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Improving Housing Conditions: Labelled Loans in Kenya and Uganda

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Amreen Choda, Annekathrin Schoofs, and Noel Verrinder[1]

Improving Housing Conditions: Labelled Loans in Kenya and Uganda

Abstract

We evaluate a non-governmental housing microfinance intervention that attempts to improve housing conditions for low income populations by simultaneously offering them a labelled loan and non-financial technical support. Using household survey data from Kenya and Uganda, we first show evidence for the successful targeting of our labelled loans because 95% of clients used the loan for the intended housing improvement. Second, our results suggest that access to small, short-term loans enables households to invest in housing upgrades that can significantly improve both the characteristics of their dwelling and their satisfaction with their dwelling. These effects are robust to four different estimation approaches (difference-in-differences, inverse probability weighting, matching, and ordinary least squares with post-double selection Lasso).

JEL-Code: I15, I31, O18

Keywords: Housing conditions; microfinance; health; Uganda; Kenya

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1 Amreen Choda, Genesis Analytics Limited, Nairobi; Annekathrin Schoofs, University of Passau and RWI; Noel Verrinder. *– The data underlying this research were collected for an impact evaluation commissioned by Habitat for Humanity's Terwilliger Centre for Innovation in Shelter. We are grateful for valuable comments by Nathan Fiala, Thorben Korfhage, Lise Masselus, and Jörg Peters. Schoofs gratefully acknowledges the support of a special grant (Sondertatbestand) from the German Federal Ministry for Economic Affairs and Energy and the Ministry of Innovation, Science, and Research of the State of North Rhine-Westphalia, and financial support by the Transatlantic Programme of the Federal Republic of Germany and the European Recovery Programme of the Federal Ministry of Economics and Technology (BMWi) as well as the RWI Transatlantic Research Exchange Programme.-* *All correspondence to: Annekathrin Schoofs, RWI - Büro Berlin, Invalidenstr. 112, 10115 Berlin, Germany, e-mail: annekathrin.schoofs@rwi-essen.de*

1. Introduction

Access to adequate, safe, and affordable housing and basic services for all is seen as a human right, and hence is manifested in the 2030 Agenda for Sustainable Development (UN, 2015). To meet this objective, Habitat for Humanity International's Terwilliger Centre for Innovation in Shelter (henceforth Habitat) and the Mastercard Foundation implemented the 'Building Assets, Unlocking Access' (BAUA) programme in Kenya and Uganda. With a population growth rate of 3.2% per year, the national housing deficit in Uganda has grown to 1.6 million houses, of which 1.395 million units are in rural areas (The Ministry of Lands, Housing and Urban Development, 2016). In Kenya, the deficit has grown to 2 million houses (The World Bank, 2017). In both countries, the projected number of people living in temporary shelters or low-quality housing is further increasing (The World Bank, 2011; Habitat for Humanity, 2019).

The BAUA programme aims to provide adequate housing for people living on less than five dollars a day. By means of small, short-term loans that have affordable payment schedules, clients can complete incremental construction on their homes. In addition, non-financial housing support services (HSS) offer construction advice and linkages to masons, engineers, and building material suppliers. Habitat recognised that its traditional approach of direct housing provision was not sufficient to meet demand en masse, so they started exploring housing microfinance (HMF)[1] as a market-based solution to improve housing. Habitat supported six financial institutions in the two countries to develop HMF products that were supposed to be commercially viable but also attractive for customers. The ultimate goal was to have the financial institutions develop scalable products. The broader objective was to influence the market by proving the business case for HMF and the donor landscape by demonstrating the poverty impacts of housing finance.

This study evaluates the BAUA programme in Kenya and Uganda. Our sample consists of 2,341 existing clients from a deposit-taking microfinance bank, KWFT[2], in Kenya and a commercial bank, Centenary Bank[3], in Uganda of whom 1,213 clients were offered the programme. As both banks agreed to withhold product roll-out in some of their branches, we rely on the staggered order - though not random - in which

[1] In the remainder of this paper, we will use the 'BAUA programme' and 'HMF product' interchangeably, keeping in mind that the HMF product includes financial and non-financial services.

[2] KWFT is one of the largest deposit-taking microfinance institutions in Kenya in terms of market share, number of branches and size of loan portfolio.

[3] Centenary Bank is a leading microfinance commercial bank in Uganda serving over 1,400,000 customers, whose services can be accessed through 72 branches across the country.

lenders introduced the HMF product across branches. For this evaluation, we mimic a randomised phasing-in as a non-randomised difference-in-differences (DiD) approach on a two-period panel data survey. Pre-intervention branch characteristics, however, show that more profitable branches were targeted first, which is why we also apply an 'inverse probability weighting' (IPW) method. Weighting by the inverse sampling probability minimizes bias in our estimates by accounting for baseline differences across treatment and comparison groups.

Like in other microfinance interventions, take-up during piloting was low (Dahal and Fiala, 2020) in both countries. We, therefore, decided to track customers who had recently taken out the product and conducted retrospective baseline surveys shortly after take-up. This may cause responses to be biased, in part because clients might exhibit systematic recollection errors at baseline. We revisited participants 18 months later for follow-up surveys before the BAUA programme began in comparison branches. By comparing clients in branches not offered the HMF product with clients in branches using the HMF product, we estimate effects on the intensive margin. This clearly has implications for external validity as impacts on borrowers at the external margin can differ compared with impacts presented in this study (Wydick, 2016).

Despite the HMF product being unique in its combination of financial and construction support, at the time of the study, financial services providers (FSPs) in both countries had comparable products in their portfolios. KWFT did not offer a loan for generic house improvements but rather a suite of loan products targeted at specific house improvements, such as loans for water tanks or solar panels. Centenary Bank offered a home improvement product but with higher interest and no HSS or training on basic construction concepts for loan officers. Competing FSPs also offered similar products but again not with dedicated HSS in support of Habitat. While there has generally been growth in finance for housing, markets in Kenya and Uganda are still dominated by commercial institutions that offer formal mortgages. Such services only meet the financial needs of a small percentage of these countries' populations, typically the middle- to high-income earners. Low-income households are excluded from formal housing finance because they lack formal land tenure documentation - which makes them a relevant target group for the BAUA programme.

A crucial feature of the BAUA programme is the *labelled* loan - a loan that is linked to housing investments through its name only. Unlike loans that are *bundled* with the investment and are directly transferred to the producer of the product, a labelled loan can be spent according to the desires of the borrower. The BAUA programme incentivises borrowing for housing improvements with information brochures and con-

struction support. Our initial scoping work in Uganda confirms that labelled financial products were already being offered (meaning that labelling as such is not new). Yet usage and impacts of labelled products for a specific purpose on borrowing and investment decisions remain unclear. While previous studies show the effectiveness of labelled mobile money accounts (Dizon et al., 2020) and labelled loans (Augsburg et al., 2019), others find little evidence of potential benefits of earmarked accounts because alternative approaches like non-earmarked accounts or subsidies worked better or equally well (Habyarimana and Jack, 2018; Lipscomb and Schechter, 2018).

We find evidence for the successful targeting of our labelled loans because 95% of clients used the loan for the intended housing improvement. These results are in line with the concept of mental accounting, suggesting that once an account is labelled for a specific purpose, households tend to spend their money accordingly (Thaler, 1985). Additionally, we also see that loans did not only serve one but multiple purposes, including non-labelled purposes (e.g. school fees, business, or medical expenses). About 40% of clients mentioned at least two purposes, with 30% being unrelated to housing improvements. This may diminish impacts on housing, which is why, in a second step, we look at pre-specified improvements in dwelling characteristics and basic services.

As clients can complete various types of improvements on their housing using the loan, it can improve livelihoods in multiple ways. The methodological implication is that our sample size is too small to have enough statistical power to determine downstream effects of each type of improvement. In contrast to previous studies that focus on specific housing improvements such as sanitation upgrades (Duflo et al., 2015; Guiteras et al., 2015; Yishay et al., 2017; Augsburg et al., 2019), we contribute to the literature by analysing the mechanism of helping people improve their dwellings rather than heterogeneity by type of improvement.

Our findings suggest that facilitating small, short-term housing microfinance together with non-financial HSS has strong effects on housing conditions. In Kenya, treated clients improved their homes in terms of water access, lighting (electricity or gas), cooking (electricity, gas, or solar energy), and rain protection. They invested in better quality material for roofing, flooring, and walls. In Uganda, clients significantly improved their cooking facilities by building separate kitchens onto their homes. In both countries, the intervention results in improved housing satisfaction.

These improvements might ultimately lead to further downstream impacts on physical and psychological health outcomes (Evans, 2003; Thomson et al., 2009), but also on human capital, feelings of security, social cohesion, well-being, and asset accumulation (Cattaneo et al., 2009; Legovini et al., 2011; Galiani et al., 2017). However,

given the sample size and hence power restrictions, we only explore potential changes on key development indicators. We find no effects in development indicators such as health, education, and social power associated with the HMF intervention. Similarly, we cannot attribute any income or wealth effects to the intervention.

In sum, the HMF product helps clients to improve the physical structure of their houses. This yields important insights for various stakeholders such as policymakers, FSPs, and donors to alleviate the supply-side challenges that restrict access to housing microfinance. We provide evidence for labelling as an effective tool for home improvements.

Our findings offer important insights for microfinance organisations that are interested in targeting loans to specific purposes. We provide a proof-of-concept that labelling the loan can be enough to make customers use the loan for the desired purpose. Since bundled loans have obvious bureaucratic disadvantages like monitoring and operational costs that come with the sale, supply, transportation, and installation of the specific product, labelling loans can thus be an attractive alternative. As such the labelled loan is also less difficult and less costly to scale-up than bundled loans. In fact, the HMF product in this study was rolled-out and provided to clients just like the business-as-usual scenario. Two years after endline data collection, both banks still provide the HMF as part of their loan portfolio, also suggesting that the product jointly developed with Habitat is sustainable.

The remainder of the manuscript is structured as follows: Section 2 summarizes the existing evidence on housing improvements; Section 3 describes the intervention and the conceptual framework; Section 4 provides the data and empirical strategy; Sections 5 and 6 provide results and robustness; and Section 7 concludes.

2. Previous evidence on housing improvements

This paper contributes to a housing literature that goes far beyond (i) the physical structure of houses, but also covers (ii) relocation of households, (iii) tenure security, and (iv) maintenance or upgrading of existing household structures and infrastructure, typically water and sanitation.

(i) One of the most significant findings in terms of physical home improvements is that they can synergistically exploit socio-economic and health outcomes. In a quasi-experimental study, Cattaneo et al. (2009) study a Mexican government programme (Piso firme) that replaced dirt floors by cement floors. They find large positive im-

pacts on adult welfare, measured by higher satisfaction with housing and quality of life. Results also show significantly improved child health (reduction in parasitic infections, diarrhoea, anaemia) and cognitive development. More recently, Galiani et al. (2017) look at the effects of providing better houses to slum dwellers in El Salvador, Mexico, and Uruguay. The better physical housing structure led to children's health improvements in El Salvador and Mexico, improved perception of safety and security in El Salvador, and overall satisfaction with housing and life.

(ii) Despite positive economic and non-economic impacts of relocation programmes, a major problem with this kind of interventions is people's disconnection from previous informal networks and jobs. Legovini et al. (2011) look at different informal settlement upgrading interventions in South Africa. In Limpopo Province, relocating households from an informal, unserviced home to a fully serviced Reconstruction and Development Programme (RDP) house led to increased household sizes, household upgrading[4], satisfaction levels, and asset accumulation. Households were also more involved in community organisations. On the downside, the programme resulted in higher unemployment rates, which increased people's dependency on government grants. Barnhardt et al. (2017) study the effects of randomly relocating slum dwellers into improved housing on the outskirts of Ahmedabad, India. 14 years later, many beneficiaries had never moved to their new houses and those who moved did not show any significant differences to the control group. If anything, it led people to disconnect from their families and caste networks and reduced their access to informal insurance.

(iii) Research has consistently shown that greater security of tenure can increase human capital. In Peru, Field (2007) uses variation in ownership rights arising from a large-scale, urban land titling programme. She finds an increase in total labour force hours that is also reflected in fewer hours spent on housework, and a substitution of adult for child labour. Similarly, Galiani and Schargrodsky (2010) use a natural experiment that led to an exogenous allocation of land titles in a poor suburban area of Buenos Aires. Entitled families substantially reduced their household size, increased housing and human capital investments for their children. Although land titling allows the poor to access credit markets, the authors argue that land titling can decrease poverty by means of better education. They estimate that the benefits in terms of improved school performance are comparable to Oportunidades[5], a social inclusion

[4]Households move from having an average of one bedroom in informal shacks to an average of two bedrooms in an RDP home. This reduces the percentage of households that use their kitchen as a sleeping area from 73% to 4% (Legovini et al., 2011).

[5]In 2014, the programme has been renamed to Prospera.

programme in Mexico that provides cash transfers to families.

(iv) More recently, a new literature has emerged, providing evidence of water and appropriate sanitary facilities as effective, preventive health investments. In Morocco, Devoto et al. (2012) first show that households have large willingness to pay for a private water connection. The combination of less time spent collecting water and less intra-household conflicts on water matters can lead to sustained improvements in overall well-being. Second, they randomly offer credit to finance a water connection at home and find a significant improvement in self-reported well-being and social integration. On the contrary, public health effects or income gains are low. A study by Duflo et al. (2015) estimates the effects of the combination of a sanitation and water system upgrade in slums in rural India. This integrated approach shows strong long-term health effects, particularly reduction of diarrhoea by between 30% and 50%. Guiteras et al. (2015) show that sanitation subsidies cause better uptake of sanitation ownership in comparison with community motivation and information or supply-side interventions. An alternative to encourage investments in sanitation are microloans. Using a randomised controlled trial (RCT), Yishay et al. (2017) find that facilitating access to microloans significantly raises people's willingness to pay for improved latrines. Augsburg et al. (2019) study a cluster RCT in India and find that labelled loans for sanitation increase the uptake of new toilets.

3. The BAUA programme

3.1. Low-quality housing and targeting

Low-quality housing can be described by the materials used for construction and the available infrastructure, such as water, sanitation, and electricity. These characteristics usually reflect the socio-economic situation of the household and have a direct bearing on health and welfare of each household member.

In rural Kenya, the materials used for flooring range from earth (43.1%) over cement (28.4%) to dung (26.9%). One fifth of rural households have access to own toilet facilities, while almost 47.7% must rely on pit latrines without slabs/open pits. Only 12.6 % of rural households have access to the electricity grid, relative to 68.4% of urban households. Similarly, in Uganda, only about a quarter of rural dwellings have a cemented floor, while 73.1% remain earthen. 60.8% of houses have walls which are made of bricks and more than two thirds of houses have iron roofs (68.6%). In urban areas, this number increases to 92.6%. While almost three quarter of the rural

population have access to an improved water source[6], 85.9% of households still use a pit latrine. Less than 10% of households are connected to the electricity grid. The number of rooms used for sleeping provides a good indication for the risk of contracting infectious diseases within the household. The more people sleep in one room, the higher the risk of respiratory infections and skin diseases. 53% of Kenyan households use one room for sleeping. In rural Uganda, 40.6% of houses have one room, shared by 2.4 people on average. In addition, the place and the type of fuel used for cooking influence indoor air quality and the degree to which household members are exposed to the risk of respiratory infections and other diseases. In Kenya, an overwhelming majority of households (84.2%) use wood as cooking fuel. While 61.1% of Kenyans cook in a separate building, about a third cooks in the house with limited ventilation (30.4%) (Kenya National Bureau of Statistics, 2015). In Uganda, firewood usage for cooking has decreased by 8.6 percentage points since the 2012/13 Uganda National Household Survey (UNHS) but remains the most common source for cooking at 80.8% (Uganda Bureau of Statistics, 2018).

3.2. The housing microfinance products

In February 2014, Habitat partnered with KWFT[7] and Centenary Bank[8] to support the development of viable housing products for low-income families, who were not being served by each of the bank's existing loan products. As a result of this partnership, the local banks developed new products, called the 'Nyumba Smart Loan' in Kenya and the 'Cente-Home Loan' in Uganda, both of which include a labelled loan and non-financial HSS.

For comparison, Table A.1 lists the characteristics of the two loans. At the time of the study, both loans targeted rural and peri-urban residents. While the minimum and maximum loan limits were fairly similar across countries, average loan sizes differed with UGX 7,300,000 (USD 2000 or $PPP 6,803) in Uganda and KES 76,000 (USD

[6]The Ugandan Bureau of Statistics uses the definition by the the WHO/UNICEF Joint Monitoring Programme (JMP). 'An improved drinking water source is one that, by nature of its construction and when properly used, adequately protects the source from outside contamination, particularly fecal matter. Water sources considered as improved include piped water, public taps, boreholes, protected springs/wells, gravity flow schemes, rain water and bottled water. Unprotected wells/springs, rivers/lakes/streams, vendors and tanker trucks were considered unimproved water sources' (Uganda Bureau of Statistics, 2018, p. 140).

[7]KWFT is one of the largest deposit-taking microfinance institutions in Kenya in terms of market share, number of branches and size of loan portfolio.

[8]Centenary Bank is a leading microfinance commercial bank in Uganda serving over 1,400,000 customers, whose services can be accessed through 72 branches across the country.

700 or $PPP 1,984) in Kenya.[9] Both loans had a payment period of up to 60 months. The average length of repayment was higher for the 'Cente-Home Loan' (a difference of six months), which corresponds to the higher average value of the loan. Clients had to provide collateral and could access the HMF product individually or in groups. In our sample, most clients are individually liable for their loan.

A common element between the two countries is the labelled loan. All funds are disbursed directly to clients who can then spend the borrowed money as they see fit. Loan use checks by product officers are not incentivised or sanctioned. If a client applies for a follow-up housing loan, the new loan is indeed linked to the loan usage of the previous housing loan. In this case, the loan should be used to finance construction, improvement, renovations, or repairs of houses on an incremental basis, or the improvement of tenure. Approval of other types of loans do not depend on loan use and are linked to loan repayment history.

Another similarity is the provision of non-financial services in form of HSS. HSS are construction advice or technical assistance that is provided to clients as part of the housing loan package. Loan takers receive information brochures and are also linked to selected masons, surveyors, engineers, and building material suppliers.

3.3. Theory of change

Habitat provides the main inputs. The programme entails of Habitat selecting FSPs to partner with and then providing these financial partners with technical assistance to design a product comprising of micro-finance and HSS components. FSPs input time to perform market research and develop the product. In a next step, FSPs begin marketing the HMF products, as they would any new micro-finance product. That includes to train loan officers on the product features but also on basic construction features. In treatment branches, loan officers then advertise the product through home visits and banks advertise the product through brochures and posters.

The product is relevant to people who want to improve their housing conditions but require financing to do so. Both the labelling of the loan and additional incentives in form of HSS can nudge clients to complete incremental housing improvements, but ultimately, they were free to use the loan as needed. If they do allocate the finance towards housing improvements, outcomes can be realised through better dwelling characteristics and/or services. We, therefore, assess the basic structure of a respondents'

[9]The purchasing power parity adjusted exchange rate in 2014 was 38.3 KES/1 USD in Kenya and 1,073.7 UGX/1 USD in Uganda.

dwelling, including materials used for roof, walls, and flooring, number of rooms, a separate kitchen, a chimney, and quality of available services such as water and sanitation[10] as primary outcomes. All the above will aid in the overall welfare of the households and their level of satisfaction with their houses.

Households' utility may benefit directly from these improved housing conditions. They can immediately enhance safety and protection against environmental hazards and reduce exposure to health threats such as parasites or smoke. Open defecation and exposure to pathogenic organisms such as mosquitoes and parasitic worms can cause morbidity and mortality. Improved sanitation arising from the installation of latrines and running water in households can reduce prevalence of such diarrheal diseases and thus result in better health security for the households' inhabitants (Environmental Health Project, 2004). Additionally, households with improved heating, lighting, and cooking facilities have lower risks of serious health hazards such as indoor air pollution and the probability of fires (Martin et al., 2014). A measurable reduction in the prevalence of diseases, however, takes considerable time - perhaps even intergenerationally.

Interventions that influence people's feelings about the areas they reside can bring stability to a person's life. It is, therefore, relevant to understand if this project affects perceived health and mental well-being of its beneficiaries. We hypothesize that someone is happier and less stressed living in a cleaner, warmer, more aesthetically pleasing environment. Like Cattaneo et al. (2009), we use the 'Perceived Stress Scale' (PSS) developed by Cohen et al. (1983) to measure the impact on mental health.[11]

Additionally, access to electricity and thus appropriate lighting can extend children's study hours and ultimately improve their educational performance. Empirically, there is no consensus about the relationship between time spend on homework and whether a household has electricity (Khandker et al., 2009; Bensch et al., 2011; Barron and Torero, 2014). This study looks at days absent from school, school expenses and hours spent on schooling to assess the project's impact on education. Figure 1 summarizes these transmission channels from product development to an increase in people's well-being.

[10] We present this only for Kenya because sanitation improvements were incorrectly translated in Uganda.

[11] This ten-item scale captures the degree to which members find their lives to be unpredictable, uncontrollable, and overloaded. Participants were asked to report how frequently they felt a certain way in the past six months. See Table A.2 for PSS questions.

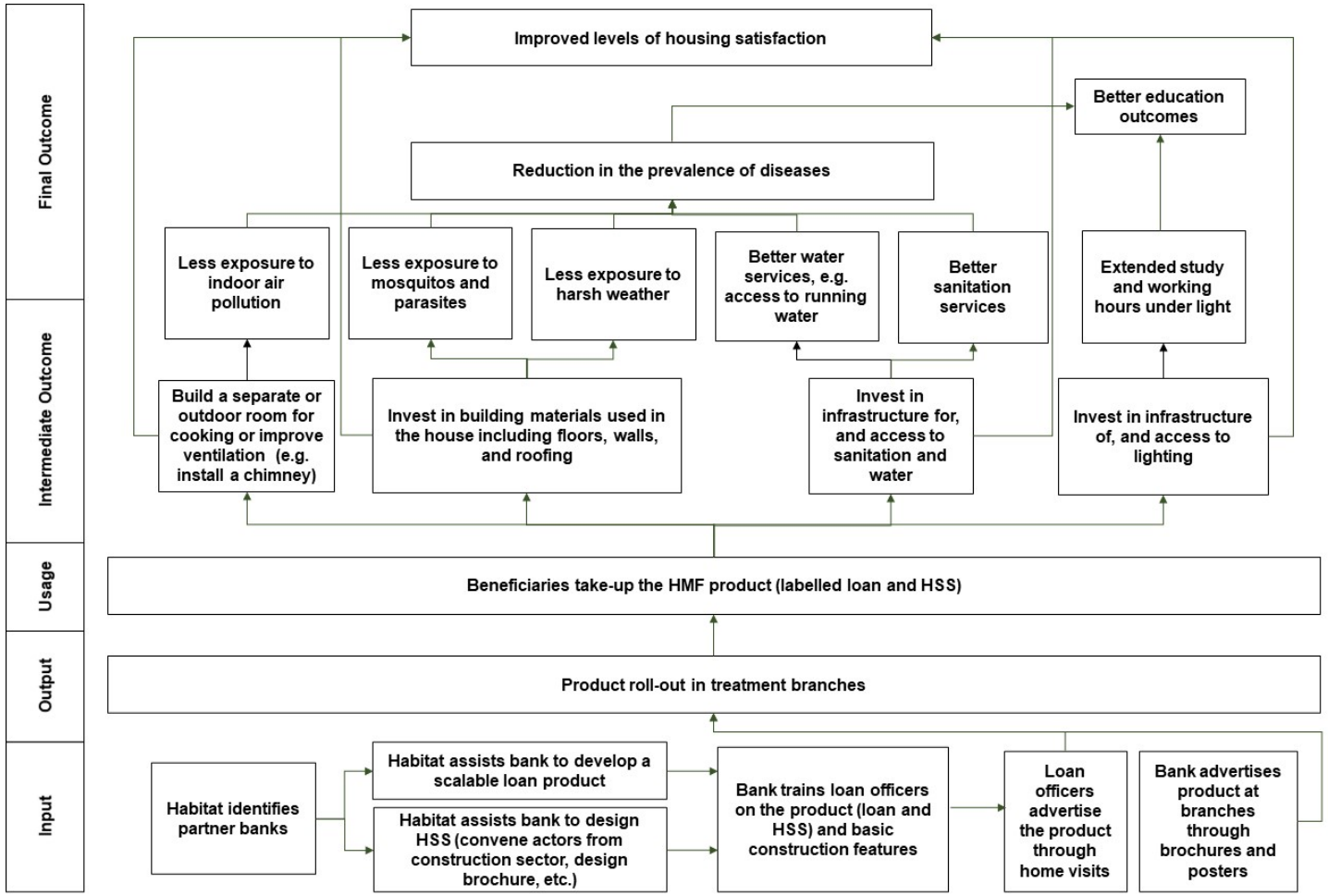


Figure 1: Theory of change

4. Data and empirical approach

Given the commercial nature of both partner banks, the study design had to be as unobtrusive as possible without compromising its credibility and statistical validity. The banks did not want to deny their clients access to a product based on random selection because they were concerned about their client relationships and reputation. Specifically, they were concerned that clients would speak to each other and then feel discriminated against for being denied the product. Instead, both banks agreed to a staggered roll-out and to withhold the product from a small number of branches, which they claimed they had selected to be highly comparable in terms of their geographic locations with other branches that did receive the product but were far enough to avoid unintended spillover effects. Figures A.1 and A.2 present the geographical spread of the final branches that were selected to be part of this study.

4.1. Data collection

Figure 2 summarizes the timeline of the development of the HMF products and the impact evaluation in both countries. In Kenya, the bank provided us with a non-random list of eight branches to be part of the evaluation: four treatment and four comparison branches. In June 2015, after a six-month piloting phase, the partner bank rolled out the 'Nyumba Smart Loan' in all but four of its 222 branches across Kenya. In Uganda, after a piloting phase of nine months, the partner bank started to roll out the 'Cente-Home Loan' to 15 branches every six months until all branches had been served. In August 2016, the product was offered to the first 15 branches across Uganda. Clients from these branches constitute the treatment group. The bank provided us with a list of further 17 branches in which the phased roll-out would only take place after the follow-up survey. Clients from these branches serve as the comparison group. Of these 32 branches, we randomly selected 17 to be part of this study (9 belonging to the treatment group and 8 belonging to the comparison group). This selection was done to facilitate logistics and to reduce data collection costs.

To ensure a representative sample in each branch, at baseline, we stratified the number of clients per branch proportional to the total number of clients in that branch. During piloting in both countries, take-up among bank clients was low, perhaps also due to the specific purpose advertised by this product. Against this background and to ensure a powerful sample of people who are interested in the BAUA programme, we decided to oversample customers who had recently taken out the HMF product.

In both countries, three out of four customers in our treatment sample were randomly chosen from a pool of customers who decided to use the product. The remaining quarter in our treatment sample is a random sample of existing bank clients who were also offered the product but had not taken up the loan, yet. The comparison group is a random sample of existing bank clients from branches without access to the BAUA programme. Take-up statistics throughout the project validate our approach. In Kenya, between baseline and endline survey, there was only a 8% increase in HMF loan take-up from the treatment group. In Uganda, only 5%. We have no reason to believe that contamination in comparison branches is an issue because take-up in those branches was zero.

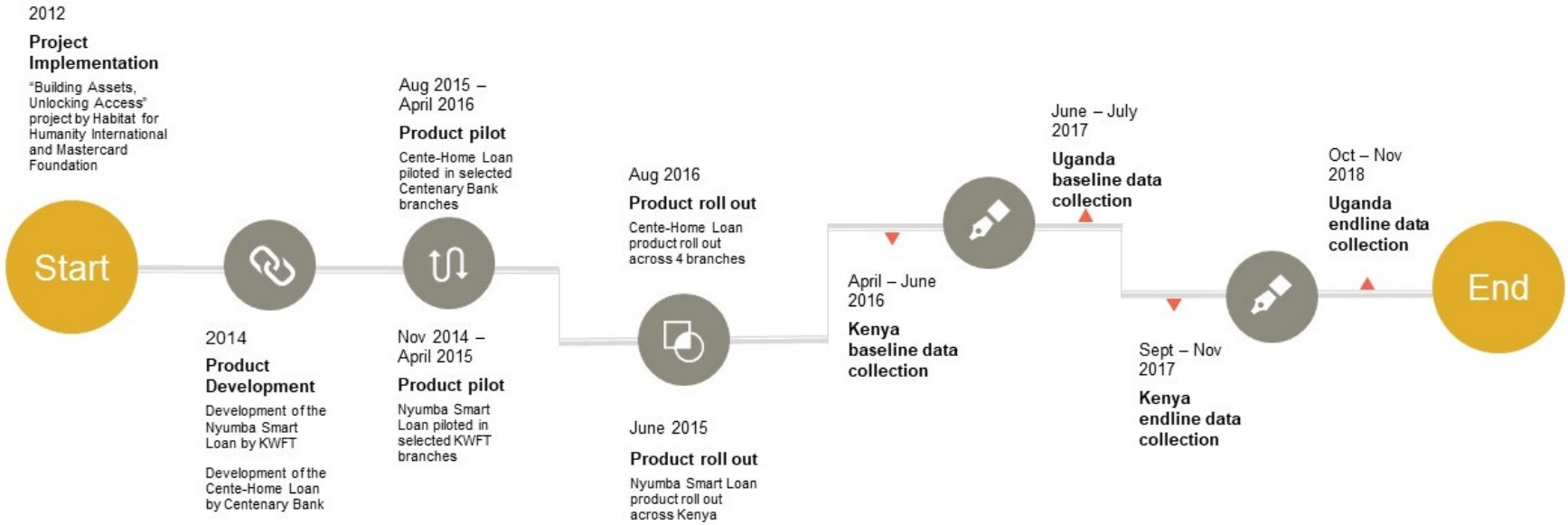
Consequently, we conducted retrospective baseline surveys shortly after take-up. Baseline data collection was conducted between April to June 2016 in Kenya, and between June to July 2017 in Uganda. Given that there is likely to be a delay between output delivery activities and their measurable effect on outcome performance indicators, the baseline study will still provide an accurate estimate of pre-operation conditions even after the project has begun. Even if participants would immediately start construction work at their homes, we expect housing improvement impacts to surface only over the medium or longer run so that impacts are not visible two weeks after loan-granting. In the very unlikely event that this may happen, we would at most underestimate the effects of the HMF product at endline.

In total, the baseline sample includes 3,021 individuals across the two countries, 1,547 KWFT clients in Kenya (771 from the comparison group and 776 from the treatment group) and 1,474 Centenary Bank clients in Uganda (673 from the comparison group and 801 from the treatment group). All participants were revisited for a follow-up survey about 18 months later (Kenya: September to November 2017, Uganda: October to November 2018). 2,341, or 77.5%, could be reached. In Kenya, the field teams completed 1,242 interviews during this follow-up survey, out of which 631 respondents could access the HMF product. In Uganda, 1,099 respondents participated at follow-up; 581 of them were offered the HMF product. Table A.3 shows that attrition was not significantly associated with treatment status, which implies no selective attrition.

4.2. Bank clients and loan usage

Baseline surveys contain a wide range of information on household and individual characteristics, in addition to house ownership, dwelling's age, time lived in house and

Figure 2: Timeline



outcome data. Respondents were asked to recall the condition of their houses before the provision of the loan. We expect this information to be reasonably accurate because dwelling characteristics and major home improvements are easy to remember. Other information, however, may become more difficult to recall, including variables such as perceived health, mental well-being or monetary values. Like Lachaud et al. (2018), we cannot completely rule out systematic recollection errors at baseline and report results (especially on health and education) with caution.

Table 1 presents baseline characteristics for bank clients divided by treatment status. Variable definitions are provided in Table A.4.[12] On average, participants are 40 years old and married. Households consist of five members, including the respondent and two children. About half of the sample has completed secondary education or more and 24% of participants state 'subsistence farming' as their main occupation. The majority is either self-employed, teaches or undertakes some form of casual employment. Many households possess livestock (cows, goats, pigs, poultry), while vehicles are less commonly owned. House ownership is very common. 42% have lived in their house for ten or more years. Houses are on average ten years old, but twelve per cent of the sample do not know when their house was built. We still consider this covariate to be important for loan take-up and, hence, include a missingness dummy as an additional covariate and recode missing values to zero.

Figure A.3 shows that 95% of those who took up the HMF product in treatment branches used the loan for the intended housing improvement. The loan was commonly dedicated to improve the physical structure of the houses (roofs, floors, doors/windows), to paint the exterior, or to buy building materials for the construction of new houses. A less common usage was to improve basic services such as sanitation, water, or electrification. The category 'other' mainly refers to non-labelled purposes such as school fees, business, or medical expenses. As multiple response options were possible, we also see that about 40% of clients mentioned at least two purposes, with on average 30% being unrelated to housing improvements.

[12] We follow Lin and Green (2016) in treating missing covariates. If no more than 10% of the covariate's values are missing, we recode the missing values to the overall country mean at baseline. If more than 10% of the covariate's values are missing, we include a missingness dummy as an additional covariate and recode missing values to zero. We test sensitivity of estimates to these approaches and also show balancing for raw data in Table A.5 and Table A.6.

Table 1: Household balancing in pooled sample

	Obs	Sample mean	Treatment mean	Comparison mean	Regression difference	p-Value	SDIFF
	Pooled households						
Female	2,341	0.65	0.66	0.65	0.010	0.957	0.021
Age	2,341	40.48	41.02	39.89	1.128	0.325	0.108
Secondary school or more	2,341	0.46	0.47	0.44	0.028	0.787	0.057
Married	2,341	0.82	0.81	0.82	−0.007	0.677	−0.017
Household size	2,341	4.87	4.90	4.84	0.064	0.861	0.027
Has children	2,341	0.76	0.76	0.77	−0.013	0.764	−0.030
Number of children	2,341	1.87	1.91	1.82	0.082	0.681	0.053
Subsistence farmer	2,341	0.24	0.20	0.29	−0.084	0.246	−0.195
Business person	2,341	0.43	0.46	0.40	0.054	0.450	0.109
Food expenses (z-score)	2,341	0.00	0.02	−0.02	0.045	0.682	0.046
Owns cell phone	2,341	0.92	0.92	0.91	0.003	0.956	0.010
Owns radio	2,341	0.79	0.79	0.78	0.014	0.609	0.034
Owns television	2,341	0.46	0.51	0.41	0.096	0.336	0.194
Owns fridge	2,341	0.10	0.13	0.07	0.053	0.251	0.177
Owns motorcycle	2,341	0.25	0.26	0.24	0.020	0.576	0.047
Owns livestock	2,341	0.79	0.79	0.79	−0.002	0.984	−0.004
Owns land	2,341	0.66	0.69	0.62	0.076	0.374	0.161
Owns house	2,341	0.79	0.83	0.75	0.081	0.147	0.199
Years lived in house	2,341	9.65	9.44	9.89	−0.448	0.743	−0.055
Dwelling age	2,341	9.64	9.08	10.24	−1.158	0.406	−0.119
Dwelling age missing	2,341	0.12	0.10	0.14	−0.038	0.236	−0.120
F-Statistic = 7.04							
p-Value = 0.000							

Notes: Values are calculated using baseline survey data for the pooled sample. To proxy for income, we look at the standard score of an important expenditure category that is food and drinks (excluding alcohol). The z-score is calculated using the sub sample mean in each country.

To address missing values, we follow Lin and Green (2016).

The second last column reports the p-value of the OLS regression of the listed baseline characteristic on the indicator for treatment assignment with robust standard errors clustered at the branch level. Obs stands for observations and SDIFF stands for normalised difference. The F-statistic provides an omnibus test of balance.

4.3. Empirical strategy

The empirical analysis makes use of two-period panel data surveys in Kenya and Uganda. We are unable to evaluate the financial and non-financial components of the BAUA programme separately; however, speculate that the additional information provided as part of the HSS had been vital nudging clients to use the loan for housing improvements. Using a DiD approach, we take advantage of the delayed provision of the BAUA programme in some branches to identify causal impacts. The DiD approach excludes non-borrowers in treatment areas from the analysis. Hence, we estimate effects on the intensive margin by comparing existing clients in branches not offered the HMF product with existing clients in branches using the HMF product.

One assumption underlying this identification approach is that the staggered implementation design across branches addresses potential selection bias by sampling

later cohorts of the project as the comparison group, given that these were mobilised and selected the same way as earlier cohorts, the treatment group. In other words, instead of randomly varying the treatment, this approach would rather vary the order in which clients would be offered the HMF product. To confirm that the composition does not significantly differ between treatment and comparison groups, we present extensive balancing tests. Table 2 shows p-values and normalised differences for branch characteristics at baseline. In Kenya, none mean-equality test is significant using the conventional p-values in column (5). Given the low number of branches per country, column (6) additionally shows the normalised difference that is the difference in means between the treatment and comparison groups, divided by the square root of the average of the sample variances of the two groups, following Imbens (2015). This measure is not affected by scale or sample size. The lowest normalised difference obtained equates to 0.390, and so does not pass the Imbens (2015) cut-off criterion of 0.3. All branch characteristics in both countries lie well above this value and need to be considered imbalanced. We argue that this results most likely from a roll out strategy that targeted more profitable branches first because treatment branches have more clients, more credit officers and hold a higher collective value of loans ('loan book') than comparison branches. Consequently, and to achieve comparability between both groups, we include branch-level fixed effects with standard errors clustered at the branch level.

Table 2: Balance across branches

	Sample mean	Treatment mean	Comparison mean	Regression difference	p-Value	SDIFF
	Kenyan branches (N = 8)					
Client size	6247.50	7270.75	5224.25	2046.500	0.302	0.798
Credit officers	6.75	7.50	6.00	1.500	0.458	0.560
Loan book (ln)	11.26	11.59	10.94	0.646	0.168	1.109
Outstandings per client (ln)	2.61	2.76	2.46	0.305	0.349	0.787
	Ugandan branches (N = 17)					
Client size	3401.41	4890.56	1726.13	3164.431	0.002	1.821
Credit officers	9.29	13.67	4.38	9.292	0.000	2.104
Loan book (ln)	16.25	16.83	15.61	1.223	0.024	1.206

Notes: Monetary values are transformed to the natural logarithm.
Normalised differences were calculated using the following equation:

$$SDIFF = \frac{\bar{X}|_{T=1} - \bar{X}|_{T=0}}{\sqrt{\frac{var(X)|_{T=1} + var(X)|_{T=0}}{2}}}$$

While there is no empirical evidence to support the use of any particular cut-off point to define imbalance, Imbens (2015) suggests an arbitrary cutoff of 0.3.

A second key identifying assumption is that, in the absence of the treatment, the average outcomes for the treated and comparison groups would have followed parallel paths over time. Although the DiD approach controls for group-specific and time-constant unobservables, this assumption may be implausible if pre-treatment characteristics that are thought to be associated with outcome variables are unbalanced between the treated and the untreated study participants.

In addition to Table 2, Table 3 shows balancing for both country sub samples.[13] Of the 2,341 individuals included in this study, 1,242 belong to the Kenya sample and 1,099 to the Uganda sample. In the Kenya sample, the value of the F-statistic for the test that the covariates jointly predict assignment to treatment ('omnibus test') is 6.94 (p=0.000). Interestingly, the share of households owning a motorcycle, livestock or a house is significantly higher in the treatment group compared to the comparison group. This implies a target group of wealthier households in Kenya. Among treatment households in Uganda, significantly less people were married than in comparison households. However, the normalised difference is not significant for this variable. Further, having non-agricultural employment, a greater likelihood for television and

[13] Tables A.7 and A.8 show balancing for those who took up the loan in treatment branches at baseline and the comparison group.

fridge ownership and less time lived in generally younger houses are variables correlated with treatment status. Like in Kenya, the p-value for an omnibus test of balance is 0.000 in Uganda. Because of imbalance within the country sub samples, we do not only report DiD estimates controlling for characteristics unbalanced at baseline but also apply a weighting algorithm to further improve the balancing.

These pre-treatment characteristics also have predictive power for loan take-up. Table 4 estimates a probit model with take-up as the dependent variable and reveals some precisely estimated coefficients. In Kenya, households with children have a higher probability of take-up than those without children. The probability of take-up increases with land and house ownership and decreases with the age of the dwelling. In Uganda, males are more likely to take up the HMF product than females. Those who are older, better off, own a television or a house have a higher probability of taking up the loan. Owning livestock or having lived in a house for a long period decreases this probability. Looking at the pseudo-r-squared, the predictive power of the conditioning variables is much higher in Uganda (0.182) than in Kenya (0.061). Table 5 shows baseline outcome levels for both countries.[14] In Kenya, all except four outcome indicators have similar levels for the period before the intervention started. Although household characteristics imply a target group that is better off, we see a different picture when looking at outcomes. Households in the comparison group have significantly better roofs, water, and lighting. Initially, they are also more satisfied with their flooring quality. The opposite holds true for Uganda. People in treatment areas have significantly better flooring, water, and cooking infrastructure at baseline. They feel more secure to invite guests to their homes and their children had missed less days at school before the programme began. Coefficients for other outcomes are not statistically significant.

[14] Table A.9 shows similar results on raw data without imputations.

Table 3: Household balancing in country sub samples

	Obs	Sample mean	Treatment mean	Comparison mean	Regression difference	p-Value	SDIFF
	Kenyan households						
Female	1,242	0.99	1.00	0.99	0.012	0.347	0.135
Age	1,242	41.75	42.30	41.19	1.109	0.473	0.103
Secondary school or more	1,242	0.26	0.26	0.26	0.000	0.996	0.000
Married	1,242	0.82	0.83	0.81	0.018	0.478	0.047
Household size	1,242	4.59	4.74	4.43	0.305	0.560	0.155
Has children	1,242	0.79	0.78	0.80	−0.021	0.705	−0.052
Number of children	1,242	1.84	1.92	1.76	0.165	0.663	0.112
Subsistence farmer	1,242	0.35	0.30	0.39	−0.090	0.402	−0.189
Business person	1,242	0.49	0.52	0.47	0.052	0.609	0.104
Food expenses (z-score)	1,242	−0.00	−0.01	0.00	−0.014	0.940	−0.015
Owns cell phone	1,242	0.95	0.97	0.94	0.029	0.202	0.135
Owns radio	1,242	0.79	0.78	0.80	−0.015	0.626	−0.037
Owns television	1,242	0.32	0.31	0.33	−0.026	0.568	−0.055
Owns fridge	1,242	0.03	0.02	0.03	−0.012	0.355	−0.074
Owns motorcycle	1,242	0.24	0.27	0.21	0.066	0.079	0.154
Owns livestock	1,242	0.94	0.97	0.90	0.068	0.002	0.281
Owns land	1,242	0.77	0.84	0.70	0.142	0.040	0.341
Owns house	1,242	0.88	0.93	0.83	0.101	0.047	0.316
Years lived in house	1,242	11.77	12.02	11.52	0.493	0.660	0.057
Dwelling age	1,242	11.28	10.97	11.60	−0.630	0.731	−0.063
Dwelling age missing	1,242	0.08	0.05	0.10	−0.056	0.142	−0.211
F-Statistic = 6.94 p-Value = 0.000							
	Ugandan households						
Female	1,099	0.27	0.29	0.25	0.039	0.339	0.087
Age	1,099	39.03	39.63	38.37	1.265	0.134	0.127
Secondary school or more	1,099	0.68	0.70	0.66	0.041	0.579	0.091
Married	1,099	0.81	0.79	0.83	−0.034	0.075	−0.086
Household size	1,099	5.19	5.08	5.31	−0.234	0.624	−0.088
Has children	1,099	0.73	0.73	0.73	−0.000	0.998	−0.000
Number of children	1,099	1.89	1.89	1.90	−0.013	0.935	−0.008
Subsistence farmer	1,099	0.13	0.10	0.16	−0.068	0.079	−0.202
Business person	1,099	0.36	0.39	0.33	0.061	0.480	0.129
Food expenses (z-score)	1,099	0.00	0.06	−0.06	0.113	0.274	0.111
Owns cell phone	1,099	0.88	0.87	0.89	−0.024	0.763	−0.074
Owns radio	1,099	0.78	0.80	0.76	0.047	0.311	0.114
Owns television	1,099	0.63	0.73	0.51	0.222	0.019	0.469
Owns fridge	1,099	0.18	0.24	0.12	0.120	0.002	0.317
Owns motorcycle	1,099	0.26	0.25	0.28	−0.032	0.622	−0.073
Owns livestock	1,099	0.62	0.59	0.66	−0.068	0.424	−0.141
Owns land	1,099	0.53	0.53	0.52	0.012	0.887	0.025
Owns house	1,099	0.68	0.71	0.64	0.067	0.133	0.145
Years lived in house	1,099	7.26	6.63	7.96	−1.325	0.033	−0.191
Dwelling age	1,099	7.78	7.03	8.64	−1.609	0.041	−0.177
Dwelling age missing	1,099	0.16	0.15	0.17	−0.022	0.618	−0.060
F-Statistic = 6.56 p-Value = 0.000							

Notes: Values are calculated using baseline survey data for Kenya and Uganda.

To address missing values, we follow Lin and Green (2016).

The second last column reports the p-value of the OLS regression of the listed baseline characteristic on the indicator for treatment assignment with robust standard errors clustered at the branch level. Obs stands for observations and SDIFF stands for normalised difference. The F-statistic provides an omnibus test of balance.

Table 4: Probit of take-up at endline on baseline characteristics (treatment only)

	(1) Pooled Mfx / SE	(2) Kenya Mfx / SE	(3) Uganda Mfx / SE
Female	−0.056		−0.098***
	(0.207)		(0.137)
Age	0.002	0.002	0.003*
	(0.008)	(0.014)	(0.008)
Secondary school or more	−0.047	0.022	−0.075
	(0.150)	(0.134)	(0.261)
Married	0.013	−0.019	0.003
	(0.154)	(0.224)	(0.156)
Household size	−0.010*	−0.000	−0.009
	(0.024)	(0.029)	(0.038)
Has children	0.002	0.034***	−0.036
	(0.115)	(0.025)	(0.215)
Subsistence farmer	−0.033	−0.065	−0.017
	(0.174)	(0.264)	(0.198)
Business person	−0.011	−0.045	−0.015
	(0.108)	(0.177)	(0.123)
Food expenses (z-score)	0.034**	0.015	0.067***
	(0.057)	(0.075)	(0.091)
Owns cell phone	−0.005	−0.101	0.034
	(0.160)	(0.275)	(0.152)
Owns radio	−0.022	0.014	−0.033
	(0.115)	(0.157)	(0.163)
Owns television	0.067**	−0.003	0.140***
	(0.131)	(0.089)	(0.145)
Owns fridge	0.041	−0.055	0.031
	(0.178)	(0.251)	(0.212)
Owns motorcycle	−0.010	0.008	−0.022
	(0.100)	(0.156)	(0.157)
Owns livestock	−0.055*	0.176	−0.075***
	(0.130)	(0.503)	(0.107)
Owns land	0.024	0.064**	−0.014
	(0.131)	(0.130)	(0.213)
Owns house	0.140***	0.110*	0.121**
	(0.140)	(0.231)	(0.238)
Years lived in house	0.001	0.005	−0.005*
	(0.011)	(0.015)	(0.016)
Dwelling age	−0.004**	−0.007*	−0.002
	(0.008)	(0.018)	(0.007)
Dwelling age missing	−0.039	−0.118	−0.018
	(0.253)	(0.319)	(0.334)
Observations	1213	631	581
Pseudo R^2	0.066	0.061	0.182

Notes: The table reports marginal effects of probit regressions with standard errors clustered at the branch level in brackets. * p < 0.10, ** p < 0.05, *** p < 0.01 denote statistical significance.

To address missing values, we follow Lin and Green (2016).

The outcome variable in columns 1-3 is an indicator equal to one if the person has taken out the HMF product at one of our partner banks at endline. Households from comparison areas are excluded from this analysis.

Table 5: Household balancing on outcomes

	Kenya				Uganda			
	Treat mean	Comp mean	Regression difference	p-Value	Treat mean	Comp mean	Regression difference	p-Value
Dwelling characteristics								
Improved roof	0.94	0.99	−0.046	0.088	0.94	0.89	0.047	0.324
Improved walls	0.68	0.54	0.131	0.476	0.93	0.88	0.054	0.171
Improved flooring	0.51	0.57	−0.064	0.384	0.89	0.80	0.090	0.024
Number of rooms	3.11	3.17	−0.060	0.771	3.89	3.62	0.272	0.278
Separate kitchen	0.74	0.71	0.036	0.726	0.68	0.70	−0.018	0.597
Chimney	0.15	0.09	0.061	0.308	0.18	0.16	0.017	0.660
Services & protection								
Improved water	0.04	0.16	−0.123	0.060	0.54	0.31	0.233	0.004
Improved toilet	0.39	0.40	−0.014	0.872				
Improved lighting	0.47	0.65	−0.183	0.001	0.86	0.79	0.066	0.111
Improved cooking	0.03	0.07	−0.038	0.243	0.04	0.02	0.019	0.075
Protection against rain	0.51	0.58	−0.075	0.155	0.80	0.79	0.015	0.704
Satisfaction								
Floor quality	0.15	0.25	−0.101	0.018	0.40	0.38	0.025	0.665
Wall quality	0.18	0.26	−0.080	0.135	0.42	0.37	0.045	0.392
Roof quality	0.23	0.31	−0.081	0.113	0.51	0.43	0.082	0.162
House quality	0.19	0.25	−0.062	0.184	0.42	0.34	0.080	0.183
Pride	0.76	0.68	0.075	0.177	0.74	0.54	0.200	0.000
Finances								
Current finances to peers	3.53	3.48	0.050	0.438	3.35	3.42	−0.070	0.292
Future finances to peers	4.18	4.08	0.101	0.345	3.92	3.87	0.047	0.507
Saved in last year	0.85	0.77	0.083	0.235	0.69	0.72	−0.033	0.468
Total credit	−0.05	0.06	−0.109	0.142	−0.01	0.01	−0.020	0.747
Monthly income	−0.02	0.04	−0.061	0.519	0.02	−0.01	0.029	0.628
Health								
Mental health	19.70	20.78	−1.080	0.444	19.22	20.31	−1.089	0.274
Blocked nose	0.16	0.13	0.034	0.357	0.06	0.07	−0.006	0.872
Runny nose	0.23	0.21	0.013	0.795	0.17	0.16	0.004	0.928
Persistent sneezing	0.10	0.08	0.012	0.726	0.03	0.05	−0.022	0.370
Sore throat	0.07	0.05	0.016	0.274	0.01	0.03	−0.016	0.392
Painful swallowing	0.05	0.04	0.004	0.788	0.01	0.02	−0.009	0.543
Cough	0.26	0.26	−0.004	0.916	0.22	0.26	−0.044	0.317
Fever	0.25	0.24	0.004	0.964	0.26	0.35	−0.092	0.207
Headache	0.39	0.37	0.022	0.818	0.11	0.18	−0.065	0.285
Short breath	0.04	0.04	−0.003	0.763	0.01	0.01	−0.003	0.696
Itchy eyes	0.06	0.04	0.018	0.277	0.02	0.02	0.001	0.939
Nausea	0.06	0.06	−0.007	0.779	0.02	0.03	−0.008	0.663
Vomiting	0.07	0.07	−0.000	0.996	0.02	0.03	−0.008	0.676
Rash	0.02	0.02	0.001	0.899	0.01	0.03	−0.017	0.227
Diarrhoea	0.04	0.04	−0.000	0.978	0.02	0.05	−0.023	0.251
Worms	0.12	0.18	−0.062	0.289	0.06	0.05	0.011	0.554
No health problems	0.33	0.34	−0.016	0.783	0.51	0.43	0.078	0.234
Education								
Days absent from school	1.50	1.66	−0.160	0.673	0.95	1.78	−0.829	0.084
School expenses	0.04	−0.03	0.074	0.453	0.08	−0.04	0.125	0.216
Homework	1.40	1.35	0.044	0.425	0.55	0.74	−0.185	0.087

Notes: Values are calculated using baseline survey data for Kenya and Uganda.
To address missing values, we follow Lin and Green (2016).
Columns five and nine report p-values of OLS regressions of the listed baseline outcome on the indicator for treatment assignment with robust standard errors clustered at the branch level.

Despite outcome levels differ initially, the key to identification in a DiD is that they have moved in parallel between the pre-period and the treatment period absent the intervention. Because we cannot guarantee that the outcomes of interest would be, on average, the same in these two periods in the absence of the intervention, we need to capture all covariates that are fixed over time and are theoretically associated with our outcomes of interest or would otherwise lead to different time trends (Angrist and Pischke, 2008). A lack of longer pre-treatment periods prevents us from extending pre-trend tests to, for instance, event-study methods. For this reason, we also apply DiD on a weighted sample where we can make levels more similar. Table 6 shows that after inverse probability weighting the highest of the normalised differences equals 0.155, which easily passes the Imbens (2015) cut-off criterion of 0.3. Most of the post-weighting normalised differences lie well below even this modest value. Similarly, the post-weighting variance ratios all end up close to one leading to a strong balance performance. Condition on this set of covariates and thus extending our analyses to more similar groups, we assume that the common-trend assumption holds.

Table 6: Pre- and post-weighting balancing

	Normalised differences		Variance ratio	
	Raw	Weighted	Raw	Weighted
	Kenya sample			
Has children	−0.038	0.020	1.057	0.974
Owns motorcycle	0.174	0.010	1.230	1.009
Owns livestock	0.352	0.028	0.192	0.820
Owns land	0.390	0.013	0.580	0.973
Owns house	0.396	0.035	0.326	0.869
Years lived in house	0.051	−0.007	0.992	0.996
Dwelling age	−0.089	−0.115	1.133	1.333
Dwelling age missing	−0.241	−0.020	0.432	0.913
	Uganda sample			
Female	0.034	0.073	1.039	1.090
Age	0.135	−0.046	0.923	0.882
Married	−0.066	−0.009	1.116	1.016
Food expenses (z-score)	0.160	−0.079	1.454	0.738
Subsistence farmer	−0.229	−0.026	0.589	0.928
Owns livestock	−0.205	0.005	1.098	0.999
Owns television	0.587	−0.009	0.693	1.013
Owns fridge	0.359	−0.070	1.832	0.930
Owns house	0.200	−0.011	0.843	1.006
Years lived in house	−0.238	−0.062	0.610	1.008
Dwelling age	−0.246	−0.089	0.754	1.440
Dwelling age missing	−0.086	0.020	0.850	1.042

Notes: Values are calculated using baseline survey data for Kenya and Uganda.
Normalised differences are divided by 100. Comparison households are only recruited from the comparison branches. Non-borrowers in treatment areas are excluded from this analysis. Robust standard errors are clustered at the branch level.

Third, the estimator requires that the outcome of one unit is unaffected by the treatment status of other units. Throughout this study, we implicitly assume that this Stable Unit Treatment Value Assumption (SUTVA) holds. This assumption will be violated when externalities are present and spillover effects exist. However, we assume that if there are spillover effects, they only exist at a local level and not across branches. Because we vary exposure to the treatment at the branch level, it is unlikely that spillover effects on untreated households undermine our identification strategy.

Fourth, a causal interpretation requires exclusion restrictions. The idea is that after conditioning on the group and period effects-treatment exposures that occur at $t+1$ are not anticipated by outcomes measured in an earlier period such as t. The restriction could fail in practice if respondents change their behaviour in anticipation of the treatment. We believe this to be unlikely because respondents could not lie about outcomes that affect their application for future housing loans.

If the identifying assumptions hold, the treatment effect can be estimated in a regression framework. $T_i \in \{0,1\}$ indicates whether or not individual, i, is treated ($T_i = 1$), i.e. took up the HMF product, and $Post_t \in \{0,1\}$ indicates the post treatment period ($Post_t = 1$), i.e. during follow-up surveys. We further interact a linear time trend with the treatment dummy. This controls for time-invariant unobserved differences between groups (Angrist and Pischke, 2008). Because the regressor of interest only varies at the branch level, we also include branch-level fixed effects. These control for any time invariant small-sample differences, e.g. certain types of branches were given priority for treatment selection by banks. Additionally, we cluster errors at the branch level in all specifications. To further reduce the risk of confounding factors, a set of relevant pre-treatment covariates that are relevant for the development of outcomes or product take-up enter the regression:

$$Y_{it} = \alpha + \beta_1 T_i + \beta_2 Post_t + \beta_3 (T_i \times Post_t) + \delta X_{it} + \epsilon_{it} \tag{1}$$

where Y_{it} denotes the individual outcome variable i at time t, X_{it} is a vector of covariates, and ϵ_{it} represents the error-term. The coefficients, β and δ are to be estimated. The coefficient of interest, β_3, is the DiD estimator for the impact of the intervention of a treated individual i.

Next, we apply a combination of DiD and weighting to improve balancing. In our main analysis, we rely on inverse probability weighting (IPW) that is reweighting the untreated observations to look like the treated ones. We estimate the following equation that is linked to the estimator by Horvitz and Thompson (1952):

$$\Delta = \frac{1}{N}\sum_{i=1}^{N}\left[D_i\frac{Y_i}{P(X_i)} - (1-D_i)\frac{Y_i}{1-P(X_i)}\right] \tag{2}$$

We choose this approach because we had neither to define a bandwidth which again embodies a bias-variance trade-off[15], nor choose a number of neighbours or strata. We will show results relative to alternative matching estimators in the robustness section. One challenge with IPW, however, is when there are probabilities very close to zero, as this leads to division by very small numbers. We therefore modify the tolerance level for robustness and show the histogram after weighting to validate the common support condition. Both histograms (Figures 3 and 4 for Kenya and Uganda, respectively) reveal that the support condition is sufficiently met, and that the density is not skewed towards zero probability. This indicates that the set of conditioning variables meaningfully predict take-up of the HMF product.

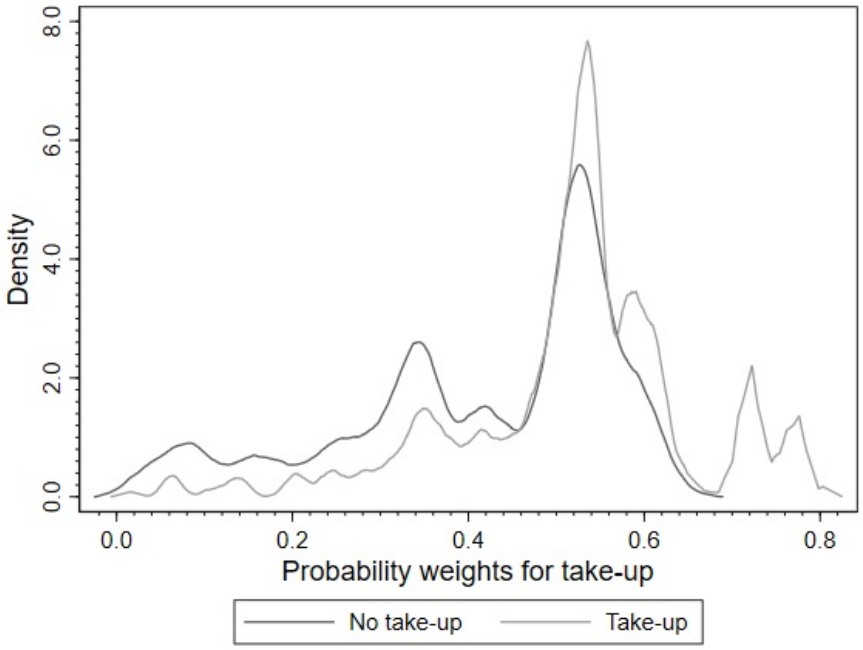


Figure 3: Probability weights histogram for Kenya

[15] A larger bandwidth implies lower variance and higher bias, a smaller bandwidth implies a higher variance and lower bias.

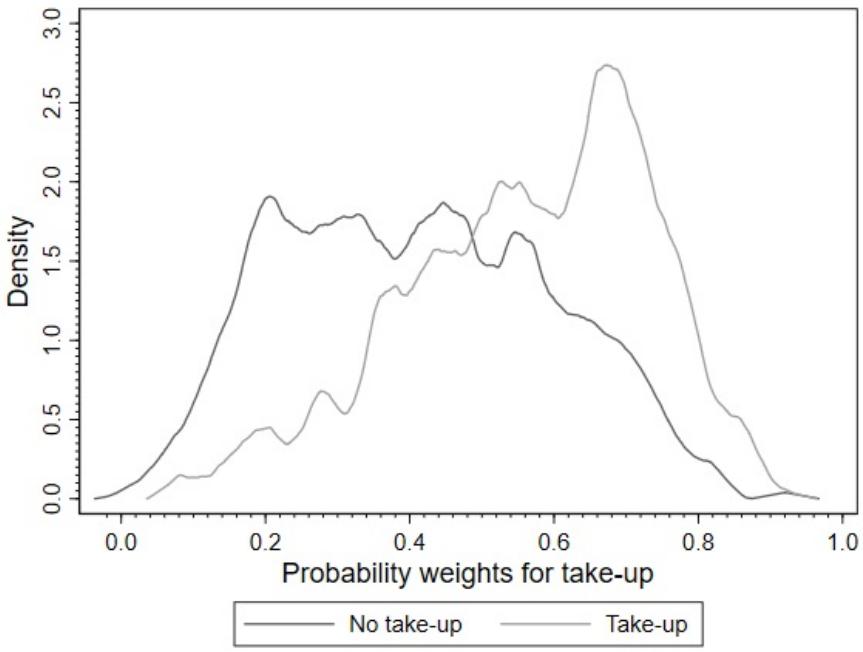


Figure 4: Probability weights histogram for Uganda

5. Results

We present results from two estimation strategies in Table 7. The first result is obtained directly from Equation (1), studying the differential effects of the HMF product on treated households versus those in comparison branches. The second result applies the IPW-Equation (2) also estimating the Average Treatment Effect on the Treated (ATET). We account for multiple hypothesis testing by aggregating variables into predefined families of outcomes and studying the effect of treatment on an index for each family. All components of the index are standardised, added and standardised again; hence, equally weighted.

Looking at dwelling characteristics, our analysis finds contrasting effects between both country sub samples. In Kenya, beneficiaries of the 'Nyumba Smart Loan' experienced a positive impact on the overall housing conditions. As a result of loan take-up, they added more rooms to their houses, and improved roofing, walls and flooring. Although coefficients are very similar in size and direction, the outcome of a separate room used as a kitchen is only significant in the second specification. In Uganda, a separate kitchen is the only outcome that was significantly affected by the intervention. Considering both specifications, there is an increase of 9.4 to 13.7 per-

centage points in the number of households with separate kitchens, and as a result, households are less exposed to indoor pollution. We do not find further impact on the reported main materials used for roofing, walls, or flooring in Uganda.

Similarly, for services and rain protection, the HMF product had greater impact in Kenya than in Uganda. In Kenya, there is an improvement in the type of fuel used for lighting and cooking (electricity, gas, solar energy) and protection against rain that is consistently significant in both specifications. On average, beneficiaries also report improved access to water of about 3.6 percentage points that is significant in the weighted estimation. They mainly stated an increase in access to piped water connections and water tanks. In Uganda, the weighted estimation strategy shows a positive impact on rain protection on the ten percent significance level. We cannot confirm further impacts under this outcome category for Ugandan households.

In both countries, positive and significant effects of the HMF product on the physical housing structure have resulted in an improved housing satisfaction amongst users of the HMF product. Our analyses show a significant increase in satisfaction with the quality of floors, walls, roofs, and the overall housing condition. Results are similar for both countries and among estimation strategies. Although anecdotal evidence shows that housing improvements make people feel prouder of their homes and in-turn increases the number of social events held in their homes, we do not see any statistically significant impact on pride.[16]

The paper does come with some limitations inherent to the applied retrospective evaluation design. That is why we look at secondary outcomes that could potentially result from better housing conditions with caution. In other words, we do not claim any causal statements on these outcomes and view results presented in Table 8 as exploratory. In terms of personal finances (current and future finances, savings, borrowings, and earnings), we see no changes in households' financial behaviour in Kenya. Ugandan households are more likely to be optimistic about their overall financial situation in comparison with their peers. From the theory of change, the improvements made to housing are expected to lead to an improvement in the health of the occupants. And although both countries consistently show negative coefficients on symptoms, we cannot confidently attribute mental or physical health impacts to the HMF product take-up. The same is true for educational outcomes.[17]

[16] In Kenya, qualitative evidence shows that loan takers increased their participation in community activities.

[17] Despite this, qualitative interviews undertaken with beneficiaries revealed that improvements made to their physical housing structure, such as adding extra rooms, have made the households more conducive for children to spend more time on their homework.

6. Additional analyses

To account for statistical differences between pre-treatment characteristics in the treatment and comparison branches, we used DiD and inverse probability weighting to strengthen our evaluation design and to ensure that credible results of impact can still be produced while the parallel trend assumption is more likely. This section further augments our assumptions and employs three robustness exercises on our primary outcome results. Although the weighted sample is well balanced, we first apply a regression adjustment on the treatment dummy, controlling for the covariates used in the IPW-Equation (2). This corrects for any residual differences in the covariates that may be present in the weighted sample. Second, we create propensity score matching estimates using kernel matching with a Gaussian kernel and bandwidth of 0.05. Finally, we report ATET estimates using the post-double-selection (PDS) methodology by Belloni et al. (2014). The set of covariates selected by balancing tests and probit estimations seems plausible, given that one might have expected these variables to drive take-up, particularly house ownership, age of the house and the number of years a person has lived in that house. However, we do not know the true model and hence also do not know which covariates are important. Too many covariates lead to overfitting, whereas too few lead to omitted variables bias. That is why we want to optimize our model using this machine learning technique to identify all relevant and observable covariates.[18]

Table A.10 presents different estimation methods and confirms our main results for materials used for housing. In Kenya, the coefficient on a separate kitchen remains ambiguous. Albeit p-values for both, the non-adjusted and the adjusted IPW model, and for the PDS lasso are significant at the ten percent confidence level, they are not significant using DiD and matching approaches. We, therefore, cannot confidently conclude that Kenyan households improved their cooking environment as a result of the intervention. In Uganda, all estimation methods confirm that the intervention had a positive impact on the number of households with separate kitchens. Looking at estimates of the regression adjusted IPW model, the kernel matching, and PDS lasso, Table A.11 confirms improvements in services and rain protection in Kenya. In Uganda, robustness tests confirm a positive impact on rain protection. Results on satisfaction and pride are all confirmed using alternative estimation techniques. Although impacts on materials used are stronger in Kenya than in Uganda, Table

[18] We run this exercise with interactions and without interactions. Because results are very similar, we only show results without interactions.

Table 7: Primary treatment effects in Kenya and Uganda

	Kenya sample					Uganda sample				
	Follow up comp. mean	DiD	p-Value DiD	IPW	p-Value IPW	Follow up comp. mean	DiD	p-Value DiD	IPW	p-Value IPW
Dwelling characteristics										
Improved roof	1.00	0.041	0.097	0.041	0.036	0.93	−0.006	0.851	0.021	0.309
Improved wall	0.50	0.115	0.009	0.116	0.001	0.91	0.009	0.858	0.055	0.174
Improved flooring	0.63	0.139	0.001	0.142	0.000	0.84	0.006	0.853	0.036	0.261
Number of rooms	3.10	0.369	0.066	0.412	0.010	3.95	0.118	0.677	0.069	0.797
Separate kitchen	0.76	0.088	0.135	0.087	0.043	0.71	0.137	0.062	0.094	0.079
Chimney	0.11	0.044	0.255	0.038	0.271	0.16	0.026	0.651	−0.027	0.579
Dwelling-Index	−0.93	0.493	0.003	0.498	0.000	−0.19	0.147	0.207	0.192	0.026
Services & protection										
Water	0.14	0.040	0.117	0.036	0.050	0.38	−0.045	0.456	0.019	0.732
Toilet	0.63	0.042	0.652	0.031	0.726					
Lighting	0.79	0.157	0.005	0.169	0.000	0.46	0.131	0.163	0.115	0.143
Cooking	0.07	0.021	0.015	0.018	0.000	0.01	−0.009	0.313	0.001	0.954
Rain protection	0.59	0.205	0.014	0.201	0.001	0.86	0.068	0.165	0.068	0.063
Service-Index	−0.01	0.386	0.012	0.372	0.000	−0.22	0.131	0.361	0.206	0.128
Satisfaction										
Floor quality	0.23	0.218	0.003	0.219	0.000	0.39	0.215	0.013	0.223	0.016
Wall quality	0.25	0.243	0.009	0.243	0.000	0.39	0.227	0.006	0.239	0.006
Roof quality	0.31	0.234	0.004	0.239	0.000	0.39	0.237	0.008	0.251	0.003
Housing quality	0.27	0.173	0.062	0.173	0.004	0.39	0.204	0.027	0.220	0.023
Pride	0.70	0.006	0.921	0.007	0.891	0.60	−0.017	0.834	0.036	0.576
Satisfaction-Index	−0.47	0.409	0.013	0.413	0.000	−0.28	0.405	0.010	0.455	0.005

Notes: Values are calculated using baseline and follow-up survey data for Kenya and Uganda.
To address missing values, we follow Lin and Green (2016).

Table 8: Secondary treatment effects in Kenya and Uganda

	Kenya sample					Uganda sample				
	Follow up comp. mean	DiD	p-Value DiD	IPW	p-Value IPW	Follow up comp. mean	DiD	p-Value DiD	IPW	p-Value IPW
Finances										
Current finances to peers	3.48	−0.059	0.133	−0.065	0.188	3.32	0.063	0.538	0.029	0.722
Future finances to peers	3.88	−0.040	0.722	−0.017	0.876	3.57	0.294	0.010	0.318	0.001
Saved in last year	0.76	−0.063	0.596	−0.066	0.497	0.56	0.077	0.328	0.092	0.208
Total credit	0.04	0.030	0.667	−0.017	0.830	−0.06	0.053	0.380	0.089	0.293
Monthly income	0.02	0.020	0.873	0.017	0.904	−0.07	0.076	0.117	0.026	0.681
Health										
Mental health	20.63	2.167	0.144	2.042	0.146	21.89	−0.956	0.344	−1.480	0.114
Blocked nose	0.13	−0.017	0.773	−0.019	0.696	0.05	−0.014	0.728	−0.002	0.945
Runny nose	0.19	−0.016	0.860	−0.031	0.709	0.16	0.018	0.837	−0.029	0.666
Persistent sneezing	0.11	−0.016	0.792	−0.015	0.764	0.02	0.047	0.176	0.048	0.088
Sore throat	0.08	−0.038	0.340	−0.042	0.177	0.01	0.021	0.359	0.023	0.123
Painful swallowing	0.04	0.008	0.586	0.010	0.361	0.01	0.009	0.572	−0.000	0.963
Cough	0.25	−0.022	0.651	−0.032	0.418	0.31	0.018	0.843	−0.026	0.638
Fever	0.22	0.012	0.906	0.013	0.877	0.25	0.002	0.978	−0.011	0.856
Headache	0.32	−0.001	0.991	−0.013	0.889	0.15	0.011	0.865	−0.037	0.435
Short breath	0.03	−0.007	0.787	−0.011	0.633	0.00	0.009	0.323	0.008	0.251
Itchy eyes	0.05	−0.019	0.430	−0.014	0.521	0.01	−0.005	0.794	−0.011	0.297
Nausea	0.03	0.003	0.938	−0.003	0.933	0.00	0.012	0.569	0.009	0.511
Vomiting	0.05	−0.014	0.690	−0.027	0.420	0.02	−0.006	0.778	−0.015	0.283
Rash	0.03	−0.008	0.429	−0.006	0.492	0.01	0.022	0.159	0.022	0.046
Diarrhoea	0.04	−0.010	0.459	−0.011	0.303	0.03	0.008	0.797	0.002	0.928
Worms	0.16	0.012	0.829	0.024	0.570	0.07	−0.014	0.863	0.008	0.893
No health issues	0.39	−0.009	0.914	−0.004	0.957	0.41	0.063	0.415	0.103	0.026
Education										
Days absent from school	1.67	0.320	0.363	0.258	0.367	2.40	0.297	0.618	0.491	0.257
School expenses	−0.05	0.030	0.692	0.030	0.723	0.03	−0.168	0.157	−0.171	0.181
Homework	1.38	−0.026	0.818	−0.024	0.754	1.32	0.051	0.761	0.031	0.811

Notes: Values are calculated using baseline and follow-up survey data for Kenya and Uganda. To address missing values, we follow Lin and Green (2016).

A.12 shows a similar positive impact on satisfaction in both countries. This suggests that the HMF product in Uganda is being used for purposes other than improving the building materials or services but that make customers similarly happy, such as plastering or painting walls.

7. Discussion and conclusion

Remaining true to Habitat's original principles of self-help and sustainability, through the BAUA programme, Habitat focused on improving systems that enable families to achieve affordable housing without needing ongoing direct support. This meant supporting local firms and expanding innovative and client-responsive services, products, and financing so that households can improve their housing more effectively. This study evaluates the final products of the BAUA programme in Kenya and Uganda that is a combination of a labelled loan and non-financial housing support services.

In both countries, our findings suggest that the HMF product has generally improved the lives of those who have taken up the loan, as well as their families, because coefficients are not only statistically but also economically significant. We conclude that our results are robust as inconsistencies using various methodological approaches are rare. This suggests that labelling is sufficient to nudge clients to invest in their homes without restricting their choice set. It is, however, this wide range of use options that complicates the evaluation of health or educational impacts. Although all coefficients go into the intended direction, this study does not entail the sufficient power and (potentially) time frame to observe ultimate effects on poverty indicators.

This study has nothing to say about impacts on marginal borrowers, which clearly has implications for external validity. Even though the impact on the inframarginal borrower is considered the policy-relevant parameter in our study context, it may well be that results change once the banks extend their services to new areas and individuals not already being served. Our findings, therefore, represent a close approximation on existing bank clients who are interested in the BAUA programme in Kenya and Uganda because we sampled across multiple branches all over the countries, not limited to one area. Additionally, we have no reason to believe that these effects are affected by special care problems because the BAUA programme was provided under business-as-usual conditions. Each bank has to understand, which products are profitable - meaning that both banks in our study had no further incentive to track this product differently than other products. In fact, both banks still offer the HMF

product as part of their loan portfolio.

Given these findings, we can confidently say that labelling is sufficient to nudge clients towards product usage that this intervention was intended for, but we cannot claim any causal changes on poverty indicators as a result of it. This therefore presents an opportunity to advance the conversation around FSPs investing, scaling, and replicating HMF products in other contexts. More data and time may be needed to fully establish the potential of housing microfinance to synergistically exploit socio-economic, health and environmental goals, as decent and affordable housing remains a critical component to anti-poverty interventions.

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A. Appendix

Appendix to complement:
Improving housing conditions: Labelled Loans in Kenya and Uganda
not intended for publication in main text

Table A.1: Comparison of loans

Loan characteristics	Kenya - KWFT 'Nyumba Smart Loan'	Uganda - Centenary Bank 'Cente Home Loan'
Target market	Women entrepreneurs. Rural and peri-urban residents.	Existing and new bank clients. Engaged in micro enterprises, agriculture, and salaried employees such as civil servants. Rural and peri-urban residents.
Type of loan	Mainly group loans. Some individual loans.	Individual loans.
Loan size	USD 50 - USD 10 000 Average: USD 700	USD 30 - USD 8 275 Average: USD 2 000
Loan terms	Up to 60 months Average: 18 months	Up to 60 months Average: 24 months
Guarantees /security	Personal and group guarantees for loans under USD 5 000. Loans above this are secured with 'tangible assets' such as collateral and registered land.	Secured with the land on which housing is developed, with or without registered title. Also secured with personal guarantees.
Interest rate	24% flat (36.8 - 41.70% APR) plus 2.25% insurance, on par with other microfinance products.	25% APR plus UGX 15 000 (USD 4) application fee and 2% commitment fee (9 points below microenterprise loans).

Notes: Own elaboration.

Table A.2: Perceived Stress Scale questions

Positively worded questions
How often have you felt that you were on top of things?
How often have you felt confident your ability to handle your personal problems?
How often have you felt that things were going your way?
How often have you been able to control irritations in your life?
Negatively worded questions
How often have you been upset because of something that happened unexpectedly?
How often have you felt that you were unable to control the important things in your life?
How often have you felt nervous and 'stressed'?
How often have you felt difficulties were piling up so high that you could not overcome them?
How often have you found that you could not cope with all the things that you had to do?
How often have you been angered because of things that were outside of your control?

Notes: Answers are given on a scale ranging from zero to four, with zero corresponding to 'never', one corresponding to 'almost never', two corresponding to 'sometimes', three corresponding to 'fairly often', and four corresponding to 'very often'. Four of the questions are positively worded, and the other six are negatively worded. The PSS score is obtained by reversing the scores for the answers to the positively worded items and then summing up the scores across the answers of the ten items. Therefore, individual scores on the PSS can range from 0 to 40, with higher scores indicating higher perceived stress. Scores ranging from 0 to 13 indicate low stress; scores ranging from 14 to 26 indicate moderate stress; and scores ranging from 27 to 40 indicate high perceived stress (Cohen et al., 1983).

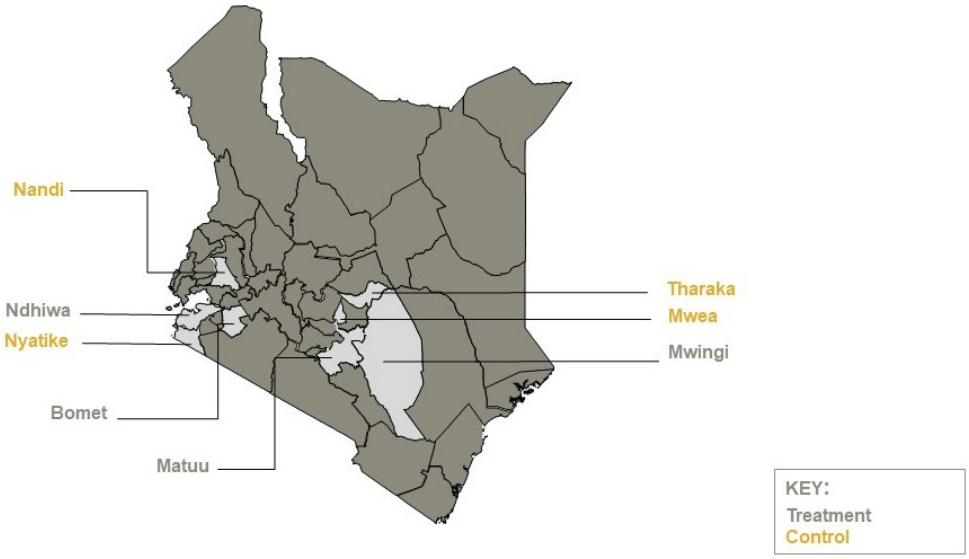

Figure A.1: Kenya

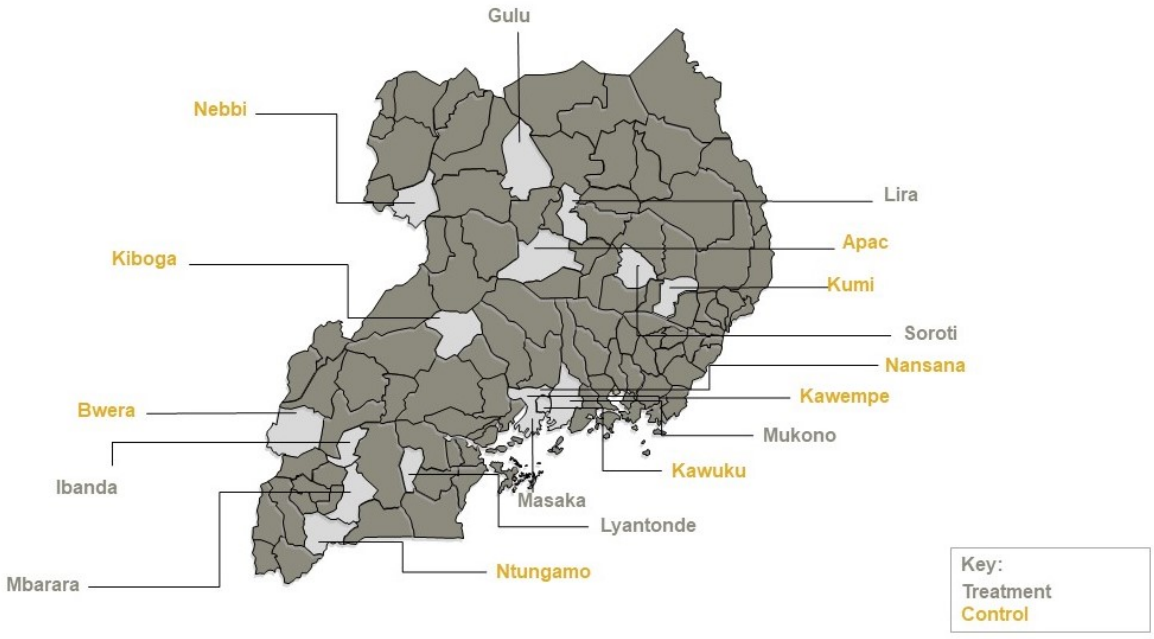

Figure A.2: Uganda

Table A.3: Sample attrition

	(1) **Kenya** Completed follow-up survey β / SE	(2) **Uganda** Completed follow-up survey β / SE
BAUA Programme	0.011	−0.050
	(0.047)	(0.041)
Age	0.005*	0.000
	(0.002)	(0.001)
Secondary school or more	0.024	−0.021
	(0.027)	(0.032)
Married	0.014	−0.072***
	(0.022)	(0.022)
Has children	0.075**	0.034
	(0.030)	(0.030)
Food expenses (z-score)	−0.002	0.009
	(0.011)	(0.011)
Owns livestock	0.135*	0.000
	(0.064)	(0.029)
Business person	0.004	−0.001
	(0.019)	(0.029)
Owns cell phone	0.023	−0.068
	(0.052)	(0.051)
Owns radio	0.056**	0.031
	(0.019)	(0.027)
Owns television	0.012	0.029
	(0.011)	(0.020)
Owns fridge	−0.027	−0.073*
	(0.063)	(0.039)
Owns land	−0.049**	0.048
	(0.021)	(0.031)
Owns house	0.028	−0.012
	(0.055)	(0.027)
Years lived in house	0.001	−0.002
	(0.002)	(0.002)
Dwelling age	−0.001	−0.001
	(0.001)	(0.002)
Dwelling age missing	−0.064	0.020
	(0.061)	(0.042)
Female		−0.018
		(0.029)
Constant	0.347**	0.841***
	(0.102)	(0.081)
Observations	1473	1398
R^2	0.037	0.018

Notes: * p < 0.10, ** p < 0.05, *** p < 0.01 denote statistical significance. Robust standard errors clustered at the branch level in parenthesis.

Table A.4: Variable descriptions

Variable name	Survey question	Indicator definition
Dwelling characteristics		
Improved roof	What is the main material used for the roof of your house?	Dummy = 1 if materials: bricks, concrete, iron, tiles
Improved walls	What is the main material used for the walls of your house?	Dummy = 1 if materials: bricks, concrete, tiles
Improved flooring	What is the main material used for the floor of your house?	Dummy = 1 if materials: bricks/concrete, carpet over concrete, tiles, wood, linoleum
Number of rooms	What is the total number of rooms in your house?	Winsorised and continuous variable
Separate kitchen	Do you have a separate room which is used as a kitchen?	Dummy = 1 if 'Yes'
Chimney	Does your household have a chimney?	Dummy = 1 if 'Yes'
Services & protection		
Improved water	What is your main source of drinking water?	Dummy = 1 if water in the dwelling, water in the yard
Improved toilet	What type of toilet facility is available to your household?	Dummy = 1 if materials: flush toilet, chemical toilet, pit latrine with slap
Improved lighting	What is your main type of fuel for lighting?	Dummy = 1 if electricity or gas
Improved cooking	What is your main type of fuel for cooking?	Dummy = 1 if electricity, gas or solar energy
Rain protection	Is your household protected against water when it rains?	Dummy = 1 if 'Yes'
How would you rate your satisfaction with ... (4-point Likert scale)		
Floor quality	... the floor quality in your household?	Dummy = 1 if 'Satisfied' or 'Very satisfied'
Wall quality	... the wall quality in your household?	Dummy = 1 if 'Satisfied' or 'Very satisfied'
Roof quality	... the roof quality in your household?	Dummy = 1 if 'Satisfied' or 'Very satisfied'
Housing quality	... with the overall quality of your household?	Dummy = 1 if 'Satisfied' or 'Very satisfied'
Pride	I would like to know if you are proud of your house. For example, would you hold a social event at your house?	Dummy = 1 if 'Yes'

Notes: Baseline and follow-up instruments in Kenya and Uganda.

Table A.4: Variable descriptions (continued)

Variable name	Survey question	Indicator definition
Finances		
Current finances to peers	How would you classify your household's current financial situation compared to other households in your community: Much above average (5), above average (4), average (3), below average (2), or much below average (1)?	Dummy = 1 if 4 or 5
Future finances to peers	In two years' time, where do you expect your household's financial situation to be in relation to the financial situation of other households in your community: Much above average (5), above average (4), average (3), below average (2), or much below average (1)?	Dummy = 1 if 4 or 5
Saved in last year	In the last 12 months, has your household made any savings?	Dummy = 1 if 'Yes'
Total credit	Loan values for other loan types	Z-score
Monthly income	In a typical month, what is the total monthly income coming into your household?	Z-score
Health: In the last six months, did a household member experience ...		
Mental health	See Table A.2	
Blocked nose	Blocked nose problems faced by each member in a hh	Mean of all hh members (0 no one, 1 everyone experienced this)
Runny nose	Runny nose problems faced by each member in a hh	Mean of all hh members
Persistent sneezing	Sneezing problems faced by each member in a hh	Mean of all hh members
Sore throat	Sore throat problems faced by each member in a hh	Mean of all hh members
Painful swallowing	Painful swallowing problems faced by each member in a hh	Mean of all hh members
Cough	Cough problems faced by each member in a hh	Mean of all hh members
Fever	Fever problems faced by each member in a hh	Mean of all hh members
Headache	Headache problems faced by each member in a hh	Mean of all hh members
Short breath	Shortness of breath problems faced by each member in a hh	Mean of all hh members
Itchy eyes	Itchy and watery eyes problems faced by each member in a hh	Mean of all hh members
Nausea	Nausea problems faced by each member in a hh	Mean of all hh members
Vomiting	Vomitting problems faced by each member in a hh	Mean of all hh members
Rash	Rash problems faced by each member in a hh	Mean of all hh members
Diarrhoea	Diarrhoea problems faced by each member in a hh	Mean of all hh members
Worms	Pass any worms?	Dummy = 1 if 'Yes'
No health issues	Did hh member experience no health problems?	Dummy = 1 if 'Yes'
Education		
Days absent from school	In the last six months, on average, how many days of school per month did your children miss?	Mean of all children
School expenses	How much did you pay for you children's last school term?	Z-score
Homework	How many hours of homework did your children do last night?	Mean of all children

Notes: Baseline and follow-up instruments in Kenya and Uganda.

Table A.5: Household balancing in pooled sample (non-imputed)

	Obs	Sample mean	Treatment mean	Comparison mean	Regression difference	p-Value	SDIFF
	Pooled households						
Female	2,341	0.65	0.66	0.65	0.010	0.957	0.021
Age	2,335	40.47	41.02	39.89	1.129	0.325	0.108
Secondary school or more	2,219	0.46	0.47	0.44	0.030	0.775	0.059
Married	2,338	0.82	0.81	0.82	−0.007	0.677	−0.017
Household size	2,341	4.87	4.90	4.84	0.064	0.861	0.027
Has children	2,341	0.76	0.76	0.77	−0.013	0.764	−0.030
Number of children	2,341	1.87	1.91	1.82	0.082	0.681	0.053
Subsistence farmer	2,336	0.24	0.20	0.29	−0.084	0.246	−0.195
Business person	2,336	0.43	0.46	0.40	0.054	0.450	0.109
Food expenses (z-score)	2,254	0.00	0.02	−0.02	0.047	0.680	0.047
Owns cell phone	2,341	0.92	0.92	0.91	0.003	0.956	0.010
Owns radio	2,341	0.79	0.79	0.78	0.014	0.609	0.034
Owns television	2,341	0.46	0.51	0.41	0.096	0.336	0.194
Owns fridge	2,341	0.10	0.13	0.07	0.053	0.251	0.177
Owns motorcycle	2,341	0.25	0.26	0.24	0.020	0.576	0.047
Owns livestock	2,341	0.79	0.79	0.79	−0.002	0.984	−0.004
Owns land	2,341	0.66	0.69	0.62	0.076	0.374	0.161
Owns house	2,335	0.79	0.83	0.75	0.082	0.145	0.200
Years lived in house	2,198	9.62	9.35	9.88	−0.531	0.711	−0.063
Dwelling age	2,341	9.64	9.08	10.24	−1.158	0.406	−0.119
Dwelling age missing	2,341	0.12	0.10	0.14	−0.038	0.236	−0.120
F-Statistic = 6.03 p-Value = 0.000							

Notes: Values are calculated using non-imputed baseline survey data for the pooled sample.

The second last column reports the p-value of the OLS regression of the listed baseline characteristic on the indicator for treatment assignment with robust standard errors clustered at the branch level. Obs stands for observations and SDIFF stands for normalised difference. The F-statistic provides an omnibus test of balance.

Table A.6: Household balancing in country sub samples (non-imputed)

	Obs	Sample mean	Treatment mean	Comparison mean	Regression difference	p-Value	SDIFF
			Kenyan households				
Female	1,242	0.99	1.00	0.99	0.012	0.347	0.135
Age	1,237	41.75	42.30	41.19	1.115	0.473	0.103
Secondary school or more	1,179	0.26	0.26	0.26	0.000	0.996	0.001
Married	1,241	0.82	0.83	0.81	0.018	0.479	0.047
Household size	1,242	4.59	4.74	4.43	0.305	0.560	0.155
Has children	1,242	0.79	0.78	0.80	−0.021	0.705	−0.052
Number of children	1,242	1.84	1.92	1.76	0.165	0.663	0.112
Subsistence farmer	1,242	0.35	0.30	0.39	−0.090	0.402	−0.189
Business person	1,242	0.49	0.52	0.47	0.052	0.609	0.104
Food expenses (z-score)	1,180	−0.00	−0.01	0.01	−0.015	0.940	−0.016
Owns cell phone	1,242	0.95	0.97	0.94	0.029	0.202	0.135
Owns radio	1,242	0.79	0.78	0.80	−0.015	0.626	−0.037
Owns television	1,242	0.32	0.31	0.33	−0.026	0.568	−0.055
Owns fridge	1,242	0.03	0.02	0.03	−0.012	0.355	−0.074
Owns motorcycle	1,242	0.24	0.27	0.21	0.066	0.079	0.154
Owns livestock	1,242	0.94	0.97	0.90	0.068	0.002	0.281
Owns land	1,242	0.77	0.84	0.70	0.142	0.040	0.341
Owns house	1,242	0.88	0.93	0.83	0.101	0.047	0.316
Years lived in house	1,147	11.79	12.09	11.52	0.565	0.647	0.062
Dwelling age	1,242	11.28	10.97	11.60	−0.630	0.731	−0.063
Dwelling age missing	1,242	0.08	0.05	0.10	−0.056	0.142	−0.211
F-Statistic = 4.26 p-Value = 0.000							
			Ugandan households				
Female	1,099	0.27	0.29	0.25	0.039	0.339	0.087
Age	1,098	39.03	39.63	38.36	1.266	0.134	0.127
Secondary school or more	1,040	0.68	0.70	0.66	0.043	0.581	0.093
Married	1,097	0.81	0.79	0.83	−0.034	0.075	−0.086
Household size	1,099	5.19	5.08	5.31	−0.234	0.624	−0.088
Has children	1,099	0.73	0.73	0.73	−0.000	0.998	−0.000
Number of children	1,099	1.89	1.89	1.90	−0.013	0.935	−0.008
Subsistence farmer	1,094	0.13	0.10	0.16	−0.068	0.079	−0.202
Business person	1,094	0.36	0.39	0.33	0.062	0.480	0.129
Food expenses (z-score)	1,074	0.00	0.06	−0.06	0.115	0.272	0.112
Owns cell phone	1,099	0.88	0.87	0.89	−0.024	0.763	−0.074
Owns radio	1,099	0.78	0.80	0.76	0.047	0.311	0.114
Owns television	1,099	0.63	0.73	0.51	0.222	0.019	0.469
Owns fridge	1,099	0.18	0.24	0.12	0.120	0.002	0.317
Owns motorcycle	1,099	0.26	0.25	0.28	−0.032	0.622	−0.073
Owns livestock	1,099	0.62	0.59	0.66	−0.068	0.424	−0.141
Owns land	1,099	0.53	0.53	0.52	0.012	0.887	0.025
Owns house	1,093	0.68	0.71	0.64	0.068	0.134	0.145
Years lived in house	1,051	7.25	6.56	7.96	−1.398	0.028	−0.198
Dwelling age	1,099	7.78	7.03	8.64	−1.609	0.041	−0.177
Dwelling age missing	1,099	0.16	0.15	0.17	−0.022	0.618	−0.060
F-Statistic = 6.23 p-Value = 0.000							

Notes: Values are calculated using non-imputed baseline survey data for Kenya and Uganda.

The second last column reports the p-value of the OLS regression of the listed baseline characteristic on the indicator for treatment assignment with robust standard errors clustered at the branch level. Obs stands for observations and SDIFF stands for normalised difference. The F-statistic provides an omnibus test of balance.

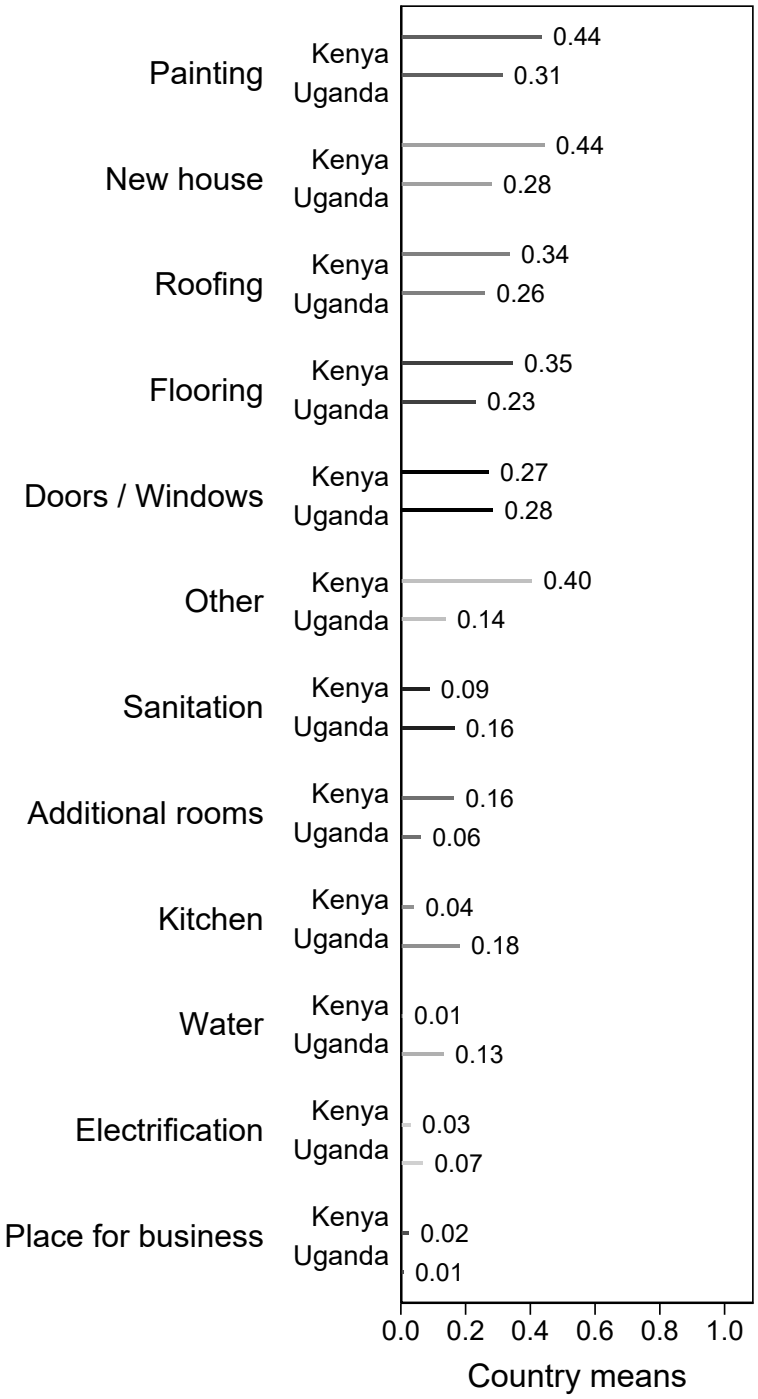

Figure A.3: Comparison of loan usage

Table A.7: Balance between borrower and comparison group in pooled sample

	Borrower		**Comparison**		Regression	p-Value	SDIFF
	Obs	Mean	Obs	Mean	difference		
	Pooled households						
Female	1,005	0.64	1,128	0.65	−0.004	0.982	−0.009
Age	1,005	41.15	1,128	39.89	1.258	0.268	0.119
Secondary school or more	1,005	0.47	1,128	0.44	0.025	0.811	0.051
Married	1,005	0.82	1,128	0.82	−0.001	0.972	−0.002
Household size	1,005	4.88	1,128	4.84	0.047	0.902	0.020
Has children	1,005	0.75	1,128	0.77	−0.015	0.727	−0.036
Number of children	1,005	1.90	1,128	1.82	0.078	0.713	0.050
Subsistence farmer	1,005	0.20	1,128	0.29	−0.091	0.215	−0.214
Business person	1,005	0.46	1,128	0.40	0.060	0.391	0.121
Food expenses (z-score)	1,005	0.05	1,128	−0.02	0.077	0.503	0.077
Owns cell phone	1,005	0.91	1,128	0.91	−0.000	0.992	−0.002
Owns radio	1,005	0.79	1,128	0.78	0.014	0.633	0.034
Owns television	1,005	0.53	1,128	0.41	0.119	0.279	0.241
Owns fridge	1,005	0.13	1,128	0.07	0.062	0.228	0.203
Owns motorcycle	1,005	0.26	1,128	0.24	0.022	0.576	0.050
Owns livestock	1,005	0.78	1,128	0.79	−0.012	0.909	−0.028
Owns land	1,005	0.69	1,128	0.62	0.078	0.383	0.164
Owns house	1,005	0.85	1,128	0.75	0.103	0.063	0.257
Years lived in house	1,005	9.26	1,128	9.89	−0.630	0.663	−0.077
Dwelling age	1,005	8.68	1,128	10.24	−1.556	0.300	−0.163
Dwelling age missing	1,005	0.09	1,128	0.14	−0.046	0.142	−0.145
F-Statistic = 9.27 p-Value = 0.000							

Notes: Values are calculated using baseline survey data for the pooled sample, excluding non-borrowers in treatment branches.

To address missing values, we follow Lin and Green (2016).

The second last column reports the p-value of the OLS regression of the listed baseline characteristic on the indicator for take-up at endline with robust standard errors clustered at the branch level. Obs stands for observations and SDIFF stands for normalised difference. The F-statistic provides an omnibus test of balance.

Table A.8: Balance between borrower and comparison group in country sub samples

	Borrower		**Comparison**		Regression	p-Value	SDIFF
	Obs	Mean	Obs	Mean	difference		
	Kenyan households						
Female	520	1.00	610	0.99	0.011	0.362	0.130
Age	520	42.48	610	41.19	1.294	0.373	0.119
Secondary school or more	520	0.26	610	0.26	0.000	0.994	0.001
Married	520	0.84	610	0.81	0.022	0.452	0.058
Household size	520	4.78	610	4.43	0.348	0.531	0.177
Has children	520	0.78	610	0.80	−0.016	0.787	−0.038
Number of children	520	1.93	610	1.76	0.175	0.664	0.119
Subsistence farmer	520	0.30	610	0.39	−0.096	0.373	−0.202
Business person	520	0.52	610	0.47	0.050	0.622	0.100
Food expenses (z-score)	520	−0.00	610	0.00	−0.005	0.979	−0.005
Owns cell phone	520	0.96	610	0.94	0.025	0.279	0.116
Owns radio	520	0.79	610	0.80	−0.010	0.783	−0.024
Owns television	520	0.31	610	0.33	−0.029	0.525	−0.061
Owns fridge	520	0.02	610	0.03	−0.013	0.336	−0.081
Owns motorcycle	520	0.28	610	0.21	0.074	0.108	0.174
Owns livestock	520	0.98	610	0.90	0.081	0.000	0.352
Owns land	520	0.86	610	0.70	0.159	0.018	0.390
Owns house	520	0.95	610	0.83	0.121	0.021	0.396
Years lived in house	520	11.97	610	11.52	0.444	0.704	0.051
Dwelling age	520	10.70	610	11.60	−0.896	0.658	−0.089
Dwelling age missing	520	0.04	610	0.10	−0.063	0.102	−0.241
F-Statistic = 7.98 p-Value = 0.000							
	Ugandan households						
Female	485	0.26	518	0.25	0.015	0.715	0.034
Age	485	39.72	518	38.37	1.357	0.132	0.135
Secondary school or more	485	0.69	518	0.66	0.032	0.649	0.070
Married	485	0.80	518	0.83	−0.026	0.205	−0.066
Household size	485	4.99	518	5.31	−0.319	0.527	−0.120
Has children	485	0.72	518	0.73	−0.012	0.864	−0.027
Number of children	485	1.87	518	1.90	−0.034	0.847	−0.021
Subsistence farmer	485	0.09	518	0.16	−0.076	0.050	−0.229
Business person	485	0.40	518	0.33	0.077	0.367	0.161
Food expenses (z-score)	485	0.11	518	−0.06	0.169	0.162	0.160
Owns cell phone	485	0.86	518	0.89	−0.026	0.745	−0.079
Owns radio	485	0.80	518	0.76	0.041	0.387	0.099
Owns television	485	0.78	518	0.51	0.270	0.003	0.586
Owns fridge	485	0.26	518	0.12	0.138	0.002	0.359
Owns motorcycle	485	0.24	518	0.28	−0.039	0.554	−0.088
Owns livestock	485	0.56	518	0.66	−0.099	0.233	−0.205
Owns land	485	0.52	518	0.52	−0.002	0.983	−0.003
Owns house	485	0.74	518	0.64	0.092	0.035	0.200
Years lived in house	485	6.35	518	7.96	−1.609	0.011	−0.238
Dwelling age	485	6.52	518	8.64	−2.120	0.005	−0.246
Dwelling age missing	485	0.14	518	0.17	−0.031	0.478	−0.086
F-Statistic = 8.95 p-Value = 0.000							

Notes: Values are calculated using baseline survey data for Kenya and Uganda, excluding non-borrowers in treatment branches.

To address missing values, we follow Lin and Green (2016).

The second last column reports the p-value of the OLS regression of the listed baseline characteristic on the indicator for take-up at endline with robust standard errors clustered at the branch level. Obs stands for observations and SDIFF stands for normalised difference. The F-statistic provides an omnibus test of balance.

Table A.9: Household balancing on outcomes (non-imputed)

	Kenya				Uganda			
	Treat mean	Comp mean	Regression difference	p-Value	Treat mean	Comp mean	Regression difference	p-Value
Dwelling characteristics								
Improved roof	0.94	0.99	−0.046	0.088	0.94	0.89	0.047	0.329
Improved walls	0.68	0.54	0.131	0.476	0.93	0.88	0.054	0.173
Improved flooring	0.51	0.57	−0.064	0.389	0.89	0.80	0.091	0.024
Number of rooms	3.11	3.17	−0.060	0.771	3.89	3.62	0.274	0.279
Separate kitchen	0.74	0.71	0.036	0.726	0.68	0.70	−0.018	0.597
Chimney	0.15	0.09	0.061	0.308	0.18	0.16	0.017	0.660
Services & protection								
Improved water	0.04	0.16	−0.123	0.060	0.54	0.31	0.234	0.004
Improved toilet	0.39	0.40	−0.014	0.872				
Improved lighting	0.47	0.65	−0.183	0.001	0.86	0.79	0.067	0.111
Improved cooking	0.03	0.07	−0.038	0.243	0.04	0.02	0.019	0.076
Rain rotection	0.51	0.58	−0.075	0.155	0.80	0.79	0.015	0.704
Satisfaction								
Floor quality	0.15	0.25	−0.101	0.018	0.40	0.38	0.025	0.665
Wall quality	0.18	0.26	−0.080	0.135	0.42	0.37	0.045	0.393
Roof quality	0.23	0.31	−0.081	0.113	0.51	0.43	0.082	0.163
House quality	0.19	0.25	−0.062	0.184	0.42	0.34	0.080	0.183
Pride	0.76	0.68	0.075	0.179	0.74	0.54	0.200	0.000
Finances								
Current finances to peers	3.53	3.48	0.050	0.440	3.35	3.42	−0.070	0.295
Future finances to peers	4.18	4.08	0.102	0.367	3.92	3.87	0.048	0.514
Saved in last year	0.85	0.77	0.083	0.236	0.69	0.72	−0.033	0.470
Total credit	−0.05	0.06	−0.109	0.142	−0.01	0.01	−0.020	0.747
Monthly income	−0.02	0.04	−0.063	0.549	0.01	−0.01	0.025	0.678
Health								
Mental health	19.69	20.78	−1.082	0.445	19.22	20.32	−1.091	0.274
Blocked nose	0.16	0.13	0.034	0.357	0.06	0.07	−0.006	0.872
Runny nose	0.23	0.21	0.013	0.795	0.17	0.16	0.004	0.928
Persistent sneezing	0.10	0.08	0.012	0.726	0.03	0.05	−0.022	0.370
Sore throat	0.07	0.05	0.016	0.274	0.01	0.03	−0.016	0.392
Painful swallowing	0.05	0.04	0.004	0.788	0.01	0.02	−0.009	0.543
Cough	0.26	0.26	−0.004	0.916	0.22	0.26	−0.044	0.317
Fever	0.25	0.24	0.004	0.964	0.26	0.35	−0.092	0.207
Headache	0.39	0.37	0.022	0.818	0.11	0.18	−0.065	0.285
Short breath	0.04	0.04	−0.003	0.763	0.01	0.01	−0.003	0.696
Itchy eyes	0.06	0.04	0.018	0.277	0.02	0.02	0.001	0.939
Nausea	0.06	0.06	−0.007	0.779	0.02	0.03	−0.008	0.663
Vomiting	0.07	0.07	−0.000	0.996	0.02	0.03	−0.008	0.676
Rash	0.02	0.02	0.001	0.899	0.01	0.03	−0.017	0.227
Diarrhoea	0.04	0.04	−0.000	0.978	0.02	0.05	−0.023	0.251
Worms	0.12	0.18	−0.064	0.315	0.06	0.05	0.012	0.558
No health problems	0.33	0.34	−0.016	0.783	0.51	0.43	0.078	0.234
Education								
Days absent from school	1.50	1.66	−0.160	0.682	0.95	1.79	−0.844	0.097
School expenses	0.04	−0.03	0.075	0.455	0.08	−0.04	0.126	0.220
Homework	1.39	1.35	0.043	0.457	0.55	0.75	−0.196	0.121

Notes: Values are calculated using baseline survey data for Kenya and Uganda.

Columns five and nine report p-values of OLS regressions of the listed baseline outcome on the indicator for treatment assignment with robust standard errors clustered at the branch level.

Table A.10: Robustness: Dwelling characteristics

Estimation method	DiD		DiD		IPW		IPW adj.		Kernel		Lasso	
	Coeff	p-Value	Coeff	p-Value	Coeff	p-Value	Coeff	p-Value	Coeff	p-Value	Coeff	p-Value
Dep var	Kenya sample											
Improved roof	0.041	0.096	0.041	0.097	0.041	0.036	0.041	0.036	0.019	0.002	0.041	0.038
Improved walls	0.115	0.008	0.115	0.009	0.116	0.001	0.121	0.001	0.089	0.046	0.106	0.001
Improved flooring	0.139	0.001	0.139	0.001	0.142	0.000	0.146	0.000	0.144	0.001	0.135	0.000
Number of rooms	0.369	0.065	0.369	0.066	0.412	0.010	0.386	0.006	0.314	0.071	0.348	0.014
Separate kitchen	0.088	0.134	0.088	0.135	0.087	0.043	0.071	0.080	0.061	0.179	0.083	0.061
Chimney	0.044	0.253	0.044	0.255	0.038	0.271	0.038	0.245	0.045	0.254	0.028	0.326
Observations	2260		2260		1130		1130		2126		1242	
	Uganda sample											
Improved roof	-0.006	0.850	-0.006	0.851	0.021	0.309	0.020	0.372	0.022	0.371	0.030	0.217
Improved walls	0.009	0.857	0.009	0.858	0.055	0.174	0.055	0.158	0.057	0.208	0.047	0.201
Improved flooring	0.006	0.852	0.006	0.853	0.036	0.261	0.027	0.403	0.034	0.324	0.038	0.124
Number of rooms	0.118	0.675	0.118	0.677	0.069	0.797	0.046	0.865	0.095	0.760	0.144	0.438
Separate kitchen	0.137	0.061	0.137	0.062	0.094	0.079	0.093	0.079	0.117	0.077	0.125	0.012
Chimney	0.026	0.649	0.026	0.651	-0.027	0.579	-0.033	0.527	-0.025	0.645	0.018	0.673
Observations	2006		2006		1003		1003		1982		1099	
Branch FE	No		Yes		No		No		No		No	
Household cov	No		Yes		No		Yes		Yes		Yes	
Housing cov	No		Yes		No		Yes		Yes		Yes	

Notes: Values are calculated using baseline and follow-up survey data for Kenya and Uganda.
To address missing values, we follow Lin and Green (2016).
The 95% confidence interval for the inverse probability weighting model is based on 1,000 bootstrap draws. All covariates are included in the regression adjusted models. Propensity score matching estimates apply kernel matching with a Gaussian kernel and bandwidth of 0.05. We cluster errors at the branch level in all specifications.

Table A.11: Robustness: Services & protection

Estimation method	DiD		DiD		IPW		IPW adj.		Kernel		Lasso	
	Coeff	p-Value	Coeff	p-Value	Coeff	p-Value	Coeff	p-Value	Coeff	p-Value	Coeff	p-Value
Dep var	Kenya sample											
Improved water	0.040	0.116	0.040	0.117	0.036	0.050	0.029	0.092	0.040	0.083	0.034	0.052
Improved toilet	0.042	0.651	0.042	0.652	0.031	0.726	0.038	0.688	0.032	0.741	0.064	0.383
Improved lighting	0.157	0.005	0.157	0.005	0.169	0.000	0.153	0.002	0.165	0.002	0.147	0.000
Improved cooking	0.021	0.014	0.021	0.015	0.018	0.000	0.017	0.000	0.025	0.012	0.017	0.000
Rain protection	0.205	0.014	0.205	0.014	0.201	0.001	0.193	0.005	0.208	0.017	0.184	0.000
Observations	2260		2260		1130		1130		2126		1242	
	Uganda sample											
Improved water	-0.045	0.453	-0.045	0.456	0.019	0.732	0.013	0.829	0.027	0.673	0.004	0.933
Improved lighting	0.131	0.160	0.131	0.163	0.115	0.143	0.116	0.127	0.128	0.156	0.113	0.159
Improved cooking	-0.009	0.310	-0.009	0.313	0.001	0.954	0.002	0.894	-0.003	0.830	-0.003	0.713
Rain protection	0.068	0.162	0.068	0.165	0.068	0.063	0.072	0.048	0.087	0.040	0.079	0.078
Observations	2006		2006		1003		1003		1982		1099	
Branch FE	No		Yes		No		No		No		No	
Household cov	No		Yes		No		Yes		Yes		Yes	
Housing cov	No		Yes		No		Yes		Yes		Yes	

Notes: Values are calculated using baseline and follow-up survey data for Kenya and Uganda.
To address missing values, we follow Lin and Green (2016).
The 95% confidence interval for the inverse probability weighting model is based on 1,000 bootstrap draws. All covariates are included in the regression adjusted models. Propensity score matching estimates apply kernel matching with a Gaussian kernel and bandwidth of 0.05. We cluster errors at the branch level in all specifications.

Table A.12: Robustness: Satisfaction & pride

Estimation method	DiD		DiD		IPW		IPW adj.		Kernel		Lasso	
	Coeff	p-Value	Coeff	p-Value	Coeff	p-Value	Coeff	p-Value	Coeff	p-Value	Coeff	p-Value
Dep var	Kenya sample											
Floor quality	0.218	0.002	0.218	0.003	0.219	0.000	0.217	0.000	0.223	0.000	0.209	0.000
Wall quality	0.243	0.009	0.243	0.009	0.243	0.000	0.236	0.000	0.242	0.003	0.226	0.000
Roof quality	0.234	0.004	0.234	0.004	0.239	0.000	0.227	0.000	0.223	0.003	0.231	0.000
Housing quality	0.173	0.061	0.173	0.062	0.173	0.004	0.166	0.006	0.179	0.031	0.167	0.005
Pride	0.006	0.920	0.006	0.921	0.007	0.891	0.002	0.972	0.021	0.728	0.003	0.960
Observations	2260		2260		1130		1130		2126		1242	
	Uganda sample											
Floor quality	0.215	0.012	0.215	0.013	0.223	0.016	0.225	0.015	0.250	0.020	0.209	0.008
Wall quality	0.227	0.005	0.227	0.006	0.239	0.006	0.244	0.005	0.267	0.013	0.220	0.002
Roof quality	0.237	0.008	0.237	0.008	0.251	0.003	0.259	0.002	0.279	0.011	0.224	0.006
Housing quality	0.204	0.026	0.204	0.027	0.220	0.023	0.223	0.020	0.245	0.029	0.197	0.014
Pride	-0.017	0.833	-0.017	0.834	0.036	0.576	0.047	0.446	0.058	0.438	0.008	0.899
Observations	2006		2006		1003		1003		1982		1099	
Branch FE	No		Yes		No		No		No		No	
Household cov	No		Yes		No		Yes		Yes		Yes	
Housing cov	No		Yes		No		Yes		Yes		Yes	

Notes: Values are calculated using baseline and follow-up survey data for Kenya and Uganda.
To address missing values, we follow Lin and Green (2016).
The 95% confidence interval for the inverse probability weighting model is based on 1,000 bootstrap draws. All covariates are included in the regression adjusted models. Propensity score matching estimates apply kernel matching with a Gaussian kernel and bandwidth of 0.05. We cluster errors at the branch level in all specifications.

Table A.13: Probit of take-up at endline on baseline characteristics (treatment only & non-imputed)

	(1) Pooled Mfx / SE	(2) Kenya Mfx / SE	(3) Uganda Mfx / SE
Female	−0.053		−0.111***
	(0.204)		(0.126)
Age	0.003	0.002	0.004**
	(0.010)	(0.020)	(0.009)
Secondary school or more	−0.051	0.022	−0.074
	(0.142)	(0.113)	(0.261)
Married	0.025	0.006	0.004
	(0.167)	(0.268)	(0.163)
Household size	−0.013*	−0.002	−0.011
	(0.029)	(0.042)	(0.047)
Has children	0.010	0.060***	−0.037
	(0.122)	(0.030)	(0.192)
Subsistence farmer	−0.064	−0.109	−0.058
	(0.184)	(0.319)	(0.234)
Business person	−0.006	−0.061	−0.004
	(0.115)	(0.201)	(0.152)
Food expenses (z-score)	0.033**	0.007	0.069***
	(0.063)	(0.087)	(0.086)
Owns cell phone	−0.023	−0.188	0.024
	(0.208)	(0.663)	(0.165)
Owns radio	−0.018	0.037	−0.043
	(0.134)	(0.144)	(0.202)
Owns television	0.079**	0.001	0.154***
	(0.134)	(0.076)	(0.177)
Owns fridge	0.054	−0.036	0.051
	(0.171)	(0.220)	(0.210)
Owns motorcycle	−0.027	−0.003	−0.033
	(0.094)	(0.153)	(0.170)
Owns livestock	−0.078**	0.174	−0.091***
	(0.145)	(0.448)	(0.096)
Owns land	0.023	0.066	−0.024
	(0.120)	(0.158)	(0.203)
Owns house	0.177***	0.160***	0.158***
	(0.156)	(0.216)	(0.257)
Years lived in house	−0.003	−0.004	−0.009***
	(0.015)	(0.021)	(0.013)
Dwelling age	0.000	0.003	−0.001
	(0.010)	(0.016)	(0.008)
Dwelling age missing	0.025	0.093	0.007
	(0.314)	(0.284)	(0.332)
Observations	976	486	489
Pseudo R^2	0.067	0.053	0.205

Notes: The table reports marginal effects of probit regressions with standard errors clustered at the branch level in brackets. * p < 0.10, ** p < 0.05, *** p < 0.01 denote statistical significance.

The outcome variable in columns 1-3 is an indicator equal to one if the person has taken out the HMF product at one of our partner banks at endline. Households from comparison areas are excluded from this analysis.