 individuals (accounting for 40% of the total number of individuals) who either (i) applied for a loan during the sample period but were rejected, or (ii) obtained their first loan after the end of the sample period (January 2017–June 2020). Together, our main data set contains 34.3 million observations in a balanced panel at the borrower-month level, corresponding to 317,281 unique individuals residing in 337 municipalities.

For each loan, we have information on its amount (principal and outstanding), interest rate, maturity, and whether the loan is in arrears. Individuals are identified with a unique numerical code which allows us to track their lending activity over time and across lenders. In addition, for all 317,281 individuals with and without loans, we have data on the municipality where they reside<sup>9</sup>, as well as other characteristics such as age, gender, marital status, and sector of employment (government or non-government).<sup>10</sup>

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<sup>8</sup>The figure compares total bank credit in billions of Rwandan francs (RWF) for all commercial banks operating in Rwanda from the credit register with aggregate statistics from the banks' balance sheets. Aggregate bank balance sheet figures, representing total credit to individuals and firms, are available for the 16 active commercial banks operating in Rwanda over our sample period at quarterly frequency. To ensure comparability between the two series, we compute total bank credit in the credit register using loans to both individuals and firms in each quarter from the same set of banks.

<sup>9</sup>To identify the location as accurately as possible, we drop from the sample individuals residing in (i) municipalities that have the same name as districts (e.g., Nyarugenge); (ii) municipalities that have the same name as provinces (e.g., Kigali); and (iii) municipalities that are not uniquely assigned to a district (e.g., Murambi). We also drop foreign currency loans, which account for less than 1% of the total number of loans.

<sup>10</sup>The non-government employee category refers to individuals who do not work in the public sector,

Summary statistics for key variables are reported in Table 1. On average, 13.3% of individuals had a loan from any financial institution in a given month—3.4% from U-SACCOs, 6.3% from commercial banks, and 4.5% from other MFIs. The average loan balance amounts to 2.9 million Rwandan francs (RFW) (approximately USD 3,000) and the average interest rate on outstanding loans is 19.5%. U-SACCOs provide smaller, shorter-term, and more expensive loans than other credit institutions—see Table C1, which shows descriptive statistics separately for U-SACCOs, commercial banks, and other MFIs.

We also collect several indicators of local economic and financial development measured at the municipality level in the pre-program period. These include bank presence (number of bank branches per capita), economic growth (change in nightlights between 2008 and 2010), economic development (nightlights in 2010), poverty (percentage of population below the poverty line), adult population, conflicts (number of violent events between 1997 and 2010), distance to capital (the travel time by car of the shortest route from Kigali to the municipality centroid, in hours) and rural (a dummy that identifies rural municipalities).<sup>11</sup>

## 4 U-SACCO Program and Access to Credit

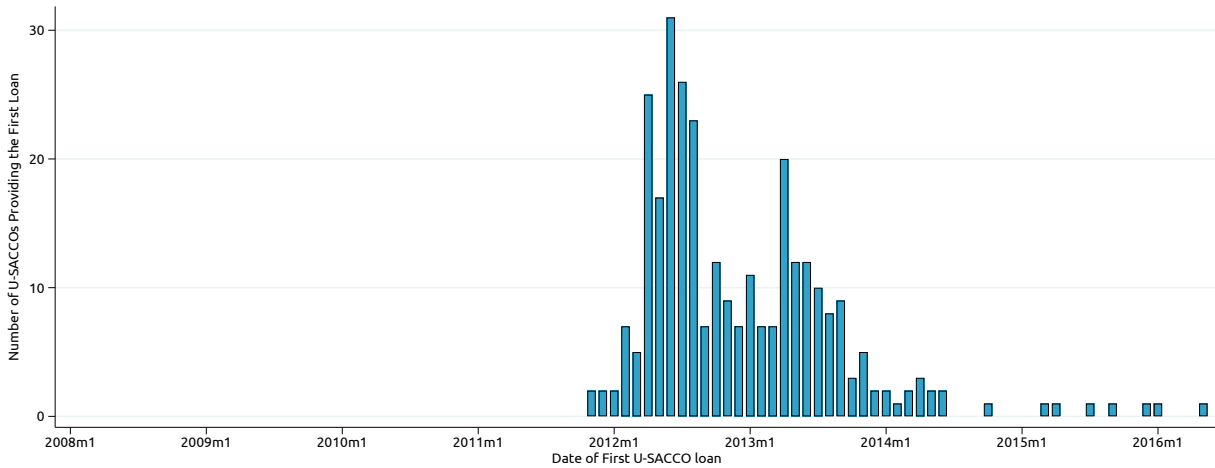
**Timing of the Program Rollout.** We identify the effect of the microcredit expansion program on access to credit by exploiting its staggered implementation, with different U-SACCOs granting their first loans in different months starting in 2011. U-SACCOs were granted licenses to start lending operations by the NBR if they met several requirements.

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including the unemployed.

<sup>11</sup>Since Rwanda does not collect data on output or consumption at the municipality level, we measure local economic activity with the share of population living under the national poverty line and with nightlights, a widely used measure of economic activity at the national and sub-national levels (Henderson, Storeygard and Weil, 2012). Nightlights are computed using data from satellite images from the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce and exhibit a great degree of spatial heterogeneity. We acknowledge its limitations in measuring economic activity, and especially its variation over time (Jean *et al.*, 2016). These problems are compounded by the change in the satellites used to capture the images around the time of the U-SACCO program and, as a result, we do use that measure when we examine the real effects of the program. However, we validate the cross-sectional use of nightlights—in our sample, there is a negative and significant correlation (−0.73) between nightlights and the poverty headcount, even within districts.

Figure 1: Staggered Implementation of the U-SACCO Program



The figure plots the number of U-SACCOs that granted their first loan in a given month during our sample period (January 2008–December 2016).

Specifically, licensing formally required the U-SACCO to collect a minimum of 10 million RWF in deposits (around 10,000 USD), have sufficient trained staff (one manager, accountant, loan officer, loan recovery officer, and cashiers, all typically hired locally), develop a saving and credit policy manual, and pass onsite inspections from the NBR. This cautious and protracted process resulted in a staggered opening of U-SACCOs between November 2011 and April 2016, as illustrated in Figure 1 which depicts the number of institutions that granted their first loan each month. During our sample period (January 2008–December 2016), U-SACCOs started lending operations in 301 out of 337 municipalities.

The key identification assumption is that the timing of the program rollout across municipalities is unrelated to (unobserved) loan demand. A systematic correlation between the timing of the implementation of the program and loan demand could arise if U-SACCOs were set up earlier in relatively more dynamic and economically developed areas. To the extent more developed areas also have higher loan demand, the endogeneity bias would generate a spurious positive correlation between the opening of a U-SACCO and access to credit. To check this identifying assumption, we examine the correlation between the time

elapsed before U-SACCOs start granting loans and a wide range of variables capturing economic development and other municipality characteristics before the program, as well as the pre-program financial position of each U-SACCO—including size (total number of members, total assets, and total deposits) and financial ratios (liquidity-to-assets and capital-to-assets). We estimate a survival model (Cox, 1972) in which the dependent variable is the waiting time (in months) until the granting of the first loan (the “event”) in a given municipality.

As reported in Table 2, the results reveal no systematic association between any of these variables and the timing of the program rollout, both when each variable is included independently (columns 1–13) as well as with all variables together (column 14). Importantly, lending activities at U-SACCOs did not start earlier where U-SACCOs had acquired more members, capital, or more deposits.<sup>12</sup> These results suggest that pre-program local economic and financial conditions do not predict the timing the program’s rollout. This finding is robust to an alternative approach by which we split municipalities between early and late starters (the first 75% vs. the last 25% municipalities) and compare the two groups along the same set of potential confounders (Table C3).<sup>13</sup>

**Identification Strategy.** To identify the effect of the microcredit expansion program on access to credit, we exploit its staggered implementation over time across municipalities in

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<sup>12</sup>Controlling for total deposits is particularly important given the minimum deposit requirement for U-SACCOs licensing. This requirement, however, had become not binding for most U-SACCOs by the time they were licensed to grant loans. Balance sheet data show that 61% of all U-SACCOs met the minimum deposit requirement by the end of 2010 (on average by a multiple of 2.2) and all but five U-SACCOs did so by the end of 2011 (on average by a multiple of 5.4). The summary statistics for the pre-program balance sheet characteristics of U-SACCOs (i.e., as of end-2010) are reported in Table C2.

<sup>13</sup>Our identifying assumption is also supported by anecdotal evidence regarding the deployment of the program, which suggests that the timing of U-SACCO openings was largely related to idiosyncratic logistical and administrative issues, rather than local economic conditions. Given the novelty, scale, and risks associated with the program, NBR staff were cautious in licensing U-SACCOs compared to other financial institutions. Once the legal requirements were in place (including minimum deposits and staff), the NBR scheduled field visits by inspectors to each U-SACCO to assess if procedures and staffing were adequate. The NBR then examined each recommendation before issuing the license to issue loans.

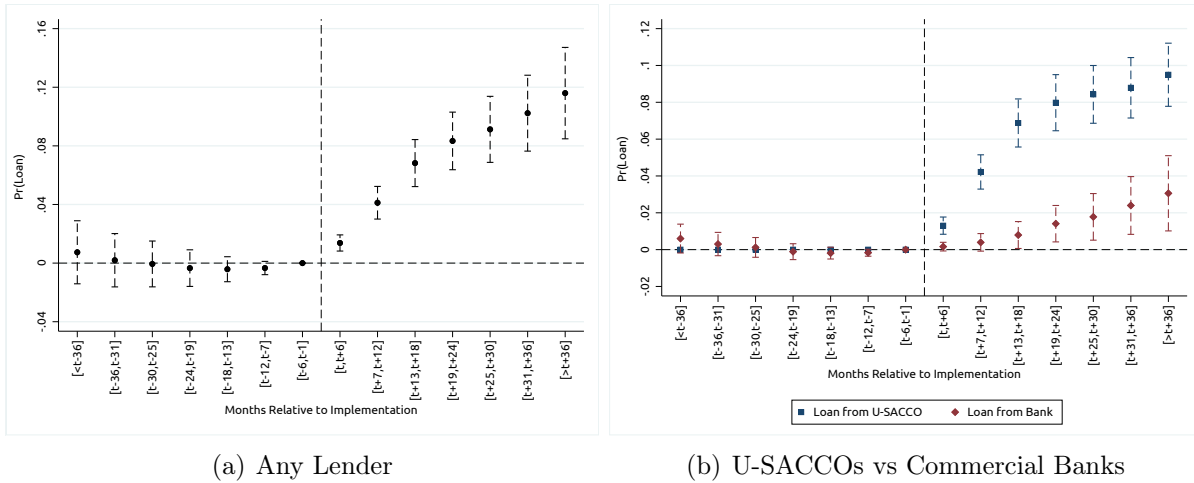
a balanced borrower-month panel. The baseline specification we estimate is as follows:

$$P(\text{Loan}_{imt}) = \beta \text{Post U-SACCO}_{mt} + \delta' X_i + \alpha_m + \phi_t + v_m t + \varepsilon_{imt} \quad (1)$$

where  $\text{Loan}_{imt}$  is a dummy variable equal to 1 if individual  $i$  residing in municipality  $m$  has an outstanding loan with any (or alternatively, a particular type of) financial institution at time (year:month)  $t$ , and 0 otherwise. Our main variable of interest is  $\text{Post U-SACCO}_{mt}$ , a dummy variable equal to 1 after a U-SACCO starts its lending activities in a given municipality  $m$  at time  $t$ , and 0 beforehand. The coefficient of interest  $\beta$  is identified by comparing, before and after the U-SACCO in municipality  $m$  starts operating, the probability of borrowers in municipality  $m$  having a loan relative to individuals in municipalities without yet an active U-SACCO.  $X_i$  are time-invariant individual characteristics, including gender, marital status, age, and sector of employment. Municipality fixed effects  $\alpha_m$  control for unobserved time-invariant spatial factors that might correlate both with the timing of U-SACCO openings and with financial access. Time (year:month) fixed effects  $\phi_t$  absorb common time-varying shocks, such as changes in economic conditions affecting all municipalities at the same time. We also include municipality-specific time trends  $v_m t$  to minimize the possibility that our estimates are confounded by differential trends in financial access across municipalities or other unobserved time-varying municipality attributes such as credit demand. We estimate Equation 1 as a linear probability model with standard errors clustered at the municipality level.

**Baseline Results.** The baseline results reported in Table 3 show a positive and statistically significant impact of the U-SACCO program on the probability that an individual obtains a loan. Columns 1–3 refer to loans granted by any financial institution i.e., U-SACCOs, commercial banks, and other MFIs. The estimates in column 2—our preferred specification with municipality time trends—indicate that the U-SACCO program raised the probability of an individual having an outstanding loan by 2.1 percentage points. This effect is economically

Figure 2: Probability of Obtaining a Loan Before and After the U-SACCO Program



The figure shows the effect of the U-SACCO program on the probability of an individual obtaining a loan from any financial institution (U-SACCOs, other MFIs, or commercial banks, Panel A) and separately for U-SACCOs and commercial banks (Panel B). The charts plot the estimated coefficients and the associated 90% confidence intervals of model 1 with interaction terms between  $Post\ U-SACCO_{mt}$  and a set of 6-month time interval dummies centered on the municipality-specific month of program rollout, as reported in column 3 (Panel A) and columns 4–5 (Panel B) of Table 3. The (lack of) effects of the U-SACCO program on the probability of an individual obtaining a loan from other MFIs are shown in Figure C3.

sizable given that the average share of individuals with an outstanding loan before the program is 6.3%. Figure C4 illustrates this result by plotting the share of individuals with loans, by municipality, before and after the program’s rollout.

To rule out potential anticipation effects, which could undermine our identification strategy, we explore the dynamic effects of the U-SACCO program. Specifically, we split the  $\beta$  coefficient according to the time that elapsed before and after the implementation of the program, using 6-month intervals centered on the timing of U-SACCO openings. The estimated coefficients and associated confidence intervals are shown in Figure 2 (Panel A) and reported in column 3 of Table 3. The estimates indicate that the likelihood of having a loan increases after the program was implemented and that this effect becomes stronger over time. The increasing magnitude of the effect over time suggests that the program had sustained effects on financial access as opposed to a one-off (transitory) effect. Figure 2 also shows that the parallel trends assumption holds in our setting—the point estimates before the program are

close to zero and statistically insignificant in the entire pre-program period.

After the implementation of the program, U-SACCOs likely competed for new borrowers with local lenders such as commercial banks and other MFIs. U-SACCOs also started screening potential borrowers from a population of lower income-earners, who were largely unknown to the financial sector. Their credit and repayment information was submitted to the credit bureau—available to all lenders. Therefore, we next examine if the overall effect of the program is entirely driven by the U-SACCOs or if it spills over to other lenders as well. To this end, we analyze loans from U-SACCOs, commercial banks, and other MFIs separately, with the dependent variables equal to 1 for individuals who have a loan at each type of lender in a given month. The results in columns 4–6 of Table 3 show that while the rise in access to credit is mostly driven by the U-SACCOs, there is a delayed positive spillover effect at commercial banks. Instead, other MFIs do not expand access to credit as a result of the U-SACCO program.

We plot our estimates on the probability of having an outstanding loan at U-SACCOs and, separately, at commercial banks in Figure 2 (Panel B).<sup>14</sup> The figure confirms two key results. First, the positive effect of the program on access to credit is mostly driven by U-SACCOs, with the likelihood of an individual having an outstanding loan at a U-SACCO rising over time to reach almost 10 additional percentage points than before the program. Second, there are spillover effects of the program to commercial banks, which catch up with a lag. In fact, starting in the second year of the program, the probability of obtaining a loan from a commercial bank increases up to 3 percentage points compared to before the program. This lagged positive spillover effect on bank lending suggests that banks may be tapping into a new customer base after U-SACCO openings. In fact, previously unbanked individuals can build a credit history at newly opened U-SACCOs and may be able to signal their quality to other lenders through the credit bureau. We explore this question explicitly

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<sup>14</sup>Figure C3 plots the same results for other MFIs and shows no significant effects after the program as well as no preexisting trends.

as well as the transition of U-SACCO borrowers to commercial banks in Section 5.

**Spatial Heterogeneity.** The positive effect of the U-SACCO program on access to credit likely varies across municipalities depending on the level of economic and financial development prior to the program. In line with the large literature on the importance of finance for growth and economic convergence (e.g., [Beck \*et al.\*, 2007](#); [Bruhn and Love, 2014](#); [Agarwal \*et al.\*, 2017](#)), we expect the increase in access to credit to be more pronounced in less developed areas. To test this hypothesis, we exploit variation across municipalities in several ex-ante indicators of development, including the number of bank branches per capita, the level and growth rate of nightlights, and the poverty rate. We also examine if there are differential effects for municipalities that are geographically remote and located in rural areas. For all variables except the rural dummy, we follow [Bruhn and Love \(2014\)](#) and split each continuous variable around the 75<sup>th</sup> percentile of its distribution to create a dummy variable for less vs. more developed municipalities. Across all measures, we find that the program’s average effect on access to credit is stronger in municipalities with lower initial levels of development (Table 4), as indicated by the positive and statistically significant coefficients on the interaction terms between *Post U-SACCO* and each of the the dummy variables.

## 4.1 Robustness and Falsification Tests

We conduct a series of robustness and falsification tests to gauge the sensitivity of our baseline results to a range of methodological choices.

**Alternative Difference-in-differences Estimator.** The standard difference-in-differences estimator, which exploits variation across municipalities that receive treatment in different periods (Equation 1), recovers a weighted average of all possible two-group/two-period difference-in-differences estimators in our sample ([Goodman-Bacon, 2021](#)). [De Chaisemartin and d’Haultfoeuille \(2020\)](#) demonstrate that when treatment effects are heterogeneous across

groups and periods, some of these weights can be negative, and propose an alternative estimator that provides unbiased estimates under treatment effect heterogeneity. The results when implementing their approach confirm that the parallel trends assumption holds in our setting, and that the program boosted access to credit—not only directly through U-SACCOs but also indirectly through positive spillover effects to commercial banks (Table C4).<sup>15</sup>

**Alternative Data Structures.** The large share of zeros in the dependent variable in the balanced borrower-month panel we use in Table 3 can potentially bias our coefficient of interest. As a result, we consider alternative aggregations of the data, including (i) collapsing the data over the time dimension and construct a balanced panel at the borrower-quarter or borrower-year levels, (ii) collapsing the data over the municipality dimension such that the dependent variable is the number of individuals (in absolute terms or as a share of total population) with an outstanding loan in a given municipality-month combination. The latter approach is particularly relevant as it leads to a reduction in the share of zeros in the dependent variable from 87% to 8%. The results show that the baseline effects of the U-SACCO program are robust to these alternative data structures (Tables C5 and C6).<sup>16</sup>

**Randomized Treatment Dates.** We conduct a falsification test to rule out the potential concern that our results are driven by coincident events other than the opening of U-SACCOs. For this purpose, for each municipality we randomly assign the U-SACCO opening date in the interval January 2008–December 2016 and repeat this exercise 1,000 times. Table C9 reports the average coefficients across simulations corresponding to the random assignments of the *Post U-SACCO* variable across municipalities. The estimated coefficient are very

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<sup>15</sup>We use the same set of controls and fixed effects as in columns 3–6 of Table 3, including municipality time trends. Standard errors are cluster bootstrapped at the municipality level with 1,000 replications. Note that the test for pre-trends of De Chaisemartin and d’Haultfoeuille (2020) differs from the standard event study pre-trend tests (e.g., Figure 2), which would be invalid when treatment effects are indeed heterogeneous.

<sup>16</sup>Several additional methodological choices have no material effect on our baseline results. First, we replace the borrower-level controls with individual fixed effects (Table C7, columns 1–5). Second, we ensure our baseline results are not driven by the inclusion of borrowers who do not obtain a loan during the sample period (Table C7, columns 6–10). Third, we include quadratic (instead of linear) municipality-specific time trends, which could pick up more complex convergence dynamics (Table C8, columns 1–5). Finally, we cluster the standard errors at the district (instead of at the municipality) level (Table C8, columns 6–10).

close to zero and statistically insignificant throughout, suggesting that our main findings are not driven by a spurious correlation between the rollout of the program and access to credit.

**External Validity with Survey Data.** We assess the external validity of our results using survey data on financial access from the 2012 and 2016 FinScope surveys. The main differences from the baseline analysis is that we only have two time periods (2012 and 2016) and we observe the district where the borrower resides instead of the municipality. We define as dependent variables a dummy equal to 1 for survey respondents who report having access to any type of loan, and then distinguish between informal or formal loans and between loans from U-SACCOs or banks. We also allow for changes in access to credit before and after the program to differ across districts with different initial bank presence, following the evidence in Table 4. The results confirm our baseline findings that access to formal loans increased in the post-program period, especially in low bank presence areas, and mostly due to U-SACCOs. Similarly to our baseline results, we also find a positive and statistically significant expansion of bank lending, albeit with a smaller coefficient than that for U-SACCOs. Furthermore, the results support the view that the U-SACCO program did not have crowding-out effects on informal lending, echoing several prior studies ([Angelucci \*et al.\*, 2015](#); [Karlan and Zinman, 2019](#)). We discuss these results further and relate them to the literature in Appendix A.

## 5 Borrower Transition to Commercial Banks

The first part of our analysis documents the impact of the microcredit expansion program on financial inclusion. We show that the program increased access to credit, particularly in less developed municipalities, and mainly through the newly set-up U-SACCOs. Importantly, we also find evidence of positive spillovers to bank lending starting about one year after the program rollout. This lagged effect suggests that banks may be attracting new customers after U-SACCO openings. With a credit information sharing system in place, unbanked

individuals can take loans from U-SACCOs, build a credit history, and be able to signal their type to other lenders. To test this hypothesis, we zoom in on the lending activities of first-time U-SACCO borrowers and, by tracing their borrowing history in the credit register over time, examine the extent to which they are able to subsequently obtain loans from commercial banks.

**Switching Activity.** We focus on individuals that were previously unbanked, had a loan at a U-SACCO, and obtained a new loan at a commercial bank during the period of analysis. Using this definition, we identify 2,910 switchers from U-SACCOs to commercial banks.<sup>17</sup> In relative terms, of all borrowers who obtained their first loan through a U-SACCO, 8% switch to a commercial bank starting in June 2012—of those who obtained more than one loan, 15% switch to commercial banks.<sup>18</sup> From the banks' perspective and considering all new bank borrowers since the program, 5% previously had a loan with a U-SACCO. This share increased over time, from less than 1% in 2012 to 9% in 2016.<sup>19</sup> The rapid increase in switching activity from MFIs (i.e., U-SACCOs and other MFIs) to banks over the sample period is shown in Figure C5. We plot the coefficients from a regression similar to the baseline approach but on a municipality-month balanced panel, where the dependent variable is the number of switching loans from MFIs to commercial banks. Consistent with the evidence shown on the spillover effects of the program to commercial banks, switching activity estimated with this alternative data structure starts in the second year after the start of the U-SACCO program. Importantly, the analysis does not show any pre-existing

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<sup>17</sup>About half of the switchers start lending exclusively from banks, while the rest keep the relationship with the U-SACCO. The number of borrowers moving from commercial banks to U-SACCOs is negligible.

<sup>18</sup>While these numbers may not appear strikingly large, it is important to note that our analysis focuses on a particular type of switching—from only a subset of MFIs to commercial banks—and that switching across lenders rarely occurs in both developing and developed economies. For instance, only 4% and 8% of U.K. and U.S. borrowers, respectively, switch banks in any given year ([The Economist, 2019](#)). Switching rates are comparable for non-financial firms, estimated at 4.5% per year in Bolivia ([Ioannidou and Ongena, 2010](#)) and 5.9% per year in Portugal ([Bonfim et al., 2021](#)).

<sup>19</sup>The characteristics of first-time U-SACCO borrowers have little common support with those first served by banks, with statistically significant differences between the two groups of first-time borrowers along multiple dimensions, including individual characteristics, location, loan type, and loan terms (Table C10).

trend in the intensity of switching across municipalities.

We start by characterizing the borrowers who switch from U-SACCOs to commercial banks, particularly their *ex-ante* credit risk profile. For this purpose, we exploit the richness of the credit register to build several measures of risk based on the borrower’s credit history. These measures mimic the ingredients of a consumer credit risk measure such as the FICO score in the U.S. and include payment history (dummy variables for nonperforming loans at any lender within one year, two years, or at any time before the new loan), credit capacity (number of lending relationships, number of loans, total outstanding loan volume before the new loan), and length of credit history (number of years since first loan). Owing to the lack of data on income, we use the employment status dummy (which identifies government employees) as a proxy, as public sector employment is associated with higher and more stable wage income (Teal, 2011). Moreover, the correlation between income and credit score weakens significantly once credit history variables are accounted for (Beer *et al.*, 2018).

Descriptive statistics in columns 1–2 of Table C11 show that switchers differ along many characteristics from non-switchers—that is, U-SACCO borrowers who do not switch to banks. For instance, they have a relatively longer credit history and greater credit capacity (more borrowing relationships and higher outstanding loan volume). This comparison suggests that switchers have higher credit quality than other U-SACCO borrowers. By contrast, they are *ex-ante* riskier than other bank borrowers—with shorter credit history, fewer loans, and markedly lower total outstanding loan volume (columns 1 vs. 3). These systematic differences emphasize the importance of controlling for *ex-ante* credit risk profile of switchers and borrowers in the comparator groups.

**Empirical Strategy.** Similarly to Ioannidou and Ongena (2010), we consider two control groups to estimate the link between switching and financial outcomes: (i) new loans granted by U-SACCOs to similar borrowers who do not switch (“non-switchers”); and (ii) new loans extended by banks to similar existing bank borrowers (“other bank borrowers”). Furthermore,

loan contract terms are an equilibrium outcome that reflects borrower risk and economic conditions. To control for these factors, we use the [Abadie and Imbens \(2011\)](#) bias-corrected nearest-neighbor matching estimator and match loans granted in the same month. Then, we select the nearest-neighbors of each switching loan based on a wide range of borrower, loan, and location characteristics. These include (i) gender, marital status, age, and employment status, (ii) loan type (whether the loan is a mortgage or is collateralized), (iii) credit history (number of years since first loan, and number of lending relationships, number of loans, and total outstanding loan amount in the month before the new loan), (iv) pre-program municipality characteristics (bank presence, nightlights and nightlight growth, poverty rate, population size, number of past conflicts, distance from the capital, and a dummy for rural municipalities) and, critically, (v) proxies for payment history—a key determinant of credit scores—computed as dummies for NPLs with any lender within 1 year, 2 years, and any time before the new loan.<sup>20</sup>

**Switching and Loan Terms.** We start the analysis by comparing loan terms across switchers and non-switchers. As reported in columns 1–3 of [Table 5](#), switching loans at banks are relatively larger, cheaper, and longer-term compared to loans granted by U-SACCOs in the same month to non-switchers. These effects are economically meaningful—switching loans are on average larger by 0.812 million RWF (around 800 USD), cheaper by 648 basis points, and have maturity longer by almost 10 months. Second, we compare loan terms for switchers with those of new loans granted by banks in the same month to other similar borrowers. As reported in columns 4–6 of [Table 5](#), switching loans at banks have similar amounts and interest rates compared to loans to existing bank borrowers, but have a slightly longer maturity (3 months).

**Switching and Default Risk.** Several studies emphasize the risks associated with rapid expansions of microcredit (e.g., [Banerjee, 2013](#); [Schicks, 2014](#); [Zinman, 2014](#)). On the one

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<sup>20</sup>The results are robust to propensity score matching based on the same set of matching characteristics as in our baseline approach ([Table C12](#)).

hand, if switchers are more likely to default than bank borrowers, rapid growth in access to credit can increase the likelihood of loan losses at banks, with implications for financial stability. On the other hand, banks may take advantage of the screening done by U-SACCOs and cream-skim from the pool of microfinance borrowers, which would leave microlenders with riskier borrowers and pose challenges to the sustainability of their business model. We examine default risk using information on non-performing loans (at least 90 days past due) within 1 year or 2 years from loan origination, or over the lifetime of the loan. In addition, we add loan contract terms (amount, interest rate, and maturity) to the set of matching variables because they can influence the probability of repayment. Comparing the performance of switching and non-switching loans, and conditional on loan contract terms and ex-ante credit risk, we find that switching loans at banks are less likely to become non-performing than loans granted by U-SACCOs to borrowers than did not switch (Table 6, columns 1–3).<sup>21</sup> In addition, switching loans are not ex-post riskier than loans granted by banks to other borrowers (columns 4–6).<sup>22</sup>

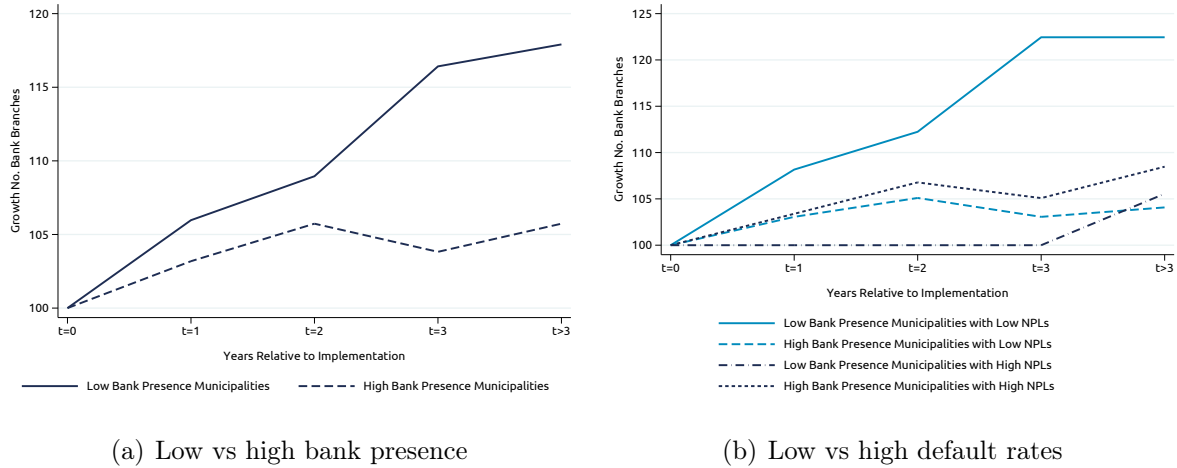
Finally, we look for direct evidence of banks' cream-skimming from U-SACCOs' borrower pool. To this end, we examine the ex-post default risk of switchers on their loans at U-SACCOs, before switching. As reported in Table C16, we find that switchers are indeed less likely to default compared to non-switchers at U-SACCOs conditional on loan contract terms and ex-ante credit risk, supporting the idea that banks cream-skim the less risky borrowers from the pool of U-SACCO borrowers.

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<sup>21</sup>It is important to note that our analysis covers a period of high and sustained economic growth. As a result, we do not observe how U-SACCO borrowers' repayment capacity evolves over a period of severe financial stress. Borrowers who are more vulnerable to negative shocks could see significantly weakened ability to repay and become excluded from the loan market altogether. This situation highlights the perils of improved credit access after MFI entry for individuals with early exposure to greater risk.

<sup>22</sup>The results in Tables 5–6 are robust to a within-lender analysis, by which we narrow the control groups to loans granted by the *same* U-SACCO the switcher left (columns 1–3 of Tables C13–C14, and respectively, to loans issued by the same bank that took the switcher (columns 4–6 of Tables C13–C14). Furthermore, for the same switcher we compare the terms of the first loan with subsequent loans at the bank, and find no significant changes in lending terms over time (Table C15).

Figure 3: Commercial Banks' Branch Expansion After the U-SACCO Program



The figure in Panel (a) shows the growth of commercial bank branches in municipalities with low (solid line) vs. high (dotted line) pre-program bank presence. The number of branches is calculated relative to the year the U-SACCO started granting loans in a given municipality—normalized at 100 for both low and high bank presence municipalities. Low bank presence municipalities are below the 75<sup>th</sup> percentile of the distribution of bank branches per capita before the program (as of 2011). The figure in Panel (b) further unpacks the sample of municipalities into those with low and high non-performing loans (NPLs). Low NPL municipalities have an NPL-to-total loans ratio below the 75<sup>th</sup> percentile of the sample distribution.

**Bank Branch Expansion.** The analysis of switching loans suggests that switchers obtain better loan terms at banks, which cream-skin the best borrowers from U-SACCOs. Does the increased lending activity targeting U-SACCO borrowers translate in more bank presence on the ground? To provide suggestive evidence on this question, we use annual data on the geographic footprint of bank branches across municipalities during 2011–2016. Panel A in Figure 3 depicts the growth in bank branches in the years when U-SACCOs open. We see that banks expand their branch network relatively more in municipalities with lower initial bank presence, bringing borrowers and banks closer. Furthermore, panel B in Figure 3 shows that this expansion was concentrated in low-risk municipalities—where risk is proxied by the overall share of NPLs. This evidence is consistent with the FinScope surveys that show that the share of adults located within 30 minutes to the nearest commercial bank increased from 21% in 2012 to 25% in 2016 (FinScope, 2012, 2016).

## 6 Mechanisms and Real Effects

Our analysis so far shows that the U-SACCO program increased access to credit and facilitated the transition of an economically significant number of previously unbanked borrowers to commercial banks. In this final section, we provide evidence on the mechanisms that might explain our results, focusing on U-SACCOs' lending constraints and screening technology, and document the effects of the program on the local economy.

**Lending Constraints at U-SACCOs?** We show a lagged spillover effect of the program on commercial bank lending and that switchers obtain better loan terms at banks. What might explain the fact that U-SACCOs are unable to offer loan terms on par with those from banks? Put differently, why are they letting go of their good clients? To explore this question, we conjecture that lending capacity related to balance sheet and regulatory constraints plays an important role.

U-SACCOs must meet specific requirements set up by the NBR in its regulation of the microfinance sector. However, in light of their heavy reliance on callable deposits as a source of funds (with average maturity around 5 months) and low capacity for treasury and loan portfolio management, U-SACCOs are subject to tighter prudential regulation not only compared to banks—as MFIs often are—but also relative to international practices. Initially, the liquidity ratio was set at 80% for all U-SACCOs. By December 2013, the liquidity threshold was lowered to 30%, yet in practice it remained elevated at 72.7% ([AFI, 2014](#)). By contrast, commercial banks, subject to the Basel II regulatory framework, were not subject to a minimum liquidity ratio. U-SACCOs were also subject to steep provisioning rates (e.g., 50% for loans 90+ days past due, and 100% for loans 180+ days past due), and were prohibited from giving out loans if they had an overall NPL ratio above 10%—a regulation that some commentators argued was potentially disruptive to lending relationships and service delivery ([MINECOFIN, 2013](#)).<sup>23</sup>

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<sup>23</sup>There were also constraints on maximum credit exposures to a single firm or individual set at 5% of total

For a direct test of lending constraints at U-SACCOs, we assemble data on U-SACCOs and commercial bank balance sheets prior to the program rollout, and relate lender size and financial ratios (measured at end-2010) to loan terms, zooming in on this relationship for U-SACCOs. Specifically, we regress loan terms (amount, interest rate, and maturity) on lender balance sheet characteristics and a dummy equal to one if the lender is a U-SACCO and 0 if it is a bank. The results indicate that U-SACCOs offer smaller, more expensive, and shorter-duration loans than banks (Table C17, columns 1, 3, and 5), with statistically significant coefficients at the 1% level. However, once we control for balance sheet size (total deposits), capital ratio, and liquidity ratio, the coefficient estimates on the U-SACCO dummy become statistically insignificant (Table C17, columns 2, 4, and 6). These results show that balance sheet characteristics explain why U-SACCOs offer worse loan terms than banks do, supporting the idea of lending constraints at U-SACCOs. We also test for the presence of constraints indirectly, by exploiting the notion of relationship lending. Our results, discussed in Appendix B, show that borrowers obtain better loan terms as relationship length increases and this effect is weaker for U-SACCOs than for banks.

**U-SACCOs' Lending Technology.** Our findings suggest that U-SACCOs play a critical screening role for the unbanked population. Coupled with the presence of the credit bureau, which tracks individuals' borrowing activities and is accessible by all lenders, U-SACCOs' lending technology—by gathering community-level information—serves to facilitate the transition of borrowers to commercial banks.<sup>24</sup> How do U-SACCOs screen their borrowers? Does their approach differ from banks? To answer these questions, we first discuss the U-SACCOs'

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net worth in general, 10% for the savings and credit cooperatives with NPL ratios below 5%. Furthermore, maximum single-loan exposures could not exceed 2.5% of total deposits.

<sup>24</sup>Mitra *et al.* (2018) features an application of a similar mechanism in the context of agricultural markets. Recent studies also examine new mechanisms by which borrowers can signal their type through means other than the traditional repayment of existing loans. For instance, Azevedo *et al.* (2019) highlight a screening mechanism by which financial outcomes improve if the individual is merely found eligible for a loan. Kovrijnykh *et al.* (2020) show that a borrower's ability to qualify for a loan from one lender can signal positive information to competing lenders. Arraiz *et al.* (2020) document free-riding in lenders' screening efforts in the context of SME lending by showing that loan approval by one lender causes other lenders to approve the same borrowers. This phenomenon can cause underinvestment in screening new borrowers and hinder financial inclusion.

lending technology while comparing it to banks, and then turn to the data to pin down U-SACCOs' relative advantage in screening.

There are two key differences in the U-SACCOs' lending technology compared to a commercial bank. First, U-SACCO borrowers are also members of the U-SACCO cooperative, which means borrowers know each other, the staff, and the loan officers—all of whom are local hires. Strong community ties, cultural proximity, and social enforcement of norms increase access to finance and the likelihood of loan repayment (Guiso *et al.*, 2004; Feigenberg *et al.*, 2013; Fisman *et al.*, 2017). Second, U-SACCO members have access to a “finance forum” comprising members of the local community, who disseminate information about financial products and educate potential borrowers about the importance of repayment. This community effort, unique to U-SACCOs, creates awareness about financial services usage, cash flow management, and financial planning.<sup>25</sup>

In Table 7 we compare loan terms offered by banks to U-SACCO-to-bank switchers with those offered by banks to first-time borrowers (columns 1–3). While we cannot control for ex-ante credit risk, as the variables measuring it are unavailable by definition for the control group, we match the loans on all borrower, loan, and location characteristics. Additionally, we compare loan terms offered by banks to U-SACCO-to-bank switchers with those offered by banks to other-MFI-to-bank switchers (columns 3–6)—the summary statistics and unconditional differences across the different groups are reported in Table C18. Other MFIs serve as a useful control group because, like commercial banks, they target wealthier individuals and are concentrated in urban areas. In both comparisons, we find that banks systematically offer lower interest rates and longer maturity loans to borrowers who had their first lending

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<sup>25</sup>The 2012 FinScope survey revealed that U-SACCO members had a collective sense of ownership, often referring to U-SACCOs as “our bank”—a bank managed by people they knew, local, and accessible. Half of the respondents chose U-SACCOs as the most trusted lender and 31% of respondents chose banks. In the 2016 survey, these shares changed to 57% and 26%, respectively, signaling the success of U-SACCOs in building trust. Focus group participants reported U-SACCOs as having faster service, better customer care, and lower account fees than commercial banks (AFI, 2014). Hakizimfura *et al.* (2020) conducted a field experiment involving 200 U-SACCOs in Rwanda to test models of local financial education delivery and found improvements in financial planning skills for the participants from U-SACCOs that were able to select the trainers from the local community (as opposed to the U-SACCO management).

relationship at the U-SACCO and then switched to banks.

Overall, these results suggest that the U-SACCO credit history is valuable to banks and supports the idea that the U-SACCOs lending technology plays a key role in supporting the transition of U-SACCO borrowers to commercial banks. It is important to highlight that the availability of a credit bureau accessible to all lenders is critical for this transition to occur. While no data are available on U-SACCOs' information requests to the credit bureau, such data have been collected for commercial banks since 2018 (outside our sample period). These data allow us to explore the extent to which banks use information from the credit bureau in their lending decisions. As shown in Table C19, there is a strong and positive correlation between the number of information requests and the number of new loans extended by banks—even within bank and a municipality-quarter pair—suggesting an “information channel” in banks' lending decisions. A complementary explanation of borrowers' transition from U-SACCOs to banks is that access to microcredit raises incomes, making borrowers more attractive for banks. We turn to this point in the next section, where we test for the program's real effects.

**Real Effects.** To analyze the impact of the program on economic activity, we assembled two types of microdata—poverty indicators from nationally representative household surveys and information on small firm formation from the establishment census.

For the poverty analysis, we use data from the 2010–2011 and 2016–2017 Integrated Household Living Conditions Surveys, which identify surveyed households as poor or extremely poor based on the \$1.09/day international (consumption) poverty line and 0.65x of this poverty line, respectively. For each household, we observe poverty status, district, and characteristics such as size and rural status. We stack the surveys and examine the link between the probability that a household is in poverty or extreme poverty after the program implementation (captured by “Post” dummy variable taking value 1 for the 2016–2017 survey), allowing for differential effects based on the pre-program level of financial development (that

is, high vs. low bank presence districts). The results, reported in Table 8, show that households were 5.6% less likely to be poor (and 4.1% less likely to be extremely poor) in the period after program implementation (columns 1 and 4). The poverty reduction effect of the program is stronger for households in districts with low bank presence (columns 2 and 5).

We also examine the real effects of access to commercial bank loans by U-SACCO borrowers who transitioned to banks. We capture this effect with the fraction of switchers in each district (relative to all U-SACCO borrowers) over the 2012–2016 period, computed from the credit register. Specifically, we unpack the program’s effect in low bank presence municipalities by level of switching intensity. We expect the program’s poverty-reducing effect to be further boosted by a higher share of switchers because switchers obtain loans on relatively more advantageous terms from banks. As reported in columns 3 and 6 of Table 8, this is indeed the case—the poverty reduction effects of the program are driven by districts with both low pre-program bank presence and a high fraction of switchers during the program.

We complement these results with evidence on the program’s impact on firm formation using the 2014 Establishment Census, which provides the municipality and date when each firm was created between January 2008 and December 2014. We restrict our sample to private sector firms and examine three outcome variables that are tightly related to the availability of microcredit: the rate at which new microenterprises and sole proprietorships are formed, and the number of jobs created by new firms (regardless of size). Given that we observe firm creation and new employment at the municipality-month level, here we can exploit the staggered rollout of the program for identification. The results, shown in Table C20, indicate that municipalities where U-SACCOs start granting loans earlier tend to have a higher rate of firm formation (columns 1–4)—a result that speaks directly to the positive link between microcredit and entrepreneurship (Bruhn and Love, 2014; Banerjee *et al.*, 2015, 2019). The magnitude of the effects are larger in municipalities with ex-ante low bank presence. We also find that the program boosted private sector employment (columns 5–6).

Overall, these positive effects of the U-SACCO program on the local economy are inconsistent with the idea of negative local general-equilibrium effects caused by crowding-out of other types of lending—such as informal lending—and are therefore consistent with the results based on the FinScope surveys (Appendix A). They also increase our confidence that the financial access boosting effect of U-SACCOs translated into positive local real effects.

## 7 Conclusion

We exploit the staggered implementation of a large-scale microfinance expansion program to analyze its effects on access to credit and on the transition of previously-unbanked individuals to commercial banks. Using data from a unique administrative dataset comprising the universe of individual loans granted by all financial institutions in Rwanda between 2008 and 2016, we show that the program raised the likelihood of access to loans for the previously-unbanked population. While this effect is mostly driven by newly set-up U-SACCOs, we show that there were also positive spillover effects on bank lending starting one year after implementation. The program also generated positive effects on the local economy through poverty reduction and firm creation.

A key result of our paper is that an economically sizeable share of U-SACCO borrowers switch to commercial banks, which grant them larger, cheaper, and longer-term loans than the loans they might have received from U-SACCOs. The borrowers that transition from U-SACCOs to banks are less risky than non-switchers but have comparable ex-post risk of default, adjusted for ex-ante credit risk, to other commercial bank borrowers. A credit history at a U-SACCO and the ability to signal quality through the credit bureau—accessible to both microfinance institutions and banks—is key to the program enabling this transition. Borrowers at U-SACCOs who switch to banks receive better loan terms than first-time bank borrowers with no credit history, highlighting the value of U-SACCOs’ prescreening of the previously unbanked population.

Overall, our analysis supports the notion that microfinance institutions play an important screening role for the unbanked population in markets where scarce collateral and weak institutions impede commercial bank activities. Together with a credit bureau that is universally accessible, the microfinance sector can support the expansion of commercial banks in traditionally underserved markets, boosting access to financial services and supporting local development. However, since banks cream-skim the best borrowers, microlenders may be left with a pool of relatively riskier borrowers, which may raise questions about the feasibility of their business models and create risks for financial stability. Indeed, aggregate statistics show that the overall NPL ratio at U-SACCOs increased between December 2014 and June 2016 (from 7.1% to 12.5%), while NPLs at commercial banks remained flat (NBR, 2016).

As the program was funded through government subsidies, our results have important implications for aggregate welfare and efficiency. Previous theoretical work shows that government interventions in credit markets where lending is inefficiently low due to information asymmetries can increase welfare (Mankiw, 1986). Our evidence suggests that the program acted as an indirect subsidy to commercial banks, which took advantage of U-SACCOs' screening to expand credit to good borrowers in underserved but promising markets. These findings show that accounting for the general equilibrium effects can change the cost-benefit calculus of microfinance subsidies (Cull *et al.*, 2009). In particular, the transition of good borrowers from microfinance to banks can be a goal of the social planner, justifying subsidies up to a point. We believe that the interplay between the microfinance and commercial banking sectors, and the government's role in this area, deserve further research.

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Table 1: Descriptive Statistics

The table presents summary statistics (mean, median and standard deviation—SD) for the main variables in our sample. The sample period is January 2008–December 2016 and includes 317,281 individuals in 337 municipalities who borrow from commercial banks, U-SACCOs, and other MFIs, or who do not receive any loans during this period. The access to credit variables (Panel A) are dummies equal to 1 if the borrower in a given month has an outstanding loan from any financial institution, a U-SACCO, a commercial bank, or other MFIs. In Panel B, loan exposure and principal amounts are expressed in million of Rwandan Francs (RWF). Non-performing loan is a dummy equal to 1 if the loan is in arrears for more than 90 days. In Panel C, Female is equal to 1 for females and 0 for males; Young takes value 1 for individuals below 30 years of age and 0 otherwise; Single is equal to 1 for single individuals and 0 otherwise; and Government Employee is equal to 1 for government employees and 0 for any other occupation and the unemployed. Panel D lists the municipality characteristics measured in the pre-program period. Bank Presence is the number of bank branches per capita, Economic Growth is the change in nightlights between 2008 and 2010, Economic Development is nightlights in 2010, Poverty is the poverty headcount ratio (% population below the poverty line), Adult Population is the number of adults (in thousands), Conflicts is the number of violent events between 1997 and 2010, Distance to Capital is the travel time (in hours) by car of the shortest route from Kigali to the municipality centroid, and Rural is a dummy that identifies rural municipalities. Data sources: Rwandan Credit Reference Bureau, National Institute of Statistics of Rwanda, National Oceanic and Atmospheric Administration (NOAA), OpenStreetMaps, and ACLED.

|  | N          | Mean  | Median | SD    |
|--|------------|-------|--------|-------|
|  | (1)        | (2)   | (3)    | (4)   |
| <i>A. Access to Credit</i>             |            |       |        |       |
| Loan from Any Institution              | 34,266,348 | 0.133 | 0.000  | 0.340 |
| Loan from U-SACCO                      | 34,266,348 | 0.034 | 0.000  | 0.181 |
| Loan from Bank                         | 34,266,348 | 0.063 | 0.000  | 0.243 |
| Loan from other MFI                    | 34,266,348 | 0.045 | 0.000  | 0.207 |
| <i>B. Loan Characteristics</i>         |            |       |        |       |
| Loan Exposure (RWF mn)                 | 4,936,650  | 2.913 | 0.558  | 18.95 |
| Loan Principal Amount (RWA mn)         | 4,936,650  | 4.132 | 1.000  | 25.85 |
| Interest Rate (%)                      | 4,102,615  | 19.52 | 18.00  | 12.88 |
| Maturity (months)                      | 4,936,650  | 31.01 | 24.00  | 27.76 |
| Non-Performing Loan                    | 4,936,650  | 0.122 | 0.000  | 0.327 |
| <i>C. Borrower characteristics</i>     |            |       |        |       |
| Female                                 | 317,281    | 0.414 | 0.000  | 0.493 |
| Single                                 | 317,281    | 0.091 | 0.000  | 0.287 |
| Young                                  | 317,281    | 0.414 | 0.000  | 0.493 |
| Government Employee                    | 317,281    | 0.089 | 0.000  | 0.285 |
| <i>D. Municipality characteristics</i> |            |       |        |       |
| Bank Presence                          | 337        | 0.046 | 0.000  | 0.074 |
| Economic Growth                        | 337        | 0.993 | 0.000  | 3.547 |
| Economic Development                   | 337        | 2.570 | 0.000  | 9.910 |
| Poverty                                | 337        | 0.420 | 0.444  | 0.125 |
| Adult Population                       | 337        | 13.85 | 12.92  | 5.075 |
| Conflicts                              | 337        | 0.852 | 0.000  | 3.436 |
| Distance to Capital                    | 337        | 1.716 | 1.589  | 0.899 |
| Rural                                  | 337        | 0.700 | 0.000  | 0.459 |

Table 2: The Timing of the U-SACCO Program and Local Conditions

The table presents the coefficient estimates of a proportional hazard model (Cox, 1972) where the dependent variable is the time (in months) until the occurrence of the first loan extended by a U-SACCO in a given municipality (the “event”). For the 36 (= 337 – 301) municipalities in our sample that do not extend loans during the sample period, the model takes the “event” as not occurring. The explanatory variables are defined at the municipality level and are measured in the pre-program period. See Table 1 for the definition of each variable. The U-SACCO variables measure, for each U-SACCO operating in a given municipality, the number of members, total assets (in million RWF), total deposits (in million RWF), the capital-to-assets ratio, and the liquidity-to-assets ratio as of 2010. Standard errors clustered at the municipality level are in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

|                         | (1)               | (2)               | (3)              | (4)               | (5)              | (6)              | (7)              | (8)               | (9)               | (10)              | (11)              | (12)             | (13)             | (14)              |
|-------------------------|-------------------|-------------------|------------------|-------------------|------------------|------------------|------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|-------------------|
| Economic Growth         | -0.025<br>(0.021) |                   |                  |                   |                  |                  |                  |                   |                   |                   |                   |                  |                  | -0.046<br>(0.063) |
| Economic Development    |                   | -0.008<br>(0.008) |                  |                   |                  |                  |                  |                   |                   |                   |                   |                  |                  | 0.003<br>(0.025)  |
| Poverty                 |                   |                   | 0.026<br>(0.501) |                   |                  |                  |                  |                   |                   |                   |                   |                  |                  | -0.920<br>(0.623) |
| Bank Presence           |                   |                   |                  | -1.394<br>(0.933) |                  |                  |                  |                   |                   |                   |                   |                  |                  | -0.774<br>(1.190) |
| U-SACCO Members         |                   |                   |                  |                   | 0.084<br>(0.052) |                  |                  |                   |                   |                   |                   |                  |                  | 0.042<br>(0.069)  |
| U-SACCO Assets          |                   |                   |                  |                   |                  | 0.003<br>(0.004) |                  |                   |                   |                   |                   |                  |                  | 0.035<br>(0.030)  |
| U-SACCO Deposits        |                   |                   |                  |                   |                  |                  | 0.002<br>(0.005) |                   |                   |                   |                   |                  |                  | -0.043<br>(0.034) |
| U-SACCO Capital Ratio   |                   |                   |                  |                   |                  |                  |                  | -0.285<br>(0.362) |                   |                   |                   |                  |                  | -1.050<br>(0.655) |
| U-SACCO Liquidity Ratio |                   |                   |                  |                   |                  |                  |                  |                   | -0.283<br>(0.318) |                   |                   |                  |                  | -0.398<br>(0.264) |
| Adult Population        |                   |                   |                  |                   |                  |                  |                  |                   |                   | -0.003<br>(0.011) |                   |                  |                  | 0.018<br>(0.015)  |
| Conflicts               |                   |                   |                  |                   |                  |                  |                  |                   |                   |                   | -0.025<br>(0.016) |                  |                  | -0.023<br>(0.021) |
| Distance to Capital     |                   |                   |                  |                   |                  |                  |                  |                   |                   |                   |                   | 0.043<br>(0.064) |                  | -0.013<br>(0.071) |
| Rural                   |                   |                   |                  |                   |                  |                  |                  |                   |                   |                   |                   |                  | 0.171<br>(0.137) | 0.123<br>(0.167)  |
| No. Observations        | 337               | 337               | 337              | 337               | 337              | 337              | 337              | 337               | 337               | 337               | 337               | 337              | 337              | 337               |

Table 3: Impact of the U-SACCO Program on Access to Credit

The table presents coefficient estimates of model 1 where the dependent variable is a dummy equal to 1 for individuals who, at time  $t$ , have an outstanding loan with any financial institution (columns 1-3) or only U-SACCOs (column 4), commercial banks (column 5), or other MFIs (column 6). *Post U-SACCO* is a dummy equal to 1 after a U-SACCO starts its lending activity in a given municipality and month, and 0 otherwise. Borrower controls include a set of dummies for gender, marital status, age, and employment status. See Table 1 for the definition of each variable. In columns 3-6 the *Post U-SACCO* dummy is split in a set of dummies for 6-month intervals around the date when the U-SACCO starts its lending activity in the municipality. The dummy variables for the pre-program period are not shown for reason of space, but they are plotted in Figures 2 (columns 3–5) and C3 (column 6). The data are at the borrower-municipality-month level. The sample period is 2008:M1 to 2016:M12. Standard errors clustered at the municipality level in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

|                          | Dummy =1 if individual has a Loan in |                     |                     |                     |                    |                  |
|--------------------------|--------------------------------------|---------------------|---------------------|---------------------|--------------------|------------------|
|                          | Any Institution                      |                     | U-SACCO             | Bank                | Other MFI          |                  |
|                          | (1)                                  | (2)                 | (3)                 | (4)                 | (5)                | (6)              |
| Post U-SACCO             | 0.032***<br>(0.006)                  | 0.021***<br>(0.005) |                     |                     |                    |                  |
| Post U-SACCO [t,t+6]     |                                      |                     | 0.014***<br>(0.003) | 0.013***<br>(0.003) | 0.002<br>(0.001)   | 0.002<br>(0.002) |
| Post U-SACCO [t+7,t+12]  |                                      |                     | 0.041***<br>(0.007) | 0.042***<br>(0.006) | 0.004<br>(0.003)   | 0.003<br>(0.003) |
| Post U-SACCO [t+13,t+18] |                                      |                     | 0.068***<br>(0.010) | 0.069***<br>(0.008) | 0.008*<br>(0.004)  | 0.004<br>(0.004) |
| Post U-SACCO [t+19,t+24] |                                      |                     | 0.083***<br>(0.012) | 0.080***<br>(0.009) | 0.014**<br>(0.006) | 0.004<br>(0.006) |
| Post U-SACCO [t+25,t+30] |                                      |                     | 0.091***<br>(0.014) | 0.084***<br>(0.010) | 0.018**<br>(0.008) | 0.005<br>(0.007) |
| Post U-SACCO [t+31,t+36] |                                      |                     | 0.102***<br>(0.016) | 0.088***<br>(0.010) | 0.024**<br>(0.010) | 0.008<br>(0.008) |
| Post U-SACCO [ $>t+36$ ] |                                      |                     | 0.116***<br>(0.019) | 0.095***<br>(0.010) | 0.031**<br>(0.012) | 0.009<br>(0.010) |
| Municipality FE          | Y                                    | Y                   | Y                   | Y                   | Y                  | Y                |
| Time (Year:month) FE     | Y                                    | Y                   | Y                   | Y                   | Y                  | Y                |
| Borrower Controls        | Y                                    | Y                   | Y                   | Y                   | Y                  | Y                |
| Municipality Time Trends | N                                    | Y                   | Y                   | Y                   | Y                  | Y                |
| No. Observations         | 34,266,348                           | 34,266,348          | 34,266,348          | 34,266,348          | 34,266,348         | 34,266,348       |
| No. Municipalities       | 337                                  | 337                 | 337                 | 337                 | 337                | 337              |
| No. Individuals          | 317,281                              | 317,281             | 317,281             | 317,281             | 317,281            | 317,281          |
| Adjusted R-squared       | 0.193                                | 0.200               | 0.201               | 0.121               | 0.078              | 0.156            |

Table 4: Access to Credit—Cross Sectional Heterogeneity

The table presents coefficient estimates of model 1 where the dependent variable is a dummy equal to 1 for individuals who, at time  $t$ , have an outstanding loan with a U-SACCOs. *Post U-SACCO* is a dummy equal to 1 after a U-SACCO starts its lending activities in a given municipality and month, and 0 otherwise. The *Post U-SACCO* dummy is interacted with a set of dummy variables which identify municipalities: (i) with low bank presence; (ii) with low growth; (iii) with low economic development; iv) with high poverty; (v) distant from the capital Kigali; and vi) in a rural area. These dummy variables are defined from the continuous ones (as defined in Table 1) by splitting the continuous variable around the 75<sup>th</sup> percentile of the sample distribution. Specifically, Low Bank Presence is equal to 1 if the number of bank branches per capita is below the 75<sup>th</sup> percentile, and 0 otherwise; Low Growth is equal to 1 if the change in nightlights between 2008 and 2010 is below the 75<sup>th</sup> percentile, and 0 otherwise; Low Nightlights is equal to 1 if nightlights in 2010 is below the 75<sup>th</sup> percentile, and 0 otherwise; High Poverty is equal to 1 if the inverse of the poverty headcount ratio in the pre-period is below the 75<sup>th</sup> percentile, and 0 otherwise; Long Distance to Capital is equal to 1 if the inverse of the travel time by car from Kigali to a municipality centroid in the pre-period is below the 75<sup>th</sup> percentile, and 0 otherwise. Borrower controls include a set of dummies for gender, marital status, age, and employment status. See Table 1 for the definition of each variable. The data are at the borrower-municipality-month level. The sample period is 2008:M1 to 2016:M12. Standard errors clustered at the municipality level in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

|   | Dummy =1 if individual has a Loan in a U-SACCO |                     |                     |                     |                    |                     |
|---|--|---------------------|---------------------|---------------------|--------------------|---------------------|
|   | (1)  | (2)                 | (3)                 | (4)                 | (5)                | (6)                 |
| Post U-SACCO x Low Bank Presence        | 0.024***<br>(0.008)                            |                     |                     |                     |                    |                     |
| Post U-SACCO x Low Growth               |  | 0.027***<br>(0.008) |                     |                     |                    |                     |
| Post U-SACCO x Low Development          |  |                     | 0.026***<br>(0.008) |                     |                    |                     |
| Post U-SACCO x High Poverty             |  |                     |                     | 0.022***<br>(0.008) |                    |                     |
| Post U-SACCO x Long Distance to Capital |  |                     |                     |                     | 0.018**<br>(0.008) |                     |
| Post U-SACCO x Rural                    |  |                     |                     |                     |                    | 0.025***<br>(0.005) |
| Post U-SACCO                            | 0.005<br>(0.008)                               | 0.002<br>(0.008)    | 0.003<br>(0.008)    | 0.005<br>(0.008)    | 0.009<br>(0.008)   | 0.010*<br>(0.005)   |
| Municipality FE                         | Y  | Y                   | Y                   | Y                   | Y                  | Y                   |
| Time (Year:month) FE                    | Y  | Y                   | Y                   | Y                   | Y                  | Y                   |
| Borrower Controls                       | Y  | Y                   | Y                   | Y                   | Y                  | Y                   |
| Municipality Time Trends                | Y  | Y                   | Y                   | Y                   | Y                  | Y                   |
| No. Observations                        | 34,266,348                                     | 34,266,348          | 34,266,348          | 34,266,348          | 34,266,348         | 34,266,348          |
| No. Municipalities                      | 337  | 337                 | 337                 | 337                 | 337                | 337                 |
| No. Individuals                         | 317,281  | 317,281             | 317,281             | 317,281             | 317,281            | 317,281             |

Table 5: Analysis of Switching Loans—Baseline

The table reports coefficients estimates of the [Abadie and Imbens \(2011\)](#) bias-corrected matching estimator where the dependent variable is the loan amount, loan interest rate, or loan maturity. The treatment group consists of new loans to borrowers who switch from U-SACCOs to commercial banks i.e., switching loans. The control group is either new loans by U-SACCOs to non-switcher borrowers (columns 1–3) or new loans by commercial banks to other borrowers (columns 4–6). We match loans that are granted in the same month and select the nearest-neighbors of each switching loan based on borrower characteristics (female, single, young, government employee), ex-ante credit history characteristics (no. years of credit history, no. lending relationships, no. loans, and total outstanding loan amount of a borrower in the month before the new loan, as well as NPLs with any lender within 1 year, 2 years, and any time before the new loan), loan characteristics (mortgage and collateral), and characteristics of the municipality where the borrower resides measured before the program. The loan amount is expressed in million RWF, the loan interest rate in percentage points, and the loan maturity in months. The detailed variable definitions are available in [Table 1](#). Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

|  | Control Group:<br>New loans by U-SACCOs to non-switchers |                      |                     | Control Group:<br>New loans by banks to other borrowers |                   |                     |
|--|--|----------------------|---------------------|---|-------------------|---------------------|
|  | Loan Amount  | Interest Rate        | Loan Maturity       | Loan Amount   | Interest Rate     | Loan Maturity       |
|  | (1)  | (2)                  | (3)                 | (4)   | (5)               | (6)                 |
| Switching Loan - Other Loans                       | 0.812***<br>(0.085)                                      | -6.481***<br>(0.518) | 9.654***<br>(0.454) | 0.006<br>(0.110)  | -0.357<br>(0.260) | 2.834***<br>(0.493) |
| <i>Matching Variables:</i>                         |  |                      |                     |   |                   |                     |
| Year:Month of Loan Issuance                        | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| U-SACCOs   | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Commercial Banks                                   | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Female   | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Single   | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Young  | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Government Employee                                | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| No. Years of Credit History Before New Loan        | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| No. Lending Relationships Before New Loan          | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| No. Loans Before New Loan                          | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Total Outstanding Loan Amount Before New Loan      | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| NPL with any Lender within 1 year Before New Loan  | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| NPL with any Lender within 2 years Before New Loan | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| NPL with any Lender Before New Loan                | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Mortgage   | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Collateral   | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Bank Presence in Municipality                      | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Economic Growth in Municipality                    | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Economic Development in Municipality               | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Poverty in Municipality                            | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Adult Population in Municipality                   | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Conflicts in Municipality                          | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Distance to Capital from Municipality              | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Rural Municipality                                 | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| No. Switchers (Treated)                            | 2,910  | 2,910                | 2,910               | 2,910   | 2,910             | 2,910               |
| No. Untreated Borrowers                            | 76,512   | 76,512               | 76,512              | 230,974   | 230,974           | 230,974             |

Table 6: Analysis of Switching Loans—Ex-Post Loan Performance

The table reports coefficients estimates of the [Abadie and Imbens \(2011\)](#) bias-corrected nearest-neighbor matching estimator where the dependent variable is a dummy equal to one if a loan becomes non-performing within 1 year, within 2 years, or until maturity, and 0 otherwise. The treatment group consists of loans to borrowers who switch from U-SACCOs to commercial banks i.e., switching loans. The control group is: new loans by all U-SACCOs to non-switcher borrowers (columns 1–3), or new loans by the same commercial bank the U-SACCO borrower switched to (columns 4–6). We match loans that are granted in the same month and select the nearest-neighbors of each switching loan based on borrower characteristics (female, single, young, government employee), ex-ante credit history characteristics (no. years of credit history, no. lending relationships, no. loans, and total outstanding loan amount of a borrower in the month before the new loan, as well as NPLs with any lender within 1 year, 2 years, and any time before the new loan), loan characteristics (mortgage, collateral, amount, interest rate, maturity), and characteristics of the municipality where the borrower resides measured before the program. The detailed variable definitions are available in [Table 1](#). Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

|   | Control Group:<br>New loans by U-SACCOs to non-switchers |                      |                      | Control Group:<br>New loans by banks to other borrowers |                  |                  |
|---|--|----------------------|----------------------|---|------------------|------------------|
|   | within 1 year  | within 2 years       | until maturity       | within 1 year   | within 2 years   | until maturity   |
|   | (1)  | (2)                  | (3)                  | (4)   | (5)              | (6)              |
| Switching Loan - Other Loans                        | -0.039***<br>(0.009)                                     | -0.044***<br>(0.010) | -0.040***<br>(0.010) | 0.000<br>(0.009)  | 0.013<br>(0.009) | 0.013<br>(0.009) |
| <i>Matching Variables:</i>                          |  |                      |                      |   |                  |                  |
| Year:Month of Loan Issuance                         | Y  | Y                    | Y                    | Y   | Y                | Y                |
| U-SACCOs  | Y  | Y                    | Y                    | Y   | Y                | Y                |
| Commercial Banks                                    |  |                      |                      |   |                  |                  |
| Female  | Y  | Y                    | Y                    | Y   | Y                | Y                |
| Single  | Y  | Y                    | Y                    | Y   | Y                | Y                |
| Young   | Y  | Y                    | Y                    | Y   | Y                | Y                |
| Government Employee                                 | Y  | Y                    | Y                    | Y   | Y                | Y                |
| No. Years of Credit History before Switching        | Y  | Y                    | Y                    | Y   | Y                | Y                |
| No. Lending Relationships before Switching          | Y  | Y                    | Y                    | Y   | Y                | Y                |
| No. Loans before Switching                          | Y  | Y                    | Y                    | Y   | Y                | Y                |
| Total Outstanding Loan Amount before Switching      | Y  | Y                    | Y                    | Y   | Y                | Y                |
| NPL with any Lender within 1 year before Switching  | Y  | Y                    | Y                    | Y   | Y                | Y                |
| NPL with any Lender within 2 years before Switching | Y  | Y                    | Y                    | Y   | Y                | Y                |
| NPL with any Lender before Switching                | Y  | Y                    | Y                    | Y   | Y                | Y                |
| Mortgage  | Y  | Y                    | Y                    | Y   | Y                | Y                |
| Collateral  | Y  | Y                    | Y                    | Y   | Y                | Y                |
| Loan Amount   | Y  | Y                    | Y                    | Y   | Y                | Y                |
| Loan Interest Rate                                  | Y  | Y                    | Y                    | Y   | Y                | Y                |
| Loan Maturity                                       | Y  | Y                    | Y                    | Y   | Y                | Y                |
| Bank Presence in Municipality                       | Y  | Y                    | Y                    | Y   | Y                | Y                |
| Economic Growth in Municipality                     | Y  | Y                    | Y                    | Y   | Y                | Y                |
| Economic Development in Municipality                | Y  | Y                    | Y                    | Y   | Y                | Y                |
| Poverty in Municipality                             | Y  | Y                    | Y                    | Y   | Y                | Y                |
| Adult Population in Municipality                    | Y  | Y                    | Y                    | Y   | Y                | Y                |
| Conflicts in Municipality                           | Y  | Y                    | Y                    | Y   | Y                | Y                |
| Distance to Capital from Municipality               | Y  | Y                    | Y                    | Y   | Y                | Y                |
| Rural Municipality                                  | Y  | Y                    | Y                    | Y   | Y                | Y                |
| No. Switchers (Treated)                             | 2,910  | 2,910                | 2,910                | 2,910   | 2,910            | 2,910            |
| No. Untreated Borrowers                             | 76,512   | 76,512               | 76,512               | 230,974   | 230,974          | 230,974          |

Table 7: Analysis of Switching Loans—Comparison with First-time Bank Borrowers

The table reports coefficients estimates of the [Abadie and Imbens \(2011\)](#) bias-corrected nearest-neighbor matching estimator where the dependent variable is, alternatively, loan size, loan interest rate, and loan maturity. The treatment group consists of loans to borrowers who switch from U-SACCOs to commercial banks i.e., switching loans. The control group is: new loans to first-time borrowers extended by the same commercial bank the U-SACCO borrower switched to (columns 1-3); and new loans to other-MFI-to-bank switchers extended by the same commercial bank the U-SACCO borrower switched to (columns 4-6). We match loans that are granted in the same month and select the nearest-neighbors of each switching loan based on borrower characteristics (female, single, young, government employee), ex-ante credit history characteristics (no. years of credit history, no. lending relationships, no. loans, and total outstanding loan amount of a borrower in the month before the new loan, as well as NPLs with any lender within 1 year, 2 years, and any time before the new loan), loan characteristics (mortgage and collateral), and characteristics of the municipality where the borrower resides measured before the program. The loan amount is expressed in million RWF, the loan interest rate in percentage points, and the loan maturity in months. The detailed variable definitions are available in [Table 1](#). Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

|   | Control Group:<br>New loans by banks to first-time borrowers |                      |                     | Control Group:<br>New loans by banks to MFI-to-bank switchers |                      |                     |
|---|--|----------------------|---------------------|---|----------------------|---------------------|
|   | Loan Amount<br>(1)   | Interest Rate<br>(2) | Maturity<br>(3)     | Loan Amount<br>(4)  | Interest Rate<br>(5) | Maturity<br>(6)     |
| Switching Loan - Other Loans                        | -0.022<br>(0.147)  | -0.690***<br>(0.227) | 2.498***<br>(0.433) | 0.108<br>(0.164)  | -1.455***<br>(0.299) | 4.275***<br>(0.662) |
| <i>Matching Variables:</i>                          |  |                      |                     |   |                      |                     |
| Year:Month of Loan Issuance                         | Y  | Y                    | Y                   | Y   | Y                    | Y                   |
| Commercial Banks                                    | Y  | Y                    | Y                   | Y   | Y                    | Y                   |
| Female  | Y  | Y                    | Y                   | Y   | Y                    | Y                   |
| Single  | Y  | Y                    | Y                   | Y   | Y                    | Y                   |
| Young   | Y  | Y                    | Y                   | Y   | Y                    | Y                   |
| Government Employee                                 | Y  | Y                    | Y                   | Y   | Y                    | Y                   |
| No. Years of Credit History before Switching        |  |                      |                     |   |                      |                     |
| No. Lending Relationships before Switching          |  |                      |                     |   |                      |                     |
| No. Loans before Switching                          |  |                      |                     |   |                      |                     |
| Total Outstanding Loan Amount before Switching      |  |                      |                     |   |                      |                     |
| NPL with any Lender within 1 year before Switching  |  |                      |                     |   |                      |                     |
| NPL with any Lender within 2 years before Switching |  |                      |                     |   |                      |                     |
| NPL with any Lender before Switching                |  |                      |                     |   |                      |                     |
| Mortgage  | Y  | Y                    | Y                   | Y   | Y                    | Y                   |
| Collateral  | Y  | Y                    | Y                   | Y   | Y                    | Y                   |
| Bank Presence in Municipality                       | Y  | Y                    | Y                   | Y   | Y                    | Y                   |
| Economic Growth in Municipality                     | Y  | Y                    | Y                   | Y   | Y                    | Y                   |
| Economic Development in Municipality                | Y  | Y                    | Y                   | Y   | Y                    | Y                   |
| Poverty in Municipality                             | Y  | Y                    | Y                   | Y   | Y                    | Y                   |
| Adult Population in Municipality                    | Y  | Y                    | Y                   | Y   | Y                    | Y                   |
| Conflicts in Municipality                           | Y  | Y                    | Y                   | Y   | Y                    | Y                   |
| Distance to Capital from Municipality               | Y  | Y                    | Y                   | Y   | Y                    | Y                   |
| Rural Municipality                                  | Y  | Y                    | Y                   | Y   | Y                    | Y                   |
| No. Switchers (Treated)                             | 2,898  | 2,898                | 2,898               | 2,819   | 2,819                | 2,819               |
| No. Untreated Borrowers                             | 83,759   | 83,759               | 83,759              | 5,725   | 5,725                | 5,725               |

Table 8: Real Effects of the U-SACCO Program on Household Poverty

The table presents coefficient estimates for the effects of the U-SACCO program on household poverty. The dependent variables are a dummy for households in poverty (columns 1–3) and households in extreme poverty (columns 4–6). The data come from the 2010–2011 and 2016–2017 Integrated Household Living Conditions Surveys (EICV3 and EICV5), obtained from the data portal of the National Institute of Statistics Rwanda. There are nationally representative household surveys conducted for purposes of poverty monitoring. Households are identified as being in poverty (extreme poverty) status if the consumption level is below the \$1.09 per day international poverty line (0.65x of the line). The poverty lines are 159,375 RWF and 105,064 RWF per adult equivalent per year (at January 2014 prices). The dummy variable *Post* takes value 1 for the (post-program) 2016–2017 survey, and 0 for the (pre-program) 2010–2011 survey. The bottom two rows report p-values from one-sided tests that (i) the coefficient on the *Post* dummy in low bank presence municipalities is higher than that in high bank presence municipalities and that (ii) the coefficient of *Post* × *Low Bank Presence* in high switching municipalities is higher than in low switching municipalities. Low bank presence municipalities are those below the 75<sup>th</sup> percentile of the distribution of the number of bank branches per capita before the program. High switching municipalities are above the 25<sup>th</sup> percentile of the distribution of share of switchers over 2012–2016 relative to the total number of U-SACCO borrowers in 2012. Household controls include size and a rural dummy. Regressions are weighted by household survey sampling weight. Standard errors clustered at the district level in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

|  | (1)                   | (2)                   | (3)                   | (4)                   | (5)                   | (6)                  |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------------|
|  | Household in poverty  |                       |                       | Household             | in                    | extreme              |
|  |                       |                       |                       | poverty               |                       |                      |
| Post   | -0.0563***<br>(0.017) |                       |                       | -0.0407***<br>(0.014) |                       |                      |
| Post × Low Bank Presence                     |                       | -0.0634***<br>(0.019) |                       |                       | -0.0462***<br>(0.016) |                      |
| Post × Low Bank Presence ×<br>High Switching |                       |                       | -0.0559***<br>(0.018) |                       |                       | -0.0363**<br>(0.015) |
| Post × Low Bank Presence ×<br>Low Switching  |                       |                       | -0.0927<br>(0.056)    |                       |                       | -0.0846<br>(0.050)   |
| Post × High Bank Presence                    |                       | -0.0242<br>(0.041)    | -0.0261<br>(0.042)    |                       | -0.0160<br>(0.034)    | -0.0171<br>(0.034)   |
| No. Observations                             | 43,307                | 43,307                | 43,307                | 43,307                | 43,307                | 43,307               |
| District FE                                  | Y                     | Y                     | Y                     | Y                     | Y                     | Y                    |
| Household controls                           | Y                     | Y                     | Y                     | Y                     | Y                     | Y                    |
| Adjusted R-squared                           | 0.117                 | 0.117                 | 0.118                 | 0.070                 | 0.070                 | 0.072                |
| Mean of dependent variable                   | 0.364                 | 0.364                 | 0.364                 | 0.149                 | 0.149                 | 0.149                |

# Internet Appendix

## A U-SACCO Program and Access to Credit: Evidence from Household Survey Data

Here we test whether the microcredit expansion program increased financial access using survey data from the 2012 and 2016 rounds of the FinScope surveys run by Access to Finance Rwanda as part of a cross-country project developed by FinMark Trust. The purpose of the FinScope surveys is to describe levels of access to and take-up of financial products and services in the formal and informal sectors. Summary statistics are shown in Table A1 and illustrate the prevalence of informal lending and the increase in formal lending, especially among U-SACCOs.<sup>26</sup>

We employ a slightly different identification strategy than in the baseline analysis for two reasons: (i) we only have two cross-sections of data; and (ii) borrower location is available at the district (not municipality) level. Since we cannot exploit the staggered rollout of the program across municipalities as we did in the baseline analysis, we take the 2012 survey data as the pre-program period and the 2016 survey data as the post-program period, and compare changes in access to credit before and after the program across districts.<sup>27</sup> We estimate the following specification, which controls for observable borrower characteristics, as in the loan-level analysis, and absorbs unobserved local heterogeneity with district fixed effects:

$$Pr(Access)_{idt} = \beta Post_t + \delta' X_i + \alpha_d + \varepsilon_{idt} \quad (\text{A-I})$$

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<sup>26</sup>Individuals with access to formal financial services are defined as those who have or use products or services from financial institutions that are regulated through an Act of Law. Therefore, formal lending includes commercial banks, U-SACCOs and other MFIs. Informal loans include moneylenders, community and savings groups and borrowing from employers and farmers associations.

<sup>27</sup>Ideally, we would have liked to use the 2008 survey as baseline, but the microdata are unavailable. It is important to note, however, that using 2012 as the benchmark will likely underestimate the effects of the program given that its implementation started in 2011.

where the dependent variable is the probability that individual  $i$  in district  $d$  has a bank loan in year  $t$  (where  $t = 2012$  or  $t = 2016$ ), and  $\alpha_d$  are district fixed effects.  $X_i$  are individual-level characteristics controlling for gender, age (with a dummy equal to 1 for 35-year old individuals or younger), marital status, food security status (with a dummy equal to 1 for individuals who had to skip a meal many times in the 3 months before the survey) and lack of formal education. The  $\beta$  coefficient of the key explanatory variable  $Post_t$  is then split between district with low and high bank presence before the rollout of the U-SACCO program

**Main results.** The results in Table A2 show that the likelihood of individuals having a loan increased significantly between 2012 and 2016, especially in areas with low initial bank presence. In addition, the expansion of access to formal credit is mostly driven by U-SACCOs: the probability of having a loan at a U-SACCO increased between 2012 and 2016 by 120%, while the same probability increased by 40% at commercial banks. Notably, the point estimate for the impact of the microcredit expansion program on the likelihood of having a loan at a U-SACCO (2.4 percentage points, column 9) is similar to that in the loan-level analysis (2.1 percentage points, see Table 3, column 2).

**Formal and informal lending.** A key advantage of using survey data from Finscope is that we can examine the interaction between formal and informal lending. On the one hand, one would expect crowding-out effects on informal lending because MFIs can provide an outside option to low-income borrowers that should effectively reduce the level of exploitation by informal lenders (Besley *et al.*, 2012; Mookherjee and Motta, 2016). A recent analysis by Banerjee *et al.* (2021), for instance, finds that the introduction of microfinance crowds out social network relationships and informal lending. On the other hand, if there is segmentation across loan markets (Hoff and Stiglitz, 1990), or if loans from informal lenders are used for different purposes than are microfinance loans, one can expect substitution to be limited. In

the context of the Village Funds (VF) microcredit program in rural Thailand, [Menkhoff and Runggruxsirivorn \(2011\)](#) show that households that borrow from informal lenders tend to be asset-poorer and less educated than households taking VF credit (suggesting segmentation), and that informal credit is more often used for consumption than for productive purposes.

Our results show that the increase in access to credit is common among formal and informal lenders, supporting the view that the U-SACCO program did not have crowding-out effects on informal lending. In fact, our results suggest crowding-in effects of access to microcredit for informal loans that echo those in several previous studies. [Angelucci \*et al.\* \(2015\)](#) and [Karlan and Zinman \(2019\)](#), for instance, study the case of a microlender in Mexico and find that households prefer informal loan sources over formal institutions because they are perceived as faster, easier to access, and since they are not reported to the credit bureau in case of default. Similarly, [Karlan and Zinman \(2011\)](#) show that access to microcredit in the Philippines strengthen community ties and encourage informal credit arrangements by providing households with more resources and liquidity. These studies suggest that microcredit may have positive effects through channels that are different from the traditional ones, and informal credit is an understudied potential channel.

Table A1: Descriptives on Financial Inclusion—Household Survey Evidence

The table presents population-weighted descriptive statistics (mean and standard deviation, SD) for a set of variables used in A2. The first five rows report statistic for a set of dummy variables equal to one for individuals with a loan with: 1) any (formal or informal) lender, 2) only informal lender, 3) only formal lenders, 4) commercial banks, and 5) U-SACCOs. Low bank presence is a dummy equal to 1 for the districts with a low number of bank branches per capita before the program and 0 for the top 5 districts in terms of number of bank branches per capita. Post is a dummy equal to one for observations in the 2016 survey and zero for those in the 2012 survey. Woman, young and married are indicator variables equal to one for women, individuals who are less than 36 year-old, and married individuals, respectively. Food security status is a dummy for individuals who had to skip a meal many times in the 3 months before the survey. No formal education is a dummy identifying individuals without any formal education. The dataset consists of repeated cross-sections of borrowers in the 2012 and 2016 FinScope surveys.

|                      | Finscope 2012<br>(n=6,150) |       | Finscope 2016<br>(n=12,480) |       | Finscope 2012 and 2016<br>(n=18,630) |       |
|----------------------|----------------------------|-------|-----------------------------|-------|--------------------------------------|-------|
|                      | Mean                       | SD    | Mean                        | SD    | Mean                                 | SD    |
| Any Loan             | 0.256                      | 0.437 | 0.499                       | 0.500 | 0.323                                | 0.468 |
| Informal Loan        | 0.204                      | 0.403 | 0.405                       | 0.491 | 0.255                                | 0.436 |
| Formal Loan          | 0.053                      | 0.223 | 0.094                       | 0.292 | 0.068                                | 0.252 |
| Bank Loan            | 0.028                      | 0.164 | 0.037                       | 0.189 | 0.031                                | 0.174 |
| U-SACCO Loan         | 0.019                      | 0.138 | 0.046                       | 0.209 | 0.025                                | 0.157 |
| Low Bank Presence    | 0.788                      | 0.409 | 0.809                       | 0.393 | 0.811                                | 0.392 |
| Post                 | 0.000                      | 0.000 | 1.000                       | 0.000 | 0.418                                | 0.493 |
| Woman                | 0.577                      | 0.494 | 0.103                       | 0.304 | 0.340                                | 0.474 |
| Young                | 0.463                      | 0.499 | 0.527                       | 0.499 | 0.497                                | 0.500 |
| Married              | 0.564                      | 0.496 | 0.516                       | 0.500 | 0.553                                | 0.497 |
| Food Security Status | 0.260                      | 0.439 | 0.263                       | 0.440 | 0.262                                | 0.439 |
| No Formal Education  | 0.265                      | 0.441 | 0.209                       | 0.406 | 0.246                                | 0.431 |

Table A2: Impact of U-SACCO Program on Access to Credit—Household Survey Evidence

The table presents coefficient estimates of equation A-1 in which the dependent variable is a dummy variable equal to one for individuals with a loan with: 1) any (formal or informal) lender (columns 1-2), 2) only informal lender (columns 3-4), 3) only formal lenders (columns 5-6), 4) commercial banks (columns 7-8), and 5) U-SACCOs (columns 9-10). The Post dummy is equal to 1 for the 2016 survey, and 0 for the 2012 survey and the low and high bank presence are two dummy indicators for districts with a number of bank branches per capita before the program before and above 0.085, respectively. Borrower characteristics (gender, age, marital status, food security status and the level of education) are defined in the note to Table A1. The dataset consists of repeated cross-sections of borrowers in the 2012 and 2016 FinScope surveys. The bottom rows report the mean of the dependent variables in the 2012 survey and the t-test for the equality of the coefficients of the interaction terms between the Post dummy and the Low and High Bank Presence dummies. Regressions are weighted using surveys' individual weights. Standard errors are clustered at the district level in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

|                           | (1)                  | (2)                  | (3)                 | (4)                 | (5)                  | (6)                  | (7)                  | (8)                  | (9)                  | (10)                 |
|---------------------------|----------------------|----------------------|---------------------|---------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| D.V.: Having a loan       | Any Loan             | Informal Loan        | Formal Loan         | Bank Loan           | SACCO loan           |                      |                      |                      |                      |                      |
| Post                      | 0.227***<br>(0.020)  | 0.189***<br>(0.018)  | 0.039***<br>(0.008) | 0.010*<br>(0.005)   | 0.024***<br>(0.004)  | 0.025***<br>(0.005)  | 0.024***<br>(0.004)  | 0.024***<br>(0.004)  | 0.025***<br>(0.005)  | 0.025***<br>(0.005)  |
| Post × Low Bank Presence  | 0.245***<br>(0.022)  | 0.202***<br>(0.019)  | 0.044***<br>(0.008) | 0.012***<br>(0.004) | 0.012***<br>(0.004)  | 0.012***<br>(0.004)  | 0.012***<br>(0.004)  | 0.012***<br>(0.004)  | 0.012***<br>(0.004)  | 0.012***<br>(0.004)  |
| Post × High Bank Presence | 0.154***<br>(0.036)  | 0.137***<br>(0.036)  | 0.018<br>(0.011)    | -0.001<br>(0.008)   | -0.001<br>(0.008)    | -0.001<br>(0.008)    | -0.001<br>(0.008)    | -0.001<br>(0.008)    | -0.001<br>(0.008)    | -0.001<br>(0.008)    |
| Woman                     | -0.043***<br>(0.011) | -0.044***<br>(0.011) | -0.030**<br>(0.012) | -0.031**<br>(0.012) | -0.013**<br>(0.005)  | -0.013**<br>(0.005)  | -0.004<br>(0.005)    | -0.004<br>(0.005)    | -0.008***<br>(0.003) | -0.008***<br>(0.003) |
| Young                     | -0.045***<br>(0.010) | -0.044***<br>(0.010) | -0.014<br>(0.009)   | -0.014<br>(0.009)   | -0.031***<br>(0.005) | -0.030***<br>(0.005) | -0.015***<br>(0.004) | -0.014***<br>(0.004) | -0.016***<br>(0.003) | -0.016***<br>(0.003) |
| Married                   | 0.148***<br>(0.010)  | 0.147***<br>(0.009)  | 0.089***<br>(0.009) | 0.089***<br>(0.009) | 0.059***<br>(0.005)  | 0.059***<br>(0.005)  | 0.029***<br>(0.005)  | 0.029***<br>(0.005)  | 0.024***<br>(0.003)  | 0.024***<br>(0.003)  |
| Food Security Status      | -0.042***<br>(0.011) | -0.041***<br>(0.011) | 0.002<br>(0.013)    | 0.003<br>(0.013)    | -0.043***<br>(0.004) | -0.043***<br>(0.004) | -0.018***<br>(0.003) | -0.018***<br>(0.003) | -0.018***<br>(0.003) | -0.018***<br>(0.003) |
| No Formal Education       | -0.068***<br>(0.009) | -0.068***<br>(0.009) | -0.016*<br>(0.008)  | -0.016*<br>(0.008)  | -0.051***<br>(0.006) | -0.051***<br>(0.006) | -0.026***<br>(0.004) | -0.026***<br>(0.004) | -0.020***<br>(0.004) | -0.020***<br>(0.004) |
| No. Observations          | 18,630               | 18,630               | 18,630              | 18,630              | 18,630               | 18,630               | 18,630               | 18,630               | 18,630               | 18,630               |
| District FE               | Yes                  | Yes                  | Yes                 | Yes                 | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |
| Adjusted R-squared        | 0.119                | 0.121                | 0.092               | 0.092               | 0.048                | 0.048                | 0.037                | 0.037                | 0.021                | 0.021                |
| Mean of D.V. in 2012      | 0.256                | 0.256                | 0.206               | 0.206               | 0.050                | 0.050                | 0.025                | 0.025                | 0.020                | 0.020                |
| Equality test (p-value)   |                      | 0.036                | 0.112               | 0.112               | 0.043                | 0.043                | 0.089                | 0.089                | 0.599                | 0.599                |

## B Relationship Lending at U-SACCOs

Here we test for the presence of lending constraints, by exploiting the notion of relationship lending. The idea is that loan terms should improve as borrowing relationships matures, especially for informationally-opaque borrowers (Boot and Thakor, 1994; Bharath *et al.*, 2011; Bos *et al.*, 2021). Better loan terms would also reflect dynamic repayment incentives in microfinance (Tedeschi, 2006; Shapiro, 2015). However, such returns would be lower at U-SACCOs if the regulatory environment or balance sheet size acted as a constraint. We bring this conjecture to the data by examining the patterns of repeated borrowing at U-SACCOs to test whether loan terms (loan size, interest rate, and maturity) improve with the length of the lender-borrower relationship and how these terms compare to loan terms at commercial banks.

First, in the sample of switchers we conduct a within-borrower analysis by comparing the first loan at U-SACCOs with all the subsequent loans before switching (taking the average of loan terms when there is more than one loan). We find that a longer lending relationship is associated with a significant increase in loan size and maturity (Table B1, Panel A). Then, comparing the last loan obtained by switchers at the U-SACCO with the first loan that *the same borrower* obtains from a bank, we find that the premium offered by banks in terms of loan size and maturity is larger than what borrowers can obtain through repeated borrowing at U-SACCOs. In addition, the first loan at the commercial bank is 3.5 percentage point cheaper than the last at the U-SACCO (Table B1, Panel B).

Second, in the full sample we relate loan terms to a measure of relationship length (defined as the number of months since the first loan was granted to a given borrower by a given financial institution), a dummy variable for loans granted by U-SACCOs, and their interaction term. This specification allows us to test whether returns to a longer lender-borrower relationship differ between U-SACCOs and banks. As reported in Table B2, longer borrower relationships are associated, on average and across all lender types, with better loan terms.

However, the benefits of relationship lending are lower at U-SACCOs than they are at banks (Panel A). The same results hold if the dependent variables identify large loans and those with low interest rates and long maturity (Panel B).

We interpret the evidence in Tables **B1–B2** on lower returns to relationships lending at U-SACCOs than at banks suggesting lending constraints at U-SACCOs.

Table B1: Analysis of Switching Loans—Within Borrower and Across Lender Types

The table presents within-borrower mean comparison tests of loan terms (loan amount, interest rate spread, and loan maturity). The interest rate spread is the interest rate on the loan minus the repo rate. In panel A we consider individuals with multiple loans at the U-SACCO before they switch to commercial banks and compare the subsequent loan (or the average of loan terms of the subsequent loans) at the U-SACCO with the first one. In panel B we consider the same individuals who switched from U-SACCOs to commercial banks and compare the switching loan at the bank with the last loan obtained at the U-SACCO before switching. Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

|  | Loan Amount         | Interest Rate Spread | Maturity            |
|--|---------------------|----------------------|---------------------|
|  | (1)                 | (2)                  | (3)                 |
| <b>Panel A.</b> Subsequent Loan of Switcher at U-SACCO -<br>First Loan of Switcher at U-SACCO Before Switching | 0.531***<br>(0.065) | -0.403<br>(0.480)    | 5.388***<br>(0.385) |
| No. Subsequent Loans of Switchers at U-SACCO Before Switching  | 5,181               | 2,790                | 5,181               |
| No. First Loans of Switchers at U-SACCO Before Switching   | 2,910               | 1,772                | 2,910               |
| <b>Panel B.</b> Switching Loan at Commercial Bank -<br>Last Loan at U-SACCO Before Switching                   | 0.729***<br>(0.075) | -3.554***<br>(0.507) | 7.618***<br>(0.413) |
| No. Future Loans of Switchers  | 2,910               | 1,694                | 2,910               |
| No. Switching Loans  | 2,910               | 1,694                | 2,910               |

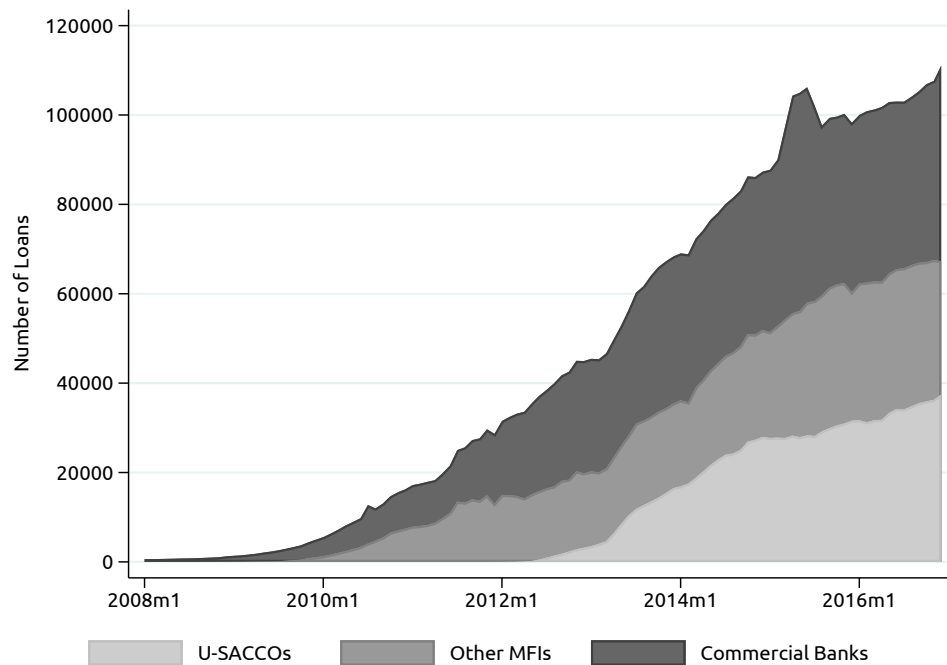
Table B2: Lending Constraints at U-SACCOs: The Role of Relationship Length

The table presents coefficient estimates of a linear model in which the dependent variable is a measure of loan terms (amount, interest rate, and maturity). In Panel A loan amount is expressed in million RWF, interest rate in percent (divided by 100) and maturity in months. In Panel B the dependent variables are defined as follows: (i) a dummy variable equal to 1 if loan size is larger than the 75<sup>th</sup> percentile of the sample distribution, and 0 otherwise; (ii) a dummy variable equal to 1 if the interest rate on the loan is lower than the 25<sup>th</sup> percentile of the sample distribution, and 0 otherwise; and (iii) a dummy variable equal to 1 if loan maturity is larger than the 75<sup>th</sup> percentile of the sample distribution, and 0 otherwise. *U-SACCO* is a dummy equal to 1 if the borrower has a loan with a U-SACCO and 0 otherwise. Relationship length measured the length of the bank-borrower relationship, in months. Borrower controls include a set of dummies for gender, marital status, age, and employment status. See Table 1 for the definition of each variable. The data are at the borrower-municipality-month level, conditional on individuals having an outstanding loan. The sample period is 2008:M1 to 2016:M12. Standard errors clustered at the municipality level in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

|                               | (1)                              | (2)                                | (3)                           |
|-------------------------------|----------------------------------|------------------------------------|-------------------------------|
| <b>Panel A</b>                | Loan amount                      | Interest rate                      | Maturity                      |
| Relationship Length × U-SACCO | -0.828***<br>(0.108)             | 0.296*<br>(0.157)                  | -2.294***<br>(0.247)          |
| Relationship Length           | 1.007***<br>(0.122)              | -0.506***<br>(0.037)               | 7.339***<br>(0.144)           |
| U-SACCO                       | -0.960***<br>(0.230)             | 5.256***<br>(0.507)                | -9.991***<br>(0.496)          |
| Adjusted R-squared            | 0.027                            | 0.115                              | 0.262                         |
| <b>Panel B</b>                | Loan amount<br>> 75th percentile | Interest rate<br>< 25th percentile | Maturity<br>> 75th percentile |
| Relationship Length × U-SACCO | -0.011***<br>(0.002)             | -0.074***<br>(0.005)               | -0.042***<br>(0.004)          |
| Relationship Length           | 0.032***<br>(0.002)              | 0.063***<br>(0.002)                | 0.087***<br>(0.002)           |
| U-SACCO                       | -0.141***<br>(0.008)             | -0.010<br>(0.015)                  | -0.121***<br>(0.008)          |
| Municipality × Time FE        | Y                                | Y                                  | Y                             |
| Borrower Controls             | Y                                | Y                                  | Y                             |
| No. Observations              | 2,816,928                        | 2,816,928                          | 2,816,928                     |
| No. Municipalities            | 337                              | 337                                | 337                           |
| No. Individuals               | 129,523                          | 129,523                            | 129,523                       |
| Adjusted R-squared            | 0.188                            | 0.168                              | 0.193                         |

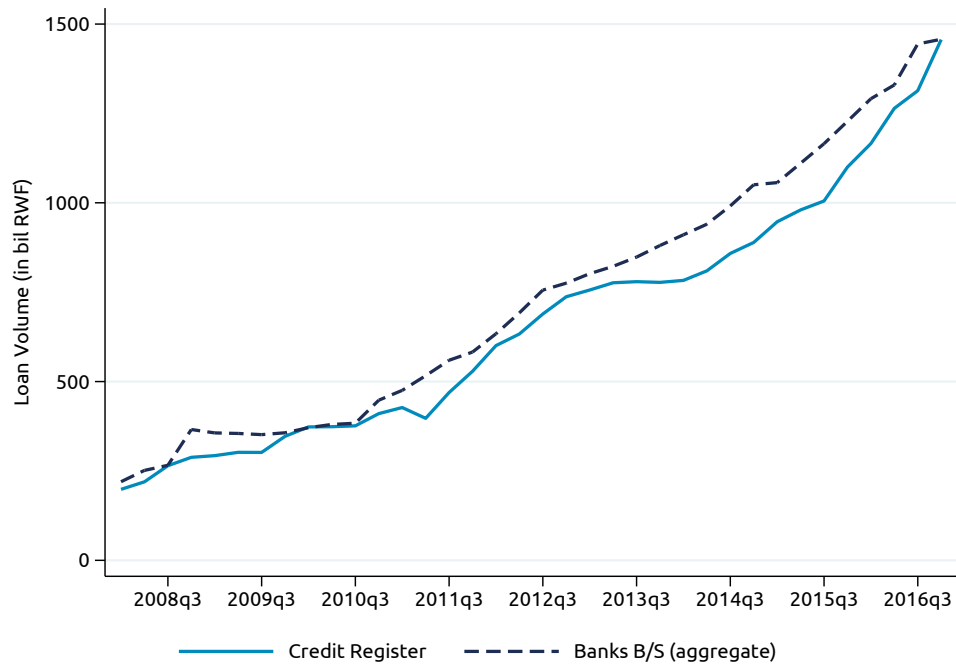
## C Additional Figures and Tables

Figure C1: Number of loans of U-SACCOs, Other MFIs, and Commercial Banks



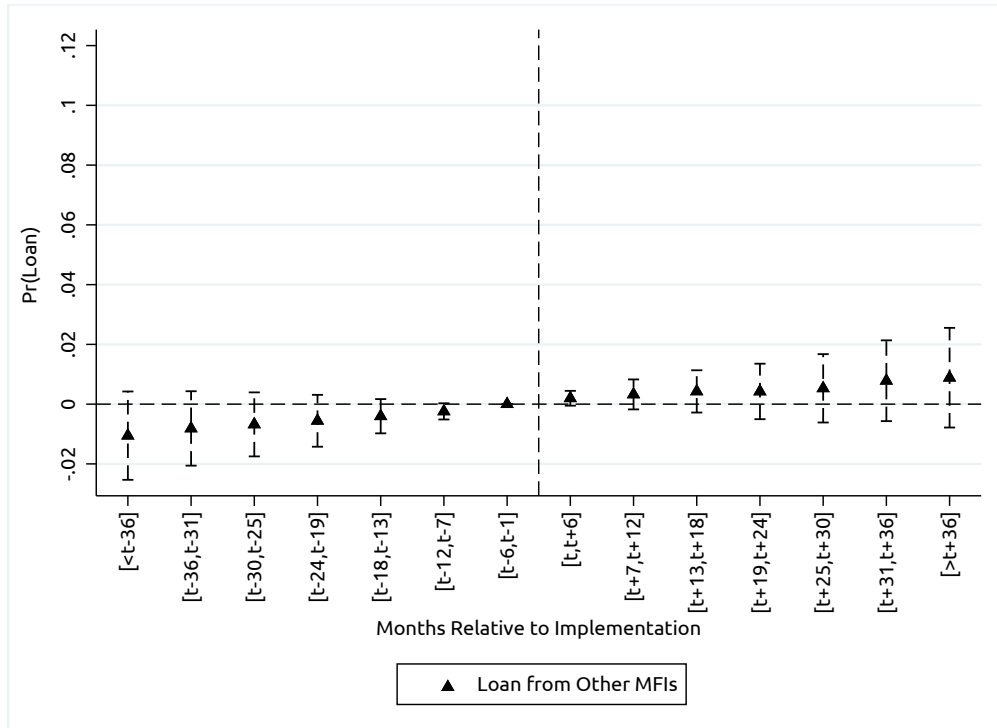
The figure shows the evolution over time of the number of outstanding loans by U-SACCOs, other MFIs, and commercial banks, at monthly frequency.

Figure C2: Credit Register Representativeness



The figure shows total bank credit in billions of Rwandan francs (RWF) for all commercial banks operating in Rwanda from the credit register (solid line) and aggregate statistics from the banks' balance sheets (dashed line).

Figure C3: Probability of Getting a Loan Before and After the U-SACCO Program—Other MFIs

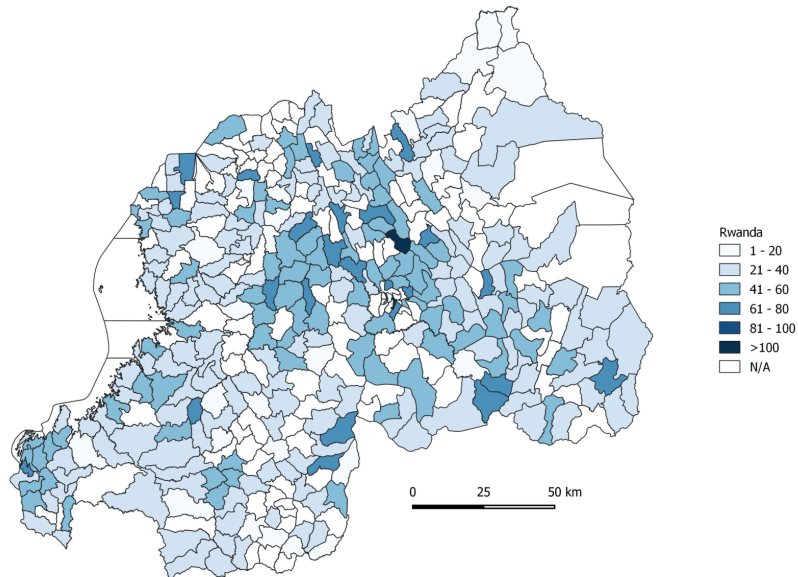


The figure shows the effect of the U-SACCO program on the probability of an individual obtaining a loan from other MFIs. The charts plot the estimated coefficients and the associated 90% confidence intervals of model 1 with interaction terms between  $Post\ U-SACCO_{mt}$  and a set of 6-month time interval dummies centered on the municipality-specific month of program rollout, as reported in column 6 of Table 3.

Figure C4: Share of Individuals with a Loan Before and After the U-SACCO Program



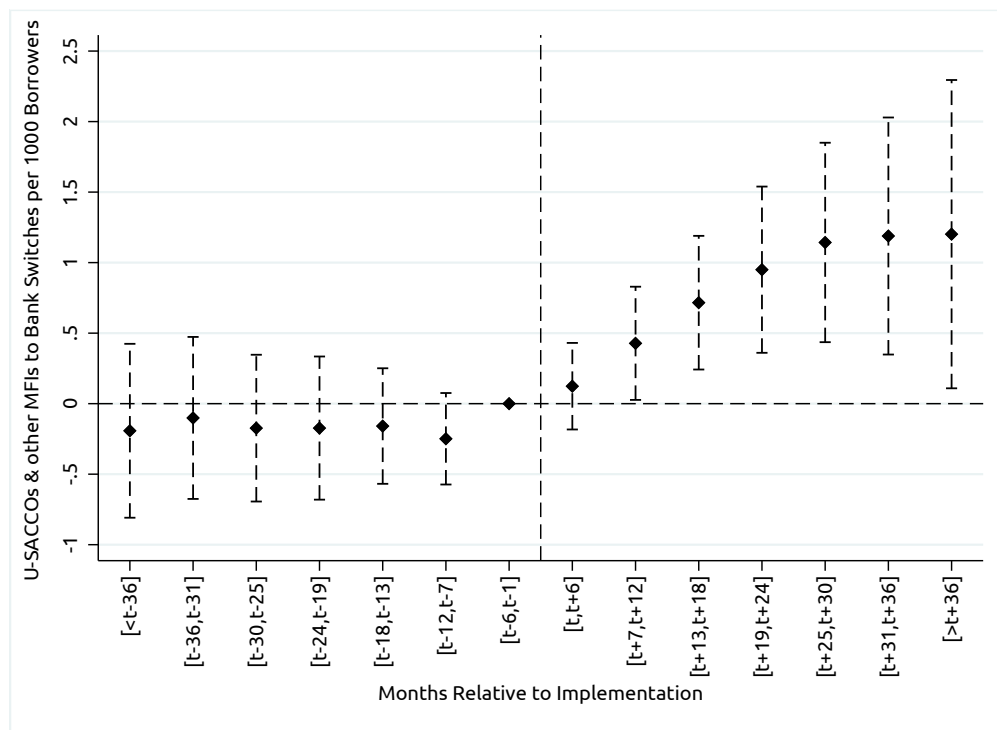
(a) Pre-program



(b) Post-program

The figure shows the share of individuals with an outstanding loan (relative to total adult population, in thousands), by municipality, before and after the U-SACCO program. The pre- and post-program period are defined using as a threshold the month in which the U-SACCO grants its first loan in a given municipality.

Figure C5: Probability of Switching, Before and After the U-SACCO Program



The figure shows the effect of the U-SACCO program on the probability of switching to commercial banks. The chart plots the estimated  $\beta$  coefficients and the associated 90% confidence intervals of the following regression in a balanced panel at the municipality-time level:

$$P(\text{Switching}_{mt}) = \sum_{T=-7}^{+7} \beta_T \text{Post } U\text{-SACCO}_{mt} \times \text{Time Interval}_T + \alpha_m + \phi_t + v_{mt} + \varepsilon_{mt}$$

where  $\text{Switching}_{mt}$  is the fraction of switchers from all microfinance institutions (i.e., U-SACCOs and other MFIs) to commercial banks (per 1000 borrowers) in municipality  $m$  at time (year:month)  $t$ . The effect of the dummy variable  $\text{Post } U\text{-SACCO}_{mt}$  (equal to 1 after a U-SACCO starts its lending activities in a given municipality  $m$  at time  $t$ , and 0 otherwise) is decomposed in 6-month time intervals  $T$  centered on the municipality-specific month of program rollout. Municipality fixed effects  $\alpha_m$  and time (year:month) fixed effects  $\phi_t$  control for unobserved time-invariant spatial factors and common time-varying shocks.  $v_{mt}$  are municipality-specific time trends and standard errors are clustered at the municipality level.

Table C1: Summary Statistics, by Lender Type

The table presents summary statistics (mean, median and standard deviation—SD) for the main variables in our sample, by lender type. The sample period is January 2008–December 2016 and includes 190,138 individuals in 337 municipalities who borrow from commercial banks, U-SACCOs, and other MFIs. See Table 1 for the definition of each variable and data sources. The sum of the number of borrowers by lender type is larger than the total number of borrowers in the sample, as the same individual may borrow from more than one lender type.

|  | U-SACCOs (n=301) |       |        |       | Commercial banks (n=16) |       |        |       | Other MFIs (n=105) |       |        |       |
|--|------------------|-------|--------|-------|-------------------------|-------|--------|-------|--------------------|-------|--------|-------|
|  | N                | Mean  | Median | SD    | N                       | Mean  | Median | SD    | N                  | Mean  | Median | SD    |
|  | (1)              | (2)   | (3)    | (4)   | (5)                     | (6)   | (7)    | (8)   | (9)                | (10)  | (11)   | (12)  |
| <i>A. Access to Credit</i>             |                  |       |        |       |                         |       |        |       |                    |       |        |       |
| Loan from any Institution              | 1,165,796        | 1.000 | 1.000  | 0.000 | 2,150,956               | 1.000 | 1.000  | 0.000 | 1,542,543          | 1.000 | 1.000  | 0.000 |
| Loan from SACCO                        | 1,165,796        | 1.000 | 1.000  | 0.000 | 2,150,956               | 0.045 | 0.000  | 0.207 | 1,542,543          | 0.053 | 0.000  | 0.223 |
| Loan from Bank                         | 1,165,796        | 0.083 | 0.000  | 0.276 | 2,150,956               | 1.000 | 1.000  | 0.000 | 1,542,543          | 0.077 | 0.000  | 0.266 |
| Loan from other MFI                    | 1,165,796        | 0.070 | 0.000  | 0.255 | 2,150,956               | 0.055 | 0.000  | 0.228 | 1,542,543          | 1.000 | 1.000  | 0.000 |
| <i>B. Loan Characteristics</i>         |                  |       |        |       |                         |       |        |       |                    |       |        |       |
| Loan Exposure                          | 1,153,232        | 0.554 | 0.300  | 0.987 | 2,217,528               | 5.204 | 0.948  | 27.84 | 1,565,890          | 1.406 | 0.479  | 4.423 |
| Loan Principal Amount                  | 1,153,232        | 0.843 | 0.500  | 1.083 | 2,217,528               | 7.260 | 1.678  | 38.07 | 1,565,890          | 2.124 | 0.900  | 5.283 |
| Interest Rate (%)                      | 666,932          | 24.83 | 20.00  | 19.87 | 2,149,996               | 18.95 | 18.00  | 10.15 | 1,285,687          | 17.70 | 14.00  | 11.57 |
| Maturity (months)                      | 1,153,232        | 18.01 | 12.00  | 13.20 | 2,217,528               | 40.94 | 38.00  | 32.13 | 1,565,890          | 26.51 | 22.93  | 23.57 |
| Non-Performing Loan                    | 1,153,232        | 0.093 | 0.000  | 0.291 | 2,217,528               | 0.136 | 0.000  | 0.343 | 1,565,890          | 0.123 | 0.000  | 0.329 |
| <i>C. Borrower characteristics</i>     |                  |       |        |       |                         |       |        |       |                    |       |        |       |
| Female                                 | 76,166           | 0.237 | 0.000  | 0.425 | 90,003                  | 0.397 | 0.000  | 0.489 | 57,474             | 0.294 | 0.000  | 0.456 |
| Single                                 | 76,166           | 0.100 | 0.000  | 0.299 | 90,003                  | 0.107 | 0.000  | 0.309 | 57,474             | 0.114 | 0.000  | 0.318 |
| Young                                  | 76,166           | 0.358 | 0.000  | 0.479 | 90,003                  | 0.384 | 0.000  | 0.486 | 57,474             | 0.338 | 0.000  | 0.473 |
| Government Employee                    | 76,166           | 0.083 | 0.000  | 0.276 | 90,003                  | 0.129 | 0.000  | 0.335 | 57,474             | 0.327 | 0.000  | 0.469 |
| <i>D. Municipality characteristics</i> |                  |       |        |       |                         |       |        |       |                    |       |        |       |
| Economic Growth                        | 301              | 0.801 | 0.000  | 3.038 | 337                     | 0.993 | 0.000  | 3.547 | 337                | 0.993 | 0.000  | 3.547 |
| Economic Development                   | 301              | 2.094 | 0.000  | 8.866 | 337                     | 2.570 | 0.000  | 9.910 | 337                | 2.570 | 0.000  | 9.910 |
| Poverty                                | 301              | 0.426 | 0.448  | 0.122 | 337                     | 0.420 | 0.444  | 0.125 | 337                | 0.420 | 0.444  | 0.125 |
| Bank Presence                          | 301              | 0.042 | 0.000  | 0.070 | 337                     | 0.046 | 0.000  | 0.074 | 337                | 0.046 | 0.000  | 0.074 |
| Adult Population                       | 301              | 13.71 | 12.88  | 4.965 | 337                     | 13.85 | 12.92  | 5.075 | 337                | 13.85 | 12.92  | 5.075 |
| Conflicts                              | 301              | 0.728 | 0.000  | 2.867 | 337                     | 0.852 | 0.000  | 3.436 | 337                | 0.852 | 0.000  | 3.436 |
| Distance to Capital                    | 301              | 1.764 | 1.667  | 0.898 | 337                     | 1.716 | 1.589  | 0.899 | 337                | 1.716 | 1.589  | 0.899 |
| Rural                                  | 301              | 0.724 | 0.000  | 0.448 | 337                     | 0.700 | 0.000  | 0.459 | 337                | 0.700 | 0.000  | 0.459 |

Table C2: Summary Statistics: U-SACCOs' Balance Sheet Characteristics

The table report the average values of U-SACCO characteristics, measured in 2010, before the program. The U-SACCO members is the number of members with shares. Total assets and total deposits are measured in million RWF. Capital is the ratio of capital over total assets. Liquidity is the ratio of cash over total assets. Data source: Rwandan Cooperative Agency.

|                         | N   | Mean  | Median | SD    |
|-------------------------|-----|-------|--------|-------|
|                         | (1) | (2)   | (3)    | (4)   |
| U-SACCO Members         | 337 | 1.723 | 1.470  | 1.056 |
| U-SACCO Assets          | 337 | 20.74 | 16.67  | 15.08 |
| U-SACCO Deposits        | 337 | 15.64 | 11.90  | 13.73 |
| U-SACCO Capital Ratio   | 337 | 0.289 | 0.258  | 0.147 |
| U-SACCO Liquidity Ratio | 337 | 0.948 | 1.000  | 0.182 |

Table C3: The Timing of the U-SACCO Program: Early vs. Late Starters

The table report the mean values of a set of municipality-level characteristics measured before the U-SACCO program, separately for municipalities that are early and late starters in the program, depending on the time when the U-SACCO opened. Late starters are the last 25% of municipalities in granting the first U-SACCO loan. See Tables 1 and 2 for the definition of each variable.

|                         | Late starter<br>(n=83) | Early starter<br>(n=254) |
|-------------------------|------------------------|--------------------------|
| Economic Growth         | 1.389                  | 0.863                    |
| Economic Development    | 3.571                  | 2.243                    |
| Poverty                 | 0.419                  | 0.420                    |
| Bank Presence           | 0.059                  | 0.041                    |
| U-SACCO Members         | 1.586                  | 1.768                    |
| U-SACCO Assets          | 19.38                  | 21.18                    |
| U-SACCO Deposits        | 14.80                  | 15.92                    |
| U-SACCO Capital Ratio   | 0.286                  | 0.290                    |
| U-SACCO Liquidity Ratio | 0.952                  | 0.947                    |
| Adult Population        | 13.89                  | 13.83                    |
| Conflicts               | 1.482                  | 0.646                    |
| Distance to Capital     | 1.750                  | 1.704                    |
| Rural                   | 0.663                  | 0.713                    |

Table C4: Access to Credit—Alternative Difference-in-differences Estimator

The table presents two-way fixed effect estimates of model 1 following De Chaisemartin and d’Haultfoeuille (2020), where the dependent variable is a dummy equal to 1 for individuals who, at time  $t$ , have an outstanding loan with any financial institution (column 1) or only U-SACCOs (column 2), commercial banks (column 3), or other MFIs (column 4). *Post U-SACCO* is a dummy equal to 1 after a U-SACCO starts its lending activity in a given municipality and month, and 0 otherwise. Borrower controls include a set of dummies for gender, marital status, age, and employment status. See Table 1 for the definition of each variable. The *Post U-SACCO* dummy is split in a set of dummies for 6-month intervals around the date when the U-SACCO starts its lending activity in the municipality. The data are at the borrower-municipality-month level. The sample period is 2008:M1 to 2016:M12. Bootstrapped (1,000 replications) standard errors clustered at the municipality level in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

|                          | Dummy =1 if individual has a Loan in |                       |                       |                        |
|--------------------------|--------------------------------------|-----------------------|-----------------------|------------------------|
|                          | Any Institution                      | U-SACCO               | Bank                  | Other MFI              |
|                          | (1)                                  | (2)                   | (3)                   | (4)                    |
| Post U-SACCO [t-36,t-31] | -0.0002<br>(0.0002)                  | 0.0000<br>(0.0000)    | -0.0001<br>(0.0001)   | 0.0000<br>(0.0001)     |
| Post U-SACCO [t-30,t-25] | -0.0003<br>(0.0004)                  | 0.0000<br>(0.0000)    | -0.0003<br>(0.0003)   | -0.0001<br>(0.0001)    |
| Post U-SACCO [t-24,t-19] | -0.0002<br>(0.0003)                  | 0.0000<br>(0.0000)    | -0.0002<br>(0.0003)   | -0.0001<br>(0.0002)    |
| Post U-SACCO [t-18,t-13] | 0.0002<br>(0.0003)                   | 0.0000<br>(0.0000)    | 0.0001<br>(0.0002)    | 0.0000<br>(0.0003)     |
| Post U-SACCO [t-12,t-7]  | 0.0001<br>(0.0004)                   | 0.0000<br>(0.0000)    | 0.0000<br>(0.0002)    | 0.0001<br>(0.0003)     |
| Post U-SACCO [t-6,t-1]   | 0.0004<br>(0.0004)                   | 0.0000<br>(0.0000)    | 0.0003<br>(0.0003)    | 0.0002<br>(0.0003)     |
| Post U-SACCO [t,t+6]     | 0.0128***<br>(0.0016)                | 0.0143***<br>(0.0014) | 0.0012***<br>(0.0008) | -0.0002***<br>(0.0007) |
| Post U-SACCO [t+7,t+12]  | 0.0415***<br>(0.0036)                | 0.0460***<br>(0.0030) | 0.0039***<br>(0.0022) | -0.0005***<br>(0.002)  |
| Post U-SACCO [t+13,t+18] | 0.0728***<br>(0.0064)                | 0.0793***<br>(0.0046) | 0.0082***<br>(0.0043) | -0.0015***<br>(0.0042) |
| Post U-SACCO [t+19,t+24] | 0.0905***<br>(0.0093)                | 0.0960***<br>(0.0054) | 0.0155***<br>(0.0062) | -0.0048***<br>(0.0068) |
| Post U-SACCO [t+25,t+30] | 0.1016***<br>(0.0125)                | 0.1083***<br>(0.0056) | 0.0201***<br>(0.0082) | -0.0085***<br>(0.0092) |
| Post U-SACCO [t+31,t+36] | 0.1125***<br>(0.0154)                | 0.1143***<br>(0.0059) | 0.026***<br>(0.0108)  | -0.0082***<br>(0.0105) |
| Municipality FE          | Y                                    | Y                     | Y                     | Y                      |
| Time (Year:month) FE     | Y                                    | Y                     | Y                     | Y                      |
| Borrower Controls        | Y                                    | Y                     | Y                     | Y                      |
| Municipality Time Trends | Y                                    | Y                     | Y                     | Y                      |
| No. Observations         | 34,272,396                           | 34,272,396            | 34,272,396            | 34,272,396             |
| No. Municipalities       | 337                                  | 337                   | 337                   | 337                    |
| No. Individuals          | 317,337                              | 317,337               | 317,337               | 317,337                |

Table C5: Impact of the U-SACCO Program on Access to Credit—Alternative Data Structure

The table presents coefficient estimates of model 1 collapsing the original dataset at the borrower-municipality-month level to a quarterly (columns 1–5) or yearly (columns 6–10) frequency. The dependent variable is a dummy equal to 1 for individuals who, at time  $t$ , have an outstanding loan with any institutions (columns 1–2 and 6–7) or specifically in U-SACCOs (columns 3 and 8), commercial banks (columns 4 and 9) or other MFIs (columns 5 and 10). *Post U-SACCO* is a dummy equal to 1 after a U-SACCO starts its lending activity in a given municipality and month, and 0 otherwise. Borrower controls include a set of dummies for gender, marital status, age, and employment status. See Table 1 for the definition of each variable. In columns 2–5 the *Post U-SACCO* dummy is split in a set of dummies for 6-month intervals around the date when the U-SACCO starts its lending activity in the municipality. In columns 7–10 the *Post U-SACCO* dummy is split in a set of dummies for 12-month intervals around the date when the U-SACCO starts its lending activity in the municipality. The dummy variables for the pre-program period are not shown for reason of space. The data are at the borrower–municipality–time level. The sample period is 2008:M1 to 2016:M12. Standard errors clustered at the municipality level in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

|                          | Quarterly           |                     |                     |                    |                  | Yearly              |                     |                    |           |                  |
|--------------------------|---------------------|---------------------|---------------------|--------------------|------------------|---------------------|---------------------|--------------------|-----------|------------------|
|                          | (1)                 | (2)                 | (3)                 | (4)                | (5)              | (6)                 | (7)                 | (8)                | (9)       | (10)             |
| Post U-SACCO             | 0.021***<br>(0.005) |                     |                     |                    |                  | 0.019***<br>(0.006) |                     |                    |           |                  |
| Post U-SACCO [t,t+6]     |                     | 0.012***<br>(0.003) | 0.012***<br>(0.003) | 0.001<br>(0.001)   | 0.002<br>(0.002) |                     |                     |                    |           |                  |
| Post U-SACCO [t+7,t+12]  |                     | 0.039***<br>(0.007) | 0.041***<br>(0.006) | 0.004<br>(0.003)   | 0.003<br>(0.003) |                     |                     |                    |           |                  |
| Post U-SACCO [t,t+12]    |                     |                     |                     |                    |                  | 0.024***<br>(0.007) | 0.022***<br>(0.006) | 0.003<br>(0.004)   |           | 0.004<br>(0.003) |
| Post U-SACCO [t+13,t+18] |                     | 0.066***<br>(0.010) | 0.067***<br>(0.008) | 0.008*<br>(0.005)  | 0.004<br>(0.004) |                     |                     |                    |           |                  |
| Post U-SACCO [t+19,t+24] |                     | 0.080***<br>(0.012) | 0.077***<br>(0.009) | 0.014**<br>(0.006) | 0.003<br>(0.005) |                     |                     |                    |           |                  |
| Post U-SACCO [t+13,t+24] |                     |                     |                     |                    |                  | 0.068***<br>(0.015) | 0.067***<br>(0.012) | 0.009<br>(0.008)   |           | 0.004<br>(0.005) |
| Post U-SACCO [t+25,t+30] |                     | 0.086***<br>(0.014) | 0.081***<br>(0.010) | 0.017**<br>(0.008) | 0.004<br>(0.007) |                     |                     |                    |           |                  |
| Post U-SACCO [t+31,t+36] |                     | 0.097***<br>(0.016) | 0.084***<br>(0.010) | 0.024**<br>(0.010) | 0.006<br>(0.008) |                     |                     |                    |           |                  |
| Post U-SACCO [t+25,t+36] |                     |                     |                     |                    |                  | 0.088***<br>(0.020) | 0.075***<br>(0.015) | 0.021*<br>(0.012)  |           | 0.005<br>(0.007) |
| Post U-SACCO [ $>t+36$ ] |                     | 0.111***<br>(0.019) | 0.091***<br>(0.011) | 0.031**<br>(0.013) | 0.007<br>(0.010) | 0.118***<br>(0.026) | 0.085***<br>(0.018) | 0.038**<br>(0.018) |           | 0.010<br>(0.009) |
| Municipality FE          | Y                   | Y                   | Y                   | Y                  | Y                | Y                   | Y                   | Y                  | Y         | Y                |
| Time (Year:quarter) FE   | Y                   | Y                   | Y                   | Y                  | Y                | N                   | N                   | N                  | N         | N                |
| Time (Year) FE           | N                   | N                   | N                   | N                  | N                | Y                   | Y                   | Y                  | Y         | Y                |
| Borrower Controls        | Y                   | Y                   | Y                   | Y                  | Y                | Y                   | Y                   | Y                  | Y         | Y                |
| Municipality Time Trends | Y                   | Y                   | Y                   | Y                  | Y                | Y                   | Y                   | Y                  | Y         | Y                |
| No. Observations         | 11,422,116          | 11,422,116          | 11,422,116          | 11,422,116         | 11,422,116       | 2,855,529           | 2,855,529           | 2,855,529          | 2,855,529 | 2,855,529        |
| No. Municipalities       | 337                 | 337                 | 337                 | 337                | 337              | 337                 | 337                 | 337                | 337       | 337              |
| No. Individuals          | 317,281             | 317,281             | 317,281             | 317,281            | 317,281          | 317,281             | 317,281             | 317,281            | 317,281   | 317,281          |
| Adjusted R-squared       | 0.199               | 0.200               | 0.122               | 0.078              | 0.154            | 0.191               | 0.192               | 0.130              | 0.075     | 0.142            |

Table C6: Impact of the U-SACCO Program on Access to Credit—Panel at the Municipality-Month Level

The table presents coefficient estimates of model 1 collapsing the original dataset at the municipality-month level and taking as dependent variable the number of individuals—in absolute number (columns 1–5) or scaled by the adult population (in thousands, columns 6–10)—who have an outstanding loan with: any institutions (columns 1–2 and 6–7) or, specifically, U-SACCOs (columns 3 and 8), commercial banks (columns 4 and 9) or other MFIs (columns 5 and 10). *Post U-SACCO* is a dummy equal to 1 after a U-SACCO starts its lending activity in a given municipality and month, and 0 otherwise. Borrower controls include a set of dummies for gender, marital status, age, and employment status. See Table 1 for the definition of each variable. In columns 2–5 and 7–10 the *Post U-SACCO* dummy is split in a set of dummies for 6-month intervals around the date when the U-SACCO starts its lending activity in the municipality. The dummy variables for the pre-program period are not shown for reason of space. The data are at the borrower-municipality-time level. The sample period is 2008:M1 to 2016:M12. Standard errors clustered at the municipality level in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

|                          | No. Individuals in Municipality |                      |                       |                  |        | Fraction of Individuals in Municipality |                     |                    |                   |        |
|--------------------------|---------------------------------|----------------------|-----------------------|------------------|--------|---|---------------------|--------------------|-------------------|--------|
|                          | (1)                             | (2)                  | (3)                   | (4)              | (5)    | (6)                                     | (7)                 | (8)                | (9)               | (10)   |
|                          | Borrowing from:                 |                      |                       |                  |        | Borrowing from:                         |                     |                    |                   |        |
|                          | Any Institution                 | U-SACCO              | Bank                  | Other MFI        |        | Any Institution                         | U-SACCO             | Bank               | Other MFI         |        |
| Post U-SACCO             | 11.925***<br>(3.358)            |                      |                       |                  |        | 1.117***<br>(0.221)                     |                     |                    |                   |        |
| Post U-SACCO [t,t+6]     | 7.910***<br>(2.718)             | 7.564***<br>(1.759)  | 0.745<br>(2.043)      | 1.630<br>(1.559) |        | 0.717***<br>(0.174)                     | 0.709***<br>(0.147) | 0.129<br>(0.100)   | 0.055<br>(0.079)  |        |
| Post U-SACCO [t+7,t+12]  | 29.377***<br>(5.142)            | 30.267***<br>(3.141) | 3.085<br>(3.761)      | 2.439<br>(3.064) |        | 2.503***<br>(0.338)                     | 2.644***<br>(0.269) | 0.317<br>(0.199)   | 0.067<br>(0.153)  |        |
| Post U-SACCO [t+13,t+18] | 51.126***<br>(7.406)            | 51.414***<br>(4.218) | 7.640<br>(5.441)      | 2.279<br>(4.287) |        | 4.234***<br>(0.481)                     | 4.383***<br>(0.364) | 0.634**<br>(0.306) | 0.048<br>(0.212)  |        |
| Post U-SACCO [t+19,t+24] | 63.088***<br>(9.577)            | 60.354***<br>(5.085) | 13.599*<br>(7.116)    | 1.192<br>(5.588) |        | 5.101***<br>(0.621)                     | 5.067***<br>(0.432) | 1.024**<br>(0.423) | -0.032<br>(0.274) |        |
| Post U-SACCO [t+25,t+30] | 71.323***<br>(11.711)           | 63.936***<br>(5.632) | 19.331**<br>(8.822)   | 1.501<br>(6.797) |        | 5.521***<br>(0.757)                     | 5.329***<br>(0.478) | 1.263**<br>(0.543) | -0.025<br>(0.329) |        |
| Post U-SACCO [t+31,t+36] | 83.742***<br>(13.995)           | 66.055***<br>(6.183) | 28.227***<br>(10.745) | 4.267<br>(7.915) |        | 6.263***<br>(0.904)                     | 5.535***<br>(0.539) | 1.721**<br>(0.668) | 0.137<br>(0.379)  |        |
| Post U-SACCO [t+36]      | 95.272***<br>(17.421)           | 71.434***<br>(6.471) | 33.972**<br>(13.802)  | 5.591<br>(9.778) |        | 7.105***<br>(1.111)                     | 6.060***<br>(0.586) | 2.057**<br>(0.876) | 0.177<br>(0.449)  |        |
| Municipality FE          | Y                               | Y                    | Y                     | Y                | Y      | Y                                       | Y                   | Y                  | Y                 | Y      |
| Time (Year:month) FE     | Y                               | Y                    | Y                     | Y                | Y      | Y                                       | Y                   | Y                  | Y                 | Y      |
| Municipality Time Trends | Y                               | Y                    | Y                     | Y                | Y      | Y                                       | Y                   | Y                  | Y                 | Y      |
| No. Observations         | 36,396                          | 36,396               | 36,396                | 36,396           | 36,396 | 36,396                                  | 36,396              | 36,396             | 36,396            | 36,396 |
| No. Municipalities       | 337                             | 337                  | 337                   | 337              | 337    | 337                                     | 337                 | 337                | 337               | 337    |
| Adjusted R-squared       | 0.964                           | 0.967                | 0.880                 | 0.964            | 0.929  | 0.944                                   | 0.948               | 0.867              | 0.941             | 0.922  |

Table C7: Impact of the U-SACCO Program on Access to Credit—Adding Borrower Fixed Effects and Dropping Individuals who Never Borrow

The table presents coefficient estimates of model 1 adding borrower fixed effects (columns 1–5) or excluding borrowers who were never granted a loan during the sample period (columns 6–10). The dependent variable is a dummy equal to 1 for individuals who, at time  $t$ , have an outstanding loan with: any institutions (columns 1–2 and 6–7) or, specifically, in U-SACCOs (columns 3 and 8), commercial banks (columns 4 and 9) or other MFIs (columns 5 and 10). *Post U-SACCO* is a dummy equal to 1 after a U-SACCO starts its lending activity in a given municipality and month, and 0 otherwise. Borrower controls include a set of dummies for gender, marital status, age, and employment status. See Table 1 for the definition of each variable. In columns 2–5 and 7–10 the *Post U-SACCO* dummy is split in a set of dummies for 6-month intervals around the date when the U-SACCO starts its lending activity in the municipality. The dummy variables for the pre-program period are not shown for reason of space. The data are at the borrower-municipality-time level. The sample period is 2008:M1 to 2016:M12. Standard errors clustered at the municipality level in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

|                          | Borrower Fixed Effects |                     |                     |                    |                  | Drop Borrowers that Were Never Granted a Loan |                     |                     |                    |                  |
|--------------------------|------------------------|---------------------|---------------------|--------------------|------------------|---|---------------------|---------------------|--------------------|------------------|
|                          | (1)                    | (2)                 | (3)                 | (4)                | (5)              | (6)   | (7)                 | (8)                 | (9)                | (10)             |
| Post U-SACCO             | 0.021***<br>(0.005)    |                     |                     |                    |                  | 0.032***<br>(0.007)                           |                     |                     |                    |                  |
| Post U-SACCO [t,t+6]     |                        | 0.014***<br>(0.003) | 0.013***<br>(0.003) | 0.002<br>(0.001)   | 0.002<br>(0.002) |   | 0.021***<br>(0.005) | 0.021***<br>(0.004) | 0.002<br>(0.003)   | 0.003<br>(0.003) |
| Post U-SACCO [t+7,t+12]  |                        | 0.041***<br>(0.007) | 0.042***<br>(0.006) | 0.004<br>(0.003)   | 0.003<br>(0.003) |   | 0.065***<br>(0.011) | 0.067***<br>(0.008) | 0.006<br>(0.005)   | 0.005<br>(0.005) |
| Post U-SACCO [t+13,t+18] |                        | 0.068***<br>(0.010) | 0.069***<br>(0.008) | 0.008*<br>(0.004)  | 0.004<br>(0.004) |   | 0.108***<br>(0.015) | 0.110***<br>(0.011) | 0.013<br>(0.008)   | 0.006<br>(0.008) |
| Post U-SACCO [t+19,t+24] |                        | 0.083***<br>(0.012) | 0.080***<br>(0.009) | 0.014**<br>(0.006) | 0.004<br>(0.006) |   | 0.132***<br>(0.019) | 0.127***<br>(0.013) | 0.023**<br>(0.011) | 0.006<br>(0.010) |
| Post U-SACCO [t+25,t+30] |                        | 0.091***<br>(0.014) | 0.084***<br>(0.010) | 0.018**<br>(0.008) | 0.005<br>(0.007) |   | 0.145***<br>(0.023) | 0.134***<br>(0.014) | 0.031**<br>(0.014) | 0.007<br>(0.012) |
| Post U-SACCO [t+31,t+36] |                        | 0.102***<br>(0.016) | 0.088***<br>(0.010) | 0.024**<br>(0.010) | 0.008<br>(0.008) |   | 0.163***<br>(0.026) | 0.139***<br>(0.014) | 0.042**<br>(0.017) | 0.011<br>(0.014) |
| Post U-SACCO [ $>t+36$ ] |                        | 0.116***<br>(0.019) | 0.095***<br>(0.010) | 0.031**<br>(0.012) | 0.009<br>(0.010) |   | 0.186***<br>(0.032) | 0.149***<br>(0.015) | 0.055**<br>(0.022) | 0.012<br>(0.018) |
| Municipality FE          | Y                      | Y                   | Y                   | Y                  | Y                | Y   | Y                   | Y                   | Y                  | Y                |
| Time (Year:month) FE     | Y                      | Y                   | Y                   | Y                  | Y                | Y   | Y                   | Y                   | Y                  | Y                |
| Borrower FE              | Y                      | Y                   | Y                   | Y                  | Y                | N   | N                   | N                   | N                  | N                |
| Borrower Controls        | -                      | -                   | -                   | -                  | -                | Y   | Y                   | Y                   | Y                  | Y                |
| Municipality Time Trends | Y                      | Y                   | Y                   | Y                  | Y                | Y   | Y                   | Y                   | Y                  | Y                |
| No. Observations         | 34,266,348             | 34,266,348          | 34,266,348          | 34,266,348         | 34,266,348       | 20,534,904                                    | 20,534,904          | 20,534,904          | 20,534,904         | 20,534,904       |
| No. Municipalities       | 337                    | 337                 | 337                 | 337                | 337              | 337   | 337                 | 337                 | 337                | 337              |
| No. Individuals          | 317,281                | 317,281             | 317,281             | 317,281            | 317,281          | 190,138                                       | 190,138             | 190,138             | 190,138            | 190,138          |
| Adjusted R-squared       | 0.412                  | 0.413               | 0.268               | 0.422              | 0.410            | 0.264   | 0.265               | 0.166               | 0.125              | 0.172            |

Table C8: Impact of the U-SACCO Program on Access to Credit—Time Trends and Clustering

The table presents coefficient estimates of model 1 adding quadratic time trends (columns 1–5) or clustering the standard errors at the district level (columns 6–10). The dependent variable is a dummy equal to 1 for individuals who, at time  $t$ , have an outstanding loan with: any institutions (columns 1–2 and 6–7) or, specifically, in U-SACCOs (columns 3 and 8), commercial banks (columns 4 and 9) or other MFIs (columns 5 and 10). *Post U-SACCO* is a dummy equal to 1 after a U-SACCO starts its lending activity in a given municipality and month, and 0 otherwise. Borrower controls include a set of dummies for gender, marital status, age, and employment status. See Table 1 for the definition of each variable. In columns 2–5 and 7–10 the *Post U-SACCO* dummy is split in a set of dummies for 6-month intervals around the date when the U-SACCO starts its lending activity in the municipality. The dummy variables for the pre-program period are not shown for reason of space. The data are at the borrower-municipality-time level. The sample period is 2008:M1 to 2016:M12. Standard errors clustered at the municipality (columns 1–5) or district (columns 6–10) level in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

|                           | Quadratic Time Trends |                     |                    |   |                  | Standard Errors Clustered at the District-level |                     |                  |            |            |
|---------------------------|-----------------------|---------------------|--------------------|---|------------------|---|---------------------|------------------|------------|------------|
|                           | (1)                   | (2)                 | (3)                | (4)   | (5)              | (6)   | (7)                 | (8)              | (9)        | (10)       |
|                           | Any Institution       | U-SACCO             | Bank               | Dummy = 1 if individual has a Loan in Any Institution | Other MFI        | U-SACCO   | Bank                | Other MFI        |            |            |
| Post U-SACCO              | 0.020***<br>(0.005)   |                     |                    |   |                  | 0.021***<br>(0.005)                             |                     |                  |            |            |
| Post U-SACCO [t,t+6]      | 0.013***<br>(0.003)   | 0.013***<br>(0.003) | 0.001<br>(0.001)   | 0.002<br>(0.001)                                      | 0.002<br>(0.001) | 0.014***<br>(0.003)                             | 0.002<br>(0.001)    | 0.002<br>(0.002) |            |            |
| Post U-SACCO [t+7,t+12]   | 0.040***<br>(0.007)   | 0.041***<br>(0.006) | 0.004<br>(0.003)   | 0.003<br>(0.003)                                      | 0.003<br>(0.003) | 0.041***<br>(0.007)                             | 0.004<br>(0.003)    | 0.003<br>(0.003) |            |            |
| Post U-SACCO [t+13,t+18]  | 0.067***<br>(0.010)   | 0.067***<br>(0.008) | 0.008*<br>(0.004)  | 0.004<br>(0.004)                                      | 0.004<br>(0.004) | 0.068***<br>(0.011)                             | 0.008*<br>(0.004)   | 0.004<br>(0.005) |            |            |
| Post U-SACCO [t+19,t+24]  | 0.081***<br>(0.012)   | 0.078***<br>(0.009) | 0.014**<br>(0.006) | 0.004<br>(0.005)                                      | 0.004<br>(0.005) | 0.083***<br>(0.014)                             | 0.014**<br>(0.006)  | 0.004<br>(0.006) |            |            |
| Post U-SACCO [t+25,t+30]  | 0.089***<br>(0.013)   | 0.081***<br>(0.009) | 0.018**<br>(0.008) | 0.005<br>(0.007)                                      | 0.005<br>(0.007) | 0.091***<br>(0.015)                             | 0.018**<br>(0.007)  | 0.005<br>(0.008) |            |            |
| Post U-SACCO [t+31,t+36]  | 0.099***<br>(0.016)   | 0.084***<br>(0.010) | 0.024**<br>(0.009) | 0.008<br>(0.008)                                      | 0.008<br>(0.008) | 0.102***<br>(0.016)                             | 0.024***<br>(0.008) | 0.008<br>(0.009) |            |            |
| Post U-SACCO [ $> t+36$ ] | 0.112***<br>(0.019)   | 0.091***<br>(0.010) | 0.031**<br>(0.012) | 0.009<br>(0.010)                                      | 0.009<br>(0.010) | 0.116***<br>(0.020)                             | 0.031**<br>(0.011)  | 0.009<br>(0.011) |            |            |
| Municipality FE           | Y                     | Y                   | Y                  | Y   | Y                | Y   | Y                   | Y                | Y          | Y          |
| Time (Year:month) FE      | Y                     | Y                   | Y                  | Y   | Y                | Y   | Y                   | Y                | Y          | Y          |
| Borrower Controls         | Y                     | Y                   | Y                  | Y   | Y                | Y   | Y                   | Y                | Y          | Y          |
| Municipality Time Trends  | N                     | N                   | N                  | N   | N                | N   | N                   | N                | N          | N          |
| Quadratic Time Trends     | Y                     | Y                   | Y                  | Y   | Y                | Y   | Y                   | Y                | Y          | Y          |
| No. Observations          | 34,266,348            | 34,266,348          | 34,266,348         | 34,266,348  | 34,266,348       | 34,266,348                                      | 34,266,348          | 34,266,348       | 34,266,348 | 34,266,348 |
| No. Municipalities        | 337                   | 337                 | 337                | 337   | 337              | 337   | 337                 | 337              | 337        | 337        |
| No. Individuals           | 317,281               | 317,281             | 317,281            | 317,281   | 317,281          | 317,281   | 317,281             | 317,281          | 317,281    | 317,281    |
| Adjusted R-squared        | 0.200                 | 0.201               | 0.121              | 0.078   | 0.156            | 0.200   | 0.201               | 0.121            | 0.078      | 0.156      |

Table C9: Impact of the U-SACCO Program on Access to Credit—Falsification Test (Randomizing Treatment Dates)

The table presents coefficient estimates of model 1 where the dependent variable is a dummy equal to 1 for individuals who, at time  $t$ , have an outstanding loan with: any financial institution (columns 1 and 2) or, specifically, U-SACCOs (column 3), commercial banks (column 4), or other MFIs (column 5). *Post U-SACCO* is a dummy constructed by randomly assigning the treatment across municipalities and over time. Specifically, for each municipality we randomly assign the program implementation date in the interval 2008:M1–2016:M12 and repeat this exercise 1,000 times. The table reports the average coefficients of the simulation. Borrower controls include a set of dummies for gender, marital status, age, and employment status. See Table 1 for the definition of each variable. In columns 2–5 and 7–10 the *Post U-SACCO* dummy is split in a set of dummies for 6-month intervals around the date when the U-SACCO starts its lending activity in the municipality. The dummy variables for the pre-program period are not shown for reason of space. The data are at the borrower-municipality-time level. The sample period is 2008:M1 to 2016:M12. Standard errors clustered at the municipality (columns 1–5) or district (columns 6–10) level in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

|                          | Any Institution    |                    | U-SACCO            | Bank                | Other MFI           |
|--------------------------|--------------------|--------------------|--------------------|---------------------|---------------------|
|                          | (1)                | (2)                | (3)                | (4)                 | (5)                 |
| Post U-SACCO             | 0.0001<br>(0.0039) |                    |                    |                     |                     |
| Post U-SACCO [t,t+6]     |                    | 0.0000<br>(0.0019) | 0.0000<br>(0.0014) | 0.0000<br>(0.0010)  | 0.0000<br>(0.0008)  |
| Post U-SACCO [t+7,t+12]  |                    | 0.0001<br>(0.0034) | 0.0001<br>(0.0025) | 0.0000<br>(0.0017)  | 0.0000<br>(0.0014)  |
| Post U-SACCO [t+13,t+18] |                    | 0.0001<br>(0.0048) | 0.0002<br>(0.0035) | 0.0000<br>(0.0023)  | 0.0000<br>(0.0019)  |
| Post U-SACCO [t+19,t+24] |                    | 0.0001<br>(0.0061) | 0.0002<br>(0.0045) | 0.0000<br>(0.0029)  | 0.0000<br>(0.0025)  |
| Post U-SACCO [t+25,t+30] |                    | 0.0001<br>(0.0075) | 0.0003<br>(0.0055) | -0.0001<br>(0.0035) | 0.0000<br>(0.0030)  |
| Post U-SACCO [t+31,t+36] |                    | 0.0001<br>(0.0088) | 0.0003<br>(0.0065) | -0.0001<br>(0.0041) | 0.0000<br>(0.0036)  |
| Post U-SACCO [ $>t+36$ ] |                    | -0.0001<br>(0.011) | 0.0003<br>(0.0081) | -0.0002<br>(0.0052) | -0.0001<br>(0.0043) |
| Municipality FE          | Y                  | Y                  | Y                  | Y                   | Y                   |
| Time (Year:month) FE     | Y                  | Y                  | Y                  | Y                   | Y                   |
| Borrower Controls        | Y                  | Y                  | Y                  | Y                   | Y                   |
| Municipality Time Trends | Y                  | Y                  | Y                  | Y                   | Y                   |
| No. Observations         | 34,266,348         | 34,266,348         | 34,266,348         | 34,266,348          | 34,266,348          |
| No. Municipalities       | 337                | 337                | 337                | 337                 | 337                 |
| No. Individuals          | 317,281            | 317,281            | 317,281            | 317,281             | 317,281             |
| Adjusted R-squared       | 0.200              | 0.200              | 0.117              | 0.078               | 0.156               |

Table C10: New Loans to First-time Borrowers at U-SACCOs vs. Commercial Banks

The table presents average loan and borrower characteristics for new loans of first-time borrowers at U-SACCOs and commercial banks. The detailed variable definitions are available in Table 1. Loan amount is expressed in million RWF, interest rate in percentage points and maturity in months.

|                                       | New Loans by U-SACCOs<br>to First-time Borrowers<br>(n=33,491) | New Loans by Banks<br>to First-time Borrowers<br>(n=83,759) |
|---------------------------------------|--|---|
| Loan Amount                           | 0.536  | 2.383***  |
| Interest Rate                         | 25.36  | 21.13***  |
| Loan Maturity                         | 14.50  | 23.41***  |
| Female                                | 0.237  | 0.400***  |
| Single                                | 0.080  | 0.103***  |
| Young                                 | 0.188  | 0.217***  |
| Government Employee                   | 0.015  | 0.139***  |
| Economic Growth in Municipality       | 0.827  | 3.793***  |
| Economic Development in Municipality  | 2.157  | 10.49***  |
| Poverty in Municipality               | 0.426  | 0.331***  |
| Bank Presence in Municipality         | 0.042  | 0.091***  |
| Adult Population in Municipality      | 13.70  | 18.21***  |
| Number of Conflicts in Municipality   | 0.669  | 2.186***  |
| Distance to Capital from Municipality | 1.645  | 1.409***  |
| Rural Municipality                    | 0.249  | 0.600***  |

Table C11: Analysis of Switching Loans—Summary Statistics

The table presents average loan and borrower characteristics for the treatment (column 1) and control groups (columns 2–3) in the switching analysis described in Section 5. The detailed variable definitions are available in Table 1. Column 1 refers to loans of borrowers who switch from a U-SACCO to a commercial bank, column 2 to loans of U-SACCO borrowers who do not switch, and column 3 to loans of commercial bank borrowers. All variables except borrower characteristics are measured ex-ante, in the pre-program period. Columns 2 and 3 report the result of a t-test of equality of means with column 1. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

|  | U-SACCO to<br>Banks<br>Switching Loans<br>(n=2,910)<br>(1) | New Loans by U-<br>SACCOs<br>to Non-<br>Switchers<br>(n=76,512)<br>(2) | New Loans by<br>Banks<br>to Other Bor-<br>rowers<br>(n=230,974)<br>(3) |
|--|--|--|--|
| Female   | 0.269  | 0.227***   | 0.266  |
| Single   | 0.114  | 0.092***   | 0.088***   |
| Young  | 0.174  | 0.191**  | 0.194***   |
| Government Employee                            | 0.115  | 0.087***   | 0.348***   |
| No. Years of Credit History before Switching   | 0.787  | 0.740**  | 1.097***   |
| No. Lending Relationships before Switching     | 0.613  | 0.441***   | 0.583***   |
| No. Loans before Switching                     | 0.685  | 0.530***   | 0.781***   |
| Total Outstanding Loan Amount before Switching | 0.435  | 0.443  | 5.257***   |
| Economic Growth in Municipality                | 0.991  | 1.006  | 4.216***   |
| Economic Development in Municipality           | 2.573  | 2.674  | 11.64***   |
| Poverty in Municipality                        | 0.410  | 0.420***   | 0.311***   |
| Bank Presence in Municipality                  | 0.049  | 0.044***   | 0.097***   |
| Adult Population in Municipality               | 14.542   | 13.854***  | 19.16***   |
| Number of Conflicts in Municipality            | 0.855  | 0.675***   | 2.487***   |
| Distance to Capital from Municipality          | 1.642  | 1.623  | 1.283***   |
| Rural Municipality                             | 0.688  | 0.730***   | 0.332***   |

Table C12: Analysis of Switching Loans—Propensity Score Matching

The table reports coefficients estimates using propensity score matching where the dependent variable is, alternatively, loan size, loan interest rate, or loan maturity. The treatment group consists of new loans to borrowers who switch from U-SACCOs to commercial banks i.e., switching loans. The control group is either new loans by U-SACCOs to non-switcher borrowers (columns 1–3) or new loans by commercial banks to other borrowers (columns 4–6). We match loans that are granted in the same month and compute the propensity score of each switching loan based on borrower characteristics (female, single, young, government employee), ex-ante credit history characteristics (no. years of credit history, no. lending relationships, no. loans, and total outstanding loan amount of a borrower in the month before the new loan, as well as NPLs with any lender within 1 year, 2 years, and any time before the new loan), loan characteristics (mortgage and collateral); and characteristics of the municipality where the borrower resides measured before the program. The loan amount is expressed in million RWF, the loan interest rate in percentage points, and the loan maturity in months. The detailed variable definitions are available in Table 1. Standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

|   | Control Group:<br>New loans by U-SACCOs to non-switchers |                      |                     | Control Group:<br>New loans by banks to other borrowers |                    |                     |
|---|--|----------------------|---------------------|---|--------------------|---------------------|
|   | Loan Amount  | Interest Rate        | Maturity            | Loan Amount   | Interest Rate      | Maturity            |
|   | (1)  | (2)                  | (3)                 | (1)   | (2)                | (3)                 |
| Switching Loan - Other Loans<br>(propensity score matching) | 0.824***<br>(0.080)                                      | -6.139***<br>(0.490) | 10.17***<br>(0.438) | 0.132<br>(0.119)  | -0.102<br>(0.258)  | 2.988***<br>(0.547) |
| Switching Loan - Other Loans<br>(without matching)          | 0.881***<br>(0.021)                                      | -5.074***<br>(0.392) | 9.323***<br>(0.226) | -2.157***<br>(0.412)                                    | 0.631**<br>(0.266) | 3.667***<br>(0.481) |
| <i>Matching Variables:</i>                                  |  |                      |                     |   |                    |                     |
| Year:Month of Loan Issuance                                 | Y  | Y                    | Y                   | Y   | Y                  | Y                   |
| U-SACCOs  | Y  | Y                    | Y                   | Y   | Y                  | Y                   |
| Commercial Banks  | Y  | Y                    | Y                   | Y   | Y                  | Y                   |
| Female  | Y  | Y                    | Y                   | Y   | Y                  | Y                   |
| Single  | Y  | Y                    | Y                   | Y   | Y                  | Y                   |
| Young   | Y  | Y                    | Y                   | Y   | Y                  | Y                   |
| Government Employee   | Y  | Y                    | Y                   | Y   | Y                  | Y                   |
| No. Years of Credit History before Switching                | Y  | Y                    | Y                   | Y   | Y                  | Y                   |
| No. Lending Relationships before Switching                  | Y  | Y                    | Y                   | Y   | Y                  | Y                   |
| No. Loans before Switching                                  | Y  | Y                    | Y                   | Y   | Y                  | Y                   |
| Total Outstanding Loan Amount before Switching              | Y  | Y                    | Y                   | Y   | Y                  | Y                   |
| NPL with any Lender within 1 year before Switching          | Y  | Y                    | Y                   | Y   | Y                  | Y                   |
| NPL with any Lender within 2 years before Switching         | Y  | Y                    | Y                   | Y   | Y                  | Y                   |
| NPL with any Lender before Switching                        | Y  | Y                    | Y                   | Y   | Y                  | Y                   |
| Mortgage  | Y  | Y                    | Y                   | Y   | Y                  | Y                   |
| Collateral  | Y  | Y                    | Y                   | Y   | Y                  | Y                   |
| Economic Growth in Municipality                             | Y  | Y                    | Y                   | Y   | Y                  | Y                   |
| Economic Development in Municipality                        | Y  | Y                    | Y                   | Y   | Y                  | Y                   |
| Poverty in Municipality                                     | Y  | Y                    | Y                   | Y   | Y                  | Y                   |
| Bank Presence in Municipality                               | Y  | Y                    | Y                   | Y   | Y                  | Y                   |
| Adult Population in Municipality                            | Y  | Y                    | Y                   | Y   | Y                  | Y                   |
| Conflicts in Municipality                                   | Y  | Y                    | Y                   | Y   | Y                  | Y                   |
| Distance to Capital from Municipality                       | Y  | Y                    | Y                   | Y   | Y                  | Y                   |
| Rural Municipality  | Y  | Y                    | Y                   | Y   | Y                  | Y                   |
| No. Switchers (Treated)                                     | 2,910  | 2,910                | 2,910               | 2,910   | 2,910              | 2,910               |
| No. Untreated Borrowers                                     | 76,512   | 76,512               | 76,512              | 230,974   | 230,974            | 230,974             |

Table C13: Analysis of Switching Borrowers—Within-Lender

The table reports coefficients estimates of the [Abadie and Imbens \(2011\)](#) bias-corrected matching estimator where the dependent variable is the loan amount, loan interest rate, or loan maturity. The treatment group consists of new loans to borrowers who switch from U-SACCOs to commercial banks i.e., switching loans. The control group is either new loans by the switcher's U-SACCO to non-switcher borrowers (columns 1-3) or new loans by the commercial banks the switcher switched to but to other borrowers (columns 4-6). We match loans that are granted in the same month and select the nearest-neighbors of each switching loan based on borrower characteristics (female, single, young, government employee), ex-ante credit history characteristics (no. years of credit history, no. lending relationships, no. loans, and total outstanding loan amount of a borrower in the month before the new loan, as well as NPLs with any lender within 1 year, 2 years, and any time before the new loan), loan characteristics (mortgage and collateral), and characteristics of the municipality where the borrower resides measured before the program. The loan amount is expressed in million RWF, the loan interest rate in percentage points, and the loan maturity in months. The detailed variable definitions are available in [Table 1](#). Standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

|   | Control Group:<br>New loans by switcher's U-SACCO to non-switchers |                      |                     | Control Group:<br>New loans by the receiving bank |                   |                     |
|---|--|----------------------|---------------------|---|-------------------|---------------------|
|   | Loan Amount  | Interest Rate        | Loan Maturity       | Loan Amount                                       | Interest Rate     | Loan Maturity       |
|   | (4)  | (5)                  | (6)                 | (1)   | (2)               | (3)                 |
| Switching Loan - Other Loans                        | 0.632***<br>(0.080)  | -6.923***<br>(0.849) | 7.869***<br>(0.668) | 0.137<br>(0.110)                                  | -0.217<br>(0.235) | 2.950***<br>(0.394) |
| <i>Matching Variables:</i>                          |  |                      |                     |   |                   |                     |
| Year:Month of Loan Issuance                         | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Previous U-SACCO of Switcher                        | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Commercial Bank of Switcher                         | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Female  | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Single  | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Young   | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Government Employee                                 | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| No. Years of Credit History before Switching        | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| No. Lending Relationships before Switching          | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| No. Loans before Switching                          | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Total Outstanding Loan Amount before Switching      | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| NPL with any Lender within 1 year before Switching  | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| NPL with any Lender within 2 years before Switching | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| NPL with any Lender before Switching                | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Mortgage  | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Collateral  | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Bank Presence in Municipality                       | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Economic Growth in Municipality                     | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Economic Development in Municipality                | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Poverty in Municipality                             | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Adult Population in Municipality                    | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Conflicts in Municipality                           | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Distance to Capital from Municipality               | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| Rural Municipality                                  | Y  | Y                    | Y                   | Y   | Y                 | Y                   |
| No. Switchers (Treated)                             | 1,341  | 1,341                | 1,341               | 2,879   | 2,879             | 2,879               |
| No. Untreated Borrowers                             | 76,512   | 76,512               | 76,512              | 230,974   | 230,974           | 230,974             |

Table C14: Analysis of Switching Loans—By Continued vs. Severed Relationship with U-SACCO

The table reports coefficients estimates of the [Abadie and Imbens \(2011\)](#) bias-corrected nearest-neighbor matching estimator where the dependent variable is a dummy equal to one if a loan becomes non-performing within 1 year, within 2 years, or until maturity, and 0 otherwise. Panel A examines switchers that continued the lending relationship with the U-SACCO after switching to banks, while Panel B focuses on switchers that severed the lending relationship with the U-SACCO after switching to banks. The control group in columns 1–3 are new loans by U-SACCOs to non-switchers, while in columns 4–6 it is new loans banks. We match loans that are granted in the same month and select the nearest-neighbors of each switching loan based on borrower characteristics (female, single, young, government employee), ex-ante credit history characteristics (no. years of credit history, no. lending relationships, no. loans, and total outstanding loan amount of a borrower in the month before the new loan, as well as NPLs with any lender within 1 year, 2 years, and any time before the new loan), loan characteristics (mortgage and collateral), and characteristics of the municipality where the borrower resides measured before the program. The loan amount is expressed in million RWF, the loan interest rate in percentage points, and the loan maturity in months. The detailed variable definitions are available in [Table 1](#). Standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

|  | Control Group:<br>New loans by U-SACCO to non-switchers |                                 |                                 | Control Group:<br>New loans by banks to other borrowers |                             |                             |
|--|---|---------------------------------|---------------------------------|---|-----------------------------|-----------------------------|
|  | NPL - within 1<br>year                                  | NPL - within 2<br>years         | NPL - until<br>maturity         | NPL - within 1<br>year                                  | NPL - within 2<br>years     | NPL - until<br>maturity     |
|  | (1)   | (2)                             | (3)                             | (4)   | (5)                         | (6)                         |
| Switching Loan - Other Loans<br>(Switchers that continued the lending<br>relationship with the U-SACCOs) | -0.041***<br>(0.012)<br>[1,533]                         | -0.042***<br>(0.013)<br>[1,533] | -0.038***<br>(0.014)<br>[1,533] | -0.004<br>(0.012)<br>[1,533]                            | 0.012<br>(0.013)<br>[1,533] | 0.010<br>(0.013)<br>[1,533] |
| Switching Loan - Other Loans<br>(Switchers that severed the lending<br>relationship with the U-SACCOs)   | -0.041***<br>(0.013)<br>[1,377]                         | -0.052***<br>(0.014)<br>[1,377] | -0.049***<br>(0.014)<br>[1,377] | 0.002<br>(0.011)<br>[1,377]                             | 0.014<br>(0.012)<br>[1,377] | 0.016<br>(0.012)<br>[1,377] |
| <i>Matching Variables:</i>   |   |                                 |                                 |   |                             |                             |
| Year:Month of Loan Issuance  | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| U-SACCOs   | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| Commercial Banks   | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| Female   | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| Single   | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| Young  | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| Government Employee  | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| No. Years of Credit History before Switching   | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| No. Lending Relationships before Switching   | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| No. Loans before Switching   | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| Total Outstanding Loan Amount before Switching   | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| NPL with any Lender within 1 year before Switching   | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| NPL with any Lender within 2 years before Switching  | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| NPL with any Lender before Switching   | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| Mortgage   | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| Collateral   | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| Loan Amount  | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| Loan Interest Rate   | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| Loan Maturity  | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| Bank Presence in Municipality  | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| Economic Growth in Municipality  | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| Economic Development in Municipality   | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| Poverty in Municipality  | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| Adult Population in Municipality   | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| Conflicts in Municipality  | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| Distance to Capital from Municipality  | Y   | Y                               | Y                               | Y   | Y                           | Y                           |
| Rural Municipality   | Y   | Y                               | Y                               | Y   | Y                           | Y                           |

Table C15: Analysis of Switching Loans—Subsequent Loans at the Bank

The table presents within-borrower mean comparison tests of loan terms—loan amount, interest rate spread, and loan maturity—between the new loans at the same commercial banks the U-SACCO borrower switched to, and the original switching loan. The interest rate spread is the interest rate on the loan minus the repo rate. When there is more than one loan after the switching one, these loans are averaged to compute the average amount, interest rate spread and maturity. The loan amount is expressed in million RWF, the loan interest rate in percentage points, and the loan maturity in months. The sample period is 2008:M1 to 2016:M12. Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

|                               | Loan Amount       | Interest Rate Spread | Loan Maturity     |
|-------------------------------|-------------------|----------------------|-------------------|
|                               | (1)               | (2)                  | (3)               |
| New Loans - Switching Loan    | -0.099<br>(0.148) | 0.212<br>(0.524)     | -0.561<br>(0.660) |
| No. Future Loans of Switchers | 1,050             | 1,019                | 1,050             |
| No. Switching Loans           | 2,910             | 2,910                | 2,910             |

Table C16: Analysis of Switchers' Default Risk At U-SACCOs Before Switching

The table reports coefficients estimates of the [Abadie and Imbens \(2011\)](#) bias-corrected nearest-neighbor matching estimator where the dependent variable is a dummy equal to one if a loan becomes non-performing within 1 year, within 2 years, or until maturity, and 0 otherwise. The treatment group consists of loans to U-SACCO-to-bank switcher at the U-SACCO prior to switching. The control group is comprised of new loans by U-SACCOs to non-switcher borrowers. We match loans that are granted in the same month and select the nearest-neighbors of each switching loan based on borrower characteristics (female, single, young, government employee), ex-ante credit history characteristics (no. years of credit history, no. lending relationships, no. loans, and total outstanding loan amount of a borrower in the month before the new loan, as well as NPLs with any lender within 1 year, 2 years, and any time before the new loan), loan characteristics (mortgage, collateral, amount, interest rate, maturity), and characteristics of the municipality where the borrower resides measured before the program. The detailed variable definitions are available in [Table 1](#). Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

|   | NPL - within 1<br>year | NPL - within 2<br>years | NPL - until ma-<br>turity |
|---|------------------------|-------------------------|---------------------------|
|   | (1)                    | (2)                     | (3)                       |
| Loan of Switcher at U-SACCO Before Switching -<br>Loan of Non-Switcher at U-SACCO | -0.015**<br>(0.008)    | -0.017**<br>(0.008)     | -0.014*<br>(0.008)        |
| <i>Matching Variables:</i>  |                        |                         |                           |
| Year:Month of Loan Issuance   | Y                      | Y                       | Y                         |
| U-SACCOs  | Y                      | Y                       | Y                         |
| Female  | Y                      | Y                       | Y                         |
| Single  | Y                      | Y                       | Y                         |
| Young   | Y                      | Y                       | Y                         |
| Government Employee   | Y                      | Y                       | Y                         |
| No. Years of Credit History before Switching                                      | Y                      | Y                       | Y                         |
| No. Lending Relationships before Switching  | Y                      | Y                       | Y                         |
| No. Loans before Switching  | Y                      | Y                       | Y                         |
| Total Outstanding Loan Amount before Switching                                    | Y                      | Y                       | Y                         |
| NPL with any Lender within 1 year before Switching                                | Y                      | Y                       | Y                         |
| NPL with any Lender within 2 years before Switching                               | Y                      | Y                       | Y                         |
| NPL with any Lender before Switching  | Y                      | Y                       | Y                         |
| Mortgage  | Y                      | Y                       | Y                         |
| Collateral  | Y                      | Y                       | Y                         |
| Loan Amount   | Y                      | Y                       | Y                         |
| Loan Interest Rate  | Y                      | Y                       | Y                         |
| Loan Maturity   | Y                      | Y                       | Y                         |
| Bank Presence in Municipality   | Y                      | Y                       | Y                         |
| Economic Growth in Municipality   | Y                      | Y                       | Y                         |
| Economic Development in Municipality  | Y                      | Y                       | Y                         |
| Poverty in Municipality   | Y                      | Y                       | Y                         |
| Adult Population in Municipality  | Y                      | Y                       | Y                         |
| Conflicts in Municipality   | Y                      | Y                       | Y                         |
| Distance to Capital from Municipality   | Y                      | Y                       | Y                         |
| Rural Municipality  | Y                      | Y                       | Y                         |
| No. Loans of Switchers at U-SACCOs Before Switching                               | 3,615                  | 3,615                   | 3,615                     |
| No. Untreated Borrowers   | 76,512                 | 76,512                  | 76,512                    |

Table C17: Lending Constraints at U-SACCOs

The table presents coefficient estimates from a regression of loan terms (amount, interest rate, and maturity) on a U-SACCO dummy variable (equal to 1 if the loan is granted from a U-SACCO and 0 from a commercial bank) and balance sheet characteristics. The data are at the borrower-municipality-month level. Balance sheet characteristics are measured at 2010 year-end and refer to total deposits, capital-to-asset ratio and liquidity-to-asset ratio (total cash divided by total assets). The data refer to loans from U-SACCOs or commercial banks (loans from other MFIs are excluded). The sample period is 2008:M1 to 2016:M12. Standard errors clustered at the municipality level in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

|                              | (1)                  | (2)                 | (3)                 | (4)                  | (5)                   | (6)                  |
|------------------------------|----------------------|---------------------|---------------------|----------------------|-----------------------|----------------------|
|                              | Loan amount          |                     | Interest rate       |                      | Maturity              |                      |
| U-SACCO                      | -2.777***<br>(0.265) | -0.775<br>(2.783)   | 5.487***<br>(0.613) | -0.131<br>(5.044)    | -10.192***<br>(0.425) | 4.271<br>(7.953)     |
| Deposits                     |                      | 1.248***<br>(0.165) |                     | -1.742***<br>(0.146) |                       | 6.440***<br>(0.189)  |
| Capital Ratio                |                      | 3.653*<br>(1.941)   |                     | 0.661<br>(2.463)     |                       | 25.558***<br>(2.394) |
| Liquidity Ratio              |                      | 7.405***<br>(2.705) |                     | -7.747<br>(5.102)    |                       | 33.291***<br>(8.192) |
| Municipality × Year:month FE | Y                    | Y                   | Y                   | Y                    | Y                     | Y                    |
| Borrower Controls            | Y                    | Y                   | Y                   | Y                    | Y                     | Y                    |
| No. Observations             | 308,982              | 308,982             | 308,982             | 308,982              | 308,982               | 308,982              |
| No. Municipalities           | 337                  | 337                 | 337                 | 337                  | 337                   | 337                  |
| No. Individuals              | 129,523              | 129,523             | 129,523             | 129,523              | 129,523               | 129,523              |
| Adjusted R-squared           | 0.001                | 0.004               | 0.146               | 0.160                | 0.156                 | 0.209                |

Table C18: Analysis of Switching Loans—Comparison with First-Time Bank Borrowers and MFI-to-Bank Switchers

The table presents average loan and borrower characteristics for the treatment (columns 1 and 3) and control groups (columns 2 and 4) in the switching analysis described in Section 5. Columns 1 and 3 refer to loans of borrowers who switch from a U-SACCO to a commercial bank, column 2 to new loans by commercial banks to first-time borrowers, and column 4 to new loans by commercial banks to switchers from other MFIs. The detailed variable definitions are available in Table 1. Loan amount is expressed in million RWF, interest rate in percentage points and maturity in months. Columns 2 and 4 report the result of a t-test of equality with the values reported in columns 2 and 4, respectively (switching loans). \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

|  | U-SACCO to Banks Switching Loans<br>(n=2,898) | New Loans by Commercial Banks to First-time Borrowers<br>(n=83,759) | U-SACCO to Banks Switching Loans<br>(n=2,819) | New Loans by Commercial Banks to Switchers from other MFIs<br>(n=5,725) |
|--|---|---|---|---|
| Loan Amount                                    | 1.545   | 2.383***  | 1.557   | 2.388***  |
| Interest Rate                                  | 20.59   | 21.13***  | 20.64   | 21.57***  |
| Loan Maturity                                  | 22.04   | 23.41***  | 21.80   | 21.935  |
| Mortgage                                       | 0.057   | 0.077***  | 0.057   | 0.053   |
| Collateral                                     | 0.020   | 0.073***  | 0.021   | 0.089***  |
| Female   | 0.268   | 0.400***  | 0.263   | 0.297***  |
| Single   | 0.111   | 0.103   | 0.098   | 0.119***  |
| Young  | 0.174   | 0.217***  | 0.161   | 0.141***  |
| Government Employee                            | 0.111   | 0.139***  | 0.103   | 0.250***  |
| No. Years of Credit History before Switching   | 0.785   |   | 0.788   | 0.779   |
| No. Lending Relationships before Switching     | 0.612   |   | 0.611   | 0.528***  |
| No. Loans before Switching                     | 0.684   |   | 0.681   | 0.682   |
| Total Outstanding Loan Amount before Switching | 0.433   |   | 0.435   | 0.809***  |
| Bank Presence in Municipality                  | 0.049   |   | 0.049   | 0.097***  |
| Economic Growth in Municipality                | 0.992   | 0.091***  | 0.996   | 4.898***  |
| Economic Development in Municipality           | 2.576   | 3.793***  | 2.581   | 13.18***  |
| Poverty in Municipality                        | 0.410   | 10.49***  | 0.410   | 0.301***  |
| Adult Population in Municipality               | 14.53   | 18.21***  | 14.56   | 19.47***  |
| Conflicts in Municipality                      | 0.853   | 2.186***  | 0.868   | 2.390***  |
| Distance to Capital from Municipality          | 1.643   | 1.409***  | 1.644   | 1.173***  |
| Rural Municipality                             | 0.312   | 0.600***  | 0.314   | 0.693***  |

Table C19: Information Requests at Credit Bureau and New Bank Loans

The table presents coefficient estimates of a regression of the logarithm of the number of new loans as a function of the logarithm of the number of information requests in the credit register (columns 1–3) or the logarithm of the number of information requests in the credit register that successfully identified the individual being queried (columns 4–6). The data are organized at the bank-municipality-quarter level and cover the period from January 2018 to December 2019. Standard errors clustered at the bank-municipality pair level in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

|   | (1)                  | (2)                  | (3)                  | (4)                  | (5)                  | (6)                  |
|---|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|   | No. New Loans (ln)   |                      |                      |                      |                      |                      |
| No. Information Requests (ln)   | 0.0234***<br>(0.007) | 0.0571***<br>(0.007) | 0.1391***<br>(0.017) |                      |                      |                      |
| No. Information Requests with<br>Successfully Identified Individuals (ln) |                      |                      |                      | 0.0258***<br>(0.007) | 0.0594***<br>(0.007) | 0.1361***<br>(0.017) |
| Municipality×Time (Year:quarter) FE                                       | N                    | Y                    | Y                    | N                    | Y                    | Y                    |
| Bank FE   | N                    | N                    | Y                    | N                    | N                    | Y                    |
| No. Observations  | 26,864               | 26,864               | 26,864               | 26,864               | 26,864               | 26,864               |
| Adjusted R-squared  | 0.002                | 0.226                | 0.500                | 0.003                | 0.227                | 0.500                |

Table C20: Real Effects of the U-SACCO Program on Firm and Employment Creation

The table presents coefficient estimates for the effects of the U-SACCO program on small firm and employment creation. The dependent variables are the number of new microenterprises (firms with no more than six employees), the number of new sole proprietorships (firms with one employee), and the total number of workers at newly formed firms, regardless of size. All dependent variables are in logs. The data come from the 2014 Establishment Census, obtained from the data portal of the National Institute of Statistics Rwanda, which provides the municipality and the date (year:month) when each firm was formed. *Post* is a dummy equal to 1 after a U-SACCO starts its lending activity in a given municipality and month, and 0 otherwise. The data at the municipality-month level. We restrict the sample to firms created between January 2008 and December 2014. The bottom rows reports the p-value from a one-sided test that the coefficient on the *Post* dummy in low bank presence municipalities is higher than that in high bank presence municipalities and that (ii) the coefficient of *Post*  $\times$  *Low Bank Presence* in high switching municipalities is higher than in low switching municipalities. Low bank presence municipalities are those below the 75<sup>th</sup> percentile of the distribution of the number of bank branches per capita before the program. Standard errors clustered at the municipality level in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

|  | (1)                           | (2)                           | (3)                               | (4)                               | (5)                  | (6)                    |
|--|-------------------------------|-------------------------------|-----------------------------------|-----------------------------------|----------------------|------------------------|
|  | No. New Microenterprises (ln) | No. New Microenterprises (ln) | No. New Sole proprietorships (ln) | No. New Sole proprietorships (ln) | No. New Employees    | No. New Employees (ln) |
| <i>Post</i>                                    | 0.2419***<br>(0.022)          |                               | 0.2137***<br>(0.020)              |                                   | 0.2539***<br>(0.027) | 0.2720***<br>(0.028)   |
| <i>Post</i> $\times$ <i>Low Bank Presence</i>  |                               | 0.2592***<br>(0.023)          |                                   | 0.2321***<br>(0.020)              |                      | 0.2150***<br>(0.066)   |
| <i>Post</i> $\times$ <i>High Bank Presence</i> |                               | 0.2016***<br>(0.054)          |                                   | 0.1688***<br>(0.052)              |                      |                        |
| No. Observations                               | 28,308                        | 28,308                        | 28,308                            | 28,308                            | 28,308               | 28,308                 |
| Municipality FE                                | Y                             | Y                             | Y                                 | Y                                 | Y                    | Y                      |
| Time trend                                     | Y                             | Y                             | Y                                 | Y                                 | Y                    | Y                      |
| Adjusted R-squared                             | 0.4005                        | 0.4020                        | 0.3695                            | 0.3714                            | 0.3517               | 0.3529                 |
| Mean of dependent variable                     | 0.5627                        | 0.5627                        | 0.4220                            | 0.4220                            | 0.7230               | 0.7230                 |