Agricultural credit and women's agency: Experimental evidence from India

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Abstract

Women-focused programs raising income and agency are costly and difficult to implement, and evaluations show that targeted cash transfers and loans are often appropriated into assets and enterprises outside women's control. We hypothesize that improving liquidity constraints for households increases household consumption and residual income for individual members, and evaluate its consequences for women. We test this using a randomized provision of collateral-free loans across 80 villages in India. Employing IV estimations, we find that women in loan-receiving households report independent access to banking services through debit cards and mobile phones, and allocate more time towards leisure. Households increase ownership of productive capital and consumer durables in response to the program but there are no impacts on agricultural productivity or income. The findings suggest that agricultural credit programs can serve as an effective and cost-efficient tool to improve women's outcomes, even when not directly targeted at them.

Keywords: Digital finance, Smallholder farming, Women's Financial inclusion, Labor supply

JEL codes: J12, O55, O57, Q54

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1 Introduction

Programs targeting resources to women don't always succeed in improving women's economic outcomes or agency within the household (Banerjee et al., 2015; Green et al., 2015; Attanasio et al., 2015; Angelucci et al., 2015; Said et al., 2019). Evaluations of loan programs to female entrepreneurs and cash transfers find evidence of resource appropriation (Fiala, 2018; Bernhardt et al., 2019) and male backlash (Angelucci, 2008; Bobonis et al., 2013) in several contexts, highlighting the potential risks to women through these targeted interventions. Programs can increase women's decision making ability and earnings when they incorporate mechanisms giving women direct control over these resources (Fiala, 2017; Riley, 2024). However, such programs are costly to implement and difficult to scale up. In this paper, we investigate the causal effects of reducing household's liquidity constraints on resources for women.

We evaluate this in the context of collateral-free loans to credit-constrained farmers using a randomized controlled trial conducted across 80 villages in India. The loan product was offered between 2023 and 2024 in half of the study villages (treatment group), while the remaining villages (control group) did not receive this product but continued to have access to formal and informal credit suppliers in the market. The program loan differed from other available formal loans in its lower cost, no requirement of collateral, and faster assessment and approval. We evaluate the impact of the loan program on household investment and consumption of over 1,300 households across treatment and control groups. We estimate the effects of the household receiving the loan on women's financial inclusion, time use, and participation in production and non-production decisions that were collected in the endline survey.

We anticipate that the loan funds operate as an income alleviating instrument for the household and not a single member. This is motivated by the organization of agricultural production in India at the household level. Members work jointly on the same plot but specialize in distinct tasks[1]. In this setting, household's use of loan funds may not depend on which member is the nominal beneficiary. However, individual members can benefit from the additional resources in two ways. First, the loan increases household's consumption of (composite) goods that are shared or privately consumed such as productive assets and consumer durables that increases members' utility. Second, individual members may adjust their private consumption and labor allocation in response to house-

[1]Most farm managers are men, and women typically undertake labor-intensive activities such as weeding, harvesting, and livestock management (Afridi et al., 2023; Gulati et al., 2025).

hold's consumption of composite goods and any changes in their own residual income. While we anticipate gains for all household members, we focus the analysis of this paper on women's outcomes. We examine women's bank account use in response to the loan to infer whether loan funds are shared with other members. We investigate women's time allocation to production, domestic chores and leisure to infer impacts on their individual income. Finally, because the loan increases the number of financial decisions faced by the household, we analyze whether this affects women's involvement in production and consumption decisions.

We employ two empirical models in our analysis. First, we estimate the intent-to-treat (ITT) effect of the loan program on household's agricultural intensification and asset accumulation using an analysis of covariance (ANCOVA) model. Here we exploit the random assignment of loan product and a household panel data combining baseline and endline surveys. Second, we examine how the loan affected household members, focusing on women's financial inclusion, time use, and involvement in decisions. The endline survey interviewed two household members, the farmer that was also interviewed in the baseline survey and one additional household member, yielding a sample of more than 1,000 women. We estimate the Local Average Treatment Effect of the program on women's outcomes using an Instrumental Variables (IV) model in which randomized village-level treatment assignment instruments for households receiving the loan product. Restricting the endline sample to female respondents and controlling for their position in the household, we estimate the Local Average Treatment Effect (LATE) of the program on women's outcomes. We apply the same model to the sub-set of men in our sample to compare outcomes.

The analyses identify three key findings. First, farming households use the loan money to invest in small agricultural and business equipment but do not spend on other inputs for cultivation such as seeds, fertilizers or labor. Similar to cash transfer programs, households use the loan to purchase consumer durables previously outside the household's budget constraint (Haushofer and Shapiro, 2016). Households in the treatment arm are 10 percentage points (pp) more likely to own non-mechanized farm equipment and 9 pp more likely to own large consumer durables than households in the control arm. Farmers in the treatment villages report no income improvements in response to the program but have a significantly greater food consumption score than the control group (54.3 vs. 44.7).

Second, the loan positively impacted women's transactions from their bank account and use of digital financial services. More women report weekly deposits into their in-

dividually owned bank account, and they are substantially more likely to use mobile banking applications (100 pp)[2]. The significantly greater uptake of digital financial services in the treatment arm is driven by smartphone ownership (30 pp). Both women and men in treatment are more likely to use their debit card independently (87 and 33 pp, respectively) than respondents in the control group.

Third, there are shifts in women's time allocation that correspond with large aggregate increases in households' ownership of productive capital, consumer durables. Women in treatment households allocate significantly more time to personal activities, such as leisure (2.5 versus 1.6 hours in the control group). Male respondents in treatment arm also report higher time spent on personal activities than control, reinforcing that leisure is a normal good. Women's participation in farm and non-farm economic activities in treatment group was lower than control, while men's labor supply remains similar. In the absence of aggregate changes in household income or hiring labor, this pattern indicates that the acquisition of productive capital may have specifically relaxed the demand for female labor.

We do not hypothesize changes in household members' bargaining power in the short term and empirically, find no aggregate change in women's involvement in household decisions related to production or consumption. However, there are heterogeneous effects by women's ex-ante bargaining power. Reports of greater spousal coordination in the baseline survey correspond positively with women's involvement in decisions on livestock and poultry, and non-farm business activities. We also examine heterogeneous treatment effects by household's wealth and find no trends by ex-ante asset ownership. Lastly, we analyze whether women's gains in use of digital financial services is driven by the subsample who were the nodal beneficiary of the product. Both knowledge and use of mobile banking is significantly higher for women who are direct recipients of the loan money as well as non-recipient women in the treatment group relative to women in the control group.

This paper contributes to three strands of literature. The first examines how women's access to financial resources—especially digital ones—shapes their control over those resources. In rural India, women's uptake of digital finance remains systematically low, in part because gender norms restrict unmarried women's access to the internet (Barboni et al., 2018). Interventions aimed at expanding women's access to digital tools

[2]These are linear estimates for binary dependent variables. Non-linear estimations using probit models yield consistent results but the effect sizes are smaller.

have struggled to overcome these constraints. In a government program that distributed smartphones to rural women, 40 percent transferred the device to another household member, and women's knowledge and use of mobile banking did not improve (Barboni et al., 2024). In contrast to this earlier evidence, an effect of the loan program was greater smartphone ownership by women as well as knowledge and use of mobile banking.

A broader literature similarly finds that expanding women's financial access often does not translate into greater agency within the household.Access to microfinance, savings groups and business loans and grants have had limited impact on women's decision making ability (Banerjee et al., 2015; Karlan et al., 2017; Angelucci et al., 2015; Field et al., 2021). Loans to women in multi-adult households have raised overall household income and profits of other members' enterprises but not women's own profits (de Mel et al., 2008; Garikipati, 2008; Fiala, 2018; Friedson-Ridenour and Pierotti, 2019; Bernhardt et al., 2019). Evidence from Uganda shows more promising effects where women invested in their own business when they received the loan money in their mobile accounts (Riley, 2024). Consistent with the literature, we don't find aggregate impacts on women's involvement in decision making when the household gets the loan in the absence of features to increase women's control but there are improvements in women's agency over their time and financial access. Even though we find that the increased liquidity from the loan program improved women's digital finance use, their involvement in household decision making did not rise, consistent with the broader literature.

Second, this paper adds to the literature on labor supply response to transfers or agricultural credit. Fink et al. (2020) reported increased labor supply in response to loan while transfers reduced women's probability of working and increased men's participation in domestic chores (Hidrobo et al., 2016; Beaman et al., 2023; El-Enbaby et al., 2025). In our paper, we show that both women and men increase their time allocation to leisure. Women reduce their time allocation to farming and men spend more time on domestic chores.

Third, this paper contributes to the complementary literature evaluating the effect of cash grants and microcredit on agricultural investment (Karlan et al., 2014; Tarozzi et al., 2015; Maitra et al., 2017; Nakano and Magezi, 2020; Fink et al., 2020; Beaman et al., 2023; Mukherjee et al., 2024). While there are no direct improvements in farm productivity or incomes through this intervention (details in Kramer et al. (2025)), households increased ownership of farm and business equipment and consumer durables. Additionally, this paper yields important policy implications as it shows unintended, positive consequences

of agricultural credit on women's outcomes. Household-level interventions can therefore be utilized as cost-effective ways to improve women's outcomes avoiding pecuniary and social costs of targeted programs.

The rest of the paper is structured as follows. Section 2 describes the context and conceptual framework, Section 3 describes the loan program and experimental design. Section 4 describes the data and outcome variables, Section 5 discusses the empirical models. Section 6 discusses the implications of the loan program on household resource allocation, agricultural intensification and incomes. Section 7 summarizes the impact of the program on women. We discuss mechanisms in Section 8 and conclude in Section 9.

2 Context and Conceptual Framework

2.1 Study population: Credit-constrained farming households

This intervention was conducted in two states of India, Odisha and Maharahstra. The main crop cultivated by farmers in Odisha is paddy (rice) and in Maharashtra, cotton. This study targeted loan provision to small and marginal farmers[3] in the districts of Jajpur (Odisha) and Amravati (Maharashtra). As per the Agricultural Census 2015-16, just over 30% of Maharashtra's and Odisha's landholdings are classified small. Odisha has a larger share of marginal landholdings than Maharashtra: 45% versus 18%. In our sample, over half (51%) the farmers owned 1 piece of agricultural land while 20% cultivated more than 1, and 29% did not own any.

The main sources for formal credit available to farmers are - commercial banks (government or privately owned), small finance banks (private sector entities servicing small and marginal producers), microfinance institutions (MFIs), cooperatives, self-help groups (SHG) and farmer producer organizations (FPO) (registered entity of producers that share profits). The rate of interest on loans offered by MFIs and small finance banks varies from 18 to 26% in Odisha and is 24% in Maharashtra. The interest rate on loans from commercial banks is significantly cheaper, but prohibitive because of collateral and document requirements and delayed loan processing. Loans from SHG and FPO do not require collateral for members but are available on rotation and not every planting season.

[3]Farms of size between 1 and 2 ha are classified as "small" and less than 1 ha as "marginal".

2.2 Loan and Individual Welfare

Agriculture in India involves joint contribution by different household members on the same plot. This is formally recognized by the Ministry of Agriculture & Farmers Welfare (under the Government of India) where land used for agricultural production and managed by a group of members from the same household is identified as "individually operated". It is also difficult to separate individual contribution to and profits from production (Doss, 2018). In this context, targeting loans to women in farming households with multiple adults may not guarantee their autonomy or participation in decisions around the use of loan money. There is limited evidence to verify whether the returns from focused agricultural loans to women in multi-adult households are higher than loans to the household.

Given collaboration between household members in decisions around farm management, one way to predict household resource sharing would be through a unitary model where the household has a single decision maker and household members have homogeneous preferences. Under the assumptions of this model, household's use of loan money would not depend on which member is the beneficiary of the product (Samuelson, 1956). The addition of loan money would increase non-labor income of the household and consequently their consumption. However, programs targeting resources to individual household members are designed with the expectation that individuals have different preferences (Chiappori, 1988). They rely on the collective model which assumes that we can impact welfare outcomes by allocating resources to members whose preferences align with program goals, and that the program affects outcomes only through changes in the individual beneficiary's intrahousehold power.

We frame our theoretical expectations of the effect of the loan program using a collective household model adapted from Bobonis (2009). Assuming a 2-member household $i \in A, B$ where consumption is a combination of private q^i, public K, and a set of composite goods $\mathrm{C} = C^A + C^B + C^H$ that can be consumed both privately and jointly such as consumer durables and productive capital. Each individual earns a labor income $w^i T$ and non-labor income y^i while the household also earns a joint income y^O. The distribution factors, individual and joint income y^i, y^O, affect individual member's bargaining weight within the household and therefore, resource sharing. Under conditions of pareto-optimality, the effect of the distribution factors on consumption of each good is proportional to the effect of these factors on individual bargaining weight. We make three assumptions that are relevant for the context and evaluation of this program. First,

we assume that the household perceives the loan as an increase in its joint income Y^O. Second, the loan has a strictly monotone influence on composite goods C. Third, individual members have a strict preference for leisure and financial autonomy.

This model does not assume that the program only affects consumption through changes in beneficiary's power. Instead, in a static model, the loan affects consumption in two stages. First, as unearned financial resources increase, the household decides its expenditure on public and composite goods. While the consumption of composite goods will depend on the resource sharing rule within the household, it will increase utility of all household members. In the second stage, individual members will choose private consumption to maximize their utility conditional on public and composite goods expenditure in the first stage and individual's residual income budget constraint.

This leads to two implications for household members' welfare. First, individual members' utility increases in response to increased resource allocation to C. Second, if the loan increases their residual income, they will choose private consumption to maximize utility such as increase leisure and assets to enhance financial autonomy. We test gains in individual welfare by measuring financial autonomy, time allocated to leisure, and involvement in decision making.

This model avoids three key challenges of testing the collective model with empirical analysis. First, we do not assume that the program affects household consumption only through changes in individual power. To isolate that effect, we would require simultaneous exogeneity in individual and household income. Second, as a consequence, we do not measure the pareto weight or power of each individual. Third, by analyzing the effects of the loan program on composite goods, we do not need to measure individual consumption or isolate the impact of the program on individual consumption. Collecting data on individual consumption as well as all other factors that can affect it outside of the loan program is onerous and needs a large sample size for statistically powered estimation.

2.3 Defining agency

Naila Kabeer (1999)'s definition of agency as "the ability to define one's goals and act upon them" has been widely used in the literature studying women. Sen (1999) has similarly defined agency as "acting and bringing about change". These descriptions highlight two key features: defining one's preferences and goals, and realizing outcomes that align with these preferences and goals. The empirical literature on women's empowerment

has used decision making ability as a predictor of her agency. We extend this definition to other variables that reflect her preferences and their realization in addition to say in household decisions.

In our expanded definition we consider outcomes that are most closely related with the loan program. The first set of variables are financial access and autonomy. We examine women's preferences for financial autonomy through their individual bank account ownership as well as use of debit cards linked with the account. Schaner (2016) found that debit cards are perceived to lower transaction costs of resource appropriation from individual bank accounts, and women reduced their account usage when provided a debit card. Therefore, we investigate women's Low-cost internet plans and mobile phones have facilitated the use of mobile apps for transacting from one's account[4]. The use of these apps also lowers costs of privacy in savings and transactions as it removes the requirement to physically travel to a bank branch or ATM for deposit or withdrawal. We investigate women's knowledge and uptake of the app-based banking as predictors of access and autonomy.

The second set of variables are her time allocations to productive and non-productive activities. These include farming, livestock management, business or wage employment and domestic chores, consumption and leisure. Loans and transfers to farming households impact time use of members (Hidrobo et al., 2016; Fink et al., 2020; El-Enbaby et al., 2025). We expect changes in women's time use in response to exogenous influx of capital in the household reflects their preferences to spend time in that activity.

Finally, we examine involvement in decision making. The literature on autonomy distinguishes intrinsic and extrinsic motivation to improve contextual understanding of individual decision making power (Seymour and Peterman, 2018). As we did not collect individual-level information of preferences on different decisions[5], we analyze a combined measure of solo and joint decision making with household members as well as a separate measure of women's decision making jointly with their spouse.

[4]Digital transactions have been steadily promoted by the government of India and Reserve Bank of India (CGAP, 2019)

[5]Kochar et al. (2022) highlights that some decisions align with gender stereotypes of the role of women in the household such as food preparation and their delegation to women reflects lower agency of women. Maiorano et al. (2021) define individual's ability to make *choices that they value* as a component of their measure of empowerment.

3 Program Description and Evaluation Design

3.1 Loan program and Eligibility

The intervention offered collateral-free loan to small and marginal farmers at 14% interest. The program implementer, Dvara e-registry (DER), partnered with one commercial and one small finance bank to provide these loans in the summer planting season in 2023 and the winter season spanning 2023-24[6]. In this paper, we only analyze agricultural investment in the summer planting season as most farmers in the surveyed regions do not cultivate during winter. The loan amount varied by size of land and whether the farmer was first time/ repeat borrower during the intervention. It ranged from INR 30,000 to 60,000 (USD 340 - 680). The loan was offered at the beginning of planting season and required repayment in monthly installments[7]. The program addressed two additional challenges to credit access for these farmers - loan application and processing times. DER agents visited farmers at their field or home and filled out the application on their behalf. For successful applicants, the loan was processed within 7 business days.

To be eligible for the loan, farmers were required to be residents of their village for at least five years, operating on land no more than 3 acres, and had cultivated at least once in the past three years in the agricultural season they were borrowing for. They were also required to have attended an information session organized in their village at the start of the intervention. Their credit worthiness was assessed in two ways. First, a credit score computed using key parameters from the last 3 years that were expected to affect the farmer's cash flow. These are crop productivity, farm area, damage from natural calamities or other factors, soil moisture and irrigation availability, soil nutrients and vegetative growth. Several of these indicators were collected from remote sensing tools. Loan applicants were expected to have a score above 40 in this weighted index. Appendix Figure A.1 shows that almost all the farmers in the study were above this threshold. In addition to this, evaluations from established credit bureaus were reviewed if available.

A comparable loan product offered to these farmers is under a government scheme called the Kisan Credit Card (KCC). In this program, short-term credit is provided by commercial/ small finance banks or cooperatives at the maximum interest rate of 7%

[6]Due to operational constraints, the program was not effectively implemented in winter season 2022-23.

[7]The implementing partner reported that farmers expressed preference for a monthly repayment plan over lumpsum payment after harvest.

to farmers. The loan amount is based on pre-determined regional terms, size of land, harvest, depreciation and insurance requirement. Upto INR 200,000 (about USD 2,250) is available collateral free under this scheme. Despite the favorable terms, Figure 1 shows that less than 20% of the farmers in our sample had loans from KCC while take up of the loan product offered in our intervention was about 50%.

3.2 Randomization

The experimental sample comprised 80 villages identified by DER: half were located in two blocks of Jajpur district, Odisha, and the remaining half in four blocks of Amravati district, Maharashtra.[8] DER previously operated in some of these villages through supply chain management and livestock provision. However, they did not supply loans in the selected villages before the program. After consultation with village heads, DER organized information sessions September through October in 2022 when farmers were not busy in their fields. These sessions talked about loans being offered using digital technology and gauged potential interest of farmers. They did not elicit applications or describe terms of the loan in these meetings. The villages were randomly assigned into treatment and control arms by lottery only after the conclusion of meetings in all 80 villages. Half the villages (20 per state, 40 in total) were assigned to the treatment arm and the remaining half to control (split equally between the 2 states). A roster of at least 20 farmers was created for each village by eliciting names and contact information from participants of the information session.

4 Data

4.1 Data collection and Attrition

Baseline: The survey was conducted between November 2022 and February 2023 by an independent team of enumerators hired and trained by co-authors of this paper. We interviewed the farmer who attended the information session in this round. The survey included detailed information about the crops cultivated during the period when the loan product was available, inputs utilized in cultivation, asset ownership, economic shocks, food security and participation in decision making. Across the 80 villages, the goal was to interview approximately 21 households per village and the baseline data included 1,682 households.

[8]Blocks are administrative sub-divisions of districts used for planning and development in rural areas. The blocks in Odisha are Dashrathpur and Jajpur; those in Maharashtra are Amravati, Ashti, Morshi, and Tiosa.

Administrative data: We utilize DER records on the number of households that applied for a loan in the treatment arm, were successful and the loan amount they received during the summer of 2023. We also analyze the credit score estimated by DER for each household in the control and treatment arm in 2023.

Endline: The endline survey, conducted by an independent team of enumerators between April and August 2024, successfully re-interviewed 1,431 households from the baseline. The survey was expanded to interview two members of the household: the farmer who attended the information session before baseline (henceforth, "panel respondent") and one more member of the household. In addition to the modules included in the baseline survey, it also measured respondents' autonomous use of financial services and their time use.

Sample size and Attrition: In the analysis, we restrict the sample to married respondents only. This results in 1,576 households at baseline and 1,337 in endline with 15% attrition. The sample is balanced across the intervention arms (column 1, Appendix Table A.1). Column 2 of the same table shows that ex-ante characteristics of the households are not correlated with whether they attrited except for gender of the respondent. There are additional 8 households where the endline survey was not completed and, therefore, we analyze 1,329 households in this paper. Finally, the endline survey added 1,066 "other household members" among which 982 were married.

4.2 Balance test and Summary Statistics

We report the averages of all demographic and economic variables of the household collected in the baseline survey in Table 1. Column 2 and 3 also report averages for treatment and control groups, respectively. Households in both intervention arms were statistically similar on observables before the loan program was implemented. The average respondent interviewed in baseline was middle-aged (about 44 years old). Almost 90% of them were literate but less than half had completed secondary schooling. Nearly two out of five respondents were women. Majority of them were in the lower income bracket earning less than INR 90,000 (USD 1000) per annum. Bank account ownership was close to saturation (around 93%) and one in five households had an outstanding loan.

4.3 Outcome variables

Household outcomes

Combining the baseline and endline surveys gives us a balanced panel of household investment in cultivation such as area planted, expenditure on inputs (seeds, fertilizers,

pesticides and labor), cost of renting machinery and land, as well as yield and profits. We also measured household's ownership of assets and consumer durables, income category and food security in both survey rounds.

Individual outcomes

In the endline survey, where the main respondent and an additional household member is interviewed, we collected individual level outcomes on financial access, time use and involvement in decision making from both respondents.

Financial inclusion: We asked respondents whether they owned an individual bank account, used the debit card linked with this account on their own or shared it with their spouse/ other family members, the frequency of transactions from this account, and knowledge and use of mobile apps for banking. The binary indicators take the value 1 when individual responded yes and are 0 otherwise. We expect if loan money was apportioned to different household members for consumption, it would be reflected in changes in their account activity.

Time use: We directly measured how household members spent their time in the past day and during the busiest day of the agricultural season on various production activities such as farming, horticulture, livestock management, poultry, fishpond, and non-farm economic activities such as business, self-employment and wage employment. We also investigated non-production decision categories such as consumption of large household purchases, routine household expenditures, domestic work and personal activities. The time use helps directly correlate whether accumulation of various assets in response to the loan program impacted members' labor allocation.

Decision-making: Finally, we asked questions about members' involvement in the last 12 months in decisions around each of the production and non-production categories listed in Appendix Table A.2. Questions on participation in decision making were adopted from the project-level Women's Empowerment in Agriculture Index (pro-WEAI). Decision making variables are indirect measures for intrahousehold bargaining power and the literature uses self-reported survey measures of women's decision making to infer her empowerment (Allendorf, 2007; Connelly et al., 2010; Swaminathan et al., 2012; Field et al., 2021; Annan et al., 2021; Kosec et al., 2022; Heckert et al., 2023; Doss et al., 2022; Quisumbing et al., 2023a,b).

Loan provision was not randomized by gender, therefore, we do not test direct gains in individual income or women's uptake of credit in response to the program.

5 Estimation

5.1 Intent-to-Treat

We exploit the random assignment of intervention and a panel data of outcomes measured in both baseline and endline surveys to estimate the intent-to-treat (ITT) effect of the loan intervention using the ANCOVA model below.

$$Y_{hvb,1} = \alpha_0 + \alpha_1 Y_{hvb,0} + \alpha_2 TREAT_v + \sum_{j=1}^{J} \theta_j \mathbf{X}_{hjvb,0} + \eta_b + \epsilon_{hvb} \tag{1}$$

This model estimates the effect of the program on the outcome variables while controlling for baseline levels of these variables, $Y_{hvb,0}$. They are included as regressors on the right hand side of equation 1 along with household covariates ($\mathbf{X}_{hjvb,0}$) described in Table 1. The binary indicator $TREAT_v$ identifies villages v in the treatment (= 1) and control arms (= 0) and coefficient α_2 estimates the ITT effect of the intervention on outcome. All outcomes are measured at the household level h. Multiple villages constitute an administrative block and the specification controls for differences between these blocks. The standard errors are clustered at the level of treatment assignment which is village.

5.2 Local Average Treatment Effect

We analyze the effect of the loan intervention on variables of financial access and time use measured only in the endline survey using an Instrumental Variables (IV) model. The first stage tests the predictive power of exogenous assignment of loan treatment, $TREAT_v$, to household h receiving the loan product for cultivation in summer of 2023.

$$ReceivedLoanProduct_{hv} = \beta_0 + \beta_1 TREAT_v + \sum_{j=1}^{J} \theta_j' \mathbf{X}_{hjvb,0} + \mu_{hv} \tag{2}$$

The equation below is the Two-Stage-Least-Squares (2SLS) estimation of the instrumented variation of household receiving the loan product on outcome variables.

$$Y_{hvb} = \gamma_0 + \gamma_1 \widehat{ReceivedLoanProduct}_{hvb} + \sum_{j=1}^{J} \theta_j' \mathbf{X}_{hjvb,0} + \eta_b' + \upsilon_{hvb} \tag{3}$$

Table 3 verifies that the exogenous variable, randomized assignment of treatment, is a strong predictor of household receiving the loan product. We apply this model to only the female respondents interviewed in the endline survey, therefore, the analysis is at the household level h. The same covariates are included in this estimation as equation 1 along

with a binary indicator for whether the respondent is the main farmer of the household.

We also test the implications of whose account the loan money was deposited into on women's outcomes. The following equation employs two IVs that distinguishes women in the treatment arm who received the loan money directly and women in the treatment arm who did not with women in the control group. This is operationalized using interaction terms of treatment assignment with binary variables identifying these women as exogenous regressors.

$$\begin{aligned} Y_{hb} =& \gamma_0 + \gamma_1 \widehat{ReceivedLoanProduct}_{hvb} \times Recipient_{hb} \\ &+ \gamma_2 \widehat{ReceivedLoanProduct}_{hvb} \times NonRecipient_{hb} + \sum_{j=1}^{J} \theta_j'' \mathbf{X}_{hjvb,0} + \eta_b + \upsilon_{hb} \end{aligned} \quad (4)$$

This analysis is restricted to all women surveyed in the endline, therefore, there is one respondent per household h. The covariates included are same as in the previous models.

6 Farm and household responses to the loan program

In this section, we report ITT estimates of changes to households' spending and income in response to credit. The loan program affected households' asset accumulation increasing ownership of productive capital and consumer durables (Table 2). There is a 12 pp increase in ownership of farm equipment such as hand tools, animal-drawn plows and non-mechanized irrigation tools. Receipt of loan increased household's investment in equipment for non-farm business activities such as sewing machines by 9 pp. Loan receiving households were 9 pp more likely to own large consumer durables. This includes time saving kitchen appliances such as refrigerator, TV, and washing machine as well as other household durables such as sofa, dining table, chair, mattress, cot or bed and computer. We don't find increases in mechanized farm inputs such as tractors, electric pumps, seeder and threshers. Even with subsidies from the government, some of these mechanized equipment cost at least 4 times more than the loan amount. Therefore, the changes in productive capital and consumer durables align with the increase in spending capacity of the farmers in response to the loan.

Next, we explore effects of the loan program on agricultural intensification in the summer planting season of 2023. We restrict the analysis to the main crop (rice in Odisha and cotton and/or soyabean in Maharashtra) as they occupy the largest share of agri-

cultural plot. As mentioned earlier, most farmers in these regions prefer to not cultivate during the winter season. In Appendix Table A.3, we analyze changes in the area cultivated, yield and real income from farming and find no significant differences between the treatment and control villages. Households in the treatment group did not spend any differently from the control group on irritation, purchase of seeds and fertilizers and rent of machinery and land (Table A.4). We also don't find differences in the panel respondents' reports of their expenditure on hired labor in columns 1 and 2 of Table A.5. Columns 3-5 analyze differences in panel respondents' reports of labor allocation by self and household members for crop production. We find no significant differences between the treatment and control villages in their expenditures on hired labor or supply of family labor. The insignificant differences in input utilization is also validated when we examine how treatment group households report their use of formal loans in Appendix Table A.6 as there are no differential spending on seeds, fertilizers labor or renting machinery. A companion paper evaluating this program analyzes the local average treatment effect of agricultural intensification by state, and finds that the area under cultivation expanded by 1.3 acres in the summer season in Odisha but there were no differences in the cost of production (Kramer et al., 2025).

While income from agriculture in the summer planting season did not change in response to the loan program, we find increased food security of the households using a 7 days recall measure of households' consumption of 8 food groups designed by World Food Programme (Appendix Table A.7). The increase in the ownership of assets and consumer durables instead of buying seeds/ fertilizers or leasing more land suggests that it helped meet the liquidity constraints of the household for both farming and non-farm production as well as consumption. In the next section, we investigate possible resource sharing among household members through use of bank account, time use and involcement in decision-making.

7 Did the loan benefit women?

We report LATE estimates of the households receiving the loan product on women and men in the sample. Our discussion focuses on the effects on women (panel A in results tables 4-10) and we compare it with men's outcomes (panel B) where it is useful. The loan program did not have a differential impact on women's bank account ownership (column 1, Table 4). There was high prevalence of individual account ownership (over 87% in both intervention arms) due to the government's account expansion efforts in rural areas since 2014 (see Chauhan (2025) for policy description). More women in treatment (about

30 pp) deposit funds into their bank account every week than women in control (column 3). There were no differences by intervention arm in weekly withdrawals of cash from the bank account (column 1) or receipt of income/ transfers[9] (column 4). While women do not report higher inflows into their individual accounts, more frequent deposits suggests that the loan program led to greater resource sharing with women in the treatment arm.

Households in the treatment arm exhibit greater preference for financial autonomy. Conditional on individual account ownership, men and women in the treatment group are more likely to use the debit card linked with their account autonomously instead of share it with other family members (Table 5). We investigate women's knowledge and use of mobile apps. These apps allow instantaneous transfers from the linked bank account and have negligible operational costs making them a useful method of payment. They also reduce transaction costs of using money privately. Women in treatment villages report greater knowledge and use of these mobile apps (the LATE is over 100 pp). These linear estimates are outside $[0, 1]$ as the dependent variable is binary. Gains in women's uptake of digital financial services are robust to non-linear estimation using bivariate probit models (results available on request) although effect sizes are smaller than the LATE estimates. Men in the treatment arm also report greater knowledge and use of mobile apps for banking, however, these effects are smaller and the control group averages are higher. Women's results are potentially driven by greater mobile phone ownership. Table 6 shows that conditional on an individual bank account, women in treatment were at least 30 pp more likely to own a mobile phone than women in control group. At baseline, 73% of the household in our sample owned at least one smartphone and there were no statistical differences between the two intervention arms.

Both mobile ownership and women's access to the internet have been systematically low in India due to rigid gender norms (Barboni et al., 2018). Barboni et al. (2024) evaluated a government program distributing smartphones to rural women in the state of Chhattisgarh and found that 40% of the women transferred their phone to another household member. The program did not impact women's knowledge and use of mobile banking. In this context, the positive impact of the loan program on women's smartphone ownership and uptake of digital financial services for transactions are noteworthy.

Next, we investigate changes in women's time use in response to the loan. Women in treatment allocated more time to personal activities such as eating, sleeping, leisure and recreation in response to the loan. This included social engagement such as visiting

[9]We are unable to distinguish whether the money received is from employer, government or family members.

neighbors. They allocated significantly less time to farming and non-agricultural activities such as business or wage employment. During the busiest time in farming (Table 7), women's time allocation to farming was 48% less than women in control (1.6 hours versus 3.1, p-value <5%) and to personal activities was 57% more (2.5 hours versus 1.6, p-value <1%). These differences are consistent in the day prior to survey as well (Table 8). Women's time allocation to domestic chores does not differ with household's receipt of loan suggesting that the results are likely driven by investment in farm and non-farm equipment which has reduced demand for female labor. Recent papers on cash transfers show contrasting effects on women's time allocation. In rural Egypt, women reduced their participation in non-farm work but their employment in agriculture did not change in response to the transfer (El-Enbaby et al., 2025). Working for pay in agriculture is socially more acceptable in these regions than non-farm work. Evaluation of cash and food transfers in Ecuador find no effects on women's labor force participation (Hidrobo et al., 2016). During peak season, men's labor allocation to farming did not differ across groups but they allocated more time to domestic chores. Hidrobo et al. (2016) also found that men's likelihood to participate in domestic work increased in the bundled cash and food transfer program in Ecuador. The point estimates are not significant, however, as per sharpened q values that correct for multiple hypotheses testing. While men's self reports of labor allocation to farming is consistent with reports of the panel respondent on labor utilization of male household members. However, women's self differ from the results in Table A.5 possibly because most panel respondents were men and did not reliably recall labor supply of other household members.

Finally, we test whether improved financial access and time allocations correspond with changes in women's involvement in decision making. Table 9 reports LATE estimates of the share of decisions women participated in the last 12 months (column 1), and category-wise participation in decision making (columns 2-5). The program did not impact women or men's involvement in decisions on the extensive margin. The loan did not increase the number of decisions women participated in as a share of total 10 categories tested. Less women in the treatment group report any involvement in farming decisions, however, the effects are not statistically significant based on sharpened q value of the estimate. For decisions made jointly with their spouse (Table 10), women in treatment are more likely to participate in livestock and poultry management and less in business or wage employment. These differences are also not statistically significant when corrected for multiple hypothesis testing. The empirical evidence of targeted programs on women's decision making is mixed. Cash transfer programs have had success (de Brauw et al., 2014; Bergolo and Galván, 2018) while social protection programs and bank ac-

count ownership did not (Roy et al., 2015; Field et al., 2021; Chauhan, 2025). Women's initial bargaining power in the household explains the differences in program impacts in some contexts (Hidrobo and Fernald, 2013; El-Enbaby et al., 2025). We investigate this mechanism in the next section.

Overall, the loan program seems to have increased women's financial access and freed up their time for personal activities through accumulation of productive capital. But it did not affect changes in women's involvement in decisions within the household.

8 Mechanisms

In this section, we examine potential factors that could drive improvements in women's use of their bank account and autonomy through digital financial services as well as changes in time use in response to the loan. We consider - whether women directly received the loan money in their bank account, household's ex-ante wealth, and women's ex-ante bargaining power in the household.

Loan deposit into account: We distinguish effects on women's outcomes by whether they received the loan money directly in their bank account. In this way, we can interpret whether changes are through receiving resources directly, or indirectly from household resource allocation decisions. We report the interaction of treatment for recipient and non-recipient women in comparison to women in the control group in Appendix Tables A.8-A.15. The high frequency deposit and withdrawals from the bank account are significantly more for loan recipients than control group while non-recipient women in treatment report statistically similar bank account use. These effects are consistent when sample is restricted to individual account holders (Tables A.10 and A.11).

Women's financial autonomy through digital services such as debit card and mobile apps is consistent for both recipients and non-recipients of the loan money in the treatment arm relative to control group.

Both types of women report increased time allocation to personal activities. However, the aggregate decline in economic participation is driven by the non-recipient women in treatment. Both in the day prior to survey and busiest time in the agricultural season, non-recipient women are likely to spend significantly less time in farming, business and wage employment. These women also report significantly less time in domestic chores which could be a consequence of more appliances in the household after the loan program was introduced.

Consistent with the time use, non-recipient women are less likely to participate in

decisions on farming and non-agricultural work than the control group. The recipient women participate in significantly more share of decisions than control group. Receiving the loan money increases women's likelihood to participate on farming decisions jointly with their spouse. The deposit of money for agriculture invariably increases coordination between spouses.

Ex-ante wealth: We characterize households by their wealth before the program using principal component analysis to construct an index of asset owned and then, classify them into a quintile. Interacting this ex-ante measure with loan treatment shows no significant correspondence with the outcomes of women's financial inclusion, time use or decision making.

Ex-ante coordination between spouses: We estimate coordination using a continuous variable measuring the share of decisions on production and consumption activities that farmers made with their spouse before the loan program. This ex-ante measure of women's involvement corresponds negatively with women's individual account ownership (Table A.20) and positively with women sharing a debit card with their spouse in the treatment group (Table A.21). Therefore, in households with greater ex-ante cooperation, bank accounts are more likely to be owned and managed jointly by spouses. There is a positive and significant correlation between ex-ante coordination among spouses and women's decision making after the program was implemented. Women in treatment are more likely to be involved in decisions on livestock and poultry management, non-agricultural activities and consumption with increasing share of decisions made jointly between spouses at baseline (Table A.22). During peak time in agriculture, the ex-ante coordination among spouses corresponds with greater time allocation to non-agricultural activities, consumption and domestic work (Table A.24). In this respect the loan program was effective in increasing women's involvement in decisions in households where there was higher ex-ante coordination between spouses.

9 Conclusion

An important question for effective delivery of social protection and financial inclusion is whether they should target the household or individuals. Programs transferring resources to women may improve household profits but don't usually succeed in improving women's income relative to household members or their say in household decisions. Evaluations of loan programs to female entrepreneurs and cash transfers find evidence of resource appropriation and male backlash in several contexts highlighting the potential risks to

women through these targeted interventions. In this paper, we investigate an alternative measure to improving resources for women.

Agricultural loan subsidies or collateral-free credit are provided by governments to encourage agricultural investment among small and marginal farmers in developing countries. Empirical evidence from these programs focuses on intensification practices and labor supply response to the loan money. The impact on household welfare and particularly individual gains have been under studied. Given that agricultural production is organized the household level in India, we anticipate that household's utilization of credit may not vary based on which individual is assigned as beneficiary. Instead, individual members may benefit from the additional resources in two ways. First, the loan raises the household's joint income in the short term and directly increases consumption of composite goods such as productive capital and consumer durables that are shared or privately consumed. Second, individual members may adjust their private consumption and labor allocation in response to household's consumption of composite goods and their own residual income.

In this setting, we analyze the impact of agricultural credit on women's outcomes in India using an RCT where a collateral-free loan was provided to small and marginal farmers in 40 of the 80 study villages. We combine the randomized loan provision with a balanced panel of 1,300 households interviewed in baseline and endline surveys. Households in both treatment and control groups were balanced on observable characteristics at baseline. We analyze the intent-to-treat effects of the loan program on household resource allocation using an ANCOVA model. We also collect individual level outcomes in the endline survey, and estimate local average treatment effect of the loan on individual financial inclusion and time use. In this analysis, we use an IV model that instruments the exogenous village-level treatment assignment for households receiving the loan product.

There are three key results: first, households increase ownership of productive capital for farm work (11 pp) and business (9 pp) in response to the loan program. They also increase ownership of large consumer durables (9 pp) and food security improves (21% or 10 pp). There were no changes in spending on inputs, area under cultivation or income from agriculture. Second, there is evidence of money shared among household members: more women in treatment report weekly deposit of cash in their bank account (not earnings or government transfers). Conditional on individual bank account, women in treatment report greater knowledge and use of mobile banking services (LATE estimates

of binary outcome variables are over 100 pp). The significantly greater uptake of digital financial services in the treatment arm is driven by smartphone ownership (30 pp) and women's preference for financial autonomy. Women in treatment are 87 pp more likely to use their debit card alone. Third, increased resources shift household members' labor supply. Women in treatment spend less time on farm work (1.6 vs. 3.1 hours) and more on leisure (2.5 vs. 1.6 hours). The loan beneficiary also reports more time allocation to leisure, however they spend timilar time on farming as their counterpart in the control group. In the absence of income changes, it seems that the equipment purchased reduces the requirements for women's labor. Households do not hire more labor in response to the program. Given the suggestive evidence of resource sharing among household members and its implications on women's labor supply, we also examine women's involvement in decision making on different production and non-production activities and find no changes on the extensive margin. However, in households where women had higher ex-ante bargaining power, they are more likely to participate in decisions on livestock and poultry management and non farm business activities.

For policymakers, this evidence highlights the downstream welfare effects of agricultural support programs that aren't accounted for when evaluating their benefits. Women in rural agrarian households typically face limited financial access (Demirguc-Kunt et al., 2022). By positively impacting women's independent use of financial services, such interventions extend benefits beyond farm productivity and income.

CRediT authorship contribution statement

Tarana Chauhan: Writing – original draft, Writing – review & editing, Conceptualization, Methodology, Software, Formal analysis, Visualization. **Berber Kramer**: Conceptualization, Funding acquisition. **Patrick Ward**: Conceptualization, Funding acquisition. **Subhransu Pattnaik**: Software, Data curation.

Declaration of Competing Interest

The authors have no relevant or material financial interests that relate to the research described in this paper.

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10 Figure

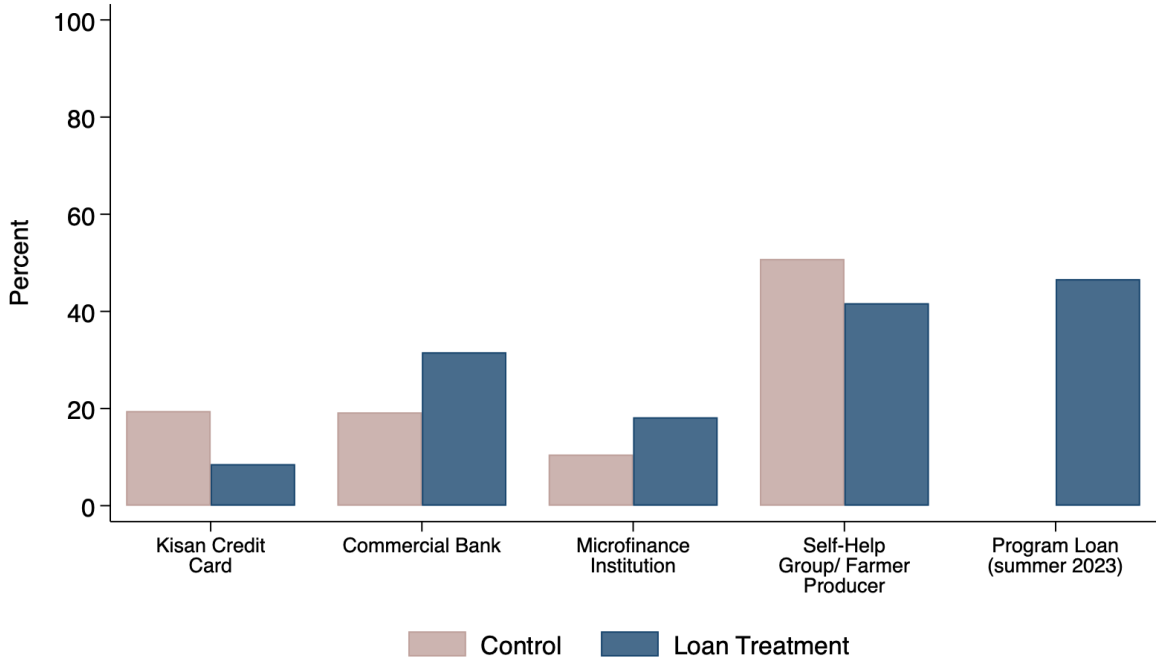

Figure 1: Sources of formal loan by intervention arm

11 Tables

Table 1: Baseline covariates by intervention arm

	(1) All	(2) Loan	(3) Control	F-test for balance across all groups	(2)-(3) Pairwise t-test
Respondent's age	43.892	44.262	43.477	0.94	0.785
	-0.423	-0.69	-0.433	0.335	
Respondent is female	0.38	0.375	0.386	0.017	-0.011
	-0.043	-0.053	-0.071	0.898	
Can read and write	0.891	0.883	0.9	0.315	-0.016
	-0.015	-0.021	-0.021	0.576	
Completed at least	0.793	0.774	0.815	0.963	-0.041
primary school	-0.021	-0.029	-0.031	0.329	
Completed at least	0.45	0.407	0.498	2.575	-0.09
secondary school	-0.028	-0.037	-0.043	0.113	
Respondent belongs	0.356	0.386	0.322	0.876	0.064
to SC/ST category	-0.035	-0.05	-0.047	0.352	
Annual Household	0.461	0.506	0.411	1.163	0.094
Income(<90,000)	-0.044	-0.059	-0.065	0.284	
Annual Household Income	0.241	0.236	0.246	0.038	-0.009
(90,000 - 120,000)	-0.023	-0.031	-0.036	0.846	
Annual Household Income	0.298	0.258	0.343	1.215	-0.085
(> 120,000)	-0.039	-0.053	-0.056	0.274	
Owns land	0.47	0.491	0.447	0.373	0.045
	-0.037	-0.05	-0.055	0.543	
Asset quintile	2.971	3.046	2.888	0.46	0.157
	-0.115	-0.152	-0.177	0.5	
Respondent has bank	0.932	0.929	0.935	0.081	-0.006
account	-0.01	-0.014	-0.015	0.777	
Borrowed money last	0.431	0.405	0.461	0.664	-0.056
12 months	-0.035	-0.046	-0.052	0.417	
Has outstanding loan	0.218	0.224	0.212	0.025	0.012
	-0.036	-0.052	-0.051	0.875	
N	1329	702	627		

Notes: The table reports averages of respondent and household characteristics from the baseline survey by intervention arm. Column 1 reports pooled estimates for the full sample. Column 2 reports the averages for the loan treatment arm and column 3 for control arm. The fourth column reports the f test for whether each variable is balanced across arms and the last column provides coefficients of a t-test comparing the treatment and control averages. "SC/ST" is abbreviation for Scheduled Caste/ Scheduled Tribe. Standard errors are clustered at the level of treatment assignment (village) and reported below mean values for each variable. The number of observations are included in the last row. $*$ p< 0.1, $**$ p< .05, $***$ p< .01

Table 2: ITT: Loan intervention and household asset ownership

	Non-mechanized farm equipment	Mechanized farm equipment	Business equipment	Large consumer durables	Small consumer durables
	(1)	(2)	(3)	(4)	(5)
Treatment: Loan	0.119*	-0.021	0.091***	0.090***	-0.078
	(0.068)	(0.045)	(0.030)	(0.031)	(0.060)
Sharpened q-values	0.092	0.268	0.015	0.015	0.144
Observations	1223	1212	1202	1217	1210
Mean dependent variable (Baseline)	0.247	0.276	0.137	0.806	0.509
Covariates included	Yes	Yes	Yes	Yes	Yes
Block fixed effects	Yes	Yes	Yes	Yes	Yes

Notes: The table reports the ITT effect of the loan intervention on household ownership of assets (listed as column titles). The dependent variables are binary and constructed from survey questions on whether household currently owns the following. Column 1 includes non-mechanized tools for farming such as hand tools, animal-drawn plows and non-mechanized irrigation tools. Column 2 includes mechanized farm equipment such as electric pump-set, diesel pump-set, tractor, seeder, power-tiller, thresher, combine harvester etc. Column 3 includes non-farm business equipment such as sewing machines and solar panels. Column 4 includes large consumer durables such as refrigerator, TV, sofa, dining table, chair, mattress, cot or bed, computer, washing machine. Column 5 includes small consumer durables (radio or transistor, pressure cooker, an inverter, electric fan, watch or clock, landline phone). The model includes outcome variable and covariates measured at baseline as regressors and block fixed effects. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table 3: Instrumental Variables: First stage

	(1)	(2)	(3)
Treatment: Loan	0.472***	0.476***	0.487***
	[0.048]	[0.044]	[0.041]
Constant	-0.000***	0.131	0.349**
	[0.000]	[0.123]	[0.167]
Observations	1301	1301	1301
Baseline covariates	No	Yes	Yes
Block fixed effects	No	No	Yes
F value	98.218	14.577	14.747

Notes: The table reports ordinary least squares estimation of village's assignment to treatment on household receiving loan product for summer cultivation in 2023. This estimation uses the endline survey only. Columns 2 and 3 include controls measured at baseline and described in Table 1. Column 3 includes block fixed effects. F values are reported in the last row. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table 4: LATE: Loan intervention and individual bank account use

	Own bank account	Withdraw weekly	Deposit weekly	Received money weekly
	(1)	(2)	(3)	(4)
Panel A: Women				
Received loan product	-0.065	0.012	0.297***	0.007
	(0.099)	(0.013)	(0.076)	(0.012)
Constant	0.841***	0.001	0.537**	0.008
	(0.161)	(0.025)	(0.226)	(0.027)
Sharpened q-values	0.398	0.391	0.001	0.398
Observations	1028	888	888	888
Control group mean	0.869	0.004	0.009	0.009
Panel B: Men				
Received loan product	0.096	-0.100**	0.289***	-0.023
	(0.078)	(0.049)	(0.087)	(0.022)
Constant	0.545**	0.050	0.508**	0.033
	(0.249)	(0.065)	(0.219)	(0.034)
Sharpened q-values	0.122	0.034	0.002	0.147
Observations	1183	1055	1055	1055
Control group mean	0.849	0.070	0.045	0.032
Baseline Controls	Yes	Yes	Yes	Yes
Block fixed effects	Yes	Yes	Yes	Yes

Notes: The table reports LATE estimates of treatment on household members' bank account ownership and use. The analysis uses treatment assignment as an exogenous instrument for the household's receipt of loan product. The dependent variables (binary) are listed as column titles. Weekly withdrawal, deposit and receipt of money in the account is the highest frequency of transactions measured in the survey data. The sample is restricted to women in the endline survey in Panel A and men in Panel B. Therefore, only one observation per household is analyzed. The estimation controls for household's demographic and economic characteristics from the baseline survey and includes block fixed effects. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table 5: LATE: Loan intervention and women's autonomy in digital financial services (individual bank account)

	Use debit card alone	Share debit card	Knows mobile app banking	Uses mobile app banking
	(1)	(2)	(3)	(4)
Panel A: Women				
Received loan product	0.874***	-0.060	1.103***	1.007***
	(0.131)	(0.105)	(0.126)	(0.111)
Constant	0.174	-0.224	-0.198	-0.129
	(0.231)	(0.160)	(0.207)	(0.196)
Sharpened q-values	0.001	0.398	0.001	0.001
Observations	888	888	888	888
Control group mean	0.181	0.314	0.206	0.164
Panel B: Men				
Received loan product	0.325***	0.066	0.582***	0.532***
	(0.100)	(0.098)	(0.104)	(0.102)
Constant	0.919***	-0.279**	0.661***	0.730***
	(0.146)	(0.139)	(0.163)	(0.177)
Sharpened q-values	0.002	0.23	0.001	0.001
Observations	1055	1055	1055	1055
Control group mean	0.495	0.241	0.589	0.552
Baseline Controls	Yes	Yes	Yes	Yes
Block fixed effects	Yes	Yes	Yes	Yes

Notes: The table reports LATE estimates of treatment on household members' uptake of digital financial services. The analysis uses treatment assignment as an exogenous instrument for the household's receipt of loan product. The dependent variables (binary) are listed as column titles. In column 2, the variable combines reports of sharing debit card with spouse or other family members. The sample is restricted to women in the endline survey in Panel A and men in Panel B. Therefore, only one observation per household is analyzed. The estimation controls for household's demographic and economic characteristics from the baseline survey and includes block fixed effects. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table 6: LATE: Loan intervention and mobile ownership

	Individual bank account		Individual/ jointly owned w/ spouse	
	Regular mobile	Smartphone	Regular mobile	Smartphone
	(1)	(2)	(3)	(4)
Panel A: Women				
Received loan product	0.316**	0.306**	0.159	0.177
	(0.138)	(0.124)	(0.136)	(0.128)
Sharpened q-values	0.047	0.047	0.138	0.126
Observations	565	613	662	731
Control group mean	0.326	0.291	0.346	0.303
Panel B: Men				
Received loan product	-0.098	0.114	-0.128	0.135
	(0.133)	(0.120)	(0.116)	(0.107)
Sharpened q-values	0.83	0.83	0.83	0.83
Observations	634	758	731	862
Control group mean	0.663	0.728	0.669	0.718
Baseline Covariates	Yes	Yes	Yes	Yes
Block fixed effects	Yes	Yes	Yes	Yes

Notes: The table reports LATE estimates of treatment on household members' mobile phone ownership. The analysis uses treatment assignment as an exogenous instrument for the household's receipt of loan product. The dependent variables (binary) are listed as column titles. The sample is restricted to women in the endline survey in Panel A and men in Panel B. Therefore, only one observation per household is analyzed. The estimation controls for household's demographic and economic characteristics from the baseline survey and includes block fixed effects. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table 7: ITT: Loan intervention and time use (peak farming time)

	Farming	Livestock & Poultry	Non-agriculture	Consumption	Domestic work	Personal activity
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Women						
Received loan product	-1.469*	-0.147	-2.300***	-0.145	-0.176	0.923***
	(0.779)	(0.175)	(0.605)	(0.266)	(0.542)	(0.334)
Constant	2.477*	0.196	2.401**	0.532	3.279***	1.007**
	(1.319)	(0.253)	(1.150)	(0.384)	(0.974)	(0.473)
Sharpened q-values	0.086	0.431	0.001	0.541	0.594	0.016
Observations	1023	1023	1023	1023	418	408
Control group mean	3.106	0.357	1.354	0.683	3.174	1.629
Panel B: Men						
Received loan product	0.313	-0.418	-0.727	-0.417*	1.194*	0.325
	(0.778)	(0.284)	(0.550)	(0.221)	(0.689)	(0.205)
Constant	3.345***	-0.019	2.298*	1.592***	0.871	1.888***
	(1.180)	(0.358)	(1.295)	(0.417)	(1.040)	(0.330)
Sharpened q-values	0.288	0.269	0.269	0.269	0.269	0.269
Observations	1175	1175	1175	1175	275	461
Control group mean	4.269	0.484	1.313	0.653	1.599	1.575
Baseline Covariates	Yes	Yes	Yes	Yes	Yes	Yes
Block fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table reports LATE estimates of loan treatment on hours spent by respondent in different activities (listed as column titles) in a busy day during the agricultural season. The analysis uses treatment assignment as an exogenous instrument for the household's receipt of loan product. Column 1 includes farming and processing of the harvest for food consumption and high value crop farming. Column 2 includes management of large livestock (e.g. cattle and buffaloes), small livestock (sheep, goats, pigs) and poultry. Column 3 includes non-farm economic activities such as small business, self-employment and wage and salary employment. Column 5 includes cooking, cleaning, fetching firewood or water, and caring for children or others. Column 6 include eating, sleeping, and leisure such as visiting neighbors, watching TV etc. The sample is restricted to women in the endline survey in Panel A and men in Panel B. Therefore, only one observation per household is analyzed. The estimation controls for household's demographic and economic characteristics from the baseline survey and includes block fixed effects. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table 8: ITT: Loan intervention and time use (yesterday)

	Farming	Livestock & Poultry	Non-agriculture	Consumption	Domestic work	Personal activity
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Women						
Received loan product	-1.473**	-0.237	-0.973*	-0.706	-0.436	1.071***
	(0.579)	(0.214)	(0.530)	(0.594)	(0.549)	(0.379)
Constant	1.840	0.142	1.365	4.946***	4.159***	2.011***
	(1.174)	(0.278)	(1.119)	(0.915)	(1.029)	(0.423)
Sharpened q-values	0.71	0.585	0.585	1	0.71	0.71
Observations	988	988	988	988	383	376
Control group mean	2.306	0.415	0.969	1.369	3.483	1.757
Panel B: Men						
Received loan product	0.133	-0.496	-0.277	-0.412	-0.140	0.082
	(0.640)	(0.304)	(0.559)	(0.647)	(0.524)	(0.297)
Constant	3.345***	-0.068	1.745*	7.312***	2.650***	2.057***
	(0.820)	(0.384)	(0.911)	(0.985)	(0.851)	(0.390)
Sharpened q-values	1	1	1	1	1	1
Observations	1168	1168	1168	1168	285	467
Control group mean	2.969	0.514	1.340	1.456	1.890	1.967
Baseline Covariates	Yes	Yes	Yes	Yes	Yes	Yes
Block fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table reports LATE estimates of loan treatment on hours spent by respondent in different activities (listed as column titles) in the day prior to survey. The analysis uses treatment assignment as an exogenous instrument for the household's receipt of loan product. Column 1 includes farming and processing of the harvest for food consumption and high value crop farming. Column 2 includes management of large livestock (e.g. cattle and buffaloes), small livestock (sheep, goats, pigs) and poultry. Column 3 includes non-farm economic activities such as small business, self-employment and wage and salary employment. Column 5 includes cooking, cleaning, fetching firewood or water, and caring for children or others. Column 6 include eating, sleeping, and leisure such as visiting neighbors, watching TV etc. The sample is restricted to women in the endline survey in Panel A and men in Panel B. Therefore, only one observation per household is analyzed. The estimation controls for household's demographic and economic characteristics from the baseline survey and includes block fixed effects. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table 9: LATE: Loan intervention and participation in decision-making

	Share of decisions made	Farming	Livestock & Poultry	Non agriculture	Consumption
	(1)	(2)	(3)	(4)	(5)
Panel A: Women					
Received loan product	0.016	-0.224*	0.079	-0.212	0.147
	(0.076)	(0.123)	(0.093)	(0.135)	(0.134)
Constant	0.047	0.517**	-0.053	0.313	0.464**
	(0.150)	(0.250)	(0.131)	(0.283)	(0.184)
Sharpened q-values	0.847	0.414	0.426	0.414	0.414
Observations	1028	1028	1028	1028	1028
Control group mean	0.247	0.690	0.212	0.308	0.462
Panel B: Men					
Received loan product	-0.009	-0.127	-0.113	-0.062	-0.029
	(0.069)	(0.084)	(0.102)	(0.134)	(0.140)
Constant	0.254***	1.124***	0.030	0.461**	1.175***
	(0.085)	(0.111)	(0.146)	(0.235)	(0.163)
Sharpened q-values	1	1	1	1	1
Observations	1183	1183	1183	1183	1183
Control group mean	0.270	0.859	0.282	0.338	0.486
Baseline covariates	Yes	Yes	Yes	Yes	Yes
Block fixed effects	Yes	Yes	Yes	Yes	Yes

Notes: The table reports LATE estimates of loan treatment on involvement in decision making (listed as column titles). The analysis uses treatment assignment as an exogenous instrument for the household's receipt of loan product. Column 1 is total number of decisions she reports involvement in as a share of ten decisions asked in the survey. The remaining outcome variables are binary. Column 2 includes farming and processing of the harvest for food consumption and high value crop farming. Column 3 includes management of large livestock (e.g. cattle and buffaloes), small livestock (sheep, goats, pigs) and poultry. Column 4 includes non-farm economic activities such as small business, self-employment and wage and salary employment. Column 5 includes decisions on purchase of large items such as bicycles, land and transport vehicles as well as routine items such as food. The sample is restricted to women in the endline survey in Panel A and men in Panel B. Therefore, only one observation per household is analyzed. The estimation controls for household's demographic and economic characteristics from the baseline survey and includes block fixed effects. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table 10: LATE: Loan intervention and joint decision making with spouse

	Farming	Livestock & Poultry	Non agriculture	Consumption
	(1)	(2)	(3)	(4)
Panel A: Women				
Received loan product	-0.110	0.134*	-0.211*	0.138
	(0.137)	(0.074)	(0.124)	(0.125)
Constant	-0.084	-0.145	0.283	0.204
	(0.275)	(0.125)	(0.281)	(0.207)
Sharpened q-values	0.269	0.214	0.214	0.218
Observations	1028	1028	1028	1028
Control group mean	0.365	0.096	0.244	0.310
Panel B: Men				
Received loan product	0.015	0.080	-0.000	-0.057
	(0.117)	(0.082)	(0.108)	(0.110)
Constant	0.153	-0.219**	0.014	0.305**
	(0.150)	(0.110)	(0.095)	(0.141)
Sharpened q-values	1	1	1	1
Observations	1183	1183	1183	1183
Control group mean	0.222	0.102	0.125	0.164
Baseline covariates	Yes	Yes	Yes	Yes
Block fixed effects	Yes	Yes	Yes	Yes

Notes: The table reports LATE estimates of loan treatment on decisions made jointly with their spouse. The analysis uses treatment assignment as an exogenous instrument for the household's receipt of loan product. The outcome variables are binary and take the value 0 if the woman is not involved in the decision or makes the decision on her own. Column 1 includes farming and processing of the harvest for food consumption and high value crop farming. Column 2 includes management of large livestock (e.g. cattle and buffaloes), small livestock (sheep, goats, pigs) and poultry. Column 3 includes non-farm economic activities such as small business, self-employment and wage and salary employment. Column 4 includes decisions on purchase of large items such as bicycles, land and transport vehicles as well as routine items such as food. The sample is restricted to women in the endline survey in Panel A and men in Panel B. Therefore, only one observation per household is analyzed. The estimation controls for household's demographic and economic characteristics from the baseline survey and includes block fixed effects. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

12 Appendix Figure

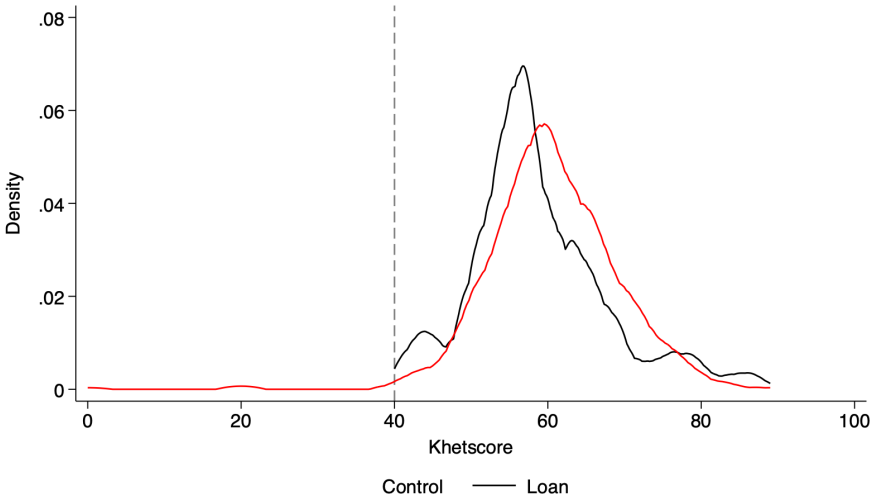

Figure A.1: Distribution of sample by credit score

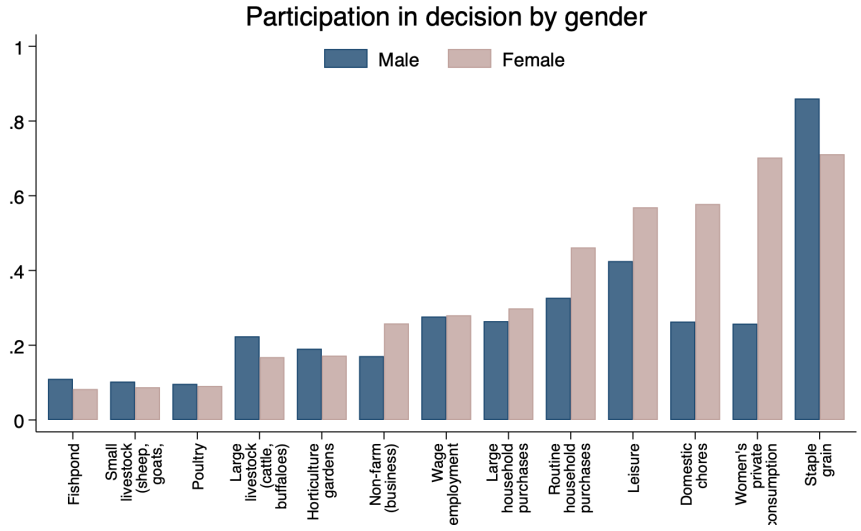

Figure A.2: Share of responses for decision category by gender

13 Appendix Tables

Table A.1: Attrition by treatment assignment and baseline characteristics

	Sample that attrited	
	(1)	(2)
Treatment: Loan	-0.042	-0.036
	(0.038)	(0.039)
Respondents' age		0.001
		(0.002)
Respondent is female		0.060**
		(0.027)
Can read and write		0.025
		(0.030)
Completed at least primary school		-0.012
		(0.027)
Completed at least secondary school		-0.014
		(0.025)
Respondent belongs to SC/ST category		-0.021
		(0.024)
Annual Household Income(<90,000)		-0.001
		(0.027)
Annual Household Income		-0.028
(between 90,000 and 120,000)		(0.025)
Owns land		0.004
		(0.023)
Respondent has bank account		-0.039
		(0.046)
Borrowed money last 12 months		0.019
		(0.025)
Have outstanding loan		-0.058
		(0.035)
Constant	0.168***	0.190**
	(0.026)	(0.093)
Observations	1576	1576
Non-attrited (N)	1337	1337
Block dummies	Yes	Yes
Mean dep. variable	0.152	

Notes: The table reports reduced form estimation of whether attrition of the sample was significantly correlated with treatment assignment (column 1) or ex-ante characteristics of the household measured from the baseline survey (column 2). The binary dependent variable distinguishes the sample that was interviewed at baseline and not in the endline survey. Both models include block fixed effects. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. The average sample that attrited in the control group is reported in the last row of column 1. $*$ p< 0.1, $**$ p< .05, $***$ p< .01

Table A.2: Variable description

Variable	Description
Farming	- Farming and processing of the harvest: grains that are grown primarily for food consumption (rice, maize, wheat, millet) - Horticultural (gardens) or high value crop farming and processing of the harvest
Livestock & Poultry	- Raising cattle, buffaloes, sheep, goats, pigs and processing of milk and/or meat - Raising (chickens, ducks, turkeys) and processing of eggs and/or meat
Non-agriculture	- Small business, self-employment, buy-and-sell - Wage and salary employment
Domestic work	Cooking, cleaning, fetching firewood or water, and caring for children or others
Personal activities	Eating, sleeping, leisure such as visiting neighbors, watching TV, listening to the radio, seeing movies, or doing sports

Table A.3: ITT: Loan intervention and agricultural expansion

	Area cultivated	Yield (Harvest/ area)	Real income from farming
	(1)	(2)	(3)
Treatment: Loan	0.216	-1.609	-23.075
	[0.185]	[2.088]	[111.059]
Observations	1103	658	989
Mean dependent variable (Baseline)	3.074	10.502	1040.354
Covariates included	Yes	Yes	Yes
Block fixed effects	Yes	Yes	Yes

Notes: The table reports the results of an ANCOVA estimation to test the effect of the loan intervention on agricultural practices of the main crop cultivated during summer season. The dependent variables are continuous and listed as column titles. The model includes outcome variable and covariates measured at baseline as regressors and block fixed effects. This estimation uses responses from both the baseline and endline survey. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table A.4: ITT: Loan intervention and expenditure on inputs

	Total expenditure for main crop (real terms)				
	Irrigation	Seeds	Fertilizer	Machines	Rent
	(1)	(2)	(3)	(4)	(5)
Treatment: Loan	1.168	3.759	25.538	-2.935	5.174
	[3.675]	[4.401]	[20.701]	[9.646]	[6.753]
Observations	1299	1299	1299	1299	1299
Mean dependent variable (Baseline)	19.172	43.069	101.887	55.203	6.091
Covariates included	Yes	Yes	Yes	Yes	Yes
Block fixed effects	Yes	Yes	Yes	Yes	Yes

Notes: The table reports the results of an ANCOVA estimation to test the effect of the loan intervention on purchase of inputs for cultivation of the main crop during summer season. The dependent variables are continuous and listed as column titles. The model includes outcome variable and covariates measured at baseline as regressors and block fixed effects. This estimation uses responses from both the baseline and endline survey. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table A.5: ITT: Loan intervention and labor utilization

	Expenditure for main crop (real terms)		Number of days of labor		
	Male labor	Female labor	Own labor	Male household member	Female household member
	(1)	(2)	(3)	(4)	(5)
Treatment: Loan	-2.372	3.315	-1.582	-2.668	0.301
	[14.279]	[10.087]	[5.369]	[3.917]	[2.772]
Observations	1299	1299	1299	1299	1299
Mean dependent variable (Baseline)	54.904	48.559	28.085	17.680	14.977
Covariates included	Yes	Yes	Yes	Yes	Yes
Block fixed effects	Yes	Yes	Yes	Yes	Yes

Notes: The table reports the results of an ANCOVA estimation to test the effect of the loan intervention on purchase of labor (columns 1-2) and household labor supply (column 3-5) for cultivation of the main crop during summer season. The dependent variables are continuous and listed as column titles. The model includes outcome variable and covariates measured at baseline as regressors and block fixed effects. This estimation uses responses from both the baseline and endline survey. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table A.6: LATE: Use of formal loans

	Seeds	Pesticides	Labor	Rent machinery	Loan repayment
	(1)	(2)	(3)	(4)	(5)
Received loan product	-0.079	-0.160	0.008	-0.134	-0.292***
	(0.094)	(0.102)	(0.157)	(0.131)	(0.104)
Constant	0.502**	1.464***	0.787***	1.019***	0.433**
	(0.245)	(0.208)	(0.269)	(0.248)	(0.202)
Observations	556	556	556	556	556
Control group mean	0.896	0.902	0.628	0.803	0.443
LASSO covariates	Yes	Yes	Yes	Yes	Yes
Block fixed effects	Yes	Yes	Yes	Yes	Yes

Notes: The table reports LATE estimates of use of formal loans on categories listed as column titles. The analysis uses treatment assignment as an exogenous instrument for the household's receipt of loan product. The model includes covariates measured at baseline as regressors and block fixed effects. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table A.7: ITT: Food Consumption Score (FCS)

	FCS score
	(1)
Treatment: Loan	9.605***
	(3.045)
Observations	1301
Mean dependent variable (Baseline)	44.718
Covariates included	Yes
Block fixed effects	Yes

Notes: The table reports ITT estimates of loan treatment on food consumption score of the household. The analysis uses an ANCOVA model where outcome variables and covariates measured at baseline are used as regressors in the estimation. The estimation controls for household's demographic and economic characteristics from the baseline survey and includes block fixed effects. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table A.8: LATE: Loan intervention and women's account use by recipient status

	Own bank account	Withdraw 2-3 times/month	Deposit 2-3 times/month	Received money 2-3 times/month
	(1)	(2)	(3)	(4)
Loan product *	0.032	0.729***	0.555***	0.223
Recipient member	[0.120]	[0.161]	[0.158]	[0.138]
Loan product *	-0.145	0.158	0.238	0.194
Non-recipient member	[0.121]	[0.136]	[0.152]	[0.147]
Constant	0.825***	0.048	0.271	0.495***
	[0.161]	[0.211]	[0.197]	[0.176]
Observations	1028	1028	1028	1028
Control group mean	0.869	0.427	0.373	0.365
Baseline Covariates	Yes	Yes	Yes	Yes

Notes: The table reports LATE estimates of treatment on women's bank account ownership and use. The analysis uses treatment assignment as an exogenous instrument for the household's receipt of loan product and interacts it with whether women received the loan directly in their account. The dependent variables (binary) are listed as column titles. Withdrawal, deposit and receipt 2-3 times a month is the highest frequency of transactions measured in the survey data. The analysis is restricted to women, therefore there is one observation per household. The estimation controls for household's demographic and economic characteristics from the baseline survey and includes block fixed effects. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table A.9: LATE: Loan intervention and women's autonomy in digital finance by recipient status

	Use debit card alone	Share debit card with spouse	Knows mobile app banking	Uses mobile app banking
	(1)	(2)	(3)	(4)
Loan product *	0.611***	0.025	1.000***	-0.094
Recipient member	[0.155]	[0.144]	[0.156]	[0.206]
Loan product *	0.891***	-0.113	0.909***	0.340**
Non-recipient member	[0.162]	[0.094]	[0.155]	[0.136]
Constant	0.018	-0.205*	-0.285	0.934***
	[0.244]	[0.114]	[0.243]	[0.173]
Observations	1028	1028	1028	463
Control group mean	0.177	0.177	0.208	0.824
Baseline Covariates	Yes	Yes	Yes	Yes

Notes: The table reports LATE estimates of treatment on women's uptake of digital finance. The analysis uses treatment assignment as an exogenous instrument for the household's receipt of loan product and interacts it with whether women received the loan directly in their account. The dependent variables (binary) are listed as column titles. The analysis is restricted to women, therefore there is one observation per household. The estimation controls for household's demographic and economic characteristics from the baseline survey and includes block fixed effects. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table A.10: LATE: Loan intervention and women's (individual) account use by recipient status

	Withdraw 2-3 times/month	Deposit 2-3 times/month	Received money 2-3 times/month
	(1)	(2)	(3)
Loan product *	0.697***	0.533***	0.199*
Recipient member	[0.162]	[0.162]	[0.120]
Loan product *	0.051	0.185	0.089
Non-recipient member	[0.132]	[0.157]	[0.150]
Constant	0.280	0.475***	0.626***
	[0.191]	[0.176]	[0.161]
Observations	888	888	888
Control group mean	0.469	0.416	0.403
Baseline Covariates	Yes	Yes	Yes

Notes: The table reports LATE estimates of treatment on women's bank account ownership and use. The analysis uses treatment assignment as an exogenous instrument for the household's receipt of loan product and interacts it with whether women received the loan directly in their account. The dependent variables (binary) are listed as column titles. Withdrawal, deposit and receipt 2-3 times a month is the highest frequency of transactions measured in the survey data. The analysis is restricted to women that own an individual bank account. The estimation controls for household's demographic and economic characteristics from the baseline survey and includes block fixed effects. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table A.11: LATE: Loan intervention and women's autonomy in digital finance (individual account) by recipient status

	Use debit card alone	Share debit card with spouse	Knows mobile app banking	Uses mobile app banking
	(1)	(2)	(3)	(4)
Loan product *	0.640***	0.032	1.041***	-0.113
Recipient member	[0.180]	[0.145]	[0.169]	[0.231]
Loan product *	1.070***	-0.095	1.154***	0.408***
Non-recipient member	[0.168]	[0.102]	[0.147]	[0.141]
Constant	0.232	-0.201*	-0.182	0.754***
	[0.207]	[0.116]	[0.196]	[0.182]
Observations	888	888	888	429
Control group mean	0.181	0.181	0.206	0.796
Baseline Covariates	Yes	Yes	Yes	Yes

Notes: The table reports LATE estimates of treatment on women's uptake of digital finance. The analysis uses treatment assignment as an exogenous instrument for the household's receipt of loan product and interacts it with whether women received the loan directly in their account. The dependent variables (binary) are listed as column titles. The analysis is restricted to women that own an individual bank account. The estimation controls for household's demographic and economic characteristics from the baseline survey and includes block fixed effects. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table A.12: LATE: Loan intervention and women's time use (yesterday) by recipient status

	Farming	Livestock & Poultry	Non-agriculture	Consumption	Domestic work	Personal activity
	(1)	(2)	(3)	(4)	(5)	(6)
Loan product *	-0.323	-0.219	0.807	-0.235	0.459	2.176*
Recipient member	[1.077]	[0.355]	[0.495]	[0.624]	[1.335]	[1.210]
Loan product *	-3.093***	-0.274	-3.530***	-2.037**	-1.141*	0.579*
Non-recipient member	[0.788]	[0.281]	[0.893]	[1.014]	[0.606]	[0.326]
Constant	1.508	0.014	1.081	4.965***	4.208***	1.896***
	[1.249]	[0.313]	[0.892]	[0.897]	[1.061]	[0.415]
Observations	1028	1028	1028	1028	421	416
Control group mean	2.523	0.422	1.369	1.839	3.618	1.851
Baseline Covariates	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table reports LATE estimates of treatment on women's time use in day prior to survey. The analysis uses treatment assignment as an exogenous instrument for the household's receipt of loan product and interacts it with whether women received the loan directly in their account. Column 1 includes farming and processing of the harvest for food consumption and high value crop farming. Column 2 includes management of large livestock (e.g. cattle and buffaloes), small livestock (sheep, goats, pigs) and poultry. Column 3 includes non-farm economic activities such as small business, self-employment and wage and salary employment. Column 5 includes cooking, cleaning, fetching firewood or water, and caring for children or others. Column 6 include eating, sleeping, and leisure such as visiting neighbors, watching TV etc. The analysis is restricted to women, therefore there is one observation per household. The estimation controls for household's demographic and economic characteristics from the baseline survey and includes block fixed effects. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table A.13: LATE: Loan intervention and women's time use (peak farming) by recipient status

	Farming	Livestock & Poultry	Non-agriculture	Consumption	Domestic work	Personal activity
	(1)	(2)	(3)	(4)	(5)	(6)
Loan product *	0.154	-0.244	0.228	0.207	2.197	2.389**
Recipient member	[1.542]	[0.285]	[0.460]	[0.291]	[1.652]	[1.182]
Loan product *	-2.694***	-0.081	-4.434***	-0.463	-1.159**	0.456*
Non-recipient member	[0.897]	[0.227]	[0.918]	[0.403]	[0.563]	[0.258]
Constant	2.042	0.086	2.030**	0.456	2.989***	0.690
	[1.474]	[0.284]	[0.894]	[0.369]	[1.091]	[0.498]
Observations	1028	1028	1028	1028	422	413
Control group mean	3.131	0.370	1.412	0.710	3.167	1.639
Baseline Covariates	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table reports LATE estimates of treatment on women's time use in a busy day of the agricultural season. The analysis uses treatment assignment as an exogenous instrument for the household's receipt of loan product and interacts it with whether women received the loan directly in their account. Column 1 includes farming and processing of the harvest for food consumption and high value crop farming. Column 2 includes management of large livestock (e.g. cattle and buffaloes), small livestock (sheep, goats, pigs) and poultry. Column 3 includes non-farm economic activities such as small business, self-employment and wage and salary employment. Column 5 includes cooking, cleaning, fetching firewood or water, and caring for children or others. Column 6 include eating, sleeping, and leisure such as visiting neighbors, watching TV etc. The analysis is restricted to women, therefore there is one observation per household. The estimation controls for household's demographic and economic characteristics from the baseline survey and includes block fixed effects. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table A.14: LATE: Loan intervention and women's decision making by recipient status

	Share of decisions made	Farming	Livestock & Poultry	Non-agriculture	Consumption
	(1)	(2)	(3)	(4)	(5)
Loan product *	0.235**	0.167	0.131	0.225	0.381*
Recipient member	[0.110]	[0.166]	[0.143]	[0.143]	[0.203]
Loan product *	-0.165*	-0.548***	0.035	-0.573***	-0.046
Non-recipient member	[0.092]	[0.166]	[0.119]	[0.186]	[0.176]
Constant	0.011	0.452**	-0.062	0.241	0.425**
	[0.131]	[0.223]	[0.134]	[0.237]	[0.181]
Observations	1028	1028	1028	1028	1028
Control group mean	0.247	0.690	0.212	0.308	0.462
Baseline Covariates	Yes	Yes	Yes	Yes	Yes

Notes: The table reports LATE estimates of treatment on women's involvement in decision making. The analysis uses treatment assignment as an exogenous instrument for the household's receipt of loan product and interacts it with whether women received the loan directly in their account. Column 1 is total number of decisions she reports involvement in as a share of ten decisions asked in the survey. The remaining outcome variables are binary. Column 2 includes farming and processing of the harvest for food consumption and high value crop farming. Column 3 includes management of large livestock (e.g. cattle and buffaloes), small livestock (sheep, goats, pigs) and poultry. Column 4 includes non-farm economic activities such as small business, self-employment and wage and salary employment. Column 5 includes decisions on purchase of large items such as bicycles, land and transport vehicles as well as routine items such as food. The analysis is restricted to women, therefore there is one observation per household. The estimation controls for household's demographic and economic characteristics from the baseline survey and includes block fixed effects. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table A.15: LATE: Loan intervention and women's joint decision making with spouse by recipient status

	Farming	Livestock & Poultry	Non-agriculture	Consumption
	(1)	(2)	(3)	(4)
Loan product *	0.286**	0.175	0.229	0.292*
Recipient member	[0.133]	[0.127]	[0.140]	[0.149]
Loan product *	-0.436**	0.100	-0.574***	0.011
Non-recipient member	[0.194]	[0.089]	[0.166]	[0.187]
Constant	-0.149	-0.152	0.210	0.179
	[0.225]	[0.126]	[0.224]	[0.195]
Observations	1028	1028	1028	1028
Control group mean	0.365	0.096	0.244	0.310
Baseline Covariates	Yes	Yes	Yes	Yes

Notes: The table reports LATE estimates of treatment on women's joint decision making with spouse. The analysis uses treatment assignment as an exogenous instrument for the household's receipt of loan product and interacts it with whether women received the loan directly in their account. The outcome variables are binary and take the value 0 if the woman is not involved in the decision or makes the decision on her own. Column 1 includes farming and processing of the harvest for food consumption and high value crop farming. Column 2 includes management of large livestock (e.g. cattle and buffaloes), small livestock (sheep, goats, pigs) and poultry. Column 3 includes non-farm economic activities such as small business, self-employment and wage and salary employment. Column 4 includes decisions on purchase of large items such as bicycles, land and transport vehicles as well as routine items such as food. The analysis is restricted to women, therefore there is one observation per household. The estimation controls for household's demographic and economic characteristics from the baseline survey and includes block fixed effects. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table A.16: LATE: Heterogeneous effects of ex-ante asset ownership on women's bank account use

	Own bank account	Withdraw 2-3 times/month	Deposit 2-3 times/month	Received money 2-3 times/month
	(1)	(2)	(3)	(4)
Received loan *	0.061	0.040	0.037	0.038
Asset quintile	[0.054]	[0.049]	[0.054]	[0.050]
Received Loan	-0.261	0.291	0.264	0.086
	[0.231]	[0.202]	[0.226]	[0.208]
Baseline	-0.018	-0.017	-0.016	-0.012
household asset	[0.019]	[0.017]	[0.020]	[0.019]
quintile				
Constant	0.925***	0.108	0.296	0.508**
	[0.195]	[0.228]	[0.228]	[0.199]
Observations	1028	1028	1028	1028
Control group mean	0.869	0.427	0.373	0.365
Baseline Covariates	Yes	Yes	Yes	Yes
Block fixed effects	Yes	Yes	Yes	Yes

Notes: The exogenous variable treatment assignment is interacted with the asset quintile of the household from baseline to instrument for heterogeneous effect of asset ownership in loan receiving households. Dependent variables are binary and listed as column titles. The estimation controls for household's demographic and economic characteristics from the baseline survey and includes block fixed effects. The analysis is restricted to women, therefore there is one observation per household. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table A.17: LATE: Heterogeneous effects of ex-ante asset ownership on women's autonomy in digital finance

	Use debit card alone	Share debit card with spouse	Knows mobile app banking	Uses mobile app banking
	(1)	(2)	(3)	(4)
Received loan *	0.020	-0.014	0.036	0.049
Asset quintile	(0.068)	(0.047)	(0.061)	(0.062)
Received Loan	0.698**	-0.005	0.833***	0.703***
	(0.290)	(0.202)	(0.260)	(0.247)
Baseline	-0.028	-0.003	-0.032*	-0.026
household asset	(0.019)	(0.014)	(0.018)	(0.017)
quintile				
Constant	0.036	-0.237*	-0.219	-0.076
	(0.312)	(0.143)	(0.280)	(0.263)
Observations	1028	1028	1028	1028
Control group mean	0.177	0.177	0.208	0.171
Baseline Covariates	Yes	Yes	Yes	Yes
Block fixed effects	Yes	Yes	Yes	Yes

Notes: The exogenous variable treatment assignment is interacted with the asset quintile of the household from baseline to instrument for heterogeneous effect of asset ownership in loan receiving households. Dependent variables are binary and listed as column titles. The estimation controls for household's demographic and economic characteristics from the baseline survey and includes block fixed effects. The analysis is restricted to women, therefore there is one observation per household. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table A.18: LATE: Heterogeneous effects of ex-ante asset ownership on women's time use (yesterday)

	Farming	Livestock & Poultry	Non-agriculture	Consumption	Domestic work	Personal activity
	(1)	(2)	(3)	(4)	(5)	(6)
Received loan *	0.462	-0.094	0.344	-0.359	0.033	0.043
Asset quintile	(0.378)	(0.091)	(0.325)	(0.401)	(0.243)	(0.197)
Received Loan	-2.957**	0.066	-2.079*	0.454	-0.540	0.928
	(1.416)	(0.348)	(1.080)	(1.535)	(1.021)	(0.754)
Baseline	-0.162	0.025	-0.066	0.079	0.085	0.055
household asset	(0.113)	(0.049)	(0.107)	(0.117)	(0.078)	(0.059)
quintile						
Constant	2.403**	0.001	1.793	4.406***	4.193***	2.016***
	(1.204)	(0.321)	(1.127)	(1.177)	(1.147)	(0.524)
Observations	988	988	988	988	383	376
Control group mean	2.306	0.415	0.969	1.369	3.483	1.757
Baseline Covariates	Yes	Yes	Yes	Yes	Yes	Yes
Block fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The exogenous variable treatment assignment is interacted with the asset quintile of the household from baseline to instrument for heterogeneous effect of asset ownership in loan receiving households. Dependent variables are number of hours spent in activity and listed as column titles. The estimation controls for household's demographic and economic characteristics from the baseline survey and includes block fixed effects. The analysis is restricted to women, therefore there is one observation per household. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table A.19: LATE: Heterogeneous effects of ex-ante asset ownership on women's time use (peak farming)

	Farming	Livestock & Poultry	Non-agriculture	Consumption	Domestic work	Personal activity
	(1)	(2)	(3)	(4)	(5)	(6)
Received loan *	0.028	-0.056	0.113	-0.096	-0.340	0.080
Asset quintile	(0.438)	(0.073)	(0.388)	(0.166)	(0.222)	(0.163)
Received Loan	-1.555	0.039	-2.660*	0.170	0.889	0.677
	(1.846)	(0.292)	(1.412)	(0.666)	(0.945)	(0.657)
Baseline	-0.065	0.018	0.058	0.008	0.054	0.012
household asset	(0.127)	(0.041)	(0.135)	(0.057)	(0.077)	(0.043)
quintile						
Constant	2.460	0.070	2.455*	0.354	2.796***	1.153**
	(1.511)	(0.287)	(1.313)	(0.507)	(1.031)	(0.524)
Observations	1023	1023	1023	1023	418	408
Control group mean	3.106	0.357	1.354	0.683	3.174	1.629
Baseline Covariates	Yes	Yes	Yes	Yes	Yes	Yes
Block fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The exogenous variable treatment assignment is interacted with the asset quintile of the household from baseline to instrument for heterogeneous effect of asset ownership in loan receiving households. Dependent variables are number of hours spent in activity and listed as column titles. The estimation controls for household's demographic and economic characteristics from the baseline survey and includes block fixed effects. The analysis is restricted to women, therefore there is one observation per household. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table A.20: LATE: Heterogeneous effects of ex-ante spousal coordination on women's bank account use

	Own bank account	Withdraw 2-3 times/month	Deposit 2-3 times/month	Received money 2-3 times/month
	(1)	(2)	(3)	(4)
Received loan *	-0.506*	-0.177	0.069	-0.164
Joint decision	(0.280)	(0.374)	(0.380)	(0.264)
Received Loan	-0.023	0.436***	0.379***	0.208*
	(0.106)	(0.106)	(0.114)	(0.108)
BL: Share	0.075	-0.023	-0.032	0.177*
decisions jointly	(0.104)	(0.119)	(0.152)	(0.101)
with spouse				
Constant	0.882***	0.102	0.282	0.507***
	(0.133)	(0.199)	(0.193)	(0.174)
Observations	1028	1028	1028	1028
Control group mean	0.869	0.427	0.373	0.365
Baseline Covariates	Yes	Yes	Yes	Yes
Block fixed effects	Yes	Yes	Yes	Yes

Notes: The exogenous variable treatment assignment is interacted with the share of decisions farmer reported making jointly with spouse in the baseline survey to instrument for heterogeneous effect of ex-ante spousal coordination in loan receiving households on outcome variables. Dependent variables are binary and listed as column titles. The estimation controls for household's demographic and economic characteristics from the baseline survey and includes block fixed effects. The analysis is restricted to women, therefore there is one observation per household. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table A.21: LATE: Heterogeneous effects of ex-ante spousal coordination on women's autonomy in digital finance

	Use debit card alone	Share debit card with spouse	Knows mobile app banking	Uses mobile app banking
	(1)	(2)	(3)	(4)
Received loan *	-0.114	0.396*	0.073	-0.134
Joint decision	(0.559)	(0.236)	(0.496)	(0.393)
Received Loan	0.791***	-0.079	0.951***	0.878***
	(0.124)	(0.084)	(0.121)	(0.116)
BL: Share	-0.210*	-0.097	-0.088	-0.057
decisions jointly	(0.109)	(0.096)	(0.102)	(0.102)
with spouse				
Constant	0.028	-0.240**	-0.284	-0.128
	(0.235)	(0.111)	(0.227)	(0.212)
Observations	1028	1028	1028	1028
Control group mean	0.177	0.177	0.208	0.171
Baseline Covariates	Yes	Yes	Yes	Yes
Block fixed effects	Yes	Yes	Yes	Yes

Notes: The exogenous variable treatment assignment is interacted with the share of decisions farmer reported making jointly with spouse in the baseline survey to instrument for heterogeneous effect of ex-ante spousal coordination in loan receiving households on outcome variables. Dependent variables are binary and listed as column titles. The estimation controls for household's demographic and economic characteristics from the baseline survey and includes block fixed effects. The analysis is restricted to women, therefore there is one observation per household. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table A.22: LATE: Heterogeneous effects of ex-ante spousal coordination on women's participation in decisions

	Share of decisions made	Farming	Livestock & Poultry	Non-agriculture	Consumption
	(1)	(2)	(3)	(4)	(5)
Received loan * ex-ante joint decision making	0.520***	0.543	0.519**	0.586**	0.921*
	(0.196)	(0.404)	(0.263)	(0.270)	(0.485)
Received Loan	-0.024	-0.264**	0.049	-0.268*	0.068
	(0.079)	(0.130)	(0.099)	(0.142)	(0.136)
Baseline: Share of decisions jointly with spouse	-0.116*	-0.141	-0.229**	-0.002	-0.110
	(0.067)	(0.173)	(0.115)	(0.102)	(0.186)
Constant	0.007	0.475*	-0.091	0.264	0.389**
	(0.152)	(0.250)	(0.139)	(0.269)	(0.174)
Observations	1028	1028	1028	1028	1028
Control group mean	0.247	0.690	0.212	0.308	0.462
Baseline Covariates	Yes	Yes	Yes	Yes	Yes
Block fixed effects	Yes	Yes	Yes	Yes	Yes

Notes: The exogenous variable treatment assignment is interacted with the share of decisions farmer reported making jointly with spouse in the baseline survey to instrument for heterogeneous effect of ex-ante spousal coordination in loan receiving households on outcome variables. Dependent variables are binary and listed as column titles. The estimation controls for household's demographic and economic characteristics from the baseline survey and includes block fixed effects. The analysis is restricted to women, therefore there is one observation per household. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table A.23: LATE: Heterogeneous effects of ex-ante spousal coordination on women's time use (yesterday)

	Farming	Livestock & Poultry	Non-agriculture	Consumption	Domestic work	Personal activity
	(1)	(2)	(3)	(4)	(5)	(6)
Received loan *	1.734	1.057**	2.046**	0.427	4.025**	2.234
Joint decision	(2.031)	(0.465)	(0.955)	(1.454)	(1.576)	(1.775)
Received Loan	-1.557**	-0.295	-1.140**	-0.750	-0.781	1.005***
	(0.634)	(0.227)	(0.569)	(0.657)	(0.555)	(0.390)
BL: Share	-0.973	-0.524**	-0.408	0.019	0.236	-0.784
decisions jointly	(0.889)	(0.220)	(0.390)	(0.423)	(0.582)	(0.493)
with spouse						
Constant	1.716	0.065	1.201	4.910***	3.326***	1.699***
	(1.210)	(0.273)	(1.102)	(0.895)	(1.017)	(0.424)
Observations	988	988	988	988	383	376
Control group mean	2.306	0.415	0.969	1.369	3.483	1.757
Baseline Covariates	Yes	Yes	Yes	Yes	Yes	Yes
Block fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The exogenous variable treatment assignment is interacted with the share of decisions farmer reported making jointly with spouse in the baseline survey to instrument for heterogeneous effect of ex-ante spousal coordination in loan receiving households on outcome variables. Dependent variables are hours spent in activity listed as column titles. The estimation controls for household's demographic and economic characteristics from the baseline survey and includes block fixed effects. The analysis is restricted to women, therefore there is one observation per household. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01

Table A.24: LATE: Heterogeneous effects of ex-ante spousal coordination on women's time use (peak farming)

	Farming	Livestock & Poultry	Non-agriculture	Consumption	Domestic work	Personal activity
	(1)	(2)	(3)	(4)	(5)	(6)
Received loan *	3.816	0.566	2.840***	1.584**	6.716***	-0.228
Joint decision	(2.603)	(0.424)	(1.056)	(0.712)	(2.203)	(1.414)
Received Loan	-1.664**	-0.173	-2.548***	-0.265	-0.581	0.949***
	(0.843)	(0.183)	(0.630)	(0.266)	(0.536)	(0.338)
BL: Share	-1.942*	-0.318	-0.263	-0.351	-1.078*	-0.099
decisions jointly	(1.156)	(0.215)	(0.390)	(0.222)	(0.654)	(0.437)
with spouse						
Constant	2.204*	0.156	2.167**	0.406	2.209**	1.073**
	(1.336)	(0.253)	(1.085)	(0.386)	(0.983)	(0.471)
Observations	1023	1023	1023	1023	418	408
Control group mean	3.106	0.357	1.354	0.683	3.174	1.629
Baseline Covariates	Yes	Yes	Yes	Yes	Yes	Yes
Block fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The exogenous variable treatment assignment is interacted with the share of decisions farmer reported making jointly with spouse in the baseline survey to instrument for heterogeneous effect of ex-ante spousal coordination in loan receiving households on outcome variables. Dependent variables are hours spent in activity listed as column titles. The estimation controls for household's demographic and economic characteristics from the baseline survey and includes block fixed effects. The analysis is restricted to women, therefore there is one observation per household. Standard errors are clustered at the level of treatment assignment (village) and reported in parentheses. $*$ p$<$ 0.1, $**$ p$<$ .05, $***$ p$<$ .01